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High-Rise Buildings in Contemporary China

by
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A thesis submitted to
the Faculty of Graduate Studies and Research
in partial fulfillment of
the requirements for the degree of

Master of Architecture

School of Architecture
Carleton University
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Abstract

This thesis examines the evolution of form and aesthetics of high-rise buildings in the modern age and studies specific design approaches within the context of high-rise buildings. A contemporary Japanese architect, Toyo Ito's working methods and expressive means are also investigated and analyzed, in order to reveal his underlying design principles and approaches that delicately balance modern and tradition references. The objectives of this thesis are two-folds: to investigate the development of contemporary high-rise buildings in the urban settings of China, and to identify future possible design trends in high-rise buildings to express cultural continuity and self-identity.

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Wenjiao Shan

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Chapter I

Introduction

1.1 Background

In order to rid itself of economic stagnancy, China has implemented an “open door policy” and “economic reform” since the 80’s. These two policies brought China into a global economy. In order to survive and prosper, China adopted an unprecedented open and active manner of accepting outside influences to modernize its overall society; China was determined to become part of the international cultural milieu. This resulted in rapid economic growth, turning China into the world’s biggest factory as well as market and attracting investments all over the world. The great economic achievement attracted the worldwide recognition and gave the Chinese people the confidence and ambition to regain the glory of their ancestors. These are the same ancestors who had created successive and brilliant cultures that had occupied a significant position in the history of human civilization.

Along with urbanization and commercialism, high-rise buildings quickly sprouted in the urban settings of China in the 1980’s. Foreign influences were dramatic. A variety of styles and forms of high-rise buildings were brought about, along with advanced engineering technology and new building materials. China’s confidence and ambition to position itself in an international cultural milieu motivated the pursuit of exaggerated scale and novelty in architectural design. However, in most cases, the styles and forms of high-rise buildings were only

regarded as the reflection of outside influences, and the exaggerated scale and various types of high-rise buildings have broken their connection with traditional Chinese culture. China has always been a nation who longs for tradition and desires to preserve its cultural value. Therefore, as an expression of contemporary architecture, high-rise buildings, which started to reshape the urban skyline in China, were encouraged to express the distinctive Chinese cultural heritage and establish self-identity.

China has over 4,000 years of civilization. Traditional architecture, as an important part of its unique and rich culture, has always been the main resource of inspiration for contemporary Chinese architects. However, without the consideration of social-economic changes, the superficial transplanting of the skin of traditional Chinese architecture onto modern buildings would hardly maintain the cultural continuity. The result could be the stagnancy of the design and the poverty of morphology. In addition, it would restrict the evolution of contemporary Chinese architecture. Unfortunately, these types of approaches have become popular and have extended to high-rise building design in recent years. This phenomenon led the Chinese architectural community to realize the importance of promoting design innovations that could delicately balance the tradition and the modern in contemporary high-rise buildings, as well as other building types.

Japan and China are both oriental countries with rich traditional cultures. Despite of foreign influences, contemporary Japanese architecture has achieved the delicate balance of traditional and contemporary designs with unique vitality

and originality. Japanese architecture has successfully responded to the country's social-economic changes, and in a sophisticated manner preserved its cultural identity. Toyo Ito is one of the most influential and innovative Japanese architects in recent years. He constantly sought new approaches to architecture and developed a unique "floating" nature of architecture. His architecture clearly displays a hi-tech image with lightweight metals with abstract and simple forms. Yet this architecture conveys an idiosyncrasy that definitely belongs to traditional Japan. Ito's successful working methods and expressive means of delicately harmonizing modernism and traditionalism would be a valuable reference for the development of contemporary Chinese architecture, specifically for high-rise buildings.

1.2 Research Question

The primary question of this thesis is:

To what extent should contemporary high-rise buildings have meaningful reference to the historical past?

1.3 Objectives

The main objectives of this thesis are:

- To examine the development of high-rise buildings in the urban settings of China.
- To identify future possible design trends in high-rise buildings that would establish cultural continuity and convey self-identity.

1.4 Methodology

The following methodologies were used in this thesis. Various literatures were reviewed on the evolution of forms and aesthetics of high-rise buildings. Four case studies on high-rise buildings were selected that represent specific design approaches within a historical context. An investigation was carried of numerous selected projects from current websites and magazines of existing high-rise buildings in China's urban setting. The investigation concentrated on three major cities: Shenzhen, Shanghai and Beijing. These cities played a leading role in the development of high-rise buildings in China and were the first to raise architectural issues of the expression of contemporary Chinese high-rise buildings. As a valuable reference, Toyo Ito's works and his distinct approaches to architecture were also studied and analyzed. Finally, a design concept of a high-rise building was proposed in the urban settings of China. The design illustrated and allowed discussions of possible future approaches of high-rise building designs that could have a balance of self-identity, modern and traditional references of the Chinese culture.

Chapter II

The Evolution of High-rise Buildings

2.1 High-rise Building in Urban Settings

A high-rise building can be described as a multi-story building, consisting of a structural frame, equipped with high-speed elevators, and a combination of the extraordinary building height with ordinary room spaces. Although the extraordinary height is its most prominent feature, a high-rise building cannot simply be defined in terms of its height or the number of floors because the appearance of tallness is relative. There is no consensus of a determined height, the number of floors, or the proportions of a building, in order for a building to be perceived as tall. From the perspective of design and construction, Lynn S. Beedle, a pioneer who dedicated his life-long research on tall buildings, defined high-rise buildings in his book What Is A Tall Building, as “the multistory building is not generally defined by its overall height or by the number of stories, but only by the necessity of additional operation and technical measure due to the architectural height of the building”. In the foreword to the monograph “Structural Design of Tall Concrete and Masonry Buildings”, Beedle offered two explanations: the first is that a high-rise building “in which ‘tallness’ strongly influences planning, design and use”; the second is that “a building whose height creates more different conditions in the design, construction, and use than those that exist in ‘common’ buildings of a certain region and period” [1].

High-rise buildings are a phenomenon of the twentieth century and are a result of major forces such as urbanization, commercialism and technological advances. High-rises are good solutions in accommodating growth for the urban population, as well as to better utilize scarce urban land. High-rise buildings also offer other benefits such as: greater flexibility for expansion or reduction of operational areas, adjacency of complementary uses, shared facilities, and increased energy efficiency, etc. As a result, the high-rises have gained acceptance for a wide range of uses [2].

2.2 Historical Root of High-rise Buildings

In terms of a formal language, ancient tall structures, monuments and towers are regarded as the historical root of contemporary high-rise buildings. The earliest monument can be traced back to the symbolic Egyptian obelisk, a freestanding column. The Romans developed their own version with Trojan's column (A.D. 98), which became the prototype for western monuments such as Nelson's column (A.D. 1843). Other historically tall monuments are the Tower of Babel, the Colossus of Rhodes, the Pyramids of Egypt and the Mayan Temples of Mexico. These ancient structures all have a closed system of values and illustrate the yearning of man to reach the heavens.

Perhaps the true evolution of high-rise buildings began with the emergence of the tower-like pagoda in the Han dynasty of China (206 B.C. ~ 220 A.D.). It was influenced by Buddhist architecture of India earlier in time, and gradually developed into its own form based on traditional Chinese multistory

architecture with timber frame construction. These pagodas were the objects of worship to Chinese Buddhists without any dwelling functions. Their architectural form had spread to Japan, Korea and Vietnam.

In the West, certain features of gothic and renaissance architecture also demonstrate man's desire to build tall buildings. The strong influence was by the minaret from Muslim architecture of the Middle East, which included the square towers of the great mosque of Damascus to the slender spires of Turkey and India. These spires, minarets and campaniles of churches that towered above all else were visible to all within the town and those working in the fields. These features symbolized God's omnipresence. The revival of classical and gothic architecture in the nineteenth century further exploited the syntactic and symbolic power of tall buildings. Towers of medieval town halls were significant expressions of civic dignity and power of the people at the time. One ultimate example of the symbol of civic dignity is the Westminster Palace (1840-1867 A.D.) in England. Along with the Industrial Revolution, a tradition of tall buildings in industrial architecture evolved steadily. They range from the tall brick chimneys to the reinforced concrete cooling towers, with church spires and towers continuing to be the religious symbol.

In history, the visual and aesthetic function of tall buildings and structures were predominant wherever they existed. They emphasized a focal point, a dominant feature, or the importance of certain aspects of human life.

2.3 The four skyscraper ages

In the latter half of the nineteenth century, commercial high-rise buildings began to sprout up as a consequence of land use, finance, urban transportation and investment opportunities. The technological advances at the time also played a key role in this development. Two decisive technological factors were: the introduction of structural steel in construction, and the invention of the elevator in 1853. From a campanile, watchtower or minaret, to a spacious habitable high-rise building, the change in function of high-rise buildings was the most significant aspect. High-rise buildings that were erected from the latter half of the nineteenth century were regarded as a conceptual breakthrough and a new building type without precedent. Another prominent movement in the evolution of high-rise buildings was the architectural expression. From historical styles such as Beaux-arts, Neo-classicism, Neo-gothic, Renaissance Revival and Romanesque, transitional styles such as Art Deco, the First Chicago School, “Wedding Cake” to modern styles such as International Style, modernism, Late-modernism and Postmodernism, high-rise buildings as a specific approach to architecture have always been adapted to the architectural thoughts that prevailed at the time. The stylistic development of high-rise buildings over the last century has represented the progress of engineering technology, the synthesis of structure, materials, zoning and code requirements, energy and aesthetics. It has also reflected the different cultural aspirations, such as a response to the

needs of the commercialism, civic and religious values, technology and rationality, and various cultural contexts.

Cesar Pelli, known for his minimalist design which entailed glossy detailing and the exquisite use of glass as a façade material, and Ada Louis Huxtable, an architectural writer and Pritzker juror, identified four periods in the evolution of high-rise buildings which began with the innovative engineering accomplishments in Chicago. They termed these periods the “four skyscrapers ages” [3].

Fig. 2.1
Home Insurance Building,
Chicago.

Fig. 2.2
Great Northern Hotel,
Chicago.

Fig. 2.3
Monadnock Building,
Chicago.

Fig. 2.4
Wainwright Building, St. Louis.

Fig. 2.5
Guaranty Building, Buffalo.

The first skyscraper age began with the invention of the elevator by Elisha Graves Otis, in 1853, and lasted until 1908-1909. It took place in Chicago, a city that has been regarded as the birthplace of the high-rise building concept, and was lead by the first Chicago school. The high-rise buildings in this era were characterized by functional orientation. They also reflected the structural engineering advances with the structural expression of steel frame in the elevations. Such examples are the Home Insurance Building of 1885 (Fig. 2.1) in Chicago, the Great Northern Hotel of 1891 (Fig. 2.2) in Chicago, the Monadnock Building of 1891 (Fig. 2.3) in Chicago, the Wainwright Building of 1890 (Fig. 2.4) in St. Louis, and the Guaranty Building of 1895 (Fig. 2.5) in Buffalo. Essentially, the high-rise buildings at this time are the servants of engineering and are a phenomenon through which innovation is driven by business and economic requirements [4].

After a technological beginning, the second skyscraper age is an eclectic phase. It began in 1909 and continued well into the mid-1930s until all construction was halted by the great American depression. Although influenced by European models and theories, the evolution of high-rise buildings at this time took place entirely in two American cities: New York and Chicago. The attention was focused on the refinement of the architectural expression and aesthetics without any attempts to improve engineering technology. Instead of seeking out new directions, the application of historical models became the main aesthetic solutions. The design approach was assembling historical pieces into a coherent, well-proportioned entity. The art of composition seemed to be the real goal.

Fig. 2.6
Singer building,
New York.

Fig. 2.7
Metropolitan Life
Insurance Company
Tower, New York.

Fig. 2.8
Woolworth building,
New York.

Fig. 2.9
Radiator Building,
New York.

Fig. 2.10
Shelton Hotel,
New York.

Fig. 2.11
Empire State
Building, New York.

Fig. 2.12
Chrysler Building,
New York.

Fig. 2.13
Tribune Building,
Chicago.

Selected examples in New York are: The Singer Building of 1908 (Fig. 2.6), the Metropolitan Life Insurance Company Tower of 1909 (Fig. 2.7), the Woolworth Building of 1916 (Fig. 2.8), the Radiator Building of 1924 (Fig. 2.9), the Shelton Hotel of 1924 (Fig. 2.10), the Empire State Building of 1930 (Fig. 2.11), the Chrysler Building of 1930 (Fig. 2.12). The Tribune Building of 1925 (Fig. 2.13) in Chicago is also an example of a high-rise building in this period. By the late nineteenth century, the form of classical architecture was generally regarded as

an expression of civic and institutional virtue in America. It could therefore be stated that the purpose of adopting historical references was to soften the corporate, profit-driven image of the commercial high-rise buildings by evoking the civic and even religious architectural images. The goal was to create a symbol of big business as a philanthropic entity, as opposed to a purely mercantile enterprise [5]. These high-rise buildings built in this period became important references for the subsequent exploration of post-modernism of high-rise buildings.

The third skyscraper age began after World War II and lasted until the mid-1970s. It was led by the modernism movement, thus being referred to as the modern phase. In the modernism movement, architects rejected any historical references and embraced a rational and scientific method to establish a new architecture. It was a response to the industrialized society and its economic order, including mass production, discoveries of science and technology, and the mass society. The high-rise buildings in this age are characterized by functionalism, purity of form, steel and glass as construction material, and a direct expression of structure and materiality without ornaments. Building structure as a lofty art form became the symbol of a technological and industrial age [6]. The most influential high-rise buildings were designed by Mies Van Der Rohe, such as the twin apartment towers of 1951 (Fig. 2.14) at 860-880 North Lake Shore Drive in Chicago, the Toronto-Dominion Center of 1967 (Fig. 2.15) in Toronto, and the IBM Building of 1973 (Fig. 2.16) in Chicago. Mies' contemporaries also developed an architectural expression from a structural

Fig. 2.14
860-880 North Lake Shore
Drive, Chicago.

Fig. 2.15
TD Center,
Toronto.

Fig. 2.16
IBM building,
Chicago.

Fig. 2.17
Lever House,
New York.

Fig. 2.18
Inland Steel Building,
Chicago.

Fig. 2.19
Daley Center,
Chicago.

Fig. 2.20
John Hancock Center,
Chicago.

Fig. 2.21
Sears Tower,
Chicago.

system. Some prominent examples are the Lever House of 1952 (Fig. 2.17) in New York, the Inland Steel Building of 1957 (Fig. 2.18) in Chicago, the Daley Center of 1965 (Fig. 2.19) in Chicago, the John Hancock Center of 1975 (Fig. 2.20) in Chicago and the Sears Tower of 1972 (Fig. 2.21) in Chicago.

After rationalist modernism, high-rise buildings entered the fourth skyscraper age in the early 1970s, and have continued to evolve to present day. This age is the most prolific in the history of high-rise building construction. It not

only has radically transformed the American skyline but also greatly changed the urban landscape of many developing countries. Numerous high-rise buildings in this age display a diversity of architectural styles including late-modernism and post-modernism. Charles Jencks distinguished late-modernism and post-modernism architectures based on their different of historical continuity and design methodology [7]. Late-modernism adapts modern principles to complex issues of contextualization and strives to humanize technology. One ramification is the birth of Hi-tech architecture, which incorporates the structural and mechanical systems as an expression of the building façade, glorifying the scientific culture. One of the most important High-tech high-rise buildings in the twentieth century is the Hong Kong and Shanghai Bank of 1985 (Fig. 2.22) in Hong Kong. Other examples are: the Bank of China Tower of 1985 (Fig. 2.23) in Hong Kong, the Century Tower of 1991 (Fig. 2.24) in Tokyo, the Umeda Sky Building of 1993 (Fig. 2.25) in Osaka, the Malietoren of 1996 (Fig. 2.26) in Hague, the Al Faisaliah Center of 1997 (Fig. 2.27) in Riyadh, the Burj Al Arab of 1999 (Fig. 2.28) in Dubai, the 30 St Mary Axe of 2003 (Fig. 2.29) in London, and the Nittele Tower of 2003 (Fig. 2.30) in Tokyo.

Fig. 2.22
Hong Kong and
Shanghai Bank,
Hong Kong.

Fig. 2.23
Bank of China
Tower, Hong Kong.

Fig. 2.24 Tower,
Tokyo.

Fig. 2.25
Umeda Sky Building,
Osaka.

Fig. 2.26
Malietoren,
Hague.

Fig. 2.27
Al Faisaliah
Center, Riyadh.

Fig. 2.28
Burj Al Arab,
Dubai.

Fig. 2.29
30 St Mary Axe,
London.

Fig. 2.30
Nittete Tower,
Tokyo.

Post-modernism transcends the cultural centrality of technology, bringing back a full repertoire of architectural expression such as ornamentation, symbolism, humour and an urban context to respond to place and history. The most notable examples are the Portland Building of 1982 (Fig. 2.31) in Portland, the One PPG Place of 1984 (Fig. 2.32) in Pittsburgh, the Sony Tower of 1984 (Fig. 2.33) in New York, the Humana Building of 1985 (Fig. 2.34) in Louisville. In post-modernism, “Classical Eclecticism” is a current trend in the design of high-

rise buildings. A large number of high-rise buildings represent this trend, such as the One Atlantic Center of 1987 (Fig. 2.35) in Atlanta, the Milwaukee Center of 1988 (Fig. 2.36) in Milwaukee, the Vern Riffe State Office Tower of 1988 (Fig. 2.37) in Columbus, the Metropolitan Square of 1989 (Fig. 2.38) in St. Louis, the Leo Burnett Building of 1989 (Fig. 2.39) in Chicago, the 100 East Wisconsin of 1989 (Fig. 2.40) in Milwaukee, the 191 Peachtree Tower of 1990 (Fig. 2.41) in Atlanta, the 801 Grand Avenue Office Tower of 1991 (Fig. 2.42) in Des Moines, and the Aegon Centres of 1993 (Fig. 2.43) in Louisville.

In spite of the ideological differences, most architects agree that no single building can be examined solely on its own. Architecture should respond in a meaningful way to the entire physical context including climate and locale, and reject any superficial and arbitrary architectural style. The following four case studies will focus on the specific design approaches within the above context.

Fig. 2.31
Portland Building,
Portland.

Fig. 2.32
One PPG Place,
Pittsburgh.

Fig. 2.33
Sony Tower,
New York.

Fig. 2.34
Humana Building,
Louisville.

Fig. 2.35
One Atlantic
Center, Atlanta.

Fig. 2.36
Milwaukee Center,
Milwaukee.

Fig. 2.37
Vern Riffe State
Office Tower,
Columbus.

Fig. 2.38
Metropolitan Square,
St. Louis.

Fig. 2.39
Leo Burnett
Building,
Chicago.

Fig. 2.40
100 East
Wisconsin,
Milwaukee.

Fig. 2.41
191 Peachtree
Tower, Atlanta.

Fig. 2.42
801 Grand Avenue
Office Tower,
Des Moines.

Fig. 2.43
Aegon Center,
Louisville.

2.4 Case Studies

2.4.1 Messeturm in Frankfurt, Germany

The Messeturm (Fig. 2.44 and Fig. 2.45) completed in 1990 by Murphy/Jahn Inc. Architect. It is located beside the main entrance of a trade fair area in Frankfurt, Germany. It is one of the city's landmarks and a symbol of economic boom with 70 stories and 259 meters in height. This typical "point" skyscraper has a clean profile created by a square base and shaft, and a pyramidal top. It is reminiscent of the classical obelisk, thus completing its historically inspired reference in a subtle manner.

The Messeturm has a conventional tripartite form, which derives from the plan of "a circle inside a square". The switch between a circle and a square in the plan has been developed from the base, throughout the shaft, to the pyramidal top.

The base of the tower is a monumental granite-clad box, which is only 41 by 41 meters in the ground floor plan. Four big openings on the four sides of the box highlight the main entrance of the tower and expose the segments of a glass-clad cylinder in the middle, which create a sunny interior atrium. The shaft rests on the base. Its granite façade could be read as a "screen wall" punched with uniform windows. The glass-clad cylinder is revealed at the

Fig. 2.44
Messeturm, Frankfurt,
Germany

four corners and the upper part of the shaft. Triangular bay windows in the middle of the four sides of the shaft create strong vertical lines, which lead people's sight to a huge glass pyramidal top with 36.3 meters in height. The pyramidal top looks like it is pierced out of the glass cylinder within the shaft. This gives the tower a further upward thrust and a focal point on the urban skyline. Alternating bands of light and dark red granite, smaller-scale window treatment and the sheer glass cylinder and pyramid provide the tower with a sleek, polished exterior appearance. The building exhibits a combination of a traditional image and modern technology with simple aesthetics.

The Messeturm is only one component of a large complex. Other than the tower, the complex also includes a new exhibition hall and an all-glass entrance pavilion. These smaller-scale elements improve the conflict between the vertical expression of the tower and low-scale adjacent buildings, helping to integrate the entire complex with the surrounding urban scheme.

Fig. 2.45
Messeturm, Frankfurt, Germany

2.4.2 DG Bank Complex in Frankfurt, Germany

The DG Bank Complex (Fig. 2.46 and Fig. 2.48), completed in 1993 by KPF, is located in a commercial district in Frankfurt, Germany. It faces a vibrant commercial area and adjoins a quiet and consistently scaled residential district. Instead of borrowing the imagery of historical architecture, the DG Bank Complex has created a more abstract way to respond to a complicated urban context.

The DG Bank Complex consists of three major functional divisions: a high-rise office tower, a mid-rise residential and office block, and a one-floor winter garden. In response to the built urban environment, the mid-rise residential and office block adopted small scales and rhythms of the surrounding traditional architecture. Their height is the fixed cornice height of nearby apartment blocks, a traditional eave height of a typical inner-city building (generally set at 22 meters). Furthermore, this block extends along the street, creating a street wall and spaces, which continue the advantages of the traditional city. Traditional architectural references of the DG Bank Complex manifest only at the street level through the appropriate use of scale and rhythm rather than forms and details. In contrast to the mid-rise residential and office block, the high-rise office tower displays large scale and volume by articulating a

Fig. 2.46
DG Bank Complex, Frankfurt,
Germany.

composition of geometries with few decorations. The tower is further divided into three volumes. The slender central volume is clad with granite and marble. It acts as a solid spine, anchoring the tower in the Frankfurt skyline. The stable lower volume supports the central spine and has a granite finish and uniform window treatment. It establishes a balance between the volume of the tower and nearby high-rise office buildings. The shining curved part of the tower, clad with white-painted steel and reflective glass, appears to hang on the central spine of the tower. This component rises to 208 meters in height and terminates in a three-story loggia under a large marble cantilevered crown. The curved shape and predominating crown have turned the tower to the southeast beckoning the old core of the city at the distance, thus establishing a relationship with the urban fabric at a higher level. As a transitional element, the structurally expressed winter garden joins the high-rise office tower and the mid-rise residential and office block together. The garden is oriented along a north-south axis for maximum exposure to sunlight. It is designed as an enlarged civic version of the great European palm courts or crystal palace to fulfill the

Fig. 2.47
DG Bank Complex,
Frankfurt, Germany

Fig. 2.48
DG Bank Complex, Frankfurt, Germany

urban scheme.

The most important concept in this project is the fragmenting volume of a high-rise building. Employing different façade systems also helps the DG Bank Complex to further articulate its discrete volumes. The arrangement of the façade systems has resulted in a rule: skeletal steel and reflective glass volumes always stand against monolithically clad volumes. The layered, three-dimensional façades with various scaled volumes and materials give this building a well-proportioned and rich appearance. For William Pedersen, in joining together three parts, two of which act in an oppositional dialogue to a third component that stabilizes their relationship, they were more capable of addressing issues relating to formality and informality, figure and abstraction, opacity and reflectivity, symbol and function [8].

The DG Bank Complex is a significant breakthrough in the composition of high-rise buildings. In 1995, the DG Bank Complex received the reward the "Best Building of the Year" award by the American Chamber of Architects in the multifunctional skyscraper category.

2.4.3 Jinmao Tower in Shanghai, China

The Jinmao Tower completed in 1998 by SOM (Fig. 2.49 – Fig. 2.52), is located in the Pudong district, one of the newest and busiest areas in Shanghai. It is currently the tallest high-rise building in China, with a height of 421 meters. The Jinmao Tower, a combination of traditional Chinese architecture and the latest in technology, is a completely modern

Fig. 2.49
Jinmao Tower, Shanghai, China

building. In order to evoke the distinct traditional Chinese culture, architects designed the building with the theme of the Chinese pagoda. The number eight is also incorporated into the design, as it is regarded as a numerical symbol of wealth or fortune in the traditional Chinese culture [9].

The Jinmao Tower consists of two buildings: an 88-story tower and a 6-story adjacent podium. The 88-story tower contains the office and commercial spaces. The office space occupies the 3rd to the 50th floors of the building. Above the office zone is a 5-star Grand Hyatt Hotel, which fills the top 38 floors with 555 well-furnished rooms, 9 restaurants, and a swimming pool on the 57th floor. The circular hotel atrium, one of the tallest in the world, starts from the 53rd floor to the 87th floor, with a clear ceiling height of 152 meters and a diameter of 27 meters. There is also an observatory on the 88th floors of the tower at a height of 340.1 meters, the tallest and largest observation deck in China.

The Jinmao Tower has a symmetrically biaxial form. Its slender shaft rests on a 2-story base, also a magnificent lobby. The different compositions of reflective glass, stainless steel mullions and aluminum panels express the base and shaft from the outside. A series of gentle setbacks taper the shaft into 13 segments until the top floor is reached. The setback of each segment is 0.8 meter and each succeeding segment is 1/8 smaller than its predecessor in height. The segmented articulation of shaft creates a rhythmic pattern as it rise. The successive reduction between the segments visually enhances the vertical extension of the tower. This segmented composition subtly evokes the imagery of a layered Chinese pagoda. At the top, more drastic setbacks from the corner to the centre of the plan mimic the roofline of a Chinese pagoda and terminate with a symbol of city flower of Shanghai.

The number eight has not only been

Fig. 2.50
Jinmao Tower, Shanghai, China

found in the building form, but it is also used in the structure of building. The structural heart of the Jinmao Tower is a large concrete core with an octagonal shape surrounded by an array of 8 composite mega-columns with 8 smaller steel columns between them.

While the massing of the 88-story tower is dedicated to recall the form of a Chinese pagoda, its skin displays a modern and high-tech curtain wall, comprised of high-performance reflective

Fig. 2.51
Jinmao Tower, Shanghai, China

glass and an expressive exterior stainless steel mullion system. The stainless steel mullion system has become a consistent form that is carried throughout the entire building. It provides both the structural components and a visual continuity. This curtain wall reduces the solar gain and glare from the sun, thus making the tower conversant with the sky. The excellent accomplishment of this building skin was described as "an extraordinary use of today's technology and building materials to create a fabric, texture and detailing that relate to the historic and cultural values of the context" [10].

The Podium building contains a shopping mall and a cinema, a food court, and the Grand Hyatt's conference facilities and ballrooms. It is an effective

Fig. 2.52
Jinmao Tower, Shanghai, China

counterweight to the vertical expression of the tower, giving the whole complex a satisfying equilibrium.

The Jinmao Tower's design approach is sophisticated, which blends the image of traditional Chinese architecture with a gothic expression. By using the traditional pagoda image and the numerical symbolism, the Tower evokes the memory of the traditional Chinese culture, while simultaneously displaying the latest in engineering technology and architectural materials. From this perspective, the Jinmao Tower has successfully integrated the past and present.

2.4.4 Hong Kong and Shanghai Bank in Hong Kong, China

The Hong Kong and Shanghai Bank (Fig. 2.53 - Fig. 2.59) completed in 1985 by Norman Forster Associates. The building is located in the heart of Hong Kong's central business district, north of Queen's Road, Hong Kong's most affluent street and one of the oldest traffic arteries. Statue Square,

Fig. 2.53
Hong Kong and Shanghai Bank,
Hong Kong, China.

lying to the north of the building and extending to the Star Ferry Terminal and the Victoria harbor, provides this building a grand urban setting. Created without compromise: the goal was to achieve nothing less than “the best bank building in the world” [11], The Hong Kong and Shanghai Bank, with a total area of approximately ten thousand square meters and 180 meters in height, represents the highest level of precision detailing and engineering of twentieth-century. Almost every element of the glass and aluminum-clad high-rise building were custom-designed with intensive investigation into every aspect of each problem. Some of these elements include the unusual pin-connected suspension structure, the precise, robot-made cladding, the sun scoop, the sub-floor air distribution, mechanical modules, and the signage systems [12]. As a result, the Hong Kong and Shanghai Bank is regarded as a true urban monument, and one

of the best examples of high-tech architecture in the twentieth-century. It is interesting to note that although this modern high-rise building has such a sophisticated structure and bold structural expression, it was greatly influenced by “Fengshui”, an ancient Chinese art of living in a harmonious relationship with the earth’s environment and with its energy lines [13]. To some extent, this ancient traditional art gives the building relevance and confidence to stand in the surrounding contextual environment.

The most striking visual and functional feature of the Hong Kong and Shanghai Bank is its suspension structure. Four mast columns rise on either side of the building. Each of them is composed of four tubular steel masts connected by cross-bracings.

Constructed like suspension bridge, long-span suspension trusses between mast towers suspend the weight of the

reinforced-concrete floors immediately below and counterbalanced the central floor load with the weight of the prefabricated service modules, risers and stairs located outside the vertical pylons. This structural system allows the building to be constructed upward and downward at the same time.

The bridge conception for the building structure was stemmed from the original site condition. Its intent is to retain the original banking hall during the

Fig. 2.54
Hong Kong and Shanghai Bank,
Hong Kong, China.

early stages of construction in order for customers to still access the old facility, and at the same time be gradually accustomed to the dynamic contrast of the new structure and banking hall [14]. This design idea opened up an abundance of possibility. It could simplify the organization of the construction phases, and above all, it could breakthrough the traditional high-rise building floor plan with its central supply core and result in a hollowed-out high-rise building by shifting the service zone to the external walls. This spatial structure of high-rise buildings could free the office floor space from any type of barriers and maximize flexibility and transparency.

Fig. 2.55
Hong Kong and Shanghai Bank, Hong Kong, China.

The optimum flexibility of office space in this project, achieved by opening the central section, fulfills the requirement of multifunctional office floors. Maximum transparency of office spaces was achieved by the extensive application of the double-glazed, full-height glass panels on architectural envelope and the openness of office space. This transparency satisfies two demands in this project. One is the open view for everyone. All work areas of all 3500 employees have magnificent views to the outside. The south side of tower offers views of the island's mountains, the Victoria peak and the botanical

garden. The north side overlooks Victoria bay, the harbor and the mainland of China. The other demand is the perfect view of everyone by all. For the bank, visibility of everyone by everyone conveys a positive image of the company in which performance is linked with openness to the future. This requirement reflects the desire to have a controlled work environment in the electronics sector. As a result, it leads to a more flexible and open spatial arrangement where the organization of space is used in a more subtle way to motivate employees and further encourage their identification with the company. The maximum transparency of office space also fulfills the desire to get direct natural light in every working area, including the 50 square meters central area of the standard floors. In addition, maximum transparency of office space enables the architects to expose the building structure and internal activities.

The unique feature of the suspended building structure also helps the Hong Kong and Shanghai Bank to define the functional division and organize spatial hierarchy. Five long-span suspension trusses vertically divide the building into five functional zones: a banking transactional area, a data service area, an international services area, a general

Fig. 2.56
Hong Kong and Shanghai Bank,
Hong Kong, China.

administration area, and a chairman's office. At the truss level, five double-height intermediate spaces serve as reception areas, terraces and fire refuge areas, indicating the boundary between different functional zones.

A unique circulation system in this building further articulates the functional division and spatial hierarchy. The circulation system consists of high-speed elevators and escalators. Above the banking hall, the high-speed elevators only stop at the four double-height reception spaces. The central escalators, as local access paths, establish access in each functional zone. The traditional Chinese design technique of controlling accessibility to define spatial hierarchy of public, semi-public and private was very well developed in this project. Integrating escalators into the circulation system of high-rise buildings also create a promenade experience. The circulation in the Hong Kong and Shanghai Bank is a very pleasant and leisurely experience. One would pass by double-height spaces that appeal to the senses with waterfalls, air, light, foliage, cafes, and further move upward by escalators. The movement of people on escalators is vertical and horizontal at various angles. Going through various types of internal spaces and enjoying magnificent outside views from different angles, one is surrounded by a rich architectural experience that is in constant motion. Moreover, the rising and falling motions of the escalators combined with a variation of natural light over time create a fascinating space with exciting dynamics and verticality. This mixed circulation system combining with vertical spatial divisions form several "villages in the sky", as Foster called them [15]. Each is like the old villages on the south coast of China, with complete

boundaries, paths and special characters. These vertical stacks have established a sense of community for the users.

The structural components, long-span suspension trusses and masts, are the predominant features of the architectural expression of the Hong Kong and Shanghai Bank. The building skin is clad in silver-gray aluminum and sealed

Fig. 2.57
Hong Kong and Shanghai Bank, Hong Kong, China.

by double-glazed, full-height glass panels. Trusses and masts, sealed and visually strengthened by close-fitting aluminum cladding, are exposed to both outside and inside as the main visual and aesthetic elements. The dramatic contrast can be seen between the brute and strong structural components, and the delicate aluminum cladding and detailing. From outside, long-span trusses divide the north and the south façades of the building into five horizontal layers. This breaks up the scale of the building visually and reflects the functional divisions of the internal spaces.

The Hong Kong and Shanghai Bank's distinctive building structure also facilitates a series of variation of spaces. The Hong Kong and Shanghai bank has a stepped profile responding to the setback requirement of high-rise buildings. From north to south, pairs of mast towers divide the building into three vertically distinct bays with different heights: thirty-six, forty-four and twenty-nine

stories, a distinction that has created the floors with varying depth and garden terraces on the roof of each bay. The whole central section of the building is suspended over an open, street level pedestrian plaza. From this plaza, visitors enter the bank hall above by the obliquely angled escalators that penetrate the curved glazed ceiling. This huge glass ceiling both insulates the banking hall from the entry plaza and establishes a visual connection between these two spaces. As the showcase, it reveals all the activities inside the banking hall to the entry plaza. The banking hall features a soaring 52-metre-high atrium that reach through ten stories to the inner reflecting mirror of the building's "sun scoop" – a computer-controlled array of mirrors that adjusts to solar calendar and reflects light into the atrium and down to the plaza below through the glass ceiling. This equipment allows the first 11 floors of the building to bath in a remarkable brightness. By supplying natural lighting, the entry plaza is visually integrated into the atrium.

Fig. 2.58
Hong Kong and Shanghai Bank,
Hong Kong, China.

Fig. 2.59
Hong Kong and Shanghai Bank,
Hong Kong, China.

The concern for the contextual environment of the Hong Kong and Shanghai Bank is mainly in the spatial transition from a public to a less public area and access system. The entry plaza of the ground floor between the gigantic load-bearing masts is conceived as a public space. It is a continuation of the pedestrian zone of Statue Square and connects to Queen's Road from behind. This north-south passage leads people through the Square, a plaza, and an atrium, a spatial sequence from a public to a less public space, and from a city to an individual building. It has successfully integrated the building into the whole urban fabric. This passage also expresses a deeply symbolic meaning. To the North are the harbor, Kowloon and the Chinese mainland, and to the South is the colonial center. The bank building is open to both sides.

The concern for context is also embodied in the compliance of "Fengshui". This art has greatly influenced the form of the exposed structural system and placement of the entry hall, escalators, and doors. The former "chevron" structural system was rejected because it suggests knives or sharp edges and a downward direction that refers to death and decline. Instead, the final form of the trusses point upward. In order to keep the positive flow of energy across the site, the bank hall was asked not to be located at the ground level. The result is an elevated bank hall that generates an open entry plaza, enabling the flow of energy. According to the tenets of "Fengshui", the most desirable locations for entrance to a bank should be along a northwest-southeast axis. The escalators to the raised banking hall were ultimately orientated in keeping with this consideration. The entrance path, passing through a glass ceiling, allows the

energy to flow in and to remain there, thus bringing good fortune into the bank. Moreover, according to “Fengshui”, this building’s site has an excellent configuration. It is protected by mountains from behind, a lower structure to the left and right, and an open space facing the water [16].

A close relationship between the architectural expression, structure, space, circulation system, function, and urban context make the Hong Kong and Shanghai Bank an organic whole. It has received numerous awards, notably the 1986 Premier Award of the Royal Academy of Arts, the 1986 Institution of Structural Engineers Special Award, and the 1988 Quaternario Award for Innovative Technology in Architecture.

Chapter III

Contemporary High-rise Buildings in the Urban Settings of China

According to the national building code of China, residential buildings with at least ten floors, and public buildings with at least twenty-four meters in height, are categorized as high-rise buildings. It is based on fire safety requirements [17]. High-rise buildings in China are a recent phenomenon. From the establishment of the People's Republic of China to the beginning of economic reform in the 1980's, China existed primarily in isolation, due mainly to its political position. Limited economic resource, prohibitive development cost and limited technology encourage only low-rise and mid-rise building developments. The "Open Door" and "Economic Reform" policies have greatly propelled social and economic development. Rapid economic growth has drawn more and more people from the country to the city. Urban infrastructure needed to be updated and urbanization was inevitable. At the same time, advanced engineering technologies were imported along with frequent cultural and technological exchanges across the borders. As a result, high-rise building projects quickly sprouted in many cities. Since the 1980's, high-rise buildings in China have increased remarkably in both number and variety, continuously setting new height record.

3.1 The Emergence and Development of High-rise Buildings

Traditional Chinese architecture features a one-floor spatial composition. A series of rectangular-shaped spaces are horizontally united into one entity. Only the tower-like pagodas in China, as the object of worship to Chinese Buddhists, have adopted vertical expressions. In the early nineteenth century, the forms and types of traditional Chinese architecture that served feudal society have not been able to meet the emerging demands of capitalism and commercialism. It was necessary to establish a new architectural system. As a result, in the mid-nineteenth century, western architectural forms, styles, and engineering technologies were imported into China. Earlier in the twentieth century, high-rise buildings as a contemporary architectural type were introduced by western architects. The early development of high-rise buildings in China was slow. There were only less than 20 high-rise buildings in China before 1949. Among them, the highest high-rise building is the Shanghai International Hotel of 1932, which has 24 floors and 83.8 metres in height (Fig. 3.1) [18]. This building was designed by a Hungarian architect and represents a western Art-Deco style. Other well-known high-rise buildings during this period are the Bank of China of 1935 with 17 floors (Fig. 3.2) and the Broadway Mansion of 1935 with 19 floors (Fig. 3.3). Both projects are in Shanghai and were designed by the western architectural firms. The Bank of China is an eclectic combination. It expresses a base and shaft in line with the western Art-Deco style, while its top shows a simplified roof form of Chinese traditional architecture. The Broadway Mansion

Fig. 3.1
International Hotel,
Shanghai, China.
Renovated in 1999

Fig. 3.2
Bank of China,
Shanghai, China.

Fig. 3.3
Broadway Mansion,
Shanghai, China.

presents a “Wedding Cake” style of the high-rise buildings, emphasizing a functionalist vocabulary.

After 1949, in order to celebrate the National Day of the People’s Republic of China, several high-rise buildings were built in the mainland of China during the 1950’s and 1960’s. Among them, the Beijing National Culture Museum, with 13 floors and 86 meters in height, and the Beijing National Hotel, with 12 floors and 48 meters in height, are influential and representative works of “national form”. “National form” is a design trend that prevailed in China in the 1950’s and 1960’s. It emphasizes on applying the form of traditional Chinese architecture to contemporary buildings. However, this design trend without economical concern was rejected in the “Anti-Waste” movement [19]. In the 1970’s, in order to fulfill the need of foreign affairs, some hotels and residences adopted high-rise building types such as the Diplomacy Apartment in Beijing, the White Cloud Hotel in Guangzhou (Fig. 3.4), the new addition of Beijing Hotel (Fig. 3.5), and the

Guangzhou Hotel.

These buildings adopted functionalist vocabulary and were dedicated to embody reasonable function and economy at that time.

Since the 1980's, rapid economic

development has brought about a boom in building industry. One of the most obvious changes in the urban landscape of China is the rise of numerous high-rise buildings that continue to multiply rapidly in both number and variety. Three major cities, Shenzhen, Shanghai, and Beijing have played the leading roles in the construction of high-rise buildings.

Shenzhen is located in the south coast of China. It is China's first Special Economic Zone, established in August of 1980. It is often called "the testing bed of Deng Xiaoping's reform and opening" and "the window of technology, management, knowledge and foreign policy" [20].

Shenzhen used to be a small border town in the south of China, with an urban area of only 38 square kilometres. A five-story house was the highest building in the town before 1980. Aiming to become an international city and to achieve a style of "Hong Kong's city efficiency plus Singapore's city environment", by 1985, the urban area of Shenzhen had grown to 47.6 square

Fig. 3.4
White Cloud Hotel,
Guangzhou.

Fig. 3.5
New addition of Beijing
Hotel, Beijing.

kilometers, and more than two thousand high-rise buildings, including ninety-seven buildings of eighteen to fifty floors, rapidly rose in the urban area. In order to accelerate the urbanization, by November 1992, sixty-eight administrative villages in the special zone had been cancelled and turned into urban areas. By the end of 1997, the total area of the entire city had covered 2020 square kilometers. Meanwhile, high-rise buildings were rapidly being built at an alarming rate and reaching new heights. The International Foreign Trade Building of 1985, with fifty floors and 160 meters in height, marked the beginning of skyscrapers in the mainland of China. It created the famous "Shenzhen Speed" expression by building three floors each day. In 1996, The Diwang Building with 69 floors and 384 meters in height set a new height record and a construction standard of "finishing four floors in nine days" [21]. The high-speed development of Shenzhen is regarded as a brilliant page in the history of the urban construction in China as well as in the world. The High-rise buildings, as a symbol of modern city, represent the miracle of Shenzhen. Most of them such as the International Foreign Trade Building of 1985, the Development Centre Building of 1987, the Shenfeng Building of 1996, and the Diwang Building of 1996, are well known throughout the country. As Shenzhen plays the role in the "open door" policy, its high-rise buildings work as "a window of learning from the outside".

According to relevant website statistics

(www.library.tudelft.nl/~egram/skylines.htm and www.Shyscrapers.com), at present, there are 106 high-rise buildings with over 90 meters in height in Shenzhen. The top ten high-rise buildings in Shenzhen are:

1. The Diwang Building of 1996 (Fig. 3.6)
2. The SEG plaza of 2000 (Fig. 3.7)
3. The Special Zone Press Tower of 1998 (Fig. 3.8)
4. The Broadcasting Centre of 2001 (Fig. 3.9)
5. The Panglin Plaza of 1999 (Fig. 3.10)
6. The World Trade Centre of 2001 (Fig. 3.11)
7. The First Tower of 2001 (Fig. 3.12)
8. The Guotong building of 1997(Fig. 3.13)
9. The Huashi Mansion of 2002
10. The Taxation Bureau of 2000 (Fig. 3.14)

Other prominent high-rise buildings as urban landmarks include the Development Bank (Fig. 3.15), the Electronic S&T Building (Fig. 3.16), the Shenfang Plaza (Fig. 3.17), the Trade Centre (Fig. 3.18), the Baging Building (Fig. 3.19), the New Century Plaza (Fig. 3.20), the Jono Tower (Fig. 3.21), the Development Centre (Fig. 3.22), the Regalia Place (Fig. 3.23), the Bank of China (Fig. 3.24), and the News Centre (Fig. 3.25).

Fig. 3.6
Diwang Building,
Shenzhen.

Fig. 3.7
SEG Plaza,
Shenzhen.

Fig. 3.8
Special Zone Press
Tower, Shenzhen.

Fig. 3.9
Broadcasting Center,
Shenzhen.

Fig. 3.10
Panglin Plaza,
Shenzhen.

Fig. 3.11
World Trade Center,
Shenzhen.

Fig. 3.12
First Tower,
Shenzhen.

Fig. 3.13
Guodong Building,
Shenzhen.

Fig. 3.14
Taxation Bureau,
Shenzhen.

Fig. 3.15
Development Bank,
Shenzhen.

Fig. 3.16
Electronic S&T
Building, Shenzhen

Fig. 3.17
Shenfang Plaza,
Shenzhen.

Fig. 3.18
Trade Center,
Shenzhen.

Fig. 3.19
Baging Building,
Shenzhen.

Fig. 3.20
New Century Plaza,
Shenzhen.

Fig. 3.21
Jono Tower,
Shenzhen.

Fig. 3.22
Development
Center,
Shenzhen.

Fig. 3.23
Regalia Place,
Shenzhen.

Fig. 3.24
Bank of China,
Shenzhen.

Fig. 3.25
News Center,
Shenzhen.

Shanghai, the largest city in China, is located in the mid-east off the coast of China. It is the manufacturing and trade centre of the country.

Shanghai is the most cosmopolitan city in the first half of the twentieth century. Most the tallest high-rise buildings were built here before 1949. Due to its colonial history from 1843 to 1948, numerous western architectures, such as banks, hotels, exclusive clubs, press organizations, and headquarters of international affairs, were constructed at that time and are continuing well into today. One of the most recognizable architectural symbols of Shanghai's colonial history is the Bund. It consists of mainly twenty-four buildings, with various heights, along approximately 1.5 kilometers of the Zhongshan Road and the Huangpu River. The Bund is famous as "the museum of the international architecture". It represents seventeen styles of western architecture such as classical, gothic, renaissance, eclectic classicism and modern, etc. Despite interior changes, their exterior appearances have been well maintained since the 1930's [22]. The colonial history and architecture have created a distinctive urban context for Shanghai.

After the establishment of the People's Republic of China in 1949, Shanghai was still the centre of economy and industry in China. However, it loses its glory as a cosmopolitan metropolis for the next thirty years. However, since the 1980's, under the impetus of rapid "economic reform" and "open door" policy, Shanghai quickly regained its position as one of the biggest economic powerhouses in the world, as well as a showcase of modern architecture. High-rise buildings have risen at a remarkable speed over the last 20 years. In 1978,

there were 135 buildings in Shanghai that had more than eight floors. By the end of 2001, 3865 buildings with eight or more floors, including 1548 buildings with over twenty floors, rose up and reshaped the modern urban skyline of Shanghai. At the last count, there were over 300 high-rise buildings under construction or nearing completion in the city [23]. The most active location throughout all of China is the Pudong New District of Shanghai, located on the east bank of Huangpu River. Whereas a decade ago there were practically no buildings other than warehouses, shipping facilities, and small shops, this area has become one of the busiest and the most ambitious construction zones in the world. Like Shanghai's architectural past, its present high-rise buildings carry a variety of styles. They exhibit a contemporary global architecture.

According to current website statistics (www.library.tudelft.nl/~egram/skylines.htm and www.Shyscrapers.com), at present, there are 358 high-rise buildings with over 90 meters in height in Shanghai. The top ten high-rise buildings in Shanghai are:

1. The Jinmao Tower of 1998 (Fig. 3.26)
2. The Plaza 66 of 2001 (Fig. 3.27)
3. The Pudong International Information Port of 2001 (Fig. 3.28)
4. The Hong Kong New World Tower of 2002 (Fig. 3.29)
5. The Bocom Financial Towers of 2002 (Fig. 3.30)
6. The Bank of China Tower of 2000 (Fig. 3.31)
7. The Maxdo Centre of 2002 (Fig. 3.32)
8. The International Ocean Shipping Building of 2000 (Fig. 3.33)

9. The World Finance Tower of 2000 (Fig. 3.34)

10. The King Tower of 1996 (Fig. 3.35)

Among hundreds of high-rise buildings, the Tomorrow Square (Fig. 3.36), the China Insurance (Fig. 3.37), the CITIC Square (Fig. 3.38), the Senmao Building (Fig. 3.39) and the Merchants Tower (Fig. 3.40) are also representative high-rise buildings. By the end of 2007, the sleek structure of the 460-meter-tall, the Shanghai World Financial Centre (Fig. 3.41) will be completed in the city's Pudong new district, and will set a new world record for skyscrapers.

Fig. 3.26
Jinmao Tower,
Shanghai.

Fig. 3.27
Plaza 66,
Shanghai.

Fig. 3.28
Pudong Information
Port, Shanghai.

Fig. 3.29
Hong Kong New World
Tower, Shanghai.

Fig. 3.30
Bocom Financial
Tower, Shanghai.

Fig. 3.31
Bank of China,
Shanghai.

Fig. 3.32
Maxdo Center,
Shanghai.

Fig. 3.33
Ocean Shipping
Building, Shanghai.

Fig. 3.34
World Financial
Tower, Shanghai.

Fig. 3.35
King Tower,
Shanghai.

Fig. 3.36
Tomorrow Square,
Shanghai.

Fig. 3.37
China Insurance,
Building, Shanghai.

Fig. 3.38
CITIC Square,
Shanghai.

Fig. 3.39
Senmao Building,
Shanghai.

Fig. 3.40
Merchants Tower,
Shanghai.

Fig. 3.41
World Financial Center,
Shanghai.

Beijing, the capital and the second largest city in China, is located at the northern edge of the Northern China Plain. It is the cultural, political, and intellectual centre of the country, as well as being the major industrial and commercial metropolis.

Since 1271, Beijing has been selected as the capital city of the nation. There the Mongol ruler Kublai Khan, the first emperor of the Yuan dynasty (1271-1368), established his empire. Later, both the Ming (1368-1644) and the Qing (1644-1911) dynasties built Beijing as their capital city. Consequently, Beijing has conserved many glorious imperial palaces in the urban areas, such as the Forbidden City, the Temple of Heaven, the Temple of Earth, the Temple of Moon, and the Beihai Park in the centre of the city. There are also imperial palaces in the vicinity of the city, such as the Summer Palace, and the Tanzhe Temple. These traditional architectural forms all represent the ultimate achievement of ancient traditional China. As an historical city, another unique feature of Beijing is its numerous traditional residences and Hutong, which are ancient city alleys. Traditional residences in Beijing were mostly built during the Yuan, Ming, and Qing dynasties. They are also called Si He Yuan, and consist of a rectangular shape with rooms arranged around a central courtyard. Numerous Si He Yuan are clustered around the core of the city and are divided by Hutong [24].

However, despite the abundant historical architecture and the rich traditional cultural environment, Beijing took steps to modernize its urban landscape. Since the 1980's, eight business districts have been established with clusters of high-rise buildings, with offices, hotels, restaurants, retail stores and

entertainment. This has generated rapid city expansion. Along with commercial high-rise building developments, numerous residential high-rise buildings also greatly changed the urban landscape and created an interesting mixed kaleidoscope. In 1985, on average, one high-rise residential building was built in Beijing every day [25]. According to the Asian Times, Beijing awarded USA developer Johnson Fain Partners, the rights to plan an entire new business district, complete with fifty-five skyscrapers in the early 2001 [26].

According to current website statistics (www.library.tudelft.nl/~egram/skylines.htm and www.Shyscrapers.com), at present, there are 96 high-rise buildings with over 90 meters in height in Beijing. The top ten high-rise buildings in Beijing are:

1. The Jing Guang Centre of 1990 (Fig. 3.42)
2. The Capital Mansion of 1990 (Fig. 3.43)
3. The China World Trade Centre 1 of 1999 (Fig. 3.44)
4. The China World Trade Centre 2 of 1989
5. The Beijing silver Tower of 1997
6. The Cyber Tower A of 2001
7. The Kerry Centre South Tower of 1998 (Fig. 3.45)
8. The Kerry Centre North Tower of 1998
9. The Beijing Tengda Building of 2000
10. The Xinhua News Agency Building of 1989

Among the most prominent high-rise buildings under construction in Beijing are: the China World trade Centre Tower 3 with 330.1 meters in height (Fig. 3.46), the

Fortune Plaza Office Building with 260 meters in height (Fig. 3.47), the Centre Tower with 249.9 meters in height, the Beijing TV Centre with 239 meters in height (Fig. 3.48), and the CCTV Headquarters with 230 meters in height (Fig.

Fig. 3.42
Jing Guang
Center, Beijing.

Fig. 3.43
Capital Mansion,
Beijing.

Fig. 3.44
Chins World Trade
Center 1, Beijing.

Fig. 3.45
Kerry Center,
Beijing.

Fig. 3.46
China World Trade
CenterTower 3, Beijing.

Fig. 3.47
Fortune Plaza Office
Building, Beijing.

Fig. 3.48
Beijing TV Center,
Beijing.

Fig. 3.49
CCTV Headquarter,
Beijing.

3.49).

Besides Shenzhen, Shanghai and Beijing, many other major cities in China are also dedicated to the development of high-rise buildings. According to

current website statistics (www.library.tudelft.nl/~egram/skylines.htm), in terms of high-rise buildings with over 90 meters in height, there are: 77 in Guangzhou, 69 in Dalian, 50 in Chongqing, 32 in Tianjin, 31 in Xiamen, 23 in Nanjing, 15 in Wuhan and 14 in Qingdao. As the editor of Architect magazine, Mingxian Wang, said: "Skyscraper mania is sweeping cities throughout the country - from Shenzhen, where China's first skyscraper appeared, to Shanghai and Beijing...." China already has four of the tallest buildings in the world and is planning to create a new record. As a result of the September 11th terrorist attack on the World Trade Centre in New York, corporate businesses around the world are starting to re-evaluate the applicability for downtown skyscrapers and are considering lowering suburban buildings. Chinese urban planners still believe that this trend will not affect their long-term architectural blueprints [27]. Thus, high-rise buildings will continue to be one of the main building types for the future of China.

3.2 The Cause of Rapid Development of High-rise Buildings Since the 1980's

There are five main reasons for the popularity of high-rise buildings in China. The first is urbanization. In the beginning of the 1980's, along with the economic reform and policy changes, urbanization in China started to spread and kept up a rapid pace. From 1949 to the late 1970's, the rate of urbanization of China gradually grew from 10.6 percent to 17.9 percent. By 2000, it had reached 30.9 percent, although it was still 12 to 21 percentage points lower than that of

countries with a similar per capita gross domestic product. Expanding urban areas provided numerous job opportunities for rural laborers who could not find work in their hometown. By 2000, around 100 million people left their rural homes to seek fame and fortune in urban areas [28]. The rapid growth in population and wealth had exerted tremendous pressure on land value and availability of buildable sites, particularly in the urban areas. In addition, as a nation with the population of over 1.2 billion, accounting for 25 percent of the world's population, tillable land in China merely accounts for 7 percent that of the world's. Preserving limited agricultural fields is as important as urbanization. For these reasons, as a high-density building type, high-rise building naturally became one of the sensible and meaningful solutions to accommodate urban growth and preserve agricultural fields. This solution has been adopted rapidly by most of cities in China since the 1980's. Along with further urbanization, high-rise buildings will continue to be an important building type in the future of China. Chinese officials and experts believed that urbanization process would promote consumption demand and greatly boost the nation's economy. According to the Guangming Daily on July 19, 2002, China has already entered a period of fast growth in urbanization. It was predicted that the number of people living in cities would reach 1.12 billion by 2050, accounting for 70 percent of the population living in the country now. More than 600 million Chinese people will shift from rural areas to urban districts in the next 50 years. At present, mainland China has more than 660 cities and 19,000 towns. By 2050, 80 percent of towns will have grown into small or medium-sized cities. By then, China will have 50 ultra-large cities, each

with an urban population of more than 2 million, 150 big cities, 500 medium-sized cities and 1,500 small cities. The rate of urbanization in China will rise from the current 36 percent to 70 percent. This is regarded to be of vital importance in narrowing the gap between rural areas and urban districts, as well as boosting China's overall economic growth and creating more jobs [29].

The second reason for the popularity of high-rises is the changes of economic policy. Since the 1980's, China has started to transform from a centralized and rigidly planned system to a market-based system. The mechanism of real estate and commercialism began to be implemented in the building industry and has rapidly developed in recent years. One of the main policies on real estate in China is to actively promote the diversified investment by the State, locals, enterprises, and individuals instead of the single mode of investment by the State in the past. China has more than 20,000 real estate development companies [30]. Real estate and commercialism have boosted the popularity of high-rise buildings in China, not only in number, but also in variety.

The third reason is the prosperity of the market that provides the solid economic foundation for the development of high-rise buildings. Construction of high-rise buildings needs large amount of capital. The economic reform and open door policy made China the biggest markets, attracting investments from all over the world. These investments mainly went into major cities and the Special Economic Zones. Shenzhen, Shanghai and Beijing were the first preferential cities, where most of the world-class companies and financial and insurance agencies located their regional headquarters.

The fourth reason is the frequent cultural and technological exchanges with the outside world that have facilitated the development of high-rise buildings in China. The high-rise building is a recent phenomenon in China. China invited a host of internationally renowned architects for major high-rise building projects as part of the 'open door' policy. At the same time, Chinese architects have gained a more exposure to the international ideology, trends and movements, which greatly enhanced their creativity. Topics and forums regarding high-rise buildings were more and more addressed and discussed. Those topics and forums are found in such publications as: "Plan Outline and Formal Creation of high-rise buildings" in the Architect, "Structure of High-rise Buildings and Architectural Creation" in the Architectural Journal, Design of High-rise Buildings, Structural Design of high-rise building, Excellent Examples of Structural Design of High-rise Building, Origin of Design Concept of High-rise Building, etc. Periodical such as World Architecture also instantly introduces many latest high-rise projects in the world. In addition, the share and exchange of advanced engineering technology and materials with the outside world also made the construction of high-rise buildings more efficient and economical in China.

The fifth reason of the popularity of the high-rise buildings in China lies in its expression of modern ideas and life styles. Acceptances from the general public and clients made it attractive for real estate companies to promote and develop high-rise buildings. As an embodiment of economic and technological advance, the popularity of high-rise building also addressed the success of the

municipality and the government, who led the economic reform. Therefore, municipalities are also encouraged to build high-rise buildings to set new records.

3.3 The Forms and Styles of High-rise Buildings in the Urban Settings of China

Since the 1980's, the Chinese architectural community has put more efforts into developing high-rise buildings. Aside from importing advanced engineering technologies, new architectural materials and equipments from the outside world, the community also studies and absorbs various architectural forms and styles, as well as the latest design trends in architecture. A host of internationally renowned architects have been invited to express their understanding of high-rise buildings and the Chinese society. The high-rise buildings presented have addressed a range of key issues for the new generation of high-rise buildings. They range from the exploitation of innovative technologies, responding to local climates, to incorporating Chinese symbolism to create new landmarks.

Foreign architects have received some commissions of high-rise developments, a small share of the big construction in China. Chinese architects are the main force and take on the most responsibilities for the design and construction high-rise buildings. The economical advantage of modernism became the mainstream of the architectural expression of high-rise buildings in the first 10 years of development in China [31]. As the country's economy is further developed, Chinese architects are able to focus their attention on various architectural expressions of high-rise buildings (Fig. 3.50).

Fig. 3.50
Designs of high-rise buildings by
Chinese architects

After twenty years of development, a diverse architectural expressions of high-rise buildings have been simultaneously exhibited in the urban settings of

China. They range from the international style, modernism, structural expression to post-modernism and high-tech. However, in many cases, the overwhelming foreign influences, with the exaggerated scale and formal novelties, have broken the connection with the traditional Chinese culture. In order to preserve the traditional Chinese cultural value and self-identity, Chinese architects are encouraged to express the unique Chinese cultural heritage in contemporary high-rise buildings and to establish a distinctive Chinese style. Unfortunately, some designs have resorted to merely superficially transplanting the traditional architectural skin, such as adding “the great roof” or traditional pavilions on the top of high-rise buildings, placing traditional architectural patterns on the facades, etc. With the original intent of preserving the image of the historical city, this architectural phenomenon originally took place in Beijing in the 1980’s and spread rapidly to other cities of China. Among some examples of these buildings are the New Dadu Hotel (Fig. 3.51), the Haiguang Building (3.52) and the Wangfu Hotel (3.53). This design trend was widely criticized and has raised the issue to the entire Chinese society: how to best express the Chinese cultural

Fig. 3.51
New Dadu Hotel, Beijing.

Fig. 3.52
Haiguang Building, Beijing.

Fig. 3.53
Wangfu Hotel, Beijing.

heritage in contemporary high-rise buildings as well as other building types?

Furthermore, how to delicately balance modernism and tradition to create an architectural self-identity?

Chapter IV

Japanese Architect, Toyo Ito's Works: The Manifestation of Traditional Culture

4.1 Japanese Cultural Traditions and Contemporary Architecture

Japan has over 2000 years of unique civilization. The process of its cultural evolution has proved that Japan is a nation capable of recognizing and adapting a more advanced foreign culture to its own civilization. During the 5th and 6th century, Japan imported techniques, expertise and philosophy from the Silla and the Han dynasties of Korea. During the 8th and 9th centuries, it accepted and absorbed the alphabet, architecture, art and religion from the Tang dynasty of China. In the 13th century, Japanese civilization was greatly influenced once more, this time by the Sung dynasty of China. After obtaining the key elements of the various cultures, Japan closed its door to the outside world and started its six hundred years of isolationism. During this period, the Japanese eventually established their own unique culture by digesting and refining imported cultural elements, mostly from China, into Japanese society. In the middle of the 19th century, along with the shattered isolationism, Japan started once again to accept outside influence. However, the ancient saying, "Japanese spirit with Chinese learning" had been transformed into "Japanese spirit with Western learning". Overwhelming western influences led to modernization and industrialization in Japan. In this process, Japanese still preserved their ways of absorbing outside influences, which emphasizes on borrowing the external

aspects of foreign culture and altering them to fit into already-existing Japanese cultural patterns. In terms of architecture, Japanese architect, Noboru Kawazoe explained that during the evolution of modern architecture in Japan, this attitude to foreign culture caused Japanese architects to use “only the techniques and external forms of industrial civilization of the West without understanding its spiritual background” [32].

Another significant factor that has deeply affected Japanese culture is that they possess double characteristics. In The Chrysanthemum and the Sword, a recognized classic of cultural anthropology, Ruth Benedict described Japanese as both aggressive and passive, both militaristic and aesthetic, both insolent and polite, both rigid and adaptable, both submissive and resentful to being pushed around, both loyal and treacherous, both brave and timid, both conservative and hospitable to new ways. This ancient ability to accept contradictory position, as the norm, allows Japanese to remain conservative yet become very avant-garde, and to continue in their traditional ways yet adopt the very latest Western innovations. In this way, contemporary Japan with its higher modern physical civilization is able to continue to be a nation steeped in ancient tradition. This phenomenon of “both/and” has also been manifested in contemporary Japanese architecture. Michael Franklin Ross pointed out that contemporary Japanese architecture includes elements that are both modern and traditional, technological and handcrafted, futurist and nostalgic, natural and synthetic, as well as an architecture that is both hard and smooth, yet soft and flexible [33].

It is this Japanese cultural attitude and ability that helped Japanese architects to develop modern architecture in Japan in the 1920's and 1930's, eventually creating their own form of modernism after World War II. Their modernism is regarded as being more aware of change and more sophisticated. Vitality and originality of modern Japanese architecture allows it to go beyond the shade of the Western modern architecture and occupied an important position in the architectural world.

4.2 Toyo Ito's Design Method and Means of Expression

Toyo Ito is one of the world's most innovative and influential Japanese architects through the years. He constantly sought new perspectives and fresh approaches to architecture with the consideration of social changes and progression of time, thus creating a series of architectural concepts and developing a unique "floating" nature of space. The most prominent features of Ito's architecture are lightness and transparency, which are usually achieved by the application of certain contemporary materials such as light and narrow metal supports, perforated aluminum and expanded metal sheets, glass, film foil band and textiles. These features provide Ito's architecture with a unique "floating" quality. As Ito's trademark, vault, oval, bow and light elegant curves, these simple and abstract forms also increase the "floating" effect. By utilizing lightweight steel structures, metallic skins, simple geometrical forms and incorporating computer technologies into architecture, they easily give viewers a strong high-tech impression of his architecture. However, Ito's working methods and expressive means have

manifested his historical reference. Charles Jencks notes that “Ito is a post-modernist dressed as a modernist, thus his message has an unlikely freshness that takes one by surprise” [34].

4.2.1 Philosophical Thinking on Time and Change

Traditional Japanese philosophy believes in an ever-changing nature of things. This has manifested in ancient Japanese art, Ukiyoe. Ukiyoe literally means the pictures of the floating world. It is a style of wood block printing with more than three hundred years of history. Ukiyoe vividly depicts Japanese landscapes and the people’s everyday life. “Floating world” expresses the Japanese belief of “transience” and “impermanency” of all things in the world. Kitaro Nishida, an important Japanese philosopher in the early nineteen century, formulated this idea into the “eternal now”. The “eternal now” refers to a singular moment that can only be grasped by the mind, in which the past and the future are one and the same. Kitaro’s philosophy also indicates constant transformation since a moment can never be static [35]. Such philosophy on time and change has always been implemented by the changeability and flexibility of space in Japanese architecture. Moveable silk curtain stands, whose positions could be frequently changed, were used to divide space in Japanese palaces a thousand years ago. In traditional Japanese houses, movable partitions and walls quickly alter space and only a small amount of permanent furniture is placed to indicate specific room function. In the 1960’s, the Metabolist Group also seized changeability and flexibility as the key elements of modern architecture for

exploration, leading to the present change in permanent form. This enabled modern Japanese architecture to grasp the attention of the architectural world [36].

Ito was also concerned with time and change in his architectural creation and related them to historical references. He alluded to the “floating world” of Ukiyoe as an interpretation of the “floating” nature of his architecture. In “Towards a Post-ephemeral Architecture”, Ito stated: “I only believe in the pleasure of the moment” [37], which reflects Kitaro’s philosophy, “eternal now”. However, Ito applied his insight of an ever-changing nature of things onto the contemporary consumer society, which has exerted a profound influence on Japanese life. In such a consumer-oriented environment, buildings are repeatedly constructed and torn down at an incredible rate, and architecture itself has become merchandise. In “There Can Be No New Architecture Without Being Immersed in the Sea of Consumption”, Ito questioned the meaning and significance of architecture in this social phenomenon and tried to discover the reality of life in a consumer society:

My attention is devoted solely to the question whether architecture can really be architecture in such an age. ... In such a consumer-oriented environment, the question of whether it is possible for architecture to emerge at all seems very significant to me. The topography of architecture is on the brink of fundamental changes, and the question one has to ask is whether or not the appearance of architecture is possible along with this development. ... In the past ten years we have only complained that reality is progressively

getting lost through the influence of consumer-orientation in life, just as a drug addict is a slave of his drugs, so do I get the feeling that our real bodies have been eroded in this society, pulling us into a visionary fiction. ... I had the feeling as if the body had separated from the senses, so that life had lost its reality. [38]

Instead of criticizing and rejecting the challenge that contemporary architecture was facing, Ito accepted and actively searched for a modern way to work with it. He expressed this attitude in the same essay:

One must resolve this state of confusion and eliminate the alarming network of lies in the world. I get the impression that reality is not on this side of the consumer society, but on the other side which has overcome consumption. Therefore, standing on the shore of the consumer ocean, there is no other way but to dive in, swim through it and discover something new on the other shore. [39]

In order to preserve a fresh approach to architecture, Ito situated himself at a point closer to the consumer society, and regarded the sense of movement from the perspective of consumption and an unreal life in consumer society as the fascinating aspects of contemporary architecture. He employed a series of descriptive words such as “provisional”, “ephemeral”, “fictional” and “floating” to highlight the constant dangers and contradictions facing architecture in a consumer environment, and used them as architectural themes in his practice to obtain creative inspiration [40].

Fig. 4.1
Silver Hut, Tokyo.

Fig. 4.2
House in Magomezawa.

Fig. 4.3
Restaurant Nomad Minato-ku,
Tokyo.

The Silver Hut of 1984 (Fig. 4.1) in Tokyo is the starting point of the theme of “provisional”. This house consists of various spaces roofed by 7 shallow, lightweight, steel-framed roof vaults, all different in size. Its courtyard, which is surrounded by the house at three sides, is enclosed by perforated aluminum sheets and an arched steel frame. By utilizing the materials of perforated aluminum sheets, steel frame, and lightweight, steel-frame roof vaults, the building clearly conveys an impression of “provisional” and a quality of lightness. The same theme and similar design approach was used in the House in Magomezawa (Fig. 4.2) in 1986. The structure of this house is simplest in form, consisting of a contrast of two spaces. One is enclosed in a concert cube. The other is open and simply roofed under a pair of steel-frame vaults with slim metal supports. Expanded metal meshes, which are even lighter and softer than perforated aluminum sheets, cover the front façade of the open space. Such an appearance has enhanced the quality of lightness and the impression of “provisional” architecture. Ito also used the theme of “provisional” to design the Restaurant Nomad Minato-ku of 1986 (Fig. 4.3). This is a place for “nomad women” in Tokyo, symbolizing the circumstances in a consumption-oriented city.

The whole space in the restaurant is metallic, built in the manner of a stage set. Walls of expanded metal panels and perforated aluminum sheets, and metallic cloths freely hanging down as ceiling, create an atmosphere of improvisation and fiction that only temporary things may possess. As an expression of “provisional”, lightweight, steel-frame roof vaults and slim metal supports were developed in his public projects, such as the Yatsushiro Municipal Museum of 1991 in Kumamoto, the Gallery U of 1991 in Kanagawa, and the Shimosuwa Municipal Museum of 1993 in Nagano.

As a manifestation of traditional philosophical belief of the ever-changing nature of things, “ephemeral” is an important part of Japanese aesthetics. This quality can be seen in the traditional Japanese performing arts, Zen gardening and Zen landscape painting. Zen landscape paintings intensively portray floating and hazy mists, rendering an “ephemeral” beauty. Ito also seized this aesthetic idea to develop his architectural concept as a response to the consumer environment. He reached a creative conclusion in “Architecture in A Simulated City”, “We should rather build fictional and ephemeral architecture as a permanent entity” and indicated his concrete design approaches:

I have suggested fictional and ephemeral images by utilizing light and video image for the Tower of Winds of 1986 (Fig. 4.4) and the Egg of winds of 1991 (Fig. 4.5). I have attempted to evoke naturally occurring fictional and ephemeral images like natural phenomena for the Proposal for the Project for Japanese Maison de la Culture of 1990 in Paris, Nakameguro T Building of 1990 (Fig 4.6), and F

Building (of 1991) in Minami Aoyama, by using glass screens holding the liquid crystal film between them. I also tried to create images that were more natural than nature by building artificial landscapes on originally flat site in the projects such as the Guest House for Sapporo Breweries of 1989 (Fig. 4.7), and Gallery 8 (of 1991) in Yatsushiro. [41]

Fig. 4.4
"Tower of Winds", Yokohama.

Fig. 4.5
"Egg of Winds", Tokyo.

Fig. 4.6
T Building, Nakameguro.

Fig. 4.7
Guest House for Sapporo
Breweries, Hokkaido.

"Ephemeral" and "fictional" are key words for Ito's distinctive architecture. He extensively employed light and narrow metal supports, perforated aluminum and expanded metal sheets, glass, film foil band and textiles in his various projects to display the lightness and transparency of architecture. These two features, lightness and transparency, could visually reduce the observed stability

and materiality of buildings, thus conveying an impression of “ephemeral” and “fictional”. The combination of the lightness of building structure and the transparency of building skin and space provides his architecture with a unique “floating” quality.

4.2.2 Philosophical Thinking on “Naturalness” and “Spontaneity”

Zen is a traditional Japanese philosophy, which absorbs the mysticism of India, the “naturalness” and “spontaneity” of Chinese Daoism, and the thorough pragmatism of Chinese Confucianism, and concentrates exclusively on the enlightenment experience [42]. With this traditional manner, Ito explored “naturalness” of architecture and sought the most natural state of buildings. In “Primitive Hut in the Modern City”, Ito states his thought:

When things are endowed with so many meanings as in today's society, it happens that too many interpretations arise between function and form. So it is the opinion today, in relation to the house just as in relation to the furniture, that the depiction of meaning is the design. But I first of all wanted to find a way to take out the meaning and thus, by objectively deriving the form from the function, ensure that the meaning is evident from form. ... I came up against the question of what “naturalness” means for a building and what I have to do to show a building in its most natural state. ... Up to now, through my formalistic approach, I had always insisted that the buildings must have a kind of “critical character”, but now I

am of the opinion that I can never achieve naturalness if I do not detach myself from this critical character. [43]

As a result of this exploration, he always attempted to reduce his architecture into a minimal formalism and manipulate his design in a flexible and spontaneous gesture.

Lightweight, steel-frame roof vaults in the Silver Hut of 1984 not only convey a “provisional” theme but also present his primitive form of building construction, like tents. The house in Magomezawa in 1986 well expressed Ito’s architectural concept, “A provisional shed as if it were abandoned under construction, covered with membranes that emit no particular messages” and “envelop human’s bodies in weightless comfort similar to clothes” [44]. By the analogy of “tent”, “membranes” or “cloth”, Ito reduced his buildings to a primitive simplicity. An extreme example is the Pao 1 Exhibition Project of 1986 (Fig. 4.8).

The “Pao” is a dwelling for Tokyo nomad women, who have been wandering a prolific city of information and consumption at their ease. They are in no need of a house. All they barely need would be a “Pao”, as an extension of clothing equipped with three pieces of furniture of different functions.

Fig. 4.8
Pao Exhibition Project, Tokyo.

A series of Ito’s big-scale public projects also manifest his architectural concept of “tent”, “membranes” or “cloth”, through the use of gentle undulating

Fig. 4.9
Roof Garden Project,
Tokyo.

Fig. 4.10
MAC Commercial Complex,
Tokyo.

Fig. 4.11
Noh Theater, Tokyo.

Fig. 4.12
Pavilion for "World Design
Exposition in Nagoya

Fig. 4.13
Yatsushiro Municipal
Museum, Kumamoto.

Fig. 4.14
Amusement Complex
H,Tokyo.

Fig. 4.15
Shimosuma Municipal
Museum, Nagano.

Fig. 4.16
Dome, Odate.

Fig. 4.17
Seoul Dome, South Korea.

roofs and suspended ovals, usually built with lightweight, thin metal materials.

The roof with "a series of tents" form became a prominent feature of his architecture, as seen in the Roof Garden Project of 1988 (Fig. 4.9) in Tokyo, the MAC commercial Complex of 1988 (Fig. 4.10) in Tokyo, the Noh Theater Project of 1988 (Fig. 4.11) in Tokyo, and the Pavilion for "World Design Exposition in Nagoya" of 1989 (Fig.4.12). The expressive steel-frame roof vaults and suspended ovals were developed in the Project for Japanese Maison de la Culture of 1990 in Paris, the Yatsushiro Municipal Museum of 1991 (Fig. 4.13) in

Kumamoto, the Amuseum Complex H of 1992 (Fig. 4.14) in Tokyo, the Shimosuma Municipal Museum of 1993 (Fig. 4.15) in Nagano, the Sapporo Community Dome Project of 1994 in Hokkaido, the Dome in Odate of 1997 (Fig. 4.16) in Akita, and the Seoul Dome of 1997 (Fig. 4.17) in South Korea.

Based on his cognition of the human body, a fluid body, Ito further developed the architectural conception of “tent”, and supplemented a transparent quality in this primitive form of buildings in “On Fluid Architecture”:

The tent is a minimum filter that visualizes the flow of human behavior and nature; it symbolizes an architectural act accidentally taken for a given event; it is in the most primitive form but integral with nature. The tent is also a film barely covering the makeshift state while showing the existence of an interface. [45]

The irregular shape and random placement of architectural components presents Ito’s flexible and spontaneous gesture to architectural design. The roof with “a series of tents” form in Ito’s projects always freely rises and falls. In the Project for Japanese Maison de la Culture of 1990 (Fig.4.18) in Paris, three impressive bubbles having irregular shapes, house a computer room, a VIP room, and a panoramic restaurant, inserted into the building at random. In the Yatsushiro Municipal Museum of 1991 (Fig.4.19) in Kumamoto, the continuous vault roof is divided into triangular fragments of different heights, extending into air along different directions. The pillars supporting beamless floors in the permanent exhibition hall are randomly placed. In Ito’s big-scale public projects, the random placement of hollow and flexible columns, and the openings with

Fig. 4.18
Japanese Maison de la Culture,
Paris.

Fig. 4.19
Yatsushiro Municipal Museum,
Kumamoto.

Fig. 4.20
"Mediatheque",
Sendai.

Fig. 4.21
Bank of International Settlement
Extension Project, Switzerland.

Fig. 4.22
Hiroshima Messe Convention
Center Project, Hiroshima.

Fig. 4.23
Nagaoka Lyric Hall, Niigata.

Fig. 4.24
T Hall, Taisha.

irregular oval shapes on the roof, have become his trademarks, as seen in the Centre for Contemporary Art of 1999 in Italy, the Sendai Mediatheque of 2001 (Fig.4.20) in Miyagi, the Bank of International Settlement Extension Project (Fig.4.21) in Switzerland, and the Hiroshima Messe Convention Centre Project (Fig.4.22) designed in 1997. In addition, the Nagaoka Lyric Hall of 1996 (Fig.4.23) in Niigata and the T Hall in Taisha of 1999 (Fig.4.24) present a flexible form.

4.2.3 Philosophical Thinking on the Nature of Human Being

Ito often related his architectural concept with the exploration of the nature of human being and designed his architecture to reveal his discovery.

“Ephemeral and fictional architecture” expresses Ito’s opinion on people’s life in a highly consumer-oriented environment, where “life had lost its reality” and “nomad women” roam. In “Architecture of the Fluid Bodies”, he perceived the human body as a fluid body and desired to present this character of human body in the form of architecture.

But what is an architecture which superimposes itself on the human body as fluid? This made the actions of human beings (motion) and flow of nature visualizable. [46]

He further developed the relationship between architecture and human in this manner and indicated: “I want to design architecture like an unstable flowing body” [47]. Ito also perceived various types of flows, such as atmosphere, liquid, information and electrons and was dedicated to present this kind of “flowing” environment in his architecture. Ito believed that the oval could embody the sense of “flowing” [48]. Therefore, the oval became his trademark and was used in the Yatsushiro Municipal Museum of 1991 in Kumamoto, and the Amusement Complex H of 1992 in Tokyo, to form the buildings; the oval was also used in the Old People’s Home of 1994 in Kumamoto, and the Yatsushiro Hire Station of 1995 in Kumamoto, to form the courtyards. Ito also preferred to use oval shape openings on the wall and roof.

Based on his exploration of the character of human being, Ito developed a new architectural concept in “Blurring Architecture”. When He discussed “blurring architecture”, he began with an analysis of the character of the human body and its relationship with the transparency and homogeneity of space in mechanistic modernism.

Our body consists of a strange inconsistency. We take our place in nature and society through the living experience of the body, but we long for autonomous independence from it. The body as living experience is insufficient to satisfied us, so we always carry within us another body that is trying to break out of the former. The desire to achieve liberation from the captivity of the concentric circles of house, village and environment is a ubiquitous preoccupation of persons who have become aware of the new era. ... Thus a transparent geometric room in the sense of Euclid appears as the desirable room, because the depiction of complete transparency and homogeneity symbolizes detachment from location and the infinite extent of time and space. [49]

Subsequently, Ito stated his discovery about the human body, based on his observation of people’s life and computer imagery in an electronic, information age.

Thus we are living in two completely disjoint cities: one city to which the living biological body adapts, and another city where the extended body produced by the electronic network is at

home. ...The display on the monitor screen is information from the outside, but also a projection from the inside. The boundary between outside and inside in relation to body becomes blurring, and if one were to attempt to define this boundary sharply, there arises the danger of encroaching on the boundary of the self. Conscious self-awareness, of which modern people are still certain, could become endangered and blurred. [50]

In relation to the new cognition of human body, Ito developed the concept of space - a space with "floating" character demanded by the body of electronic modernism, and invented the concept of "blurring architecture" to respond to this new concept of space. For Ito, "blurring architecture" is just an image of a kind of soft architecture. He believed it should present three essential elements: 1) an architecture with soft boundaries which can react in response to the natural environment, 2) an architecture transforming the programme in a room, 3) an architecture striving for transparency and homogeneity, but also making possible special features of the location [51].

4.2.4 Philosophical Thinking on the Relationship between Nature and Man

The West and East have different attitudes towards nature. Unlike western cultures, which consider nature changeable and controllable and try to bring nature under control, the eastern cultures see human beings as a part of nature and pursue for eventual unification of nature and man. This notion is very well reflected in classical Chinese and Japanese painting and architecture. Particularly in monochrome ink paintings, human figures are often illustrated with the same brush strokes as trees, rocks and mountains. Figures are also depicted in a natural scale, carefully related to landscapes, vividly representing a harmonized relationship between nature and human beings. Traditional Japanese housing features wood frame structure with full height sliding doors and removable exterior wall panels. This allows people to remove sliding doors or push exterior walls aside completely so that light and wind could pass through the building uninterruptedly. Both house and its inhabitants could communicate with the natural surrounding at their ease.

Ito took over this traditional notion and was always committed to bring nature into his architecture. Ito regarded natural light as the essential dimension of space and used it to define architectural space. He experimented with complicated interior lighting combinations, combining the natural and the artificial in his early projects, such as the White U of 1976 in Tokyo and the House of 1981 in Kasama. Complicated lighting became an important feature in his succeeding projects. In the "Tower of Winds" of 1986 in Yokohama, Ito used computer and electronic technology to visualize the invisible elements of nature -

wind and sound, thus extending the communication between nature, architecture and mankind.

“Open-space” is another important theme in Ito’s architectural design,

Fig. 4.25
Silver Hut, Tokyo.

Fig. 4.26
House in Magomezawa.

Fig. 4.27
S-house, Tateshina.

which establishes a connection between man, architecture and nature. In the Silver Hut of 1984 (Fig.4.25) in Tokyo, various spaces surround the complex and open to a courtyard, shaped by an arched steel frame and perforated aluminum sheets. All spaces in this house are partitioned to a minimum, mostly by translucent glass, perforated sheets, or steel frames. These semi-transparent membranes function as traditional fusuma and shoji paper walls and windows. In this manner, natural light and air could smoothly penetrate through the house, and sights from the inside go through luminous, transparent spaces to acquire an ambiguity of direction. The House of 1986 (Fig.4.26) in Magomezawa emphasized a contrast between two spaces: an enclosed cube in the concrete half buried below ground level; and an open space, roofed under a gently curved vault, held in place by a pair of steel-frames, and shaped by soft metal meshes. As a transition, this breezy open space smoothly links the house with the outside. The S-house of 1995 (Fig.4.27) in Tateshina is a distinctive design. It was built

on a gentle hillside, rising from an oval platform substructure. The form of the house is a segment of a ring that opens to surrounding trees. An oval opening in the centre of the platform allows a tree to grow through within the house, which interweaves the house with the natural environment.

Fig. 4.28
Elder People's Home, Yatsushiro.

In addition to the exterior transparent walls, Ito often adopted oval shaped openings on the roof to further generate the integration of architecture and nature in his public projects. The Elder People's Home of 1994 (Fig.4.28) in Yatsushiro is located on an artificial island. A huge flat roof covers the entire building, which establishes a harmony between the building and the extensive sense of scale that the site possesses. This roof is punched by four oval openings of different sizes to bring light, ventilation, rain and season changes into the interior. A sunny spot would emerge and move about with time inside the building. One can see clouds traveling across the sky framed inside the openings. A friendly human environment is provided to the elderly. A similar concept was developed in the Nagapka Lyric Hall of 1996 in Niigata, the Centre for Contemporary Art of 1999 in Italy, the Sendai Mediatheque of 2001 in Miyagi, and the Bank of International Settlement Extension Project in Switzerland designed in 1997. From the roof to

the ground floor, a series of oval openings on the roof and floors guide shafts of natural daylight down into the centre of the building.

Fig. 4.29
Guest House for Sapporo
Breweries, Hokkaido.

Fig. 4.30
Yatsushiro Municipal Museum,
Kumamoto.

Landscape and topology are other elements used in Ito's projects to integrate his architecture with nature. The Guest House for Sapporo Breweries of 1989 (Fig.4.29) in Hokkaido is mostly buried underground and smoothly merges into the surrounding topology. Only the metallic façade facing a concave internal plaza, a ventilating tower, and the canopy, make the appearance above ground. The Yatsushiro Municipal Museum of 1991 (Fig.4.30) in Kumamoto was built on a flat site. However, the ground level near the approach was raised to bury the largest permanent exhibition space. Looking from the front, the museum looks as if it were built on the top of a small grassy hill. This artificial landscape naturally reduces the scale of the building, thus creating a harmony between the museum and the surrounding traditional architecture.

In relation to the human body, which is part of nature and has mingled with nature, Ito developed the concept of architecture and nature merging in "Blurring Architecture".

The body perceived by living experience was not an autonomous entity separated from nature, but part of nature. The buildings and

cities demanded by this body were also part of nature, constituting a space without sharp delimitation with respect to nature. It was a space with an interface able to adapt flexibly to terrain, water, wind and other fluctuating aspects of nature. [52]

Ito started to seek inspiration from natural images in *The Transparent Forest of the City*.

Using a somewhat metaphorical manner of expression, construction of a building sometimes seemed to me like the task of depicting a forest. When devising a visualization of the building, I was less led by construction like a building, but more by natural things such as gardens, groves, forests or the course of water. These concepts are non-specific, but that may have been because I wanted an unbounded space instead of a space with clearly defined boundaries between inside and outside, as is the case for a real building. [53]

Fig. 4.31
Shimosuwa Municipal Museum, Nagano.

Fig. 4.32
"Mediatheque", Sendai.

The Shimosuwa National Museum of 1992 (Fig.4.31) was built beside the Suwa Lake. It has a linear configuration stretching along the gentle

curving shoreline. The longitudinally extended shape of the building is almost completely determined by the roof structure, which is covered with silvery aluminum panels. The aluminum panels serve as a mirror that reflects the shifting color of the lake and sky. Their constantly changing features provide the building with an ephemeral atmosphere as mists and rainbow. Moreover, the undulated form of the roof evokes an image of the ripples of waves, which melts the building into the beauty of the landscape. In the Sendai Mediatheque of 2001 (Fig.4.32) in Miyagi, a natural image was used in a more concrete manner. Building columns vividly present the image of a bunch of flowing seaweed. Along with transparent building skin and homogeneous space, this image fuses architecture and nature, and bridges the physical and virtual world. It is an attempt to realize “Blurring Architecture”.

The traditional belief and pursuit of the unification of nature and man enables Ito to always develop his architecture from environmental concepts and observations, such as urban life, consumption, and various flowing states. Therefore, he created a series of architectural themes and metaphors to reflect and respond to actual environmental concerns.

Ito is a traditionalist. However, he did not superficially take over the form of traditional architecture. His understanding of tradition was focused on traditional Japanese spiritual life, Zen. As a way of Japanese life, Zen enables one to regard each activity of daily life as a way to enlightenment. This has manifested

itself in various Japanese arts such as painting, calligraphy, garden design, swordsmanship, archery, Judo, serving tea, arranging flowers, and so on. Japanese explore various characteristics of Zen experience in these activities, and use them to train the human mind in order to bring the mind in contact with the ultimate reality [54]. Ito rooted himself in this tradition and regarded architectural design as a way of enlightenment. He summarized his philosophy and Zen experience in a series of themes and building metaphors as creative inspiration and was dedicated to express them in the form of architecture. Powerful articulation of Zen philosophy and experience in his contemporary architecture creates a unique atmosphere, which conveys spiritual richness in formal simplicity. It brings about a new meaning of architecture and gives it a humanized dimension.

The continuity of philosophical notions, such as time and change, naturalness and spontaneity, and the ultimate unification of nature and man, provide his contemporary architecture with traditional Japanese aesthetics. It could be perceived that Ito's architecture with high-tech appearances has rendered identical features with traditional Japanese architecture, such as lightness, flexibility, plain-detailing and a real sense of materials. By such design method and expressive means, Ito positioned his architecture at the juncture of traditional Japan and the information age, and revealed the eternal hidden in the ephemeral.

Ito's works have demonstrated that traditional spiritual content could be embodied in contemporary architecture, and could provide a unique experience

with the continuity of aesthetics. This achievement could harmonize the modern and the traditional, promoting a sense of self-identity.

4.3 Case Studies: “Tower of Winds” in Yokohama and “Mediatheque” in Sendai

4.3.1 “Tower of Winds” in Yokohama, Japan

The “Tower of Winds” (Fig. 4.33 – Fig. 4.35) of 1986 is a 21-metre high ventilation tower, situated in the centre of a roundabout, near the Yokohama train station. The cubic core of the tower is covered in synthetic mirror plates and encased in an oval cylinder formed by perforated aluminum panels. A set of 1280 mini-lamps, twelve bright-white and vertically arranged neon rings, and thirty floodlights, are positioned between these two layers. Thirty computers (twenty-four in the interior, and six in the exterior) control this complicated lighting system, enabling this structure to respond to nature’s surrounding invisible forces - air, wind, light and sound. The computers provide each kind of light with a

Fig. 4.33
“Tower of Winds”, Yokohama.

Fig. 4.34
“Tower of Winds”, Yokohama, Japan.

different capability. The neon rings react to changes of lighting intensity from the surroundings. The floodlights adjust their strength according to the direction and swiftness of the wind. The mini-lamps alternate their rhythm according to environmental sounds. At daytime, the perforated aluminum covering reflects dim silver, and appears as soft and light as a silk curtain floating in the air. In the evening dusk, when the lights are switched on, the invisible forces of nature that people could perceive are instantly transformed into visual information by electronic technology, working together to create the dynamic and aesthetic patterns within the tower. The varying light and its reflection by synthetic mirror plates shine through the perforations of the aluminum covering. Along with the change of intensity and strength of the lighting pattern, the perforated aluminum covering fades either in or out. This expression creates an evanescent atmosphere, conveying a melancholy emotion to passing beauty. This emotional response makes this lighting tower similar to a Japanese Zen landscape painting featuring mists, winds and mountains. For Ito, the evanescent effect depicts the reality of consumer culture in the present day. This brilliant electronic display of reflection on reflection as a kaleidoscope also contains ancient Zen meaning.

Fig. 4.35
"Tower of Winds", Yokohama,
Japan

Electronic technology could help heighten the human sense to grasp the invisible and transient forces of nature. That is precisely what Zen meditation pursues. By the extension of function and the continuity of aesthetics, the "Tower of Winds" conveys Japanese traditional spiritual life. It has become an interactive landmark of the city.

4.3.2 "Mediatheque" in Sendai, Japan

Ito regarded "Mediatheque" (Fig. 4.36 – Fig. 4.43) in Sendai as his most important work. It is a culmination of Ito's architectural notion of "building fictional and ephemeral architecture as a permanent entity" and a starting point of "blurring architecture".

Fig. 4.36
"Mediatheque", Sendai, Japan. Rendering.

Fig. 4.37
"Mediatheque", Sendai, Japan.

Mediatheque is located on a 42,500 square-foot lot in the heart of the city, standing at the north of a six-lane, tree-lined boulevard. Low-scale commercial buildings, gas stations, convenience stores, metered parking lots and houses surround the other three sides of the building. This 231,500 square-foot building allows visitors from every direction to enter on all four sides. Cars can park

underground and one hundred bicycles can be secured in a covered lot on the ground level just outside the west entrance.

Multiple functions are stacked on seven floors. The ground floor is filled with a café, a bookshop, and a centrally located 5000 square-foot open area, which can be enclosed and used for exhibitions or other presentations. The second floor is an information centre containing loosely designated areas for periodicals, internet-ready computers, administrative offices, and sections for

Fig. 4.38
"Mediatheque", Sendai, Japan. Plan.

children's books. The sections are simply separated by diaphanous curtains. The third floor is a library with a double-height atrium for casual seating and open

book stacks and a quiet study area at the north. The fourth floor is the reference section of the library, above a study area. The public can rent a series of small galleries on the fifth floor. The spaces on the sixth floor are reserved for professional exhibition and performances. At the top of the building is an audiovisual centre where visitors have access to computers, CD players and DVD monitors arranged in little groups around the floor perimeter. A 180-seat theater, a conference center and an administrative area all cluster together behind a curved glass partition in the centre of this floor.

In order to accomplish an architecture that is able to support all types of programs, Ito reduced Mediatheque to a simple building system consisting of three fundamental elements: columns, plates and skin [55]. They were developed into hollow tubes, honeycomb slabs and transparent or translucent exterior walls.

Fig. 4.39
“Mediatheque”, Sendai, Japan.

Visually, the most extraordinary feature of Mediatheque is its thirteen structural tubes that hold up the entire building. They are the antithesis of conventional solid-section columns. Inspired from bunches of seaweed floating in underwater currents, these tubes are of different shapes and are randomly placed. As they rise, the tubes contract and expand in width and their centre point slightly moved, thus tilting from one side to another as if they are undulating in water. The hollow tubes, seven to thirty feet in diameter, are composed of white steel pipes with five to ten inches in diameter, ringing along the tubes'

perimeters. In order to create fire separation zones, these hollow tubes that cut through floor plates are encased by glass. The pipes of the four tubes closest to the building's corners resist seismic forces, while those of the remaining tubes only carry vertical loads. From the roof to the basement, these tubes also circulate air, water, electricity, light and even people. Stairs and elevators are plugged into some tubes. Capped by rotating and reflective panels on the roof, two tubes in the middle help guide shafts of natural daylight down into the centre of the building. For Ito, the airy and fluid image of these tubes presents an electronic and natural flow, creating a field among the homogeneous state on the plates [56].

Fig. 4.40
“Mediatheque”, Sendai, Japan.

Fig. 4.41
“Mediatheque”, Sendai, Japan.

The building's floor plates are not consistent in thickness. They consist of two thin steel panels with ribbing in between and three inches of lightweight concrete on the top. These floor plates are only 650 mm thick, thinner than usual concrete plates as they span the same distance. The thinness of the plates visually enhances the continuity of tubes in elevation and the lightness of architecture. Due to the idiosyncratic design of each tube, the distribution of force

differs greatly where the plates meet the tubes. As a result, the internal thickness of plates varies and internal orthogonal ribbing is arranged in a radial pattern around the tubes. The construction process of this complicated structure involved hand cutting, bending, and welding of heavy metal components made off-site by architectural fabricators, ship builders and industrial steel makers, all of whom had benefited from Japanese technological and handcrafted construction traditions. For Ito, these plates are schematic presentations of various different media's forms of communication amongst humans, and between humans and things [57].

The building's east and north façades are composed of horizontal stripes of transparent and semi-transparent glass and metal. The west facade is completely obscure and covered by a lightweight metal, louvered screen, which conceals exit stairs racing up the side of the building and a concrete wall behind. The south facing façade, has two layers of clear glass with a three-foot wide air space between them, which insulates interior in winter and draws air up and out in the summer. This transparent façade is crucial to Ito's architectural concept. It opens the interior

Fig. 4.42
“Mediatheque”, Sendai, Japan.

Fig. 4.43
“Mediatheque”, Sendai, Japan.

space to the outside and reveals the whole drama inside to the people on the street. The roof, which is treated as the fifth façade, is decorated with a louvered metal screen.

The great openness of interior space is an important feature of the “Mediatheque”, which provides this building with maximum flexibility. Glass wall, movable curtains, and temporary panels are used where explicit separation is required instead of boxy rooms and fixed partitions. The hollow tubes consisting of pipes reduce the visual barriers to the minimum. They cut through the plates, diminishing the separation between the floors and connecting the views above and below.

The “Mediatheque” intensively presents a series of Ito’s architectural notions. Architecture was reduced to an essential building system. By thinning down the floor plates and dissolving the skin of architecture, the image of flowing seaweeds of the columns become the only expression of architecture, which makes this building become part of nature and merge into nature. The natural image of architecture conveys an “ephemeral” and “fictional” impression as a mirage “floating” in the urban space, thus enabling this building to stand in the physical and virtual world at the same time. Ito believes that, in this manner, the “Mediatheque” would become a place where the human body as an electronic fluid and the primitive human body, unite with nature and integrate into one [58]. Moreover, the image of flowing seaweeds conveys a sense of “flowing”, representing Ito’s perception of a “flowing” environment. In short, Ito’s flexible

and spontaneous gesture to design gives this architecture a poetic dimension and allows it to stand out from rational and rigid modern architecture.

Chapter V

Concept Design: Suzhou Commerce Exchange Centre

China has 31 administrative provinces, autonomous regions and municipalities, and 56 nations. Over 1.2 billion population consists of 56 nations. There are great variations throughout the country in terms of the local economy, natural condition, and regional tradition and culture. It is impossible and inappropriate to apply a single design criteria, structure and context to the high-rise buildings in the urban settings of China. However, a good design concept that delicately balances modern civilization and the traditional culture would help to remove constraints and provide more creativity and energy for high-rise buildings in the urban settings of China.

Based on the examinations of various design approaches of high-rise buildings and of Toyo Ito's unique works, a conceptual design of a high-rise building in a selected region of China has been developed. The architectural expression in this design concept is inspired by the distinctive Chinese spiritual life. Various aspects of the local traditional culture have been summarized into a series of architectural metaphors and themes to achieve creative inspirations. Such aspects include their emotions, attitude in life, ways of expression, aesthetic awareness, social and moral value. The design concept of this high-rise building complex attempts to translate the above cultural aspects into the contemporary architectural language.

is to address the local traditional culture. The original design concept (Fig. 5.1– Fig. 5.4) focuses on Chinese aesthetic appreciation - the scenery of moonlight and the profile of a pagoda - as a response to the local traditional culture. The final design approach is to engrave the profile of a pagoda on the facade of the high-rise building and to create a recessed circular shape on the building's top portion to symbolize the moon. However, this imitation could hardly evoke the emotions from the actual experience of the breathtaking real scenery. Therefore, this design approach has not achieved its architectural and aesthetic goals. Based on the investigation of the various aspects of this project, the author attempts to explore an alternative approach by using Wu culture to interpret the cultural heritage of Suzhou.

▪ **Geography and Climate**

Suzhou (Fig.5.5 - Fig.5.7) is one of the major cities of the Jiangsu province on the east coast of China. It is situated in the middle of the Yangtze delta in the lower end of the Yangtze River, and east of Tai lakes. Lying among the lush plains, the topography of Suzhou is mainly low-lying and gentle, and full of rivers and fertile soil. Situated at the north edge of a subtropical zone, with monsoon maritime climate, Suzhou's climate is humid but mild with sufficient sunshine

Fig. 5.5
Suzhou Map

throughout the year (annual average temperature is 15.7 degrees celcius). The advantages of natural conditions and resources such as fertile soil, plentiful water and a pleasant climate, bestows the city with picturesque sceneries and a rich agriculture. Suzhou is well known as “the land of fish and rice” in China with its abundant agricultural harvests and abundant lakes and rivers. Distinctive urban features such as ample rivers running through the city, numerous bridges, and the unique riverside habitations also give Suzhou the fame of the “Oriental Venice” [59].

Fig. 5.6
Natural Scenery in Suzhou Region

Fig. 5.7
Suzhou has the fame as “Oriental Venice”.

▪ History

Suzhou was built during the late spring and autumn period (514 B.C.) with a history of more than 2,500 years. Soon after its establishment, Suzhou became a political, economic and cultural centre in the southeast region of China. Suzhou

has remained affluent over a long period of time and has seldomly been ravaged by war. Throughout history, many famous literary figures, wealthy merchants and scholars who had resigned or were removed from office, regarded Suzhou as a joyful place to live. One after another, they built homes and gardens both inside and outside the city. These scholars and literary figures created a refined culture in the city, making Suzhou one of the most famous ancient cultural cities in China and the world [60].

▪ **Local Culture**

The traditional Chinese culture is rooted in three belief systems: Confucianism, Daoism and Buddhism. Confucianism is the most influential belief among the three and is widely accepted in the Chinese society. Regarded as a sound foundation for establishing a strong centralized government, Confucianism was chosen as the dominant school of thought among imperial officials from the Han dynasty (206 B.C.-220 A.D.). Confucianism intensively defines man's relationship to one another as well his relationship society. As a way of life for the Chinese people, Confucianism stabilizes and regulates people's daily life by a moral dimension with emphasis on one's obligations to family and society. For Confucianism, the family unit focuses on the ethical institution of kinship as the centre of man's relationship to one another. The definition of family is expanded to include the living members and those that are deceased as well as those from the future generations. The family cults generally known as ancestor worship, involves paying full respect and obedience to the ancestors [61]. Greatly

influenced by Confucianism, Chinese is more likely to be nostalgic and more concerned with the continuity of tradition and social responsibility.

Daoism, a Chinese philosophical and religious system, is the second most influential belief that has fostered part of the traditional Chinese culture. It emphasizes “naturalness” and “spontaneity”, and pursues harmony of all elements in existence, such as nature, heaven, earth and mankind. “Unification of Nature and Man” is Daoism’s canon. The pursuit of the balance of “Yin” and “Yang”, which represent opposites in the universe, is a fundamental goal in Daoism’s aesthetics. Under the influence of Daoism, Chinese holds nature in high esteem and associates the human moral with the beauty of nature [62].

Buddhism was imported from India around the first century A.D. and was adapted into the Chinese philosophy as an alternate deity.

Suzhou’s traditional culture belongs to the Wu culture, which is an important and distinct part of the Chinese civilization. It was fostered in the area of the Yangtze delta. Unlike the traditional cultures in North China, which concentrated mainly on Confucianism, the Wu culture was greatly influenced by Daoism. Especially in the Suzhou area, many scholars and officials, who had resigned or were removed from government, looked for the consolation and peace from Daoism, thus pursuing the beauty of nature. Mild climates, picturesque sceneries and the strong influence of Daoism provided the people in the Yangtze delta with gentle and exquisite characters. Their distinctive characters enabled them to create a refined Wu culture, which comprised of several aspects of life – poetry, literature, painting, calligraphy, traditional opera,

language, handicraft, furniture, architecture, gardens, food, drink, and folk customs. As an artistic manifestation of Daoism, the prominent features of the Wu culture are elegance, gracefulness, intangible flexibility, illusion and exquisite feelings [63]. All of these features are found in the rich and clean rhythm of the Wu poetry, the sweet and mellow tone of the Wu dialect, the slow-paced and lingering melody of Kunqu Opera, the crisp and delightful tune of ballad singing, the quaint and lively calligraphy, the delicate and elegant landscape painting (Fig.5.8) and silk embroideries, the simplistic and cursive engraving of artists' seals, the merry and vivid New Year's pictures of wood-block printing, etc. Compared with the architecture in other areas of China, Suzhou's traditional architecture (Fig.5.9) follows the natural sceneries in nature and shows slender, light, graceful forms and flexible space arrangements. Nature is the most significant theme for art in the Wu culture. The most prestigious artistic achievements are Suzhou's gardens (Fig.5.10). They were created to imitate and idealize mountains and water under the discipline of poetry and painting theories. All elements and features in the art of the Wu culture also display romantic charm and feminine beauty.

Fig. 5.8
Chinese classical painting with calligraphy emphasized mild and soft line and natural theme.

Fig. 5.9
Suzhou architecture has light, slim and grace form, and intensively use curled and flexible line. It was blended into natural environment.

Fig.5.10
Suzhou's gardens idealize natural mountains and water under the discipline of poetry and painting theory. It attempted to display extensive natural beauty in a limited space.

■ Project Site

Fig. 5.11
Site of Suzhou Commerce Exchange Center.

The selected site (Fig. 5.11 - Fig.5.12) is approximately 27,000 square meters (150 meters by 180 meters) and is located in a fast growing region, at a conjunction of the booming hi-tech district and the old city. The site is surrounded by wonderful natural and cultural features. The old Suzhou city is to the east, the Tiger Hill with pagodas is to the north, the He Mountain and the Hanshan Temple are to the northwest, and the Lion Mountain is to the southwest at a distance. As part of the urban planning, to the west of the site are the Baolianbin River, Baolianbin Road and Baolian Garden - several multi-story residential buildings. Located to the north and the east is a future site for several high-rise residential buildings. Being one of the city's traffic arteries, Ganjiang Road is south of the site. The Suzhou Commerce Exchange Centre is a multifunctional complex, consisting of four major divisions: the Centre of Futures Market, the Centre of Culture and entertainment, an office and hotel tower, and other service spaces

and facilities. Due to the particular location of the site - a conjunction between the hi-tech district and the old city, the architecture is expected to integrate the two modern and traditional worlds.

Fig. 5.12
Site of Suzhou Commerce Exchange Center.

5.2 New Concept Design

▪ Functional Zoning and Spatial Organization (Fig. 5.13)

The Centre of Futures Market is placed in the southeast corner of the site, adjacent to the city's traffic artery. This location allows for the most convenient access to the building. The offices and hotel are stacked to form a high-rise building, located to the north. This placement allows the design to contribute a spacious water garden to the south side of the site, and enables the complex to

smoothly weave into the urban fabric. The Centre of Culture and Entertainment is organized in a multistory building, spreading along the road to the north of the site, with a separate entrance at the northwest corner. Borrowing from the sceneries of the meandering Bailianbin River to the west, it would provide a pleasant environment to users. As the extension of the high-rise building, the Centre of Culture and Entertainment and the multistory subsidiary building facing the road to the east of site, employ smaller and fragmented scales, to visually ameliorate the conflict between the vertical expression of the high-rise building

Fig. 5.13
New Concept Design
Functional Zoning.

and its surroundings, and also help to define the city street. In the high-rise building, the first four floors above ground consist of boutiques, cafeteria, restaurants, and various other service spaces, which could also be accessed from the street side. The offices occupy from the fourth to the thirty-fifth floor. Above the garden in the air on the thirty-sixth floor is a twelve-story hotel. Featured bars and restaurants are placed in a semi-circular space on the top of the building. They provide a panoramic view of the city and its natural surroundings to visitors.

- **Circulation (Fig. 5.14)**

Fig. 5.14
New Concept Design
Circulation Organization.

The access to the complex is organized according to individual functions. In order to match its big-scale and important position in the local economy, the entrance of the Centre of Futures Market is located beside the city's traffic artery,

Ganjiang Road. The entrance of the office and hotel building is placed on the street level to the east, which could offset the rush hour traffic of Ganjiang Road and generate an unhurried access. People would enter the Centre of Culture and Entertainment from the road to the west and north of the site, a more convenient entrance for the neighboring residents. Located to southeast of the site, a natural water garden provides a buffer between the building complex and the city. It also ties each individual building together by providing a pleasant inner pedestrian path. In the high-rise building, vertical circulations by elevators and stairs are enclosed in two elliptical columns. On the ground floor, high-speed skip elevators in the east traffic core take the guests directly to the upper floors of the hotel, while the employees enter the offices through the west entrance.

- **Architectural Expression (Fig. 5.15)**

Fig. 5.15
New Concept Design
Architectural Expression.

The Architectural expression of the Suzhou Commerce Exchange Centre focuses on the aspects of spiritual life in Suzhou, which could be summarized as having a nostalgic atmosphere full of “exquisite” emotions, “graceful” and “flexible” gestures, and pursuing harmony and the beauty of nature. These spiritual references are represented by four architectural themes: 1) “small bridges, flowing rivers, with small boats”, which would evoke historical memories

of a unique and fine life style of the past, 2) “exquisite”, “graceful” and “flexible” attributes presenting people’s attitude to life, 3) “the beauty of nature”, which would embrace the canon of Daoism “Unification of Nature and Human”, and convey the people’s spiritual moral; and 4) Daoism’s aesthetic tenet of the balance of “Yin” and Yang”, a harmonious beauty.

Fig. 5.16
Concept of the Access to High-rise Building.

The scenario of “Small bridges, flowing rivers, with small boats -a major transportation tool” is expressed in the entrances to the high-rise building (Fig. 5.16). Areas of water are organized as a main theme responding to the important feature of the regional natural environment. Most of them take on shapes of

nature. Flowing water with winding shorelines flank the main access naturally leads people to the entrance of the high-rise building. At the bottom of the high-rise building, a three-story arch-shape opening allows the road and the water to run uninterrupted through as a bridge, and offers a glimpse of the remote scenery beyond on the inside – the Tiger Hill and the pagoda. The entrances of the high-rise building are placed at both sides of the arch. Along the road, a series of small tents in the colonnade under the roof of the Futures Market is inspired from an ancient form of black tents on local boats, while the two-story building to the east of the road responds to the small scales and rhythms of traditional houses side by side along the river in the old city of Suzhou. These abstract expressions are reminiscent of the traditional way of access in Suzhou.

Fig. 5.17
Rendering of Center of Futures Market

The theme of water is also manipulated in the design of the Futures Market (Fig. 5.17). Its roof displays a natural and free curve as if water is flowing down to the front of the entrance. It symbolizes the gathering of fortune in Chinese traditional culture. A blue reflective curtain wall interacts with the colonnade and a series of small tents, which would generate the prosperous atmosphere of the market on the water in the past. The flowing slot in the canopy casts light and shadow and is reflected in the quiet rectangular pool, presenting a harmony of soft and hard, free and constraint.

In order to convey “exquisite”, “graceful” and “flexible” qualities of architecture in high-rise building, the mass of the high-rise building is fragmented. Its architectural skin is also softened by gentle curves (Fig. 5.18). The big opening with the flowing shape defines the base of the high-rise building. In order to visually reduce the huge scale of a high-rise building, the upper portion of the building is further divided into three kinds of volumes by different curtain-wall systems and a green terrace in the air, all interweaved with each other. Below the green terrace, one concise volume with a

Fig. 5.18
Massing of the High-rise building.

waving curtain-wall subtly twists to the West, as a response to the movement of ground water and the Lion Mountain in the distance. Small water streams down along with the curtain wall from the green terrace and is recycled and pumped up at the bottom. It would reflect the solar light and cool the building in the summer. The mullions of the curtain wall generate mild and soft curves and reduce the stiffness of the architectural skin.

The other volume follows the composition of Chinese traditional high-rise structure, a pagoda. Visually, its vertical layered composition reduces the large volume of this portion, thus generating the harmony between tall building and its surroundings in scale. The traditional flying roof of a pagoda is simplified to two parallel horizontal cornices, which are stretched to the air. The common character between the old and the new is the light and thin quality. This volume meanderingly rises up and surpasses the green terrace to the top, which has kept the visual connection and completion of shaft. Enclosed by reflective glass and with a soft and mild outline, the top part of the building interacts with the clouds, thus merging into the air. A semi-circular space serving as restaurants and bars floats within the “clouds”. It is lit with various lighting schemes at night, like Luna in the sky and reveals the events inside.

The massing of the high-rise building is conceived as a Chinese traditional landscape painting (Fig. 5.19). A bridge, flowing water, architecture, and a mountain meanderingly going up, green trees, floating clouds and human being, all natural elements in the painting, are vertically organized into, and represented in, the architectural expression. Extensive use of transparent glass is both

Fig. 5.19
Concept for the Massing of High-rise Building.

conceived to melt the volume and to generate crystal effect. It is also intended to display two slender and sleek, elliptical tubes inside - the central traffic core, which locked the whole building into the ground. The line composition by cantilevered cornices and exposed columns is conceived to enhance a slim and graceful quality. Interweaving and shift of volumes have changed the spatial axis defined by two traffic cores, thus generating a degree of vertical and horizontal flexibility.

The design of the façades of the high-rise building (Fig. 5.20) emphasizes the balance of “Yin” and “Yang”, which is a tenet of Daoism aesthetics. The fixed building complex interacts with flowing water, floating clouds and animate landscape. The flexible building profile builds on rigid building grids. The sunny

façade generates optimal shadow. The shading façade receives brightness and green from the opening. The building solid also contains a great open space such as atriums and openings.

“Unification of Nature and Humankind”, as a canon of Daoism, is placed in the design of green terraces, islands and atriums (Fig. 5.21). There are two major green terraces in the high-rise building. One makes use of the roof of the peripheral building. The other green terrace is at the thirty-second floor between the offices and hotel, as a garden in the air. It also has defined the functional division. Four central atriums with natural lighting from the south are vertically organized in the office spaces. Each of the atriums with a respective natural theme is conceived as a gathering place full of foliage amongst people, and between people and nature. From each atrium floor, the green island breaks the constraint of architectural skin and extends to the outside. It brings natural elements and seasonal changes from the ground into the air. The internal space of the atriums is partly connected. Each of the plans of the atrium floors is developed in a different way, providing flexibility in the vertical spaces. Moreover, the great transparency and openness by intensive use of glass curtain walls, allows users to enjoy outside scenery and get plenty of natural lighting.

The modern expression of this complex is embodied in the openness and transparency of the spaces, abstract and concise form, and the use of modern architectural materials such as glass and sheet metal.

Fig. 5.20
Concept of the Façades of High-rise Building.
The East façade (upper, left).
The North façade (upper, right).
The South façade (below).

Fig. 5.21
Concept of Green Island and Four Atriums.

Chapter VI

Conclusion

Twenty years of “open door” policy have brought great progress to China. At the beginning of the 21st century, China made great strides into an information age, inevitably facing the phenomena of globalization. Globalization brings about great opportunities as well as challenges for China at all levels. It has accelerated the economic and technological development of China and impelled the modernization of Chinese society. In terms of architecture, a variety of contemporary architectural thoughts, theories, and practices from the outside have greatly influenced and updated the urban landscape of China. The import of advanced engineering technologies and new architectural materials has propelled the prosperity of its building industry.

On the other hand, globalization has a strong impact on individual cultural identity. This has brought about worldwide concern. One of the consequences of globalization in the building industry is that buildings with the same architectural expression, built by similar engineering technologies and materials, have quickly multiplied world wide. National and regional cultural identity tends to fade in the international trend of contemporary architecture. Maintaining national or regional cultural identity is very important, to bring a variety of cultures to the world. Furthermore, as a kind of cohesion power, cultural identity improves the harmony of society and enhances the stability of the nation as a whole. For these reasons, the preservation of cultural identity, while at the same time accepting outside

influences becomes one of the biggest challenges for contemporary China.

Contemporary Chinese architecture, as one of the key cultural representations, plays a key role in the preservation of cultural identity.

High-rise buildings as a symbol of the transformation of Chinese society have rapidly reshaped the urban skyline of China since the 1980's. Their significant and prominent position in the urban construction and development of China has attracted more and more attention and discussion on the preservation of unique Chinese cultural value in high-rise buildings. It has become one of the biggest challenges for contemporary Chinese architects. However, simply taking over the form of traditional architecture might lead to poverty of morphology and the stagnancy of design, and constrain the evolution of contemporary Chinese architecture.

China has over 4000 year's of civilization, which have fostered Chinese distinctive sensibility, emotion, custom and aesthetic awareness. Rich traditional culture presented a unique Chinese spiritual life. The spiritual contents nurtured traditional Chinese arts, such as literature, opera, painting, calligraphy, and architecture etc, and endowed them with distinctive aesthetic qualities.

In high-rise building design, the contents of Chinese spiritual life could be used as themes of architectural expression. These themes would be a fresh force to activate the originality of architecture. Expressing traditional Chinese spiritual life, and pursuing its aesthetics uniqueness by contemporary architectural language, in high-rise buildings, would allow the development of architectural forms and space to meet the change of Chinese social life, and

respond to the advances of science and technology. Such design method and expressive means would establish a harmony in contemporary Chinese high-rise buildings, balancing modern and traditional reference. The continuity of architectural aesthetics, which reflects and holds up traditional Chinese spiritual life, could ensure the cultural continuity and preserve Chinese self-identity. It would enable the high-rise buildings in the urban settings of China to eventually undertake their overall social responsibility.

Notes

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³ Ibid. 4.

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¹⁵ Ibid. 88.

¹⁶ Hasan-Uddin Khan, ed, “Hong Kong and Shanghai Bank,” MIMAR

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³³ Ibid. 8.

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³⁹ Ibid. 203.

⁴⁰ Koji Taki, “A Conversation with Toyo Ito,” Toyo Ito 1986-1995 (Madrid: El Croquis, S.L., 1994) 23.

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⁵⁰ Ibid. 56.

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