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The Three-Dimensional Urbanism of Raffles City Chongqing

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Christopher Mulvey, as Managing Director of Safdie Architects, works closely with Moshe Safdie and a core group of the firm's principals to lead the business management, strategic planning and operations of the global practice. With a strong background in both design and project management, Mulvey is a Managing Principal with a hands-on approach, highly aware and involved with all aspects of the practice. In 2011, Mulvey relocated to Shanghai to spend six years establishing and managing the Safdie Architects China offices, and led the initial phases of Raffles City Chongqing as the China Project Director.

Abstract

Resembling a fleet of sailing ships on the river, Raffles City Chongqing (RCCQ) symbolizes both the city's noble trading past and its future as one of China's largest economic centers. Located at the confluence of the Jialing and Yangtze Rivers, RCCQ is a vibrant mixed-use development situated at the apex of the city's peninsula. Occupying 9.2 hectares of land, the project includes eight "super structures," a retail podium with a multi-modal transit hub, and an entirely reconceived transportation system. Bridging across four of the development's towers is a nearly 300-meter-long enclosed skybridge, with more than 15,000 square meters of amenities.

Keywords: Mixed-Use, Skybridge, Urban Design

Introduction

While centuries old, Chongqing is experiencing unprecedented growth and regeneration that demands thoughtful solutions to increased density and mega-scale projects. It is a city unmatched in scale and population, but inherently humane. The undulating topography of the region creates intimate pockets of public space at many different elevations, overlooking one another and the city beyond. This three-dimensional urbanism is the defining characteristic of Chongqing, and has been embraced and perpetuated by the Raffles City Chongqing (RCCQ) mixed-use development. RCCQ is both intimately connected to the urban fabric of the city and an outlier—presenting a new kind of urbanism capable of dealing with increased density in a humane and considered manner.

Figure 1. The context for the Raffles City project is Chaotianmen Square, the converging point of the Jialing and Yangtze rivers. It was critical for the project to provide multi-layered, multi-modal transportation connections. © Safdie Architects

Diverse program elements are distributed across RCCQ's eight towers, designed to maximize access to daylight and provide unblocked views. Soaring above the park and retail galleria, the positioning of the towers follows the parcels established by the layout of the retail gallerias, thereby creating a series of "urban windows" that preserve vistas from the city through the project, to the rivers and the mountain ranges beyond.

Connection to the City

With no option of expanding the width or capacity of existing roads, or ability to add new roads to reach the project, integrating RCCQ into an already dense urban peninsula required a new, innovative traffic solution (see figures 1 and 2). Maximizing the use of

Figure 2. View of the eight-tower project from the south, with the retail podium and rooftop park visible at bottom. © Arch-Exist Photography

the riverfront roads, cars are allowed access to the development without burdening the upper city roads through new connections between the upper city and the river roads. The primary roads approaching the site are diverted around the project, connecting traffic from the upper city down to the riverfront roads that encircle the retail galleria. In the original position of these primary roads, pedestrian thoroughfares continue through the project, traverse the 30-meter elevation drop across the site, and stitch the city back to the historic Chaotianmen Plaza and the convergence of the Yangtze and Jialing Rivers (see Figure 3).

“The primary roads approaching the site are diverted around the project. Pedestrian thoroughfares replace these roads, traverse the 30-meter elevation drop across the site, and stitch the city back to the historic Chaotianmen Plaza.”

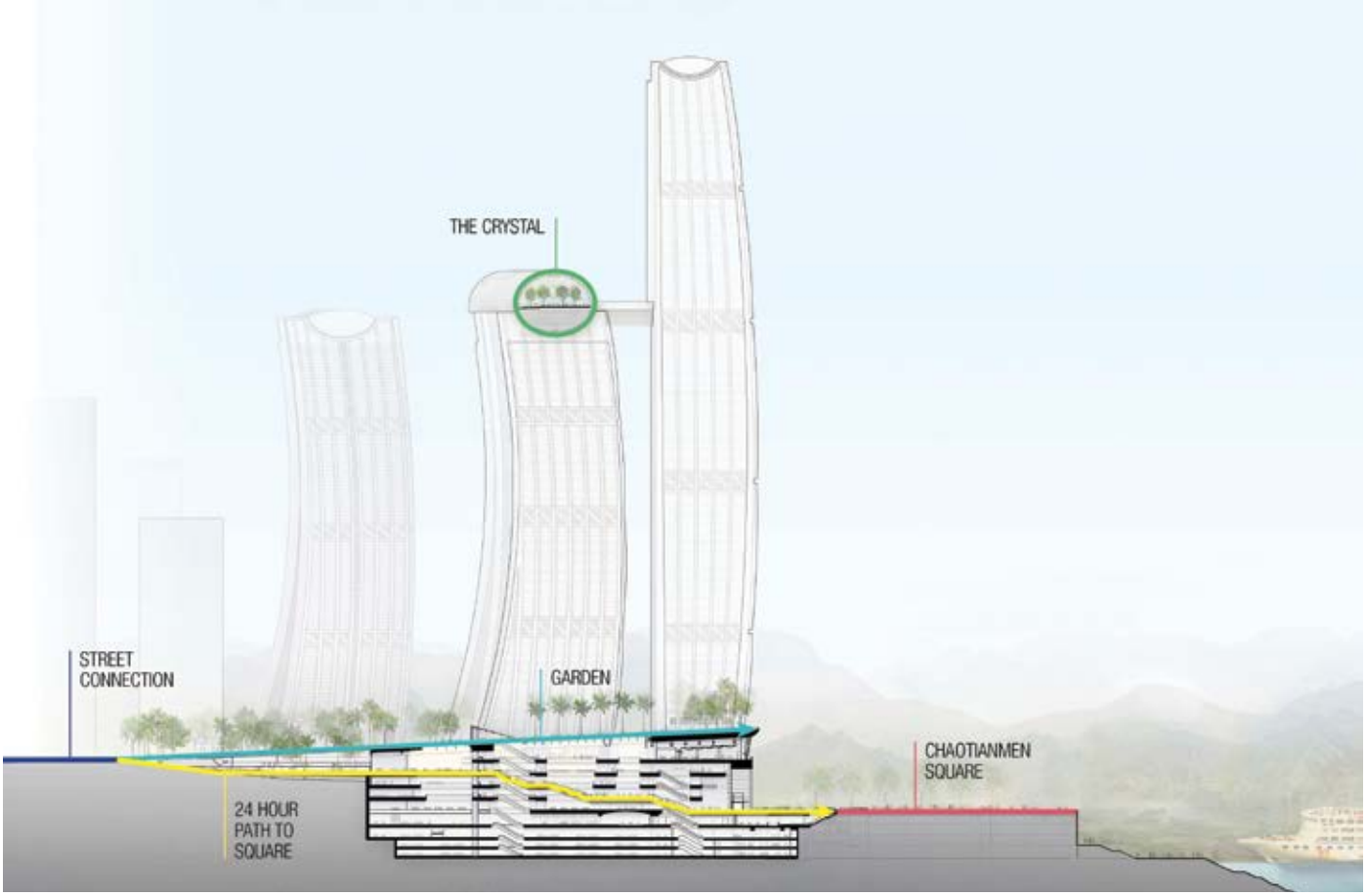

Figure 3. The project section incorporates a 30-meter level change from waterfront to city, with a 24-hour path provided through the podium. © Safdie Architects

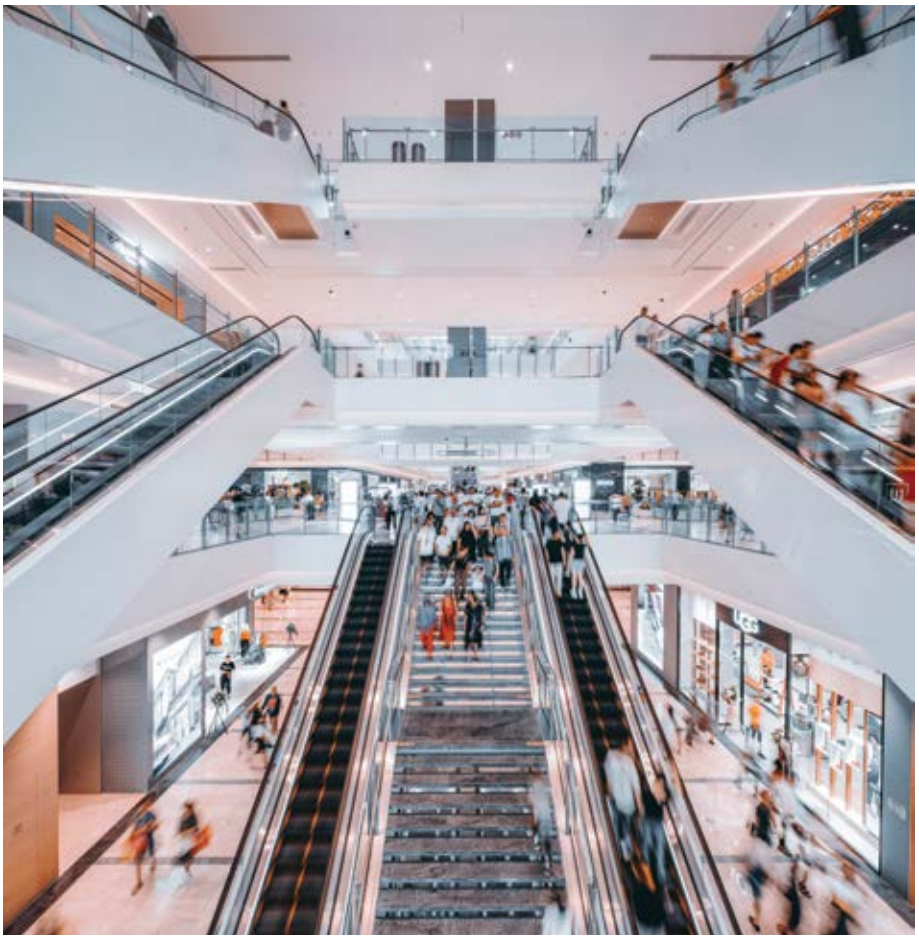

Figure 4. The central staircase of the retail podium is part of a public right-of-way through the project. © Courtesy of CapitaLand China

The elevation of the perimeter riverfront roads is one floor below the first retail level. In addition to providing drop-offs for the four residential towers, the riverfront roads are connected by a "through road" that is positioned directly below the northern east-west retail galleria. Directly accessible from the "through road" are five independent drop-off areas, each connecting to the main programs of the development—office, hotel, retail, serviced apartments and residences.

The five-story retail galleria was conceived as an extension of the city (see Figure 4). Located in one of the world's fastest-growing and densest cities, in an area scarce with public parks, RCCQ takes advantage of the topography of the city—the roof of the retail galleria is at the level of the district's higher-elevation streets—to provide over 45,000 square meters of green space, outdoor amenities and community gathering spaces within the heart of the city (see Figure 5).

The expansive public park and civic plaza showcase lushly landscaped gardens, a central cascading water feature, large-scale public sculptures by notable Chinese artists, and prominent event space

overlooking Chaotianmen Plaza. Private residential gardens feature terraces and infinity pools, with spectacular panoramic views towards the rivers below. Residential tower units include individual garden terraces—providing residents a rare opportunity for personal green space within the city.

Drawing inspiration from Chongqing's very unique "梯坎" or "stair terrace" characteristic, a 24-hour, publicly accessible grand staircase cascades through the five levels of the galleria to connect directly to Chaotianmen Square. The prominent and historically significant site was once home to the city's most important gateway and the imperial entrance to the city, Chaotianmen.

Even prior to its completion, RCCQ has been a catalyst for widespread revitalization in Chaotianmen district. A major part of the revitalization is the reconnection of the city to Chaotianmen Square, which was traditionally a famous downtown landmark, crowded with tourists, residents and shoppers. Prior to RCCQ, Chaotianmen Square had become increasingly underutilized and difficult to access, due to uncoordinated development in the surrounding area. Now, Chaotianmen Square can be accessed directly from RCCQ's retail podium and new multi-modal transit hub, including: metro, bus, and ferry terminals and over 3,000 new parking spaces. The square has once again become an extension of the city and a vibrant public space.

Towers

An ensemble of eight towers contains a mixture of office, residential, hotel and public amenities. The two northern towers, directly overlooking Chaotianmen Plaza and the convergence of the rivers, are the development's tallest, at more than 350 meters above the plaza. One contains luxury residential units, the other prime office space, up to the level of the glass-enclosed skybridge—"The Crystal"—where it transitions to a hotel. The four towers, which rise to a height of 256 meters and support The Crystal, include a dedicated office tower and an office/serviced apartment tower in the center—which are flanked symmetrically by residential towers. The two freestanding

Figure 5. The rooftop of the podium functions as a public park, providing a visual connection between city and waterfront. © Arch-Exist Photography

residential towers, each 235 meters in height, complete the prow-like arc (see Figure 6). The north side of the towers features a "sail" screen, curved to create a billowing effect, that provides uniformity to the façade and filters daylight for the residents and office workers.

Riverfront Site

The unique site location at the confluence of the two rivers, with a higher ground towards the South and generally poor soil conditions, presented major challenges during construction. Contending with the annual flooding season of July to September, when the basement levels would fall below the flood level, the construction team was limited to a period of nine months to demolish the existing riverfront roads (which acted as a natural flood barrier during excavation), complete the anti-slip piles, and build up the permanent basement flood walls. Submerged technology was required to carry out some of the piling to overcome water seepage issues, and a deep temporary retaining wall system had to be utilized to hold back the 40-meter high southern bank and the lowest basement level.

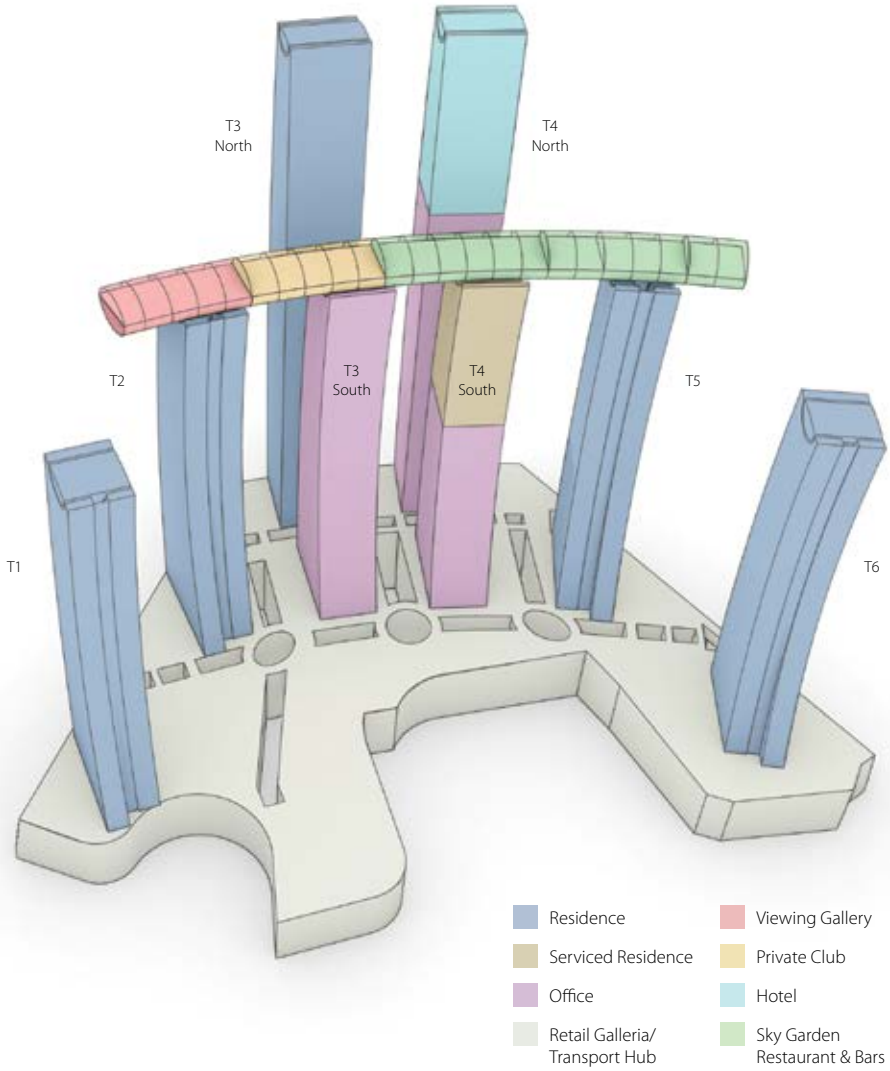

Figure 6. Program diagram of Raffles City Chongqing. © Safdie Architects

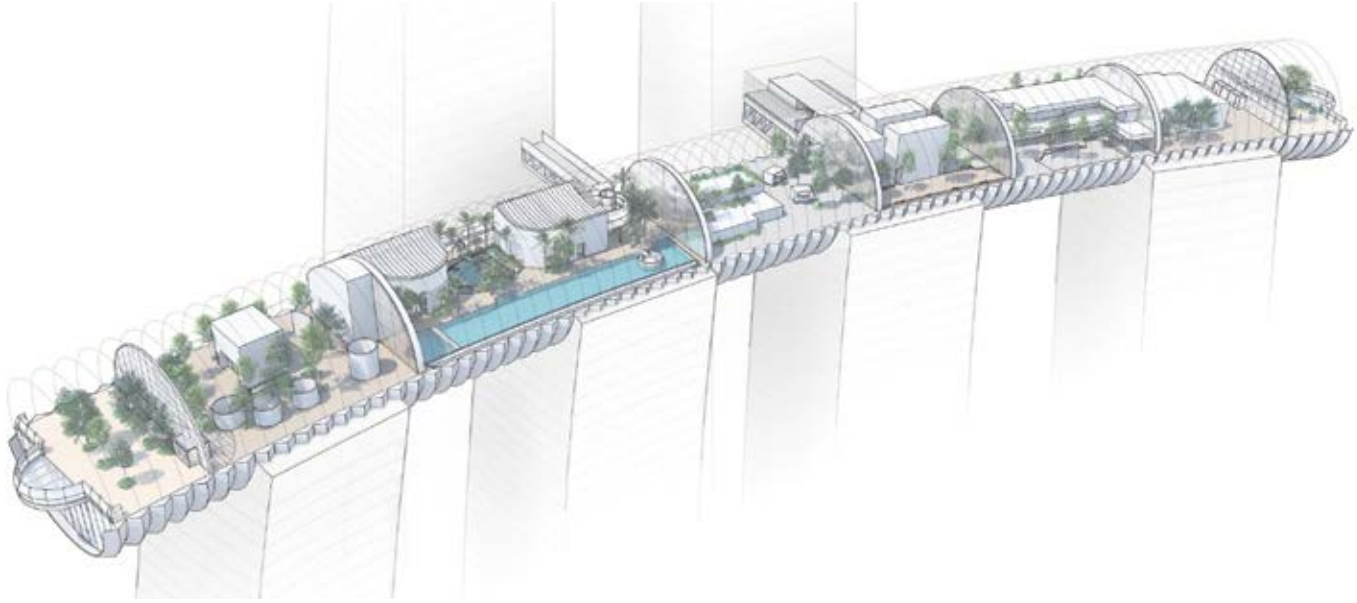

Figure 7. The Crystal skybridge incorporates, from left to right, a cantilevered, shaded observation deck with a glass bottom; a conservatory of trees; a clubhouse with gym and infinity pool; a plaza with food trucks, connecting to a skybridge containing a hotel lobby; several restaurants and lounges; and a second observatory and cantilevered deck. © Safdie Architects

Figure 8. The western end of The Crystal skybridge, showing the substantial trees and observation deck cantilevered off the top of Tower 2. © Courtesy of CapitaLand China

Figure 9. Patrons enjoy the view from the glass-bottomed western observation deck. © Arch-Exist Photography

Figure 10. View of the interior of The Crystal's public observatory. © Arch-Exist Photography

The Crystal

Beyond engaging the public at the street level, the development also draws the public into the highest levels of the project offering an array of public spaces within The Crystal's observatory garden and viewing platform. The Crystal, a nearly-300 meter-long "horizontal skyscraper" stretching across four of the development's eight towers, houses 15,000 square meters of facilities, including gardens, restaurants and bars, event spaces, a residential clubhouse, infinity pool, hotel lobby and public observatory with unobstructed views of the confluence of the rivers through a glass-bottomed, open-air viewing deck (see figures 7 through 10).

Made up of a continuous steel structure weighing 12,000 tons (equivalent to that which supports the Eiffel Tower), enclosed with a "concertina" curtain wall comprised of roughly 3,000 glass panels and close to 5,000 aluminum panels, the construction of The Crystal was a formidable challenge. The feat lay not just in the technical nature and precision of the construction, but also in planning and executing the logistics in such detail that critical works could meet all project targets, all within a severely constrained site.

Figure 11. View of the "concertina" shell of The Crystal skybridge under construction, after the supporting truss had been jacked into place. © Safdie Architects

Figure 12. Glass panels are affixed to the arch atop The Crystal skybridge. © Safdie Architects

The Crystal was divided into nine segments, assembled concurrently for efficiency. To avoid installation of the curtain-wall underbelly at height, the system was pre-assembled on the podium roof, for both safety and ease of construction. The segments between the towers were individually lifted by hydraulic jacks to their final positions (see figures 11 and 12).

Simultaneously, as the façade was being closed, 110 trees (some as high as 9 meters) that had been acclimatized in a nursery on the city outskirts of Chongqing for over a year, were hoisted and transplanted into the Conservatory portion of the skybridge (see Figure 13).

Sustainability

A development the size of Raffles City Chongqing required that sustainability be addressed at an urban scale. The integration of comprehensive green development solutions and sustainable practices as a core part of the design solution included strategies for water efficiency, energy optimization, material resources and indoor air quality.

The project incorporated integrated rainwater management to reduce storm water runoff by 25 percent, thereby minimizing impact to natural hydrology. To assure energy efficiency, the building management system (BMS) monitors and controls equipment, further reducing energy consumption. The project also implemented large temperature-difference chilled water loops, HVAC heat recovery and demand-control ventilation.

The district cooling and heating system, RCCQ's key energy-saving tool, services an area of 1.6 million square meters (hotel, serviced apartments, office and retail) with air conditioning.

Delivered via an integrated underground pipe network, the system achieves energy cost savings of about 50 percent against standard chiller systems. In the long run, this will generate about SGD 30 million (USD 21.5 million) in utility cost savings over 20 years—which will in turn benefit RCCQ tenants.

To improve the environmental quality, the project's minimum-efficiency reporting value (MERV)-13 filters have reduced PM2.5

induction by 75 to 90 percent. Additionally, with an effective construction management strategy, RCCQ managed to reduce construction waste by more than 75 percent against a conventional approach, adopted over 20 percent recycled-content materials and utilized 30 percent regional material.

Conclusion

Delivered in a single phase in only eight years, the size, scale and complexity of the development is a staggering example of construction ingenuity and exceptional design. With a total investment of RMB24 billion (USD 3.4 billion) and a construction floor area of 1.1 million square meters, the development is also CapitaLand's largest Raffles City development to date.

By addressing the specificities of local climate and integrating historically grounded cornerstones of community—park, street and piazza—into a continuum of public experience in three dimensions, the urbanism of RCCQ creates communities, fosters engagement and connections not previously achievable in dense urban centers. It posits a new urban vision to enhance the quality of life for the rapidly densifying 21st-century world. ■

Project Data

Completion Date: 2020
Height: Tower 1, 234.5 m
Tower 2, 255.6 m
Tower 3 North, 354.5 m
Tower 3 South, 255.6 m
Tower 4 North, 354.5 m
Tower 4 South, 255.6 m
Tower 5, 255.6 m
Tower 6, 234.5 m
Stories: Tower 1, 58, 3 below
Tower 2, 57, 3 below
Tower 3 North, 79, 3 below
Tower 3 South, 48, 3 below
Tower 4 North, 79, 3 below
Tower 4 South, 51, 3 below
Tower 5, 58, 3 below
Tower 6, 58, 3 below
Total Ground Area: 92,000 m^2
Total Floor Area: 1.1 million m^2
Primary Functions: T1, T2, T3N, T5, T6: Residential, Retail; T3S: Office, Retail; T4N, T4S: Hotel, Office, Retail
Owner/Developer: CapitaLand Limited
Architects: Safdie Architects (design); Chongqing Architecture and Design Institute (architect of record); P & T Group (architect of record)
Structural Engineers: Arup (design); Chongqing Architecture and Design Institute (engineer of record)
MEP Engineers: WSP (design); P & T Group (engineer of record)
Main Contractors: China Construction Eighth Engineering Division; China Construction Third Engineering Bureau Co., Ltd.
Other CTBUH Member Consultants: ALT Limited (façade); Arup (civil, fire, geotechnical, LEED, sustainability); Brandston Partnership, Inc. (lighting); CL3 Architects Ltd (interiors); Rider Levett Bucknall (cost, quantity surveyor); RWDI (wind); Safdie Architects (interiors);
Other CTBUH Member Material Suppliers: Jotun (paint/coating); KONE (elevator)

Figure 13.More than 100 trees were planted in The Crystal, including these alongside the infinity pool.
© Safdie Architects

> "As the façade was being closed, 110 trees (some as high as 9 meters) that had been acclimatized in a nursery on outskirts of Chongqing for over a year, were hoisted and transplanted into the Conservatory portion of the skybridge."