

The World's Highest Pools: A Deep Dive



S. Isaac Work



Shawn Ursini

Authors

S. Isaac Work, Building Data Analyst
Shawn Ursini, Skyscraper Database Editor
Council on Tall Buildings and Urban Habitat
The Monroe Building
104 South Michigan Avenue, Suite 620
Chicago, IL 60603
United States
t: +1 312 283 5712
e: iwork@ctbuh.org
ctbuh.org

S. Isaac Work is a building data analyst at the CTBUH headquarters. Isaac holds a B.A. in Public Policy and a Master of Public Administration, both from the University of Illinois at Chicago. He also holds a graduate certificate in Geospatial Analysis and Visualization (GSAV). Commensurate with his academic background, he brings experience in urban design, geographic information systems, graphic design, and in-depth research capabilities to CTBUH's Research and Thought Leadership team.

Shawn Ursini serves as a contributor and editor for the CTBUH database. Ursini is a native of the Chicago area and has long held a strong interest in the built environment. He received a B.A. in Architecture from the University of Illinois at Chicago with a minor in Art History focusing on architectural and urban history. Concurrent with his studies, Ursini was also gaining experience in municipal government through interning with the City of Chicago's Department of Buildings, Department of Planning & Development as well as the office of a Chicago Alderman. Ursini continued his education at UIC, earning a Masters of Urban Planning and Policy with a dual concentration focusing on Physical Planning and Urban Transportation. For the last two decades, Ursini has also served as a tour guide explaining Chicago's architecture.

Abstract

Tall building design has diversified and adapted to accommodate increased demand for distinctive amenities at a range of heights. Swimming pools are a classic feature of luxury buildings that provide the user a unique way to engage with the building's program. This study examined all 200 of the world's "supertall" buildings currently in existence—those at or above 300 meters in height. Incredibly, 108 (54 percent) of these buildings include a pool feature in some form. Pools have been classified in this paper by their height within the buildings, location, and certain design features. As a result of this research, CTBUH recently formalized a definition of "infinity pool" which introduces a new dimension to pool typologies and provides another analytical element through which to evaluate pool design. This research was conducted with the support of the CTBUH Height and Data Committee, and Al Ain Holdings.

Keywords: height, infinity pool, supertall, swimming pool

Introduction

The Council on Tall Buildings and Urban Habitat (CTBUH) is internationally recognized as the arbiter for bestowing building height designations. Other deliberative bodies that recognize record-breaking buildings, such as the Guinness World Records, refer to CTBUH when conferring such titles. This report and its related data study (see Tall Buildings in Numbers, page 52) offer the industry thorough insights into the relationship between pools and height within the tall building ecosystem.

Highest Pools in the World

Because of their recreational use and the marketing benefit of this, high pools are quite a distinction for any supertall building. Although 104 of the world's 108 pools within supertall buildings have been built since 1999, the title of World's Highest Pool has only shifted twice in that time: [Jin Mao Tower](#), Shanghai (pool at 213.8 meters) ceded to [Shanghai World Financial Center](#) (pool at 364.3 meters) in 2008, and then again to [International Commerce Centre](#), Hong Kong (pool at 468.8 meters) in 2010. International Commerce Centre is only the

fourth titleholder since the first swimming pool in a supertall building was completed at [875 North Michigan](#), Chicago, in 1969.

As of 1 February 2022, when this study was undertaken, the highest pools in the world were as follows (see Table 1):

- The Highest Pool in the World is an indoor overflow pool at [International Commerce Centre](#) (Hong Kong), 468.8 meters above grade (see Figure 1),
- The Highest Outdoor Pool is at [Guangxi China Resources Tower](#) (Nanning), 323.1 meters above grade.
- The Highest Outdoor Overflow Pool is atop [SLS Dubai](#), 317.4 meters above grade.
- The Highest Infinity Pool is atop [The Address Beach Resort](#) (Dubai), 294.5 meters above grade (see Figure 2).
- The Highest Pool in an All-Office Building is a standard indoor pool at [Poly Pazhou C2](#) (Guangzhou), 32 meters above grade.
- The Highest Pool in an All-Residential Building is a standard indoor pool at [Burj Mohammad bin Rashid](#) (Abu Dhabi), 337.6 meters above grade.
- The Highest Pool in Europe is a standard indoor pool at [Eurasia Tower](#) (Moscow), 212.5 meters above grade.

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- The Highest Pool in North America is an indoor overflow pool at [Comcast Technology Center](#) (Philadelphia), 252.3 meters above grade.
- The Highest Pool in Oceania is an indoor overflow pool at [Australia 108](#) (Melbourne), 235.0 meters above grade.

Defining Pools in Supertall Buildings

The typology of pools created by CTBUH for this study began with an overall evaluation

“Since 1969, only four buildings have held the ‘World’s Highest Pool’ title: 875 North Michigan, Chicago (1969); Jin Mao Tower, Shanghai (1999); Shanghai World Financial Center (2008); and International Commerce Centre, Hong Kong (2010).”



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Figure 1. The world’s highest pool is at the International Commerce Centre, Hong Kong, 484 meters. The indoor overflow pool is part of the Ritz-Carlton Hong Kong and is located on the 107th floor, is 468.8 meters above grade.

Title	Building	Location	Overall Rank	Regional Rank	Building Height (m)	Pool Height (m)	Pool Type
Highest Pool	International Commerce Centre	Hong Kong	1	1	484.0	468.8	Indoor Overflow
Highest Outdoor Pool	Guangxi China Resources Tower	Nanning	11	9	402.7	323.1	Outdoor Standard
Highest Outdoor Overflow Pool	SLS Dubai	Dubai	14	3	336.0	317.4	Outdoor Overflow
Highest Infinity Pool	The Address Beach Resort	Dubai	20	4	301.0	294.5	Outdoor Infinity
Highest Pool in an All-Office Building	Poly Pazhou C2	Guangzhou	66	40	311.0	32.0	Indoor Standard
Highest Pool in an All-Residential Building	Burj Mohammad bin Rashid	Abu Dhabi	9	2	381.2	337.6	Indoor Standard
Highest Pool in Europe	Eurasia Tower	Moscow	43	1	308.9	212.5	Indoor Standard
Highest Pool in North America	Comcast Technology Center	Philadelphia	31	1	339.1	252.3	Indoor Overflow
Highest Pool in Oceania	Australia 108	Melbourne	37	1	316.7	235.0	Indoor Overflow

Table 1. “Highest Pool” titles conferred to buildings based on edge design and region as of 1 February 2022.



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Figure 2. The world's highest infinity pool at The Address Beach Resort, Dubai, 294.5 meters above grade, offers panoramic views of Dubai and the Persian Gulf.

of the world's supertall buildings. A supertall building is 300 or more meters in height as measured from the base (per the official [CTBUH Height Criteria](#)). To be classified as a swimming pool in a supertall building, the pool must meet these conditions:

1. Must be functionally designed and used for recreation.
2. Must be originally designed for use by a wider group of people, i.e. not located within a private residence.
3. Must be accessible through vertical circulation within a single, self-contained building, or be accessible through a direct horizontal connection from an adjacent building.

Furthermore, pools have been classified as "indoor" or "outdoor," based on where greater than 50 percent of the pool's surface area was located, if the single pool had both an indoor and outdoor aspect. Open-air pools with a canopy or other cover were classified as outdoor pools. Pool edge design was the final characteristic considered, and was officially defined by the CTBUH Height and Data Committee.

Height and Data Committee Findings

The CTBUH Height and Data Committee convened on 15 February 2022 to review the

current definitions of pools in tall buildings. A thorough review of case studies, imagery, and technical drawings was presented to the Committee. Definitions of "infinity pool," derived from common dictionaries, were considered for overlapping or contradictory language. The Committee examined specific building case studies, including The Address Beach Resort, Dubai; SLS Dubai; [Marina Bay Sands](#), Singapore; International Commerce Centre, Hong Kong; and [Zhuhai Tower](#), Zhuhai. The cross-referencing of existing definitions, common pool typologies, photographs, and building drawings ensured an unbiased methodology for constructing a universal definition of the infinity pool.

Following a complete review of these materials, the Committee unanimously agreed to the following definitions and criteria:

- An "Infinity Pool" is an outdoor swimming pool with a continual edge over which water flows, with no building element impacting the view beyond that edge, such that the water appears to extend beyond the building.
- An "Overflow Pool" is a swimming pool (which may be indoors or outdoors), with an edge over which water flows.
- An Infinity Pool is thus a special type of Overflow Pool.
- The height of the pool is taken from the base of the building to finished floor level

(FFL) of the floor on which the pool is located (per CTBUH Height Criteria).

Evaluation of Supertall Buildings with Pools

The intent of the research was to amalgamate all available data on pools in supertall buildings and to identify those of distinction. Instead of measuring from grade to the water level of each pool, which fluctuates, their height was determined by investigating the FFL of the floor containing said pool, using original drawings and other data points. The floor height above ground was based on CTBUH's Height Criteria for measurement. This consistent standard, applied across all evaluated buildings, ensured data integrity, accounting for the minutiae of pool water levels and recirculation designs.

Through a thorough evaluation of drawings, building information, and communications with building designers and managers, all 200 of the world's supertall buildings (at the time of this research study) were evaluated for the existence and characteristics of pools. Of these 200 buildings, 108 (54 percent) contain at least one pool, and 31 (15.5 percent) have multiple pools. More pools were located indoors (66, or 61.1 percent) compared to outdoors (42, or 38.9 percent); however, 15 buildings (13.9 percent) had at

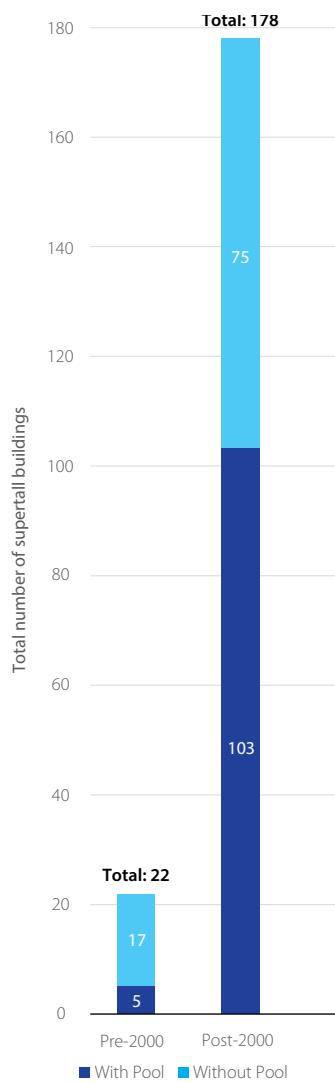


Figure 3. Cumulative supertall completions with and without pools, pre- and post-2000.

least one of each. Three buildings had multiple indoor pools, and 15 buildings had multiple outdoor pools. In buildings with more than one pool, only the highest pool was taken into consideration for comparative height analysis. Satellite imagery was used in some cases to assess each property for an outdoor pool, and to identify functions that would indicate the likelihood of an indoor pool, such as a high-level hotel.

The world's first supertall building with a pool was Chicago's 875 North Michigan Avenue (formerly John Hancock Center), built in 1969. On the building's 44th floor, 875 North Michigan features a sky lobby with a grocery

	Mixed-Use	Residential	Hotel	Office
Asia	38.9%	3.7%	0.9%	0.9%
Middle East	12.0%	12.0%	11.1%	1.9%
Europe	3.7%	1.9%	0	0
North America	7.4%	3.7%	0	0
Oceania	0	1.9%	0	0

Table 2. The chances that a given supertall building will have a swimming pool within the above categories. The most likely probability is a mixed-use building in Asia, followed by a mixed-use or residential building in the Middle East.



Figure 4. Total number of supertall buildings with and without pools, 1969 to 2021.

store, postal facility, a swimming pool, and other amenities. Coincidentally, 875 North Michigan was also the world's first mixed-use supertall building, a title held until 1996.

Before 2000, only two of 22 (9 percent) supertall buildings did not have any office space, and just five of the 22 (23 percent) of those have swimming pools. Since 2000, 68 of 178 (38 percent) supertall buildings completed have not had office space. Of these 178 buildings, 103 (58 percent) feature swimming pools (see figures 3 and 4).

A strong correlation exists between the shift away from office-only supertall buildings and their inclusion of swimming pools since the year 2000. A given supertall office-only project today is only 2.8 percent likely to include a pool, versus 62.1 percent for mixed-use, 23.1 percent for residential, and 12 percent for hotel supertalls (Table 2).

By Region

The data reveal significant clustering of pools in Asia (55 buildings, or 51 percent); of these,

44 (41 percent) are in China alone. Not far behind, the Middle East has 33 of the 108 supertall buildings with pools, of which 30, or 28 percent, are in the United Arab Emirates alone. Together, China and the United Arab Emirates alone account for 76 of the world's 108 supertall buildings with pools (69 percent). These two countries also account for 133, or 67 percent, of all 200 supertall buildings worldwide.

Of all pools evaluated, none located within 22.1 degrees of the Equator were indoors. As shown in Figure 5, the average pool in a supertall building is 29.9 degrees latitude from the Equator, although that figure is heavily weighted by the concentration of pools in China and the United Arab Emirates.

Interestingly, the northernmost pool in a supertall building is an outdoor pool at [NEVA Towers 2](#) in Moscow at latitude 55.8 degrees North, where average temperatures range from -8 to 20 degrees Celsius throughout the year. The only comparable pool in this dataset is at [The St. Regis Chicago](#), where an

outdoor pool sits at 58.8 meters above grade in a notoriously cold climate at 41.9 degrees North (see Figure 6).

By Function

In this dataset, 73 of 108 supertalls with pools are mixed-use projects, although this fact does not reveal the full spectrum of functions. When mixed-use projects were broken down by use, the hotel function was the most prevalent in 67 of 73 buildings with pools. Only four all-office supertall buildings

featured pools; however, 52 of 73 mixed-use projects with pools contained office space. Twenty-four of 26 all-residential supertall buildings had a pool, as did 24 of the 73 mixed-use projects that had a residential function; the highest all-residential supertall building with a pool is at 337.6 meters above grade in Abu Dhabi's Burj Mohammad bin Rashid (see Figure 7).

All-office supertall buildings are the most likely to not include a pool, and the

mixed-use supertall is the most prevalent supertall typology in the industry and is also most likely to feature one. As of the date of this study, a given supertall project proposal that is not exclusively office space has an 83 percent chance of having a swimming pool.

By Characteristics

A total of 74 (68.5 percent) of the 108 supertall buildings with pools include at least one indoor pool, and in 66 of these buildings, the indoor pool was the highest pool in the building. Forty-nine of these supertall buildings (45.4 percent) included outdoor pools, and the outdoor pool was the highest in 43 of them. Fifteen of 108 supertall buildings (13.9 percent) with pools featured at least one indoor and one outdoor pool (see Figure 8).

In the 200-supertall cohort, 83 buildings (77 percent) adhered to conventional pool-edge design standards. The remaining 25 contained pools in which the edge conditions met the definition of an overflow (19) or infinity pool (6). Dubai's 360-meter *Almas Tower* is the only all-office supertall building with an overflow pool.

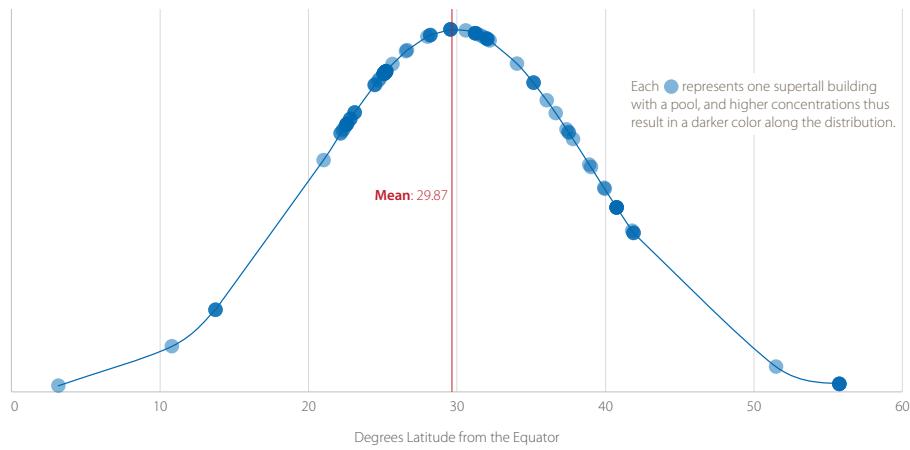
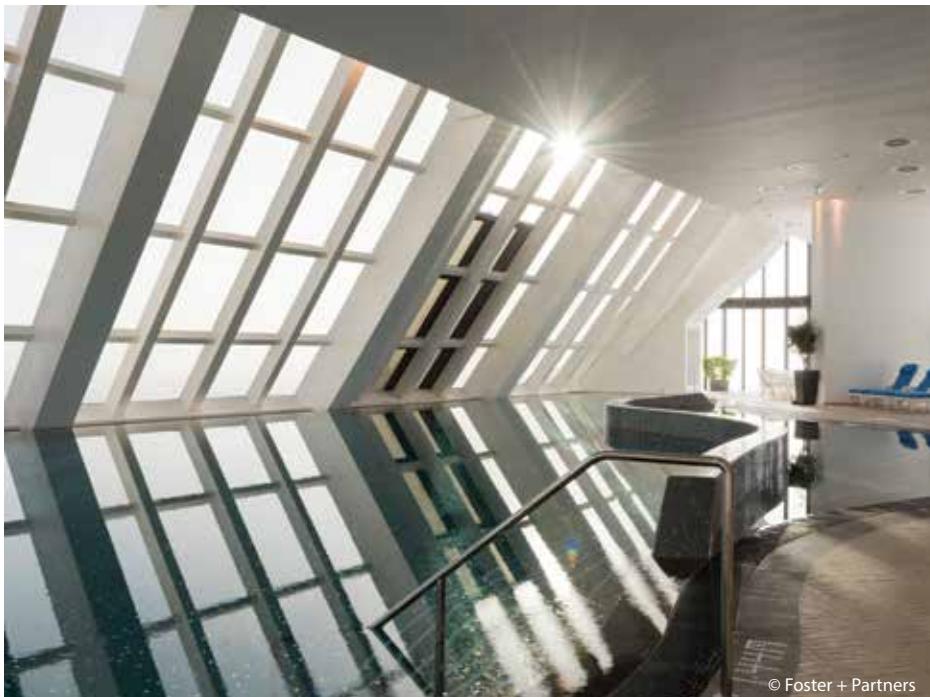


Figure 5. Distribution of supertall buildings with pools around the Equator (mean: 29.87, standard deviation: 9.36).



Figure 6. One of the world's northernmost outdoor pools is at The St. Regis Chicago, 58.8 meters above grade and 41.9° North. © Tom Harris



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Figure 7. The world's highest pool in an all-residential building is at Burj Mohammad bin Rashid, Abu Dhabi, 337.6 meters above grade. © Foster + Partners

Three of the six infinity pools discovered and categorized in this research are within the same complex: [LCT The Sharp](#) (Landmark Tower, Residential Tower A, and Residential Tower B) in Busan, South Korea. All infinity pools within supertall buildings were located on or below the seventh floor, with the lone exception being The Address Beach Resort in Dubai. This building features an unobstructed infinity pool at the 77th floor, 294.5 meters above grade, and offers panoramic views of the city and the Persian Gulf. Other tall buildings include infinity pools at height, but fall below the 300-meter supertall threshold. For example, Dubai's 231.5-meter [Palm Tower](#) features a wraparound infinity pool that caps the building's entire perimeter at the 51st floor, 203.0 meters above grade.

Special Mentions

[Burj Khalifa](#), the world's tallest building, has five pools located at different levels. Its highest is an outdoor pool at 274.6 meters above grade, below any of the criteria for the "World's Highest Pools" and ranking 25th overall.

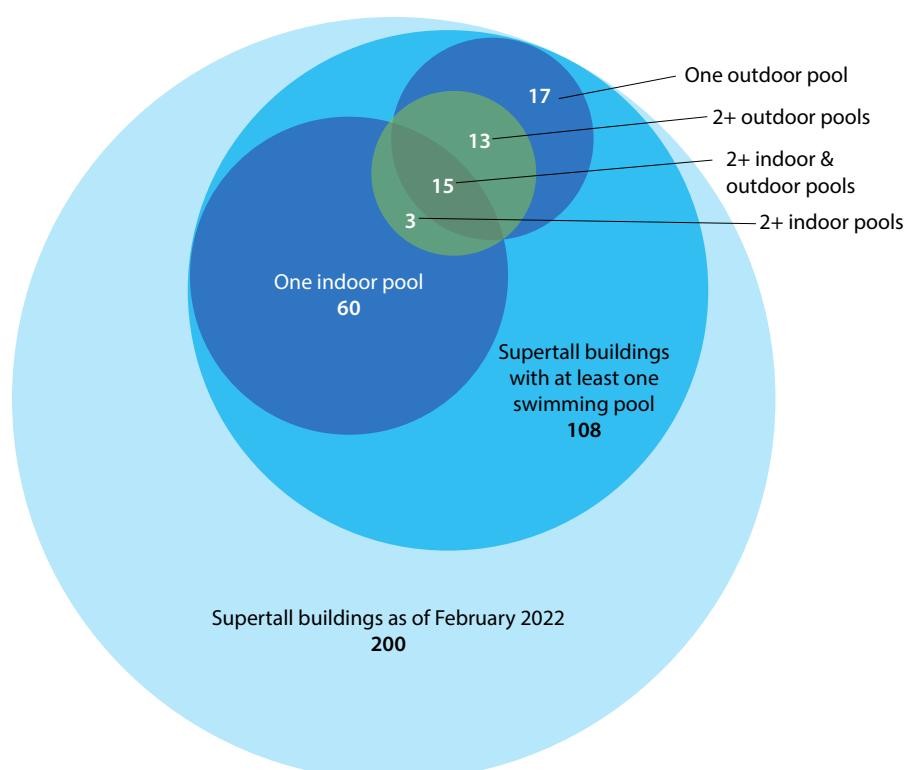


Figure 8. Supertall buildings sorted by pool inclusion, pool location, and whether the building has one or multiple pools. In this diagram, the size of each bubble correlates to the number of supertall buildings with pools in that respective category.

“A given supertall office-only project today is only 2.8 percent likely to include a pool, versus 62.1 percent for mixed-use, 23.1 percent for residential, and 12 percent for supertall hotels.”

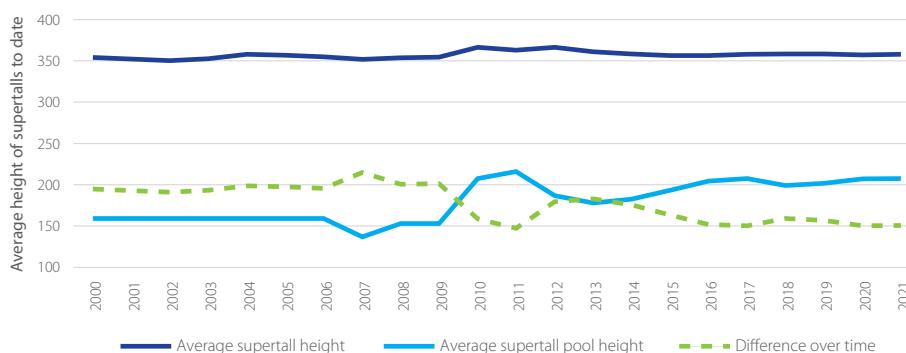


Figure 9. Average height of all supertall buildings versus average height of pools in supertall buildings over time. Since 2000, the average height of supertall buildings has grown exactly 4 meters, while the average height of the pools within them has risen over 48 meters.

T.Op Corporativo, Monterrey (305.3 meters), has a pool atop a shared podium roof. This is included in the study because there is a direct horizontal connection from the building to the pool that does not require the user to exit and re-enter.

A Tower, Dubai (333 meters), has a pool for residents on top of a structurally independent parking garage, requiring the user to exit the supertall building, so this pool is not included in the tally.

LCT The Sharp Landmark Tower, Busan (411.6 meters), has a water park spanning common areas on levels 4 to 6 in a three-building complex of supertall buildings, and all three supertall buildings were included in the study because of their equal access to the pools.

There are only four supertall buildings with an infinity pool (as defined by CTBUH): LCT The Sharp (Busan), *Magnolias Waterfront*

Residences (Bangkok), The Address Beach Resort (Dubai), and *The Address Boulevard* (Dubai). Aside from the pool at The Address Beach Resort, all infinity pools within these buildings are located at the 7th floor or below.

In Guangzhou's Poly Pazhou complex, Tower C2 contains the world's highest pool within an all-office supertall building at the 7th floor, just 32 meters above grade. In this study, Poly Pazhou C2 was only one of three all-office buildings, as well as the only all-office building with an indoor pool.

Conclusion

This study provides new insight into the development of pools in supertall buildings and where the industry is headed in providing this amenity. This report, coupled with the data study on

page 52, illustrates how pools are featured in tall buildings spatially and physically. While some supertall buildings contain pools on lower floors or shared podiums, many are taking advantage of their stature to showcase their high-floor pools as an interactive union of height and recreation. In fact, in a given new supertall building proposal, there is a 38.9 percent chance that the building will be located in Asia and have a mixed-use function (refer back to Table 2). As seen in Figure 9, the increase in the average height of pools within supertall buildings has outpaced the same growth in overall building height. The fusion of this amenity with the scenic views offered atop supertall buildings offers industry professionals a new medium through which to communicate and engage with building users.

Based on the inclusion criteria described herein, CTBUH establishes the 40 pools in Table 3 as the “World's Highest Pools.” ■

Unless otherwise noted, all images credits in this paper are to the authors.

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Rank	Building Name	Location	Year	Floors	Building Height (m)	Pool Height (m)	Function	Pool Location	Pool Type
1	International Commerce Centre	Hong Kong	2010	108	484.0	468.8	hotel/office	Indoor	Overflow
2	Guangzhou CTF Finance Centre	Guangzhou	2016	111	530.0	435.5	hotel/residential	Indoor	Normal
3	Suzhou IFS	Suzhou	2019	95	450.0	406.4	hotel/office	Indoor	Normal
4	Shanghai Tower	Shanghai	2015	128	632.0	393.4	hotel/office	Indoor	Normal
5	Lotte World Tower	Seoul	2017	123	554.5	370.7	hotel/residential	Indoor	Normal
6	Shanghai World Financial Center	Shanghai	2008	101	492.0	364.3	hotel/office	Indoor	Overflow
7	Marina 101	Dubai	2017	101	425.0	349.4	hotel/residential	Indoor	Normal
8	Eton Place Dalian Tower 1	Dalian	2016	80	383.2	339.8	hotel/office	Indoor	Normal
9	Burj Mohammed Bin Rashid	Abu Dhabi	2014	88	381.2	337.6	residential	Indoor	Normal
10	Nanning Logan Century 1	Nanning	2018	82	381.3	331.7	hotel/office	Indoor	Normal
11	Guangxi China Resources Tower	Nanning	2020	86	402.7	323.1	hotel/office	Outdoor	Normal
12	KK100	Shenzhen	2011	98	441.8	322.2	hotel/office	Indoor	Normal
13	Four Seasons Place	Kuala Lumpur	2018	74	342.5	319.5	hotel/residential	Outdoor	Normal
14	SLS Dubai	Dubai	2020	78	336.0	317.4	hotel	Outdoor	Overflow
15	Shum Yip Upperhills Tower 1	Shenzhen	2020	80	388.1	316.5	hotel/office	Indoor	Normal
16	Zhuhai Tower	Zhuhai	2017	66	328.8	308.8	hotel/office	Outdoor	Overflow
17	Guangzhou International Finance Center	Guangzhou	2010	103	438.6	306.2	hotel/office	Indoor	Normal
18	China World Tower	Beijing	2010	74	330.0	300.2	hotel/office	Indoor	Overflow
19	Hengqin International Finance Center	Zhuhai	2020	69	337.7	300.0	office/residential	Indoor	Normal
20	The Address Beach Resort	Dubai	2020	77	301.0	294.5	hotel	Outdoor	Infinity
21	Chongqing World Financial Center	Chongqing	2015	72	338.9	291.7	hotel/office	Indoor	Normal
22	Wuhan Center Tower	Wuhan	2019	88	443.1	286.4	hotel/residential	Indoor	Normal
23	Gevora Hotel	Dubai	2017	75	356.3	278.0	hotel	Outdoor	Normal
24	Forum 66 Tower 1	Shenyang	2015	68	350.6	277.3	hotel/office	Indoor	Normal
25	Burj Khalifa	Dubai	2010	163	828.0	274.6	office/residential	Outdoor	Normal
26	The Landmark	Abu Dhabi	2013	72	324.0	272.6	office/residential	Outdoor	Normal
27	Longxi International Hotel	Wuxi, China	2011	72	328.0	270.0	hotel/residential	Outdoor	Normal
28	Ocean Heights	Dubai	2010	83	310.0	267.6	residential	Outdoor	Normal
29	Jumeirah Nanjing Hotel & International Youth Cultural Centre Tower 2	Nanjing	2015	67	315.0	262.2	hotel/office	Indoor	Overflow
30	Guizhou International Financial Center T1	Guizhou	2020	79	401.0	259.5	hotel/office	Indoor	Normal
31	Comcast Technology Center	Philadelphia	2018	59	339.1	252.3	hotel/office	Indoor	Overflow
32	Chongqing IFS T1	Chongqing	2016	63	316.3	251.3	hotel/office	Indoor	Normal
33	Golden Eagle Tiandi Tower A	Nanjing, China	2019	77	368.1	242.0	hotel/office	Indoor	Overflow
34	Qingdao Hai Tian Center	Qingdao	2021	73	368.9	240.3	hotel/office	Indoor	Normal
35	Burj Rafal	Riyadh	2014	68	307.9	237.5	hotel/residential	Indoor	Overflow
36	Tianjin CTF Finance Centre	Tianjin	2019	97	530.0	237.3	hotel/office	Indoor	Normal
37	Australia 108	Melbourne	2020	100	316.7	235.0	residential	Indoor	Overflow
38	Raffles City Chongqing T3N	Chongqing	2019	79	354.5	233.0	residential	Indoor	Overflow
39	Raffles City Chongqing T4N	Chongqing	2019	74	354.5	233.0	hotel/office	Indoor	Overflow
40	YunDing Tower	Jinan	2020	69	339.0	227.6	hotel/office	Indoor	Normal

Table 3. The 40 highest pools in the world, with supplemental building data and pool characteristics.