

## A Permeable and Polycentric Urbanism



James Von Klemperer



Elie Gamburg

### Author/s

**James Von Klemperer**, President & Design Principal  
**Elie Gamburg**, Director

Kohn Pedersen Fox Associates (KPF)  
11 West 42nd Street  
New York, NY 10036  
United States  
t: +1 212 977 6500; +1 212 237 3427  
e: jvonklemperer@kpf.com; egamburg@kpf.com  
www.kpf.com

**James Von Klemperer** is president and design principal at Kohn Pedersen Fox Associates, where he began as a young architect in 1983. His work ranges in scale from a house to a city, and he contributes closely to these efforts from conception to completion. In addition to focusing on his own projects, he leads the community of designers within the firm in exploring shared architectural agendas and goals. As president of the firm, he leads a staff of 550 people in six offices around the world. Von Klemperer received a Bachelor of Arts from Harvard University in 1979 and his Master of Architecture from Princeton University in 1983.

**Elie Gamburg** is a director at KPF. Since joining KPF in 2004, he has designed projects in the United States, Asia, Europe, and the Middle East, across a variety of programs, including academic, mixed-use, office, residential, retail, and many more. Gamburg is a graduate of Harvard's Graduate School of Design, where he was awarded the Kevin V. Kieran Prize for highest academic performance.

### Abstract

*The Royal Atlantis innovates on typical high-rise hotel and residential design by introducing substantial areas of true open space into all areas of the tower – redefining the concept of urban indoor-outdoor living, vertically. The project's iconicity is a departure from typical form-driven, sculptural high-rises built in rapidly emerging global “alpha cities,” as its striking profile results entirely from moves designed to create truly unique guest and resident experiences. Residents, hotel guests, and visitors are each given spaces that seamlessly blend interior and exterior, tempering Dubai's extreme climate and creating moments where it is possible to see the skyline of the city, while swimming underwater 10 to 40 stories in the sky.*

**Keywords:** Climate, Construction, Connectivity, Context, Integrated Design, Structure

### Design Strategy

The winning result of a design competition, which stated an explicit goal of creating the “most memorable building in the city” for Dubai's next phase of urban expansion (and in time for the 2020 Expo), the design of the Royal Atlantis rethinks the conventional concept of the “iconic” tower and its role in the skyline of rapidly growing cities. Rather than an exercise in sculptural form making, the scheme's unique appearance emerges by extending the idea of indoor-outdoor living – traditionally created through open-plan houses in warm, low-density urban contexts – vertically into the tower. The Royal Atlantis is a 600-meter-long, 178-meter-tall mega structure, operating as permeable screen, porous to people, light and air (see Figure 1).

The success of cities like Dubai in attracting residents and visitors mirrors that of a previous generation of warm-weather cities such as Los Angeles, Miami, Rio de Janeiro, and Mexico City. Each offered residents fleeing colder climates the promise of year-round outdoor living. The climate of these cities allowed Modernists to create residences that seamlessly connected open-plan interiors with intimately-scaled landscaping in unified compositions. In the work of architects like Oscar Niemeyer, Richard Neutra, Luis Barragan, and Paul Rudolph, the spaces of houses and gardens flowed into one another, to create a lifestyle very different from those of Northern cities.

This is primarily due to the area requirements for open spaces, which are substantially larger than those typically provided by tower balconies and terraces, and by the difficulties of integrating water and landscape into complex high-rise structures. Ironically, it is at the largest beachfront hotels and apartment buildings, so common in any coastal resort city, that people are most removed from the sun-soaked natural environments they have come to visit, locked inside large, efficiently-planned, double-loaded slabs.

Seeking to maximize indoor-outdoor space in a dense high-rise, the design splits the conventional slab tower typology into discrete two-to-four-story volumes, pulled apart to create roofed, yet open spaces called “sky courts” and open decks atop cantilevers called “sky terraces” (see Figure 2).

Both outdoor space-types seamlessly connect hotel and residential units to the exterior and create passively conditioned exterior environments that mediate the city's extreme climate, allowing for virtually year-round use. The stepped profile of the tower allows for substantially larger terraces for the units highest in the building, and creates a large deck at the tower's mid-point, where additional publicly-accessible pools, restaurants, and event spaces are located. The resulting screen-wall configuration curves in plan to provide optimal views to all units, while minimizing cross-views from one unit into another. The discrete blocks that are





Figure 1. The Royal Atlantis will stand on the Palm Jumeirah archipelago off the coast of Dubai.

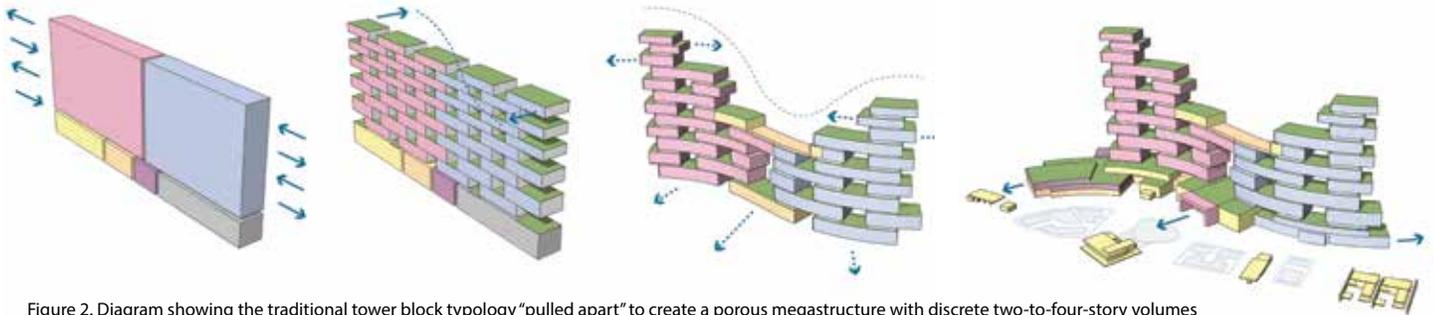


Figure 2. Diagram showing the traditional tower block typology “pulled apart” to create a porous megastructure with discrete two-to-four-story volumes and plenty of space for sky courts and terraces.

stacked to form the tower reprise themselves in the podium, allowing the lobbies, amenities, restaurants, and retail within to have terraces and extensive views (see Figure 3).

### Context

The curvature and position of the project responds to the location of The Royal Atlantis on the outer ring of Palm Jumeirah, a man-made archipelago extending from the

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Figure 3. Numerous sky courts bring resort amenities, such as lap pools, into the sky and adjacent to hotel rooms and residences.



Figure 4. The Palm Jumeirah is a massive man-made archipelago in the Persian Gulf. At center is the Atlantis Hotel, the Royal Atlantis will rise to the left. © Kerzner International Development



Figure 5. The Royal Atlantis is now under construction. It aspires to be the icon that defines the Palm Jumeirah district, in the tradition of other centers of the polycentric city that is Dubai. © Kerzner International Development

mainland into the Persian Gulf (see Figure 4). This location allows the building to have two different types of waterfront views. Looking outwards (northwards) provides an uninterrupted vista of the Persian Gulf and an extended horizon, while looking inwards (southwards) reveals Palm Jumeirah's sheltered lagoon, with broad beaches and extensive views of the Dubai skyline from Marina Bay to Downtown Dubai and the Burj Khalifa. The porosity of the building allows views through the complex, from both sides of the site, and views from the complex to the two different waterfronts at once.

The Royal Atlantis aspires to become the focal point of Palm Jumeirah, one of Dubai's most famous precincts. After expanding beyond its original city center along the Dubai Creek, the city has grown as a series of distinct neighborhoods – the “centers” of a polycentric city – each typically built by single development entities and each identifiable by a specific architectural icon. These include Jumeirah (Burj Al Arab), Downtown Dubai (Burj Khalifa), and Dubai Marina (Cayan Tower). The Royal Atlantis will similarly mark the Palm, especially as this development nears completion (see Figure 5).

The outer ring of the Palm Jumeirah is lined by resort hotels, several of which are opening contemporaneously with the Royal Atlantis. The branches and trunk of the Palm are primarily residential, with a mix of seasonal and full-time residents. The hotel zone functions as a shared destination for dining, shopping, and entertainment for the entire Palm and city beyond. The building's program itself reflects the dual nature of the Palm – the tower is half hotel and half residential, while the urban character of the project's podium integrates all the functions of a smaller neighborhood into a walkable district that will become a destination for visitors and residents (see Figure 6).

### Program, Circulation + Structure

Integrated as a singular 312,000-square meter structure, the Royal Atlantis is, in reality, two buildings, with their own entries, that work

together to define a common identity and form. The 43-story west tower contains a 795-room hotel, with rooms ranging from singles to expansive multi-floor suites, while the 38-story tall east tower houses over 230 apartments ranging from three-bedroom in-line units to multi-story penthouses. The distribution of sky courts/terraces throughout the hotel and residential towers ensures that all of the duplex and penthouse apartments, special feature suites, and most regular suites open onto the terraces, fostering the unique indoor-outdoor lifestyle the developer seeks to create (see Figure 7).

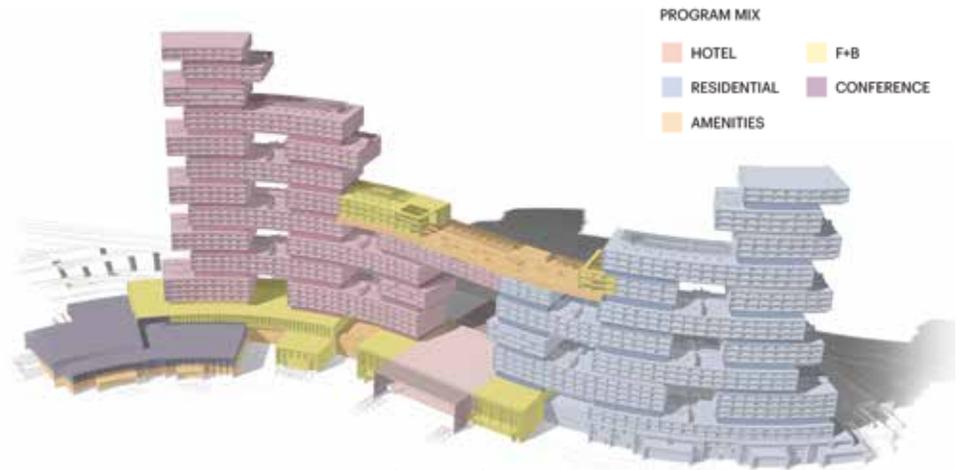


Figure 6. The program mix replicates numerous functions of a town center.

The staggered blocks forming the two towers (and their sky courts/terraces) consistently overlap at three locations in each tower, resulting in six cores divided evenly between the residences and hotel (see Figure 8). All elevators, services, and egress are within these cores. With the exception of those volumes that cantilever from the cores at the far ends of the building, the arrangement also ensures operational redundancy, as most volumes are serviced by two cores and thus by two sets of passenger lifts, service lifts, stairs, and MEP services.

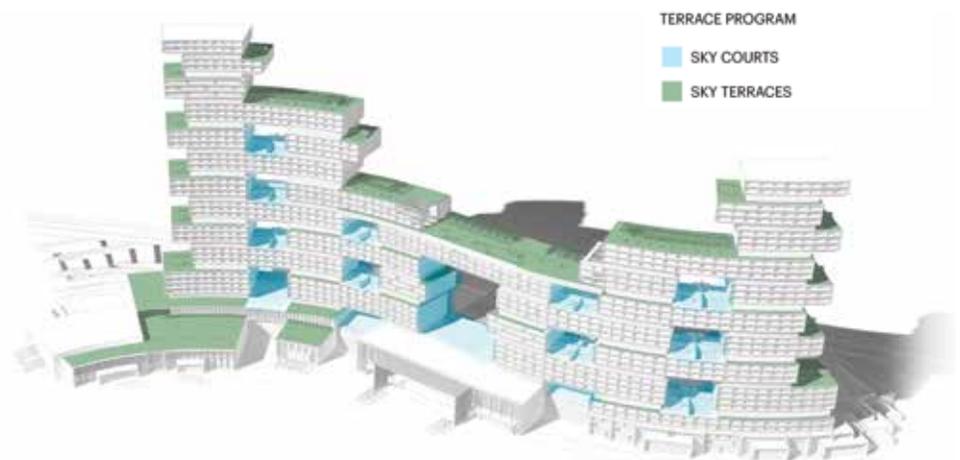


Figure 7. The organization of the program is intended to optimize the number and location of the sky courts and terraces.

The core locations are the only parts of the building where structure carries down from

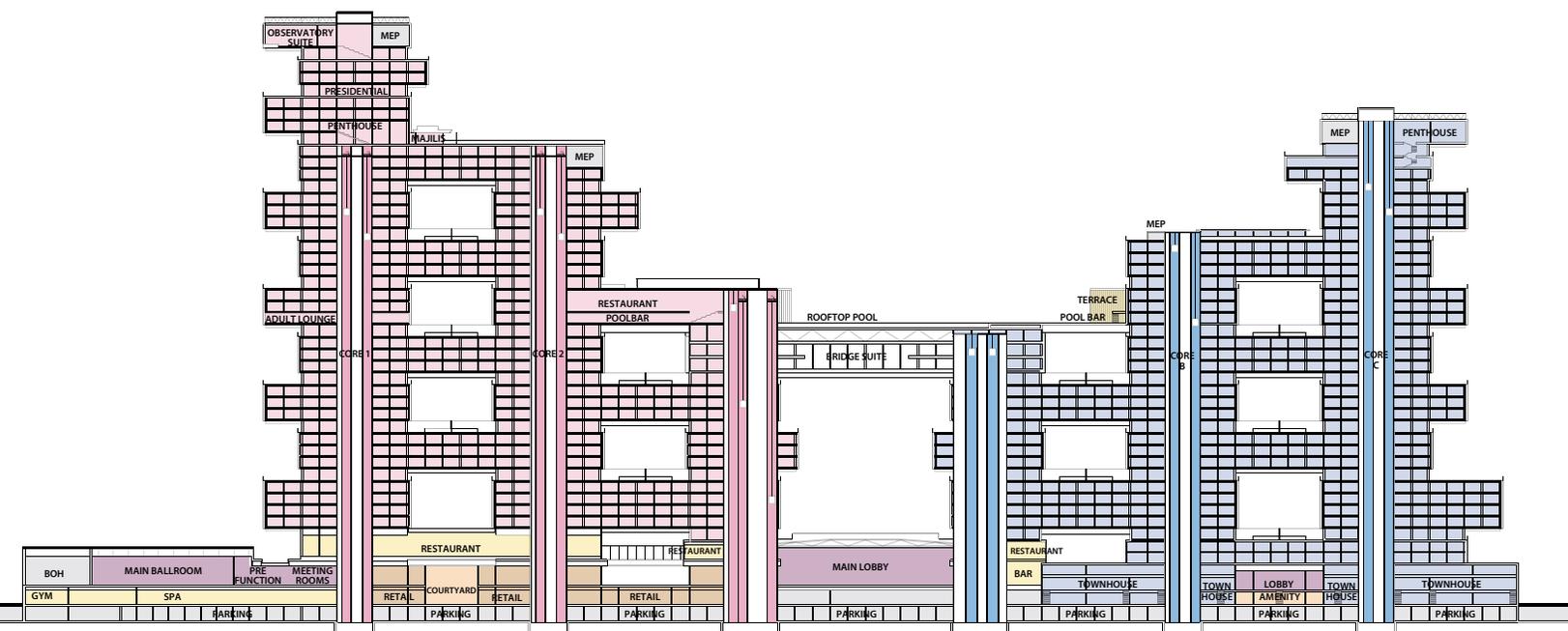


Figure 8. The staggered blocks overlap on six cores across the building, ensuring operational redundancy for each volume.



Figure 9. The project's multiple cores are well underway in this recent construction photo. © Kerzner International Development.

the top of the highest floors to the ground. The rest of the tower is structured as a series of stacked bridges, each spanning 25 to 30 meters from core to core, supported by 1.5-meter-deep girders. Mechanical and plumbing transfers occur in the girder zones, keeping the sky courts below free from all obstructions. At the far ends of the building, the volumes cantilever up to 15 meters from the cores. At these points, the beams are integrated with shear walls and columns above to create two-to-four-story-tall trusses. The resulting structural gymnastics give the project much of its presence and lend the volumes a feeling of agility – with each volume seemingly suspended mid-air, floating precariously. The project can be seen under construction in Figure 9.

A three-story-tall bridge volume unites the two towers into one dynamic composition,

while defining an 80-meter-wide-by-50-meter-wide arch below (see Figure 9).

The “Atlantis Arch” form is one of the defining elements of the Atlantis brand and, as reinterpreted here, promises to become one of the most instantly recognizable aspects of the Royal Atlantis. Both the first Atlantis in the Bahamas and the original Atlantis Dubai featured the arch motif – but whereas this is essentially a historicist form, in the Royal Atlantis the arch becomes the largest moment of porosity, emerging logically from the “pulling apart” of the building to create habitable open space.

Atop the skybridge is a 90-meter-long pool deck, flanked by restaurants and lounges and anchored by a major event space. It contains the Bridge Suite, the largest hotel suite, running the length and breadth of the

volume. At its center lies a living area with no visible structure, with operable walls, and with open terraces and pools on both sides, such that being there will feel like floating in mid-air. One-story-high trusses that span between both towers facilitate these spans. Constructed on the roof of the lobby, the bridge trusses will be jacked 19 floors into place during one of the more dramatic moments of building construction.

The base of the building is comprised of blocks arranged to form a continuous “village” that support the towers above, literally and metaphorically. These include the hotel and residential lobbies and supportive amenities, retail, hotel dining hall, shared spa, and 15 of the resort’s 18 restaurants. The podium extends eastwards to include a 6,000-square-meter conference and event center.

The volumes of the podium cascade outwards from the main towers to engage the landscape, creating a diverse set of garden, pool, and beach experiences (see Figure 10). Several outlying buildings appear as extensions of the podium – volumes that have broken away and lodged themselves in the landscape. These house the rest of the resort’s restaurants, and the support facilities for the extensive grounds.

### Landscape + Water

The arrangement of both podium and tower accentuate the landscape of the resort. The project simultaneously operates both as a set of towers emerging from the garden – integrating elements of nature into the programs above, and as a device to frame the landscape at all levels.

The sky courts, sky terraces, and sky pool deck are all moments where the resort landscape, typically found on the ground around a hotel building, is instead transported vertically into the tower, becoming part of the daily experiences of guests and residents. Each of the sky courts/terraces is split into one, two or four subcourts, depending on the number of units that open onto them. Low walls separate the privately-held courts from one another,

“All-glass apertures were deeply recessed within stone frames to ensure that the glass was fully shaded for much of the year, allowing the podium façades to have extra-transparent, low-reflectivity, low-iron glass, a rarity among glazed facades in Dubai.”



Figure 10. The segmented, interpolating nature of the long building allows variation in the landscaping and in the remainder of the site plan.

ensuring privacy but allowing air movement across the space. All the courts feature a 1.2-meter-deep plunge pool, terraces for dining and recreation, and smaller-scaled, shaded areas for lounging and gathering. These spaces are designed to bring the collective life of the residents and guests out from the units throughout much of the year as seen in Figures 3 and 4.

Shaded by floors above and by secondary screens, ventilated by littoral winds flowing from the Persian Gulf to the desert and back, and cooled by their pools and landscaping, the courts are passively tempered spaces. Their design is inspired by the Mozarabic tradition of courtyards cooled by shading, planting, ornamental fountains and pools, and porous openings to facilitate wind flow. As implemented at the Royal Atlantis, these passive tempering strategies extend the time it is enjoyable to be outside in Dubai's harsh climate from six to almost 10 months out of the year – especially in the morning and late afternoon/early evening.

Like the walled gardens of the houses that inspired them, the terraces serve as extensions of the units, becoming integral parts of the apartments, suites, and event spaces to which they are connected. People can move seamlessly between their residences and the gardens. These terraces



Figure 11. The intersecting volumes break down the scale of the megastructure to a more intimate level.

also become the backdrops to the units, visually bringing water and nature into the interiors even when one is not outside. The presence of water, open space, and greenery will define the experience of being at the Royal Atlantis.

The sky courts, terraces, main arch, and portals found through the podium simultaneously reframe the landscape beyond the building. All the plunge pools are acrylic-fronted; as a result, it will be possible for residents to swim within the pools, up to 43 stories in the air, while simultaneously looking out to see the skyline

of Dubai beyond. The surprising experience of being both beneath and over, in water and on air, intimately enclosed and expansively situated, will be uplifting and truly unique.

### Scale

The sky courts are the largest spaces in a sequence of otherwise intimate, smaller-scale experiences leading from arrival to residence and out to the terraces. In contrast to the large size of the project, the building appears to emerge as an assemblage of

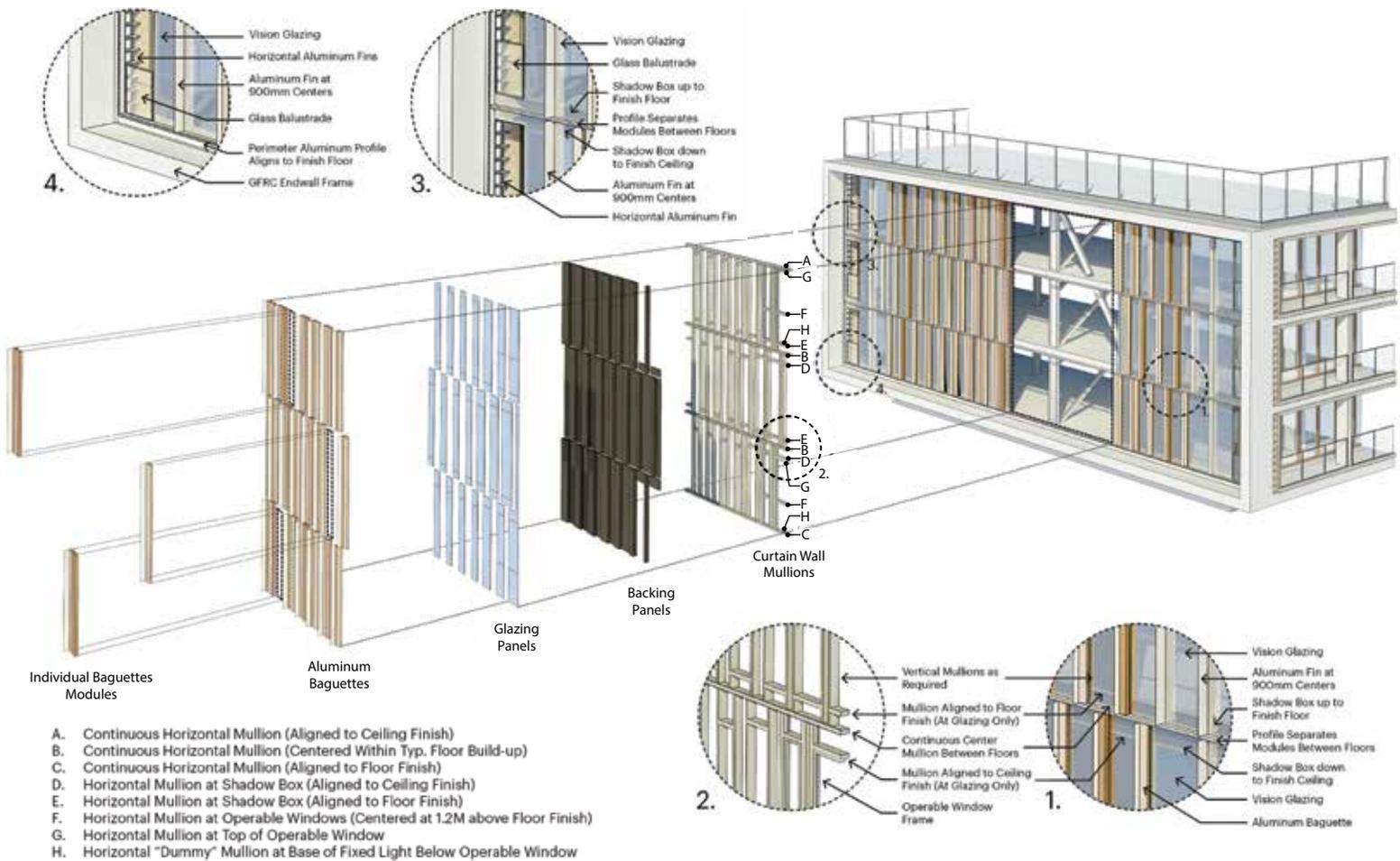


Figure 12. The end walls are designed to serve multiple functions, including shading and creating a tactile surface that works at a smaller scale, departing from the typical undifferentiated wall type common to tall buildings.

smaller elements that visually breaks down its mass (see Figure 11). As a result, the project feels surprisingly human-scaled, even intimate.

This breakdown in scale occurs operationally as well, because of the distribution of multiple cores across both the hotel and residences. The typical hotel guest will only experience a short corridor with 20–30 rooms opening onto it, as opposed to the endless corridors typically associated with vast hotel complexes of this type. Similarly, the typical resident will never enter a corridor accessing more than four apartments – and typically fewer. The result is a far more personal and private experience

than would appear possible for a building of this size, or is typical of comparable hotels and residences.

Experientially, the planning and massing strategy also ensures that the complex feels scaled more to the size of the dwelling than the tower. Each of the blocks/sky courts ranges from two to four stories tall, and the project curves dramatically across its length, so that visitors typically only perceive a small portion of the building at once. At the podium, the volumes are broken down even further, so that the building feels like an amalgam of significantly smaller elements that are more approachable and inviting. The arrangement of the podium elements creates a series of small lower-level courts, to

encourage communal gathering, dining, and socializing.

### Craft + Texture

The façade articulation of both tower and podium also diminish their scale, making them feel tactile and intricate. The primary, long façades of the tower are constructed as a series of simple glass-fiber-reinforced concrete (GFRC) brises-soleil integrated into continuous terraces, refining the massing into a series of smaller spaces sized to the individual room. This arrangement ensures privacy and intimacy and serves an environmental function. Due to the presence of the sunshades, and the depth of the terraces, most of the tower glass is fully shaded during the summer, and for much of the day during the spring and fall. This allows the project to use clearer glass and yet

achieve greater energy efficiency compared to similar hotel towers in Dubai, which typically use flat curtain walls exclusively.

The secondary “end” walls of the tower volumes presented opportunities for invention of another type. As they typically front onto the sky courts/terraces, they differ from typical tower façades, in that visitors and residents can directly engage with them. At the same time, they are one of the defining elements of the building when seen from afar. In some cases, these façades conceal truss elements at the cantilevers, while maximizing views from prestigious end units; in other cases, the façades serve as privacy screens, allowing light into the units above the sky courts and terraces, but preventing cross-views between courts and units. A parametrically defined façade system, formed from a multi-colored assembly of linear elements, inspired by traditional Mozarabic glazed tile work, flexibly accommodates vast differences across the different end-wall façade conditions, yet maintains a consistent look when seen from afar. Most importantly, these façades are refined, small-scale and well-crafted decorative elements within the context of the sky courts, due to the intricacy of their pattern, color, and construction, and the interaction with the glazed coatings in the powerful light of Dubai (see Figure 12).

The interplay of light and shadow gives great architectural opportunity to play forms against one another, amplify texture and material detail, and create dramatic patterns through shade and reflection. These effects are most immediately visible in the podium, as it is the area most directly experienced by the greatest number of people (see Figure 13). Several strategies were employed: all-glass apertures were deeply recessed within stone frames to ensure that the glass was fully shaded for much of the year, allowing the podium façades to have extra-transparent, low-reflectivity, low-iron glass, a rarity among glazed façades in Dubai. The stone portals that form the podium volumes are themselves formed from six different textures of limestone that will read beautifully when raked by the sun and by lighting at night. More importantly, the textures of the stone have a



Figure 13. The multiple textures of the project converge on the podium, the area experienced by the highest number of visitors.

tactility that encourages guests to engage directly with the architecture. Lastly, the portals are themselves shaded by decorative screens, inspired by traditional Mozarabic *mashrabiya* screens but crafted by advanced technology. The screens are exemplary of the craftwork invested in the project. The shadows they will cast on the terraces and into the gardens along the simple stone façades will be even more remarkable.

## Conclusion

The Royal Atlantis re-thinks the design of the mixed-use, high-rise residential and hotel tower through the pursuit of creating iconic experiences, rather than creating an iconic form. The project synthesizes interior and exterior living in an unconventional way for the contemporary high-rise, creating moments of surprise and tranquility unique for the typology. It is one of several projects positing strategies for integrating nature and open space with high-density built form, in ways usually found in much lower-density forms of urbanism. This focus on the visitor, resident, and guest has led equally to one of

the world's most unique building forms, one of its most unusual sets of experiences, and to a focused study of the craft and art of building such a complex project. Without the integration of sophisticated structural, mechanical and façade systems, what began as an idea could never have emerged as an imminent reality. ■

*Unless otherwise noted, all image credits in this paper are to Kohn Pedersen Fox Associates.*

## Project Data

**Completion Date:** 2019  
**Height:** 193 m  
**Stories:** 43  
**Primary Functions:** Hotel/Residential  
**Owner:** Investment Corporation of Dubai  
**Developers:** Investment Corporation of Dubai; Kerzner International Development  
**Architect:** Kohn Pedersen Fox Associates (design)  
**Structural Engineer:** Arup (Competition); WSP (Building Phases)  
**MEP Engineer:** Arup (Competition); WSP (Building Phases)

