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# Experience-Oriented Design, Connected to Daily-Use Spaces

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**Zhaoming Wang** is a senior design director of CCDI Group and the chief architect of its Dongxiying Studio. He is one of the most important architects practicing in Chinese high-rise buildings and has completed landmark works such as Baidu Headquarters, the Tencent Building, and the Shenzhen Aerospace International Center in the past few years.

**Kui Zhuang** is a senior leader of the architecture design practice of CCDI. He has rich experience in creating, designing and managing large public buildings. He closely follows the modernization of the global architecture sector and is committed to using architectural design to create diversified value in the sophisticated urban context.

Figure 1. Baidu Headquarters (at center) is seen in the context of Shenzhen Bay Park, the "Silicon Valley of Shenzhen." © NBBJ

## Abstract

*This case study analyzes the creative concepts and technical details of the Baidu Headquarters. The south China building complex is headquarters to Internet giant, Baidu, and is one of the world's tallest office buildings for an Internet company, second only to Tencent Seafront Towers, also in Shenzhen. Upon undertaking the project, the design team realized the need to address the tremendous strain that might be placed on the city's population density. The team devised a solution that involved building a close link between users and nature, so as to relieve this tension. Critical to the concept was the exploration of novel approaches to space utilization in skyscrapers, which can mitigate the high density and isolating characteristics of these buildings, allowing occupiers to cope in a more systematic and effective way.*

**Keywords:** Headquarters, Urban Density, Connectivity, Active Spaces

## Background and Opportunities

After 30 years of rapid development in China, it is now customarily accepted that cities are changing with each passing day, as large influxes of people arrive. In 2018, there were more than 80 cities with a population of more than five million in China. In total, the population adds up to 700 million urban dwellers in China, which is close to the entirety of Europe. In Shenzhen Bay Park, an office development known as "the Silicon Valley of Shenzhen", there are some 500,000 workers and thousands of established companies. The strain on the land resources and the burgeoning of skyscrapers in the science and technology park have led to increasing density, posing enormous pressure on public transport and other urban infrastructure (see Figure 1). This is leading to an anxious and stressful atmosphere, which can have a negative impact on the work environment and productivity.

The origin of high-rise buildings can be traced back to the Industrial Revolution in the mid-19th century. Gradually, the development of the skyscraper as we know it – as a building that repetitively stacks floor plates – resulted from economic optimization exercises; it was the most efficient way to organize space on limited land. However, due to the conflict between the single-use spaces in high-rises, and the diverse needs of users, ascending to work in a confined space all day is no longer compatible with contemporary workplace trends. Outdoor spaces, both on the ground level and at height, can help to relieve the paradox of isolation and density that is the symptom of skyscraper efficiency. Humans fundamentally desire to ascend towards the skies, to extend our gaze toward nature, and to have freedom of movement. Regrettably, such desires are stifled in modern offices, as the work environment is often confined to similar, often monotonous office floors of the same height and dimensions. With the verticality of the working space reduced to the absolute minimum, even spaces with glass curtain walls can seem like cages, and even the best views cannot satisfy people's longing for communion with nature.

The design team has been researching this issue for almost 15 years. At the end of 2011, Baidu, operator of the predominant search engine in China, held a competition for the design of its regional headquarters in the Shenzhen Bay Park, which gave designers the opportunity to apply research findings to a real-life situation. The team began work with the belief that a workspace is deprived of possibilities and stripped of meaning once it is isolated from its context. The greatest challenge concerning high-rise office

buildings is how to effectively avoid their isolative tendencies without sacrificing their efficiency. The chosen response was to experiment with the idea of creating a continuum of scenes in vertical buildings, seeking a balance between the accessibility and versatility of spaces. This exploration must occur within the constraints of accepted codes and operational norms. The high profile of the client and the intensity of the site conditions increased the pressure, but also provided the opportunity to create an ideal paradigm for similar skyscrapers.

## A Unique Skygarden/Skystair System

The two towers of Baidu Headquarters are set to the eastern and western edges of the site, in a roughly "V"-shaped plan configuration, such that the towers, slightly off-set on their east-west axes, "open up" towards each other; this is reinforced at the ground level by curving podia that frame the center of the campus. This orientation was chosen to make maximum use of landscape resources and show the best faces of the buildings to the square (see Figure 2).

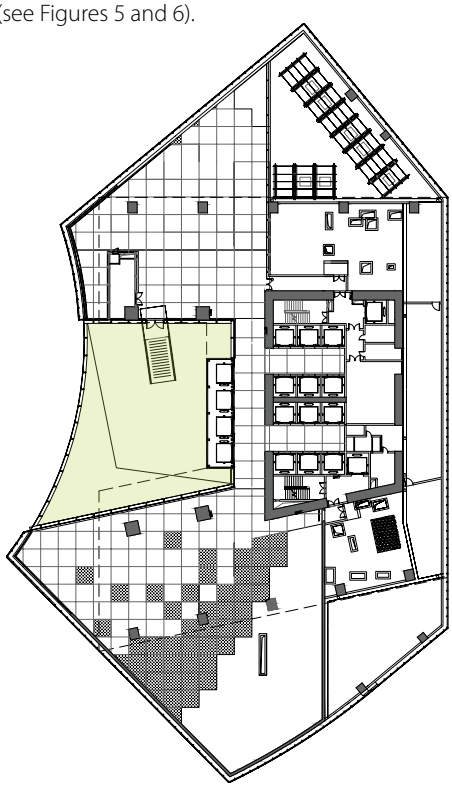
Based on previous research on the working model of Internet companies, and on previous design experience in designing Tencent Headquarters in 2006, the team proposed a bold and creative goal, which was to create a unique office building that would enable Baidu employees to walk out of their work areas for communion with nature at any time. This was extremely challenging to accomplish on a skyscraper that was planned to rise nearly 200 meters.

To reserve enough space to realize the idea, on the eastern building, the core was set to one side, creating a 12-by-18-meter trapezoidal skygarden on the opposite side, at an interval of every eight floors (see Figures 3 and 4). Each eight-floor notch is offset at the fourth floor, where the vertical enclosure overhangs two window frames' width on one side, and steps back the same width on the opposite side. This gives the otherwise regimented grid of the building

Figure 2. Baidu Headquarters directs its "zipper" façade toward an oval plaza, in the heart of Shenzhen Bay Park.

front the appearance of having a continuous "green zipper."

In the lower half of each four-story gap, exterior stairs bridge the gaps, thus minimizing the barriers between floors, as well as between the two wings of the building, appearing like laces on a boot, to carry the clothing metaphor forward one step further. The stairs provide places for short stays or breaks and for rapid access between business units. Employees can have short breaks or leisurely chats on these "social stairs" (see Figures 5 and 6).



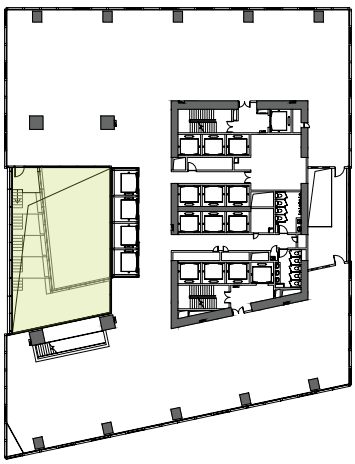
On one side of the stairs, there are troughs for green plants and a drainage system. Out of concern for safety, a 2.1-meter-high tempered and laminated glass guardrail lines each side to reduce the temptation to climb on the barriers, and to cut down on wind speed in exterior spaces, while ensuring a panoramic view. Through a computational fluid dynamics (CFD) simulation, the maximum typical wind speed of those exterior spaces is reduced to 1.5 meters per second, thus enabling longer stays.

The outdoor and indoor stairs surround the sky garden, enabling people to walk upstairs or downstairs. This also means that elevators are no longer the only means for people to travel from one floor to another, improving efficiency and providing opportunities for healthy walking when traveling only a few floors.

In addition to the "skystairs," atop the podium and throughout the fifth floor, there is additional landscaped area under shelter, further improving the supply of informal gathering space (see Figure 7). While planted and surfaced with wooden planks, it is minimally furnished and programmed. The architects believe that users themselves will endow new meanings and uses on the space if it is left relatively unprogrammed.

### Skystairs as structural supplements

Due to the concave design of the building's "V"-shaped plan, the floor plates take the



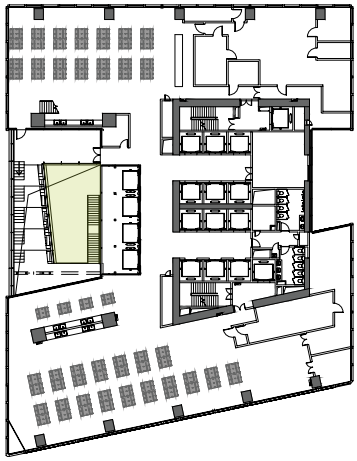


Figure 3. Three upper-level floor plans trace the relationship of the V-shaped building mass to the skygardens as the tower rises.

"Elevators are no longer the only means for people to travel from one floor to another, improving Baidu employees' efficiency and providing opportunities for healthy walking when traveling only a few floors."

Figure 4. A section perspective drawing shows the interaction between the social stair system, discussion spaces, and amenity floors.

shape of irregular quadrilaterals, and the eccentric core tube forms an unenclosed frame. The maximum span of the projecting wings is 26 meters, and these needed to be column-free in order to meet the client's spatial layout requirements. While this solved the problem of providing an open, welcoming and efficient workspace, this design move also presented a challenge to managing uneven stiffness distribution and torsion imbalance in the event of an earthquake. As cross-floor platforms require lateral stiffness, the architecture and engineering team used the outdoor stairs to act as support diagonals between floors, which interact with the landing platforms to form a force-transmitting tube. This helped to ensure a reasonable design of a structure with large spans, address problems such as irregular planes and an eccentric-core tube, while presenting a structurally rhythmic exterior appearance.

## Office Floors Supporting Efficiency and Communication

While inserting a skygarden into the notch between the two wings had the initial effect of reducing usable office space by 30% from what would be available in a more traditional layout, it created a vibrant core space in the void between the wings, which addresses the client's requirement that each department be well-connected to the other, physically and visually. Naturally, floor plan efficiency remained a prime requirement as well. To meet Baidu's need to differentiate office functions, the architects "thinned" the plan of the core tube that is traditionally at the center of an office floor plate. The standard floor was planned according to specific functions and the direction it faces. To the north and south, there is a 12-meter cantilever from the perimeter frame, which ensures the efficiency of the open office area, providing space for 160 desks. All the major supporting functions are designed around the core tube.

On the west side, the main access hall is closely connected to the vibrant core. As soon as one walks out of the elevator, one is

Figure 5. The social stairs land inside "discussion zones" on every fourth office floor.

Figure 6. Stairs provide recreation space and views, as well as alternate means of connecting floors.

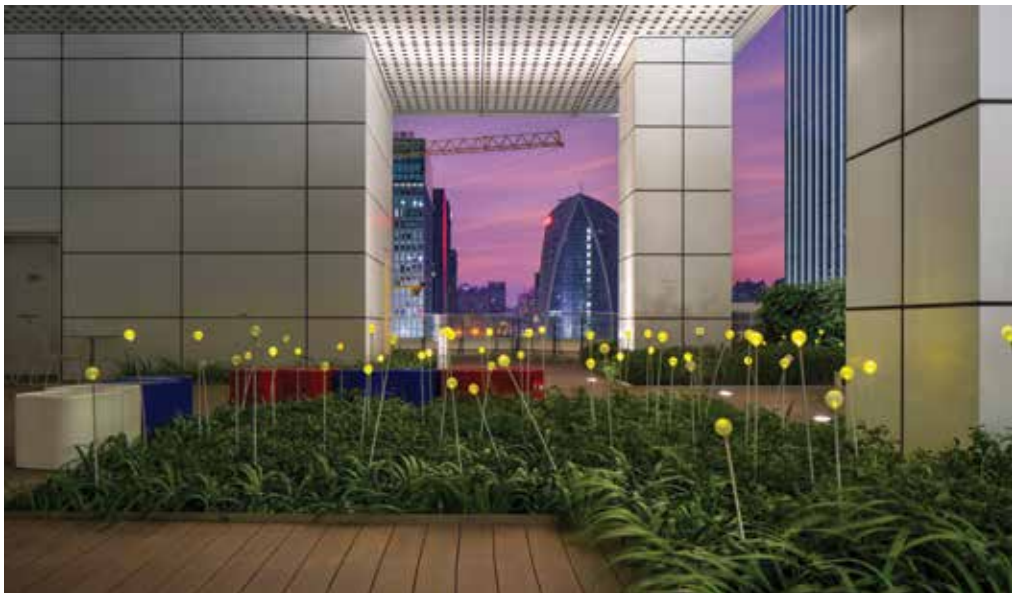


Figure 7. In addition to the "skystairs," atop the podium and throughout the fifth floor, there is additional landscaped area under shelter, further improving the supply of informal gathering space.

> “The stacked skygardens and exterior staircases give the otherwise regimented grid of the building façade the appearance of having a continuous ‘green zipper.’”

be greeted by a sunshine-filled sharing and exchange area, with the skystairs and outdoor spaces immediately visible (see Figure 8). Located just a stone’s throw away from the office area, the sharing and exchange areas (breakout spaces) are set off as independent, by a change of flooring to a polished wood, and communal seating. The architects intended to define the breakout spaces as part of the systematic link between floors. Though uniquely identifiable, there are no walls or other boundaries between the standard workspaces and breakout spaces, to encourage as much contact with the outdoor environment, and as many productive “collisions” as possible.

### Ventilated façade

The pixelated panel system on the building’s façades is an interpretation of ancient Chinese poetry into the binary codes that power the digital age, while also representing the client’s corporate temperament to the world (see Figure 9). The façade is made of aluminum alloy prefabricated members. The exterior side consists of a vertically-oriented, perforated ventilation panel. The interior side is designed with operable ventilation louvers, which provide outdoor fresh air to the interior, without the potentially visually marring effect that operable windows would have on an otherwise tidy and uniform façade (see Figure 10).

### Customized vertical transport system

Transport efficiency is a big concern when it comes to designing a skyscraper. In a typical case, the vertical transportation design optimizes for the capacity needed to transport people from the ground floor to the destination floor during peak hours. However, Baidu Headquarters presented some complicated challenges. Among these was the requirement that nearly 5,000 employees working in the building could have convenient accesses to canteens on the 4th, 14th and 29th floors, comprising 1,800 seats. Therefore, to design the elevators, the team needed to consider peak time traffic from the ground and from each office floor to any of the canteens.

The design team conducted a survey on how, where and when Baidu employees prefer to dine, and found that 85% use the company’s canteen, and that 70% of these chose to go to the canteen on the nearest floor. The survey also found that 80% of the employees working on any of the three floors above or below a canteen would be willing to walk downstairs or upstairs to the

Figure 8. An exchange area is located off the elevator lobby, with the skystairs and outdoor spaces immediately visible beyond.

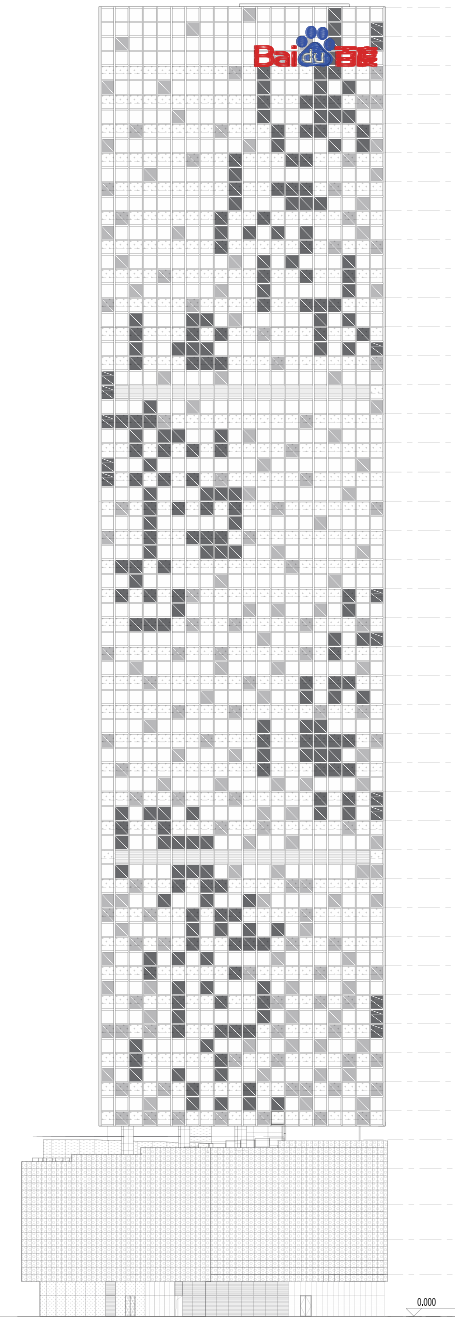


Figure 9. The pixelated façade is a reference both to Chinese poetry and to the digital realm.

canteen, while those further away would choose to wait for an elevator. Following this input, the team calculated the transport requirements to and from the canteen floors, and finalized the appropriate elevator design plan to meet the actual needs of the company.

## Diverse Amenities to Support Daily Needs

As a self-sufficient high-rise headquarters building, Baidu Headquarters has conference rooms on the 2nd, 15th and 27th floors, in addition to the three canteens, to meet the needs for mid-sized conferences and training programs. To use the conference rooms, employees can check which rooms are available on an internal online system and book one of them in advance. They are encouraged to use conference rooms on the floor that is the closest to them to improve utilization efficiency. On the first floor of the podium there is also an exhibition hall. On the second floor, there is an auditorium that can accommodate 400 people, in addition to an administrative services area. The third floor is occupied by the Internet Data Center. The canteen on the fourth floor is directly connected to the aforementioned garden on the fifth floor via the stairs. On the 14th floor, there is a gym and an elevated running track. The distribution of these amenities was carefully considered, both for circulation efficiency and convenience, to encourage employees to break away from their desks and refresh their minds and bodies.

## Thoughts on Future Design

Since their inception, skyscrapers have always been objects of fascination as well as expertly engineered machines of efficient production. No matter how urgent the need for efficiency, the external image of the skyscraper is a collective public possession, even if it is not possible for the average citizen to ascend to the top of every tall building in the city. Designers of these powerful symbols and urban concentrators should always remember their role as social observatories. Human behavior and technology develop in tandem; each informs the other. The idea of stacking office space represented a radical practice at the time of its introduction in the late 19th century, and has served its purpose for more than a century thereafter.

Figure 10. Operate ventilation louvers as seen from the interior.


Figure 11. The interface of the two wings with the skygardens and social stairs was made to reinforce the princiiple "efficiency meets experience."

The vision for the design of Baidu Headquarters was to take the high-rise office paradigm into the 21st century, by reconnecting workspaces with daily experiences and desire lines, fusing experience and efficiency by providing a design that could dynamically adapt to change (see Figure 11). Throughout the process, the team was more concerned with the evolutionary possibilities of these spaces than with creating an exquisite and inflexible construction. In the rapidly evolving context of urban China, the challenge of designing high-rise buildings is to examine the needs of the present, and to serve them. But equally, the design must be flexible enough to adapt to a future that always seems to arrive earlier than anticipated. ■

*Unless otherwise noted, all photography credits in this paper are to CCDI Group.*

## Project Data

**Completion Date:** 2017
**Height:** 189 meters
**Stories:** 43
**Total Area:** 75,994 square meters
**Primary Function:** Office
**Owner/Developer:** Baidu Group
**Architect:** CCDI Group
**Structural Engineer:** CCDI Group
**MEP Engineer:** CCDI Group
**Main Contractor:** China Construction Fourth Engineering Division Corp., Ltd.
**Other CTBUH Member Supplier:** China Construction Steel Structure Corporation (steel)