

HIGH EXPECTATIONS
L.A. now has a new tallest building. How will it fit into the fabric of the city? **PAGE 2**

FINISHING TOUCHES
In the design of the tower's interior, any detail out of place could spoil the effect. **PAGE 6**

A RIVER OF GLASS
How the project's signature skylight, inspired by the Yosemite Valley, was saved. **PAGE 18**

SEISMICALLY CHIC
One of the tallest buildings in an earthquake hot zone had to balance safety and style. **PAGE 20**

WILSHIRE GRAND

HOW WILL
L.A.'S NEWEST
HIGH-RISE
FIT INTO AN
EVOLVING
CITY?

By Thomas Curwen

Standing at the base of the Wilshire Grand, architect David Martin shielded his eyes to take in the scope of Los Angeles' newest and tallest skyscraper.

Eight years ago, this shimmering glass tower began its life in his sketchbook as an ink drawing and a splash of blue wash. Now, after four years of construction and \$1.35 billion, it is debuting on the city's stage. Guests have begun to arrive; tenants come later in the year.

The prospect leaves Martin a little nervous. The expectations for this building are high.

For all its 21st century detailing, the Wilshire Grand is a throwback to a time when Los Angeles dared to dream tall and for three decades — the early '60s to the early '90s — saw a fledgling skyline emerge above Bunker Hill, Century City and Westwood.

But such aspirations can be fickle. That boom, financed in part by Japanese capital, stalled amid an economic recession. Now 30 years later, this new tower rides a new wave of development rippling through downtown and outlying communities such as Hollywood and mid-Wilshire.

Driven by Chinese and Korean investors, this prosperity reflects not only a shift in the world economic order but also a renewed faith in Los Angeles' potential on the edge of the Pacific Rim. (In 2015, South Korea was Los Angeles' No. 3 trading partner, with two-way trade totaling \$23.7 billion.)

When Korean Air, owner of the Wilshire Grand, lighted the building's crown with the red, blue and white swirl of its logo, it captured that historical sweep. The airline's chairman, Yang Ho Cho, first visited downtown Los Angeles on his honeymoon in 1974 and was told to be careful if he went out after dark.

Today he expresses the hope that this building will be an icon for the city as well as a symbol of pride for its Korean community.

But on a late May afternoon, Martin wasn't taking a global perspective. Wandering out onto the pool deck overlooking 7th Street, his concerns were more immediate. The amplified strains of a violinist drifted from a distant sidewalk.

The Wilshire Grand has represented for him a lifetime opportunity to build a downtown landmark, much as his grandfather did with City Hall and his father with such high-rises as the Department of Water and Power and the Arco Towers.

He spoke of the building's parametric sloping, its reflectivity, the alignments between the indoor and outdoor spaces and the overhead "bones," the seismic supports — and he anticipated the critics.

What does the Wilshire Grand offer the city, they will ask. Is it for the wealthy and privileged? Does it advance the science of engineering or a theory of architecture?

"I hope they all like the building," he said.

Every tall building is a unique performance, a blend of grand effects and minute detail. Some strike a single note. Others try for a deeper, almost symphonic complexity.

The gesture might be old-fashioned, reminiscent of the early decades of the 20th century, a

statement that speaks more to the egos of a few than the needs of the many.

But this is what cities do, no matter the expense or impracticality. From a distance, these structures declare their prowess and modernity by lifting themselves above the horizon like Oz, proxies in glass for ambition and power. From the sidewalk, they inspire passers-by to peer skyward, a remarkable feat when daily occupations compel many to look only ahead.

And in Los Angeles — not New York, not Chicago — the raising of these buildings is all the more remarkable in a region where downtown is a mere island in a vast suburban sea.

Conceived during the height of the recession as two towers — one a hotel and one an office — the Wilshire Grand eventually was consolidated into one, driving the height to 73 stories.

Given its complexity, architect Michael Maltzan, whose projects include the apartment complex One Santa Fe and the new 6th Street Bridge, wants to wait before passing judgment.

"The ability to measure its impact is complicated by time," he said. "A tower, a building of that scale, functions at so many different scales, each of which is measured in different time frames, so it is hard to say from Day One if it is a success or not."

He cited a few object lessons: The Eiffel Tower and San Francisco's Transamerica Pyramid were mocked at their debuts and today are beloved icons. The U.S. Bank Tower, completed in 1989 a few blocks away from the Wilshire Grand, also received mixed reviews. One critic overlooked the design of what was then the city's tallest structure, focusing instead on its "dizzying, seven-year exercise in deal-making."

Some question whether the Wilshire Grand deserves iconic status. Its claim over the U.S. Bank Tower, they say, is a cheat, based on a spire that gives it an 82-foot advantage.

And if spires count, they add, then what about a 1,215-foot smelter smokestack in Magna, Utah?

Yet part-building, part-spire, the Wilshire Grand already has shifted Los Angeles' conception of what its skyline can be — no longer the flat-topped relics of an era that privileged helipads over ornamentation.

For architect Eric Owen Moss, however, any discussion of merit based on height is antiquated. Moss, former director of the Southern California Institute of Architecture, recently designed a 17-story tower near the La Cienega-Jefferson light rail station.

"I'm sure it matters to the developer, but I'm not sure if it matters to the city or to the community downtown at all," he said.

More interesting to Moss is whether or not the Wilshire Grand offers a new understanding of what a tower can be. He wondered how the building will interact with the street or if it will advance a new conception of the city.

"You get to be the biggest building if you demonstrate you have the biggest or most substantial content," he said.

A 60-second ride in a service elevator took Martin to the top floors.

Others may peer at the city, which from this

perspective seems oddly miniaturized.

But as he stepped onto the terrace on the 73rd floor, Martin turned to study the steel-and-glass sail — a technical achievement rising an additional 300 feet above him.

A skyscraper, Martin said, is often boring: a big box designed for utilitarian, commercial purposes with design subservient to the cost and speed of construction.

Pushing against those pressures is part of the architect's job.

And Martin counts the sail and the adjoining spire as one of his successes, an elaborate and costly artifice, a hood ornament by any other name.

As he climbed the stairs into the sail — which will be closed to the public — he was surrounded by wide-flange beams, up to 44-feet in length, crisscrossing around him like a cat's cradle.

"It's like a ship," he said, proud that this element withstood the months of debates and disagreement.

But he knows that even monumental design is never fixed in time.

Just blocks away is the City National Plaza, with its twin towers.

Designed in the 1960s by Martin's father, Albert C. Martin, these 52-story buildings — the Arco Towers — have long been honored as a model of Corporate-International style, austere in their smoked glass, dignified in their identical pairing.

Yet last year the owners modified the top story of the north tower, changing the color of the glass, adding a ribbon of silver-white around it.

Spoiling the symmetry.

As the afternoon waned, traffic on the 10 Freeway was a ribbon of cars, creeping in and out of downtown, bumper to bumper.

For all the best intentions and design, the future of the Wilshire Grand is linked to the city.

Sprawl — awesome by day and sparkling at night — is one thing, but gridlock, no matter the hour, is another.

For Thom Mayne, one of the city's preeminent architects, the success of the Wilshire Grand depends on how the city rises up to meet it.

Looking at the future, Mayne, the executive director of the UCLA Now Institute, believes that Los Angeles' greatest challenge is an anticipated population increase of 1.5 million by 2050.

He argues for the increased densification of the Wilshire Corridor, 15 miles from downtown to Santa Monica, soon accessible by subway.

To this end the Wilshire Grand, he said, is "useful," but he added, "it is one single building."

"What's important is for it to be followed by housing."

Without that step, the skyscraper "is just another random building with no broader connectivity, no synergy, no relationship to some broader strategy of how the city is going to grow and what that means to its citizens — again on human terms, on social terms, on cultural terms."

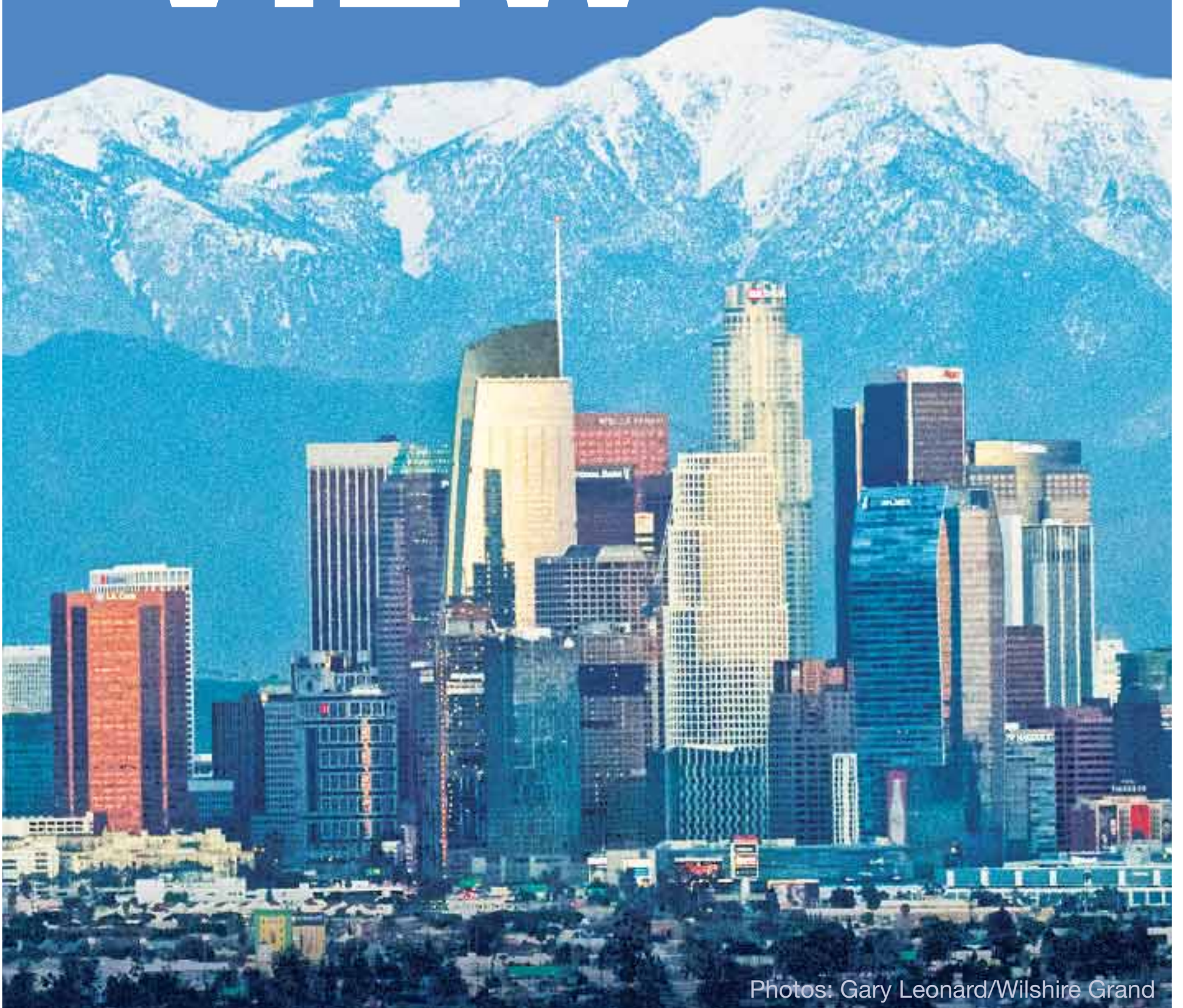
The city of Los Angeles, he said, must take the next step.

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LUIS SINCO Los Angeles Times

A VISION comes into VIEW



Photos: Gary Leonard/Wilshire Grand

Over the course of 257 weeks, 2,500 people put in place 22,000 tons of steel, 54,000 cubic yards of concrete, and 500,000 square feet of glass to build a technically sophisticated, sustainable addition to the skyline of Los Angeles.

Turner

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Thank you to our dedicated team, our partners, and our client who made this extraordinary building a reality.

Download a 3d-printable model of the Wilshire Grand Center at turnerconstruction.com/3d

WILSHIRE GRAND THE RISE OF A NEW SKYLINE

EMBRACING L.A.

The project grew from a handshake to become the tallest building west of the Mississippi. For three years, Times staff writer Thomas Curwen has chronicled its construction, from the initial planning phase to the topping off and final design touches. On the following pages are his stories of the Wilshire Grand tower.

Architect Chris King isn't entirely sure when Reyner Banham clicked, but the English critic's theories about Los Angeles came to him at just the right time.

Long before demolition crews moved in on the squat and aged hotel that had occupied the corner of Figueroa Street and Wilshire Boulevard, the 41-year-old architect with A.C. Martin Partners tried to imagine what the interior of the new skyscraper — the Wilshire Grand — might look like.

The canvas was huge, more than 2 million square feet, fitting for the city's tallest building, a combination of hotel and offices, public and private space.

King and the design team at A.C. Martin had been brainstorming a variety of concepts that would complement the architecture — its indoor-outdoor spaces, its seismic supports, its vantage upon the city — and they needed to strike a look that would mirror Los Angeles' identity.

Early on they had misjudged, developing a furniture scheme styled after the distinctive Korean roof tiles, *giwa*. They felt it would appeal to the building's owner, Yang Ho Cho, the chairman of Hanjin International Corp. and Korean Air.

But Cho and his daughter Heather, who had taken a lead in the project, didn't want the building to reflect Korean culture. Instead, they insisted that it capture Los Angeles' essential qualities.

What is the big idea, they pressed King.

Accustomed to clients asking about color schemes and materials, King realized that he needed to think larger and more conceptual. The *giwa* furniture style was too small.

Taking to the street, he studied the building site from neighboring buildings, and as the concrete core began to rise, he took the construction elevator to the top floors, where Los Angeles emerged from the rose of the compass: to the west, the swirl of the 10 and the 110 freeways; to the south, the linear grid of subdivisions stretching to San Pedro; to the east, the downtown skyline, and to the north, the San Gabriel Mountains.

King realized then that Banham still had it right. Each angle corresponded to the four ecologies: Surfurbia, Foothills, The Plains of Id, Autopia. Each would inform to the interior design of the city's newest building.

On a recent spring twilight, King was out on a rare evening run in Echo Park. Banham was far from his mind when he caught a glimpse of the Wilshire Grand lit up as it had never been before.

In a riot of color, a vertical band of light — blue fading to yellow like the colors of a sunset — played along the building's spine, and as the image lit up Instagram and as technicians fine-tuned the LEDs from inside the tower, King felt a kick of adrenaline.

Four years of construction were coming to an end, nearly 10 years conceiving, planning and drawing, and with hotel guests arriving within weeks, he knew that time was running out.

The punch list — construction-speak for all the details needing to be completed or repaired — had 35,000 items on it, and King was soon back on site, stepping through a clutter of scaffolding and cardboard boxes, overflowing dumpsters and pallets of building material that filled the rooms and hallways.

The nature of his job requires that after imagining, drawing and negotiating the high concepts, he bats clean-up, making sure all the details are in place. Perfection seemed elusive as he toured the 70th floor with senior production coordinator, Grit Leipert.

A coating of dust clouded the light fixtures hanging in the lobby. A gash marred the parquet angling across the restaurant floor, and a door in the men's room fell well short of its jamb.

They made notes and took pictures.

No detail, King said, can ever be too small or fix too minor when delivering a \$1.35-billion skyscraper.

Simply put, he said, "you don't sell a new BMW with a broken headlight."

Once King understood the role that Banham could play in the design, he and his team turned to the 70th floor — the hotel's lobby —

where guests check in, the city surrounding them.

The space, King realized, could be "a synopsis of the entire narrative" and he set about linking the interior to the city, matching details with whatever ecology was immediately in view.

If they got it right, they felt the rest of the design would fall into place.

"We're trying to choreograph a set of experiences for visitors to the building," said King. "I don't know if I'd call it subliminal, but we are trying to evoke a mood and a feeling."

Through months of debate and discussion, hours of presentations in Los Angeles and Seoul, they fine-tuned the shapes and form, colors and texture. They consulted with artists, researched materials and dug deep into their collective sensibilities to come up with what they hoped would be a coherent plan.

The stakes may not be as critical as the fire elevators or seismic supports or as sensational as the exterior lighting, but King knew that anything out of place could ruin the desired effect.

They designed a chandelier the color of automotive lights, red, white and amber, hanging from the ceiling above the check-in desk in a pattern based on a schematic of the 10 and 110 freeway intersections. The carpet and furniture in the adjacent lounge feature angular patterns replicating the city's suburban grid.

The club space, facing the mountains, is decorated with pictures of the foothills. The carpet and furniture patterns mimic the lines of a topographic map.

And in lieu of the beaches — too hard to see from this distance — they added a fifth ecology, downtown, in acknowledgment of its renaissance, so that the bar with its view of the neighboring buildings has a photo mural of the Studebaker dealership that once stood on this corner and a neon sign capturing the city street name mnemonic:

From Main we Spring to Broadway, and over the Hill to Olive. O, wouldn't it be Grand if we could Hope to pick a Flower on Figueroa?

As they developed the concept beyond the 70th floor, the complexity multiplied. The size of the project was daunting: Some components — the plaza, the restaurant, the health club — were as large as previous jobs.

They championed the improbable, a mash-up in the steakhouse of 18th century Versailles with 19th century California rancho décor, and fashioned the whimsical: the pool deck with its foam stools, buoy lights and the No Dive Bar.

"It felt like we were working on 25 Swiss watches at once," King said.

By late afternoon, he stood outside the lobby on the ground floor. King stepped among the extension cords, saws, sanders, man-lifts, pavers, drop cloths and bubble-wrapped bollards.

Along a broad band of concrete above the entrance to the parking garage, contractors had applied blue masking tape and a vinyl template, the start of a mural.

This space in the porte-cochere had always been a challenge for King, a blank canvas that done right could set the tone for arriving guests. But he didn't want it to compete with one of the project's most-significant commissions.

Through the windows of the lobby, a sculpture designed by the Korean artist Do Ho Suh dominates the space, a three-story-high wash of colors, blending like a snow cone from red to yellow to green to blue. Up close, the pattern reveals itself to be nearly 86,000 figurines — each a few inches tall — rising atop one another, hands to feet: a high-concept homage to pluralism.

The mural, by contrast, had to be less flashy.

Borrowing from Ed Ruscha's linear documentation of the Sunset Strip, King developed a pastiche of Los Angeles' suburban skyline in silhouette: street lamps, billboards, palm trees and a few icons, Randy's Donuts, the Watts Towers.

"I have always found the skyscape of Los Angeles not banal or unsightly," he said. "It sets the tone for the city."

He now just needed to decide which shade of gray — and there were six to choose from — would best capture this distinct ecology.



HORTENCIA ESPARZA helps make a bed inside a guest room of the InterContinental.



FINAL TOUCHES are made on the main path for hotel guests to get from the tower to the pool deck,



ARTISTS FINISH the splashy mural that adorns the pool area of the InterContinental Hotel.

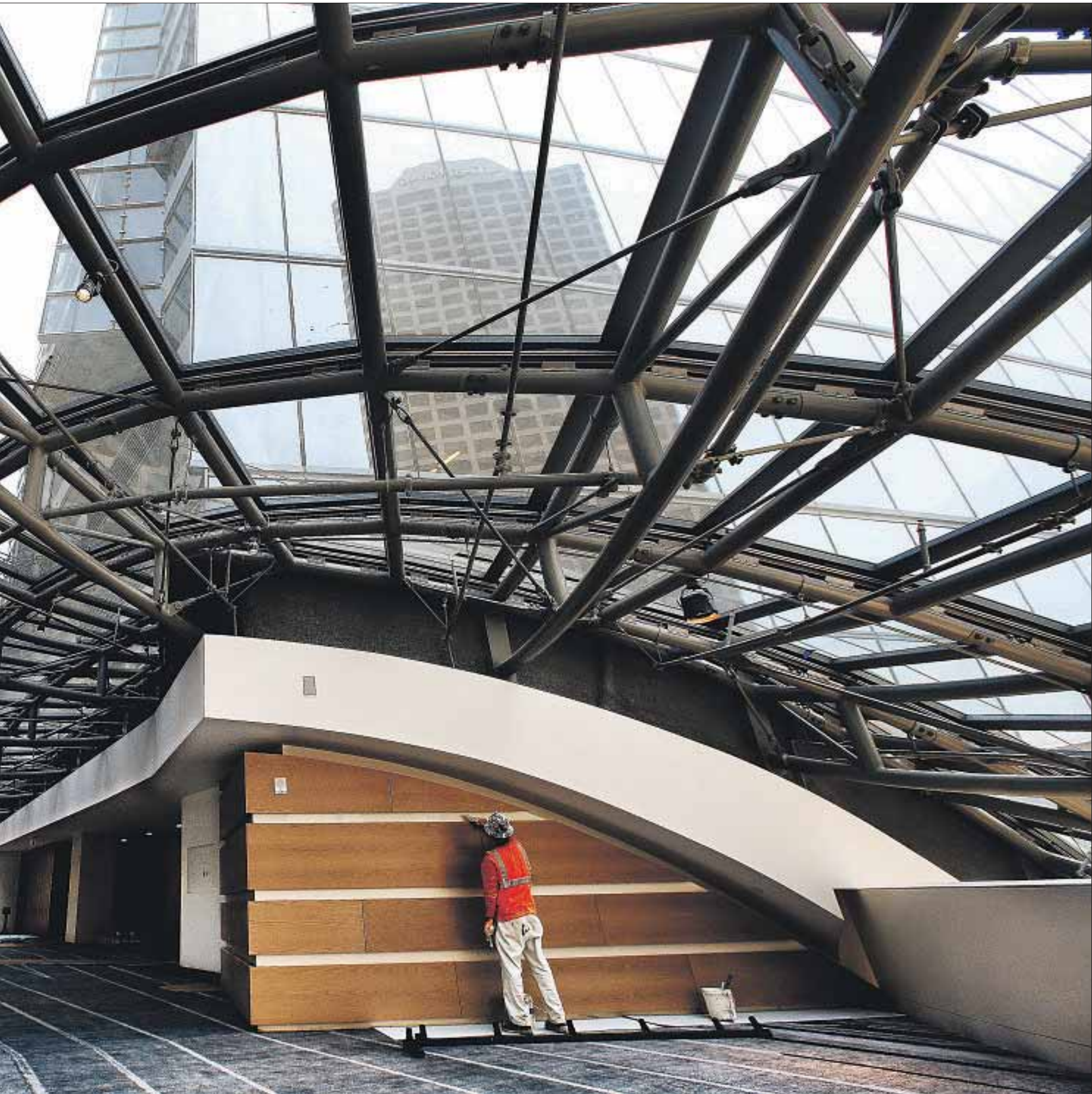
INSIDE AND OUT



A LAST-MINUTE steam cleaning for the porte cochere at the Wilshire Grand.



SCAFFOLDING is erected to install louvers and a three-story-high chandelier.



Photographs by MEL MELCON Los Angeles Times

which features foam stools, buoy lights and the No Dive Bar. “We’re trying to choreograph a set of experiences for visitors to the building,” says architect Chris King.



A WATER FOUNTAIN greets visitors in front of the Wilshire Grand Center.



A MARBLE countertop is installed in the master bath of the Presidential Suite.

WILSHIRE GRAND THE RISE OF A NEW SKYLINE



GEOLOGIST Rosalind Munro descended eight stories deep to verify the stability of the building site prior to construction.



YANG HO CHO, Korean Air chairman, and daughter Heather, executive vice president, at company headquarters in Seoul.



"WHEN WE went to one tower, all the pieces fell into place," says David Martin, co-chairman of A.C. Martin Partners.



CONSTRUCTION WORKERS guide a jumping wall form system into place as it is lowered into posi-

GROUNDWORK PLUS

Eventually all the pieces fell into place. But before the project could get off the ground, someone had to make sure that the ground was solid.

"OK. On down." Geologist Rosalind Munro spoke into her walkie-talkie. The cage she was standing in shuddered and slowly dropped farther into a shoulder-width borehole drilled beneath the streets of Los Angeles.

Munro was heading eight stories down to assess the stability of a building site. She needed to know whether the soil would support a skyscraper that would be the tallest west of Chicago and one of the tallest in the world on such seismically sensitive ground.

Looking up past strata hundreds of thousands of years old, she saw the sliver of sky grow smaller than a fingernail.

"Stop." The cage jerked still, darkness above and darkness below.

A cave-in would bury her in seconds, but the scientist put the thought out of her mind.

She reached for her pick and focused on finding answers for the engineers above ground — and for the two men whose handshake a decade ago had inspired the ambition to build the Wilshire Grand.

For nearly nine decades, members of the California Club downtown have gazed upon this city's evolving skyline from Flower Street.

Los Angeles' first skyscraper, completed in 1904, stood 175 feet tall and was a few blocks east at 4th and Spring streets. The city later imposed height limits on its buildings, and for 40 years City Hall, rising 454 feet, was the most conspicuous exception.

In the summer of 2014, the honor of being the tallest building belonged to the U.S. Bank Tower — an imposing fireplug that looms over the California Club, where on a summer evening in 2004 Chris Martin and Yang Ho Cho met for



CHRIS MARTIN'S family had shaped the city's skyline. With this project, they hoped to redefine and re-energize it.

the first time over dinner on the outdoor terrace.

Their introduction had been arranged by Max Nikias, now president of USC but then the dean of the School of Engineering. He wanted Martin, an architect and USC alumnus, to meet the South Korean businessman, a fellow Trojan.

With the city lighting up around them, they talked about their work. The Martin family helped design City Hall, and in succeeding decades had shaped the city's skyline. Martin and his cousin, David Martin, were the third generation to run A.C. Martin Partners.

Cho, 65, oversaw his family's business, which began as a freight company after World War II. Over the decades, Cho and his father developed Hanjin International Corp. into a multi-billion-dollar empire with assets that included Korean Air Lines.

The friendship between Martin and Cho grew easily. They shared a love of airplanes, and they spoke about the challenges of guiding

their children into their businesses. Over time, they visited each other's ranches, one on an island off the coast of Korea, the other just outside of Yosemite National Park.

Five years after their first meeting, Cho dropped in on his friend. On a Friday afternoon in 2009, they sat in Martin's corner office overlooking 5th and Flower streets. Martin got his guest a Coke.

"I own this hotel down the street," Martin recalls Cho saying. "Everyone tells me not to pour any more money into it."

Cho's company had acquired the Wilshire Grand from Hilton Hotels Corp. in 1989 for \$168 million. He had taken steps over the years to improve the property at the corner of Wilshire Boulevard and 7th Street, but wasn't satisfied.

"I've spent \$40 million trying to turn this into a four-star hotel, and I think I've gotten only four one-star hotels," he told associates.

Perhaps A.C. Martin could help. Martin's staff assembled six

scenarios. Five laid out modifications to the hotel. The sixth argued for demolition and construction of a hotel and an office building in two separate towers.

"That's what I want to do," Cho said.

A previous study Cho commissioned had recommended against demolition, but he didn't agree. He believed a new development would symbolize his company's commitment to Los Angeles, and he believed that in spite of the recession, it was the time to make that statement.

Cho had another request as well, one that offered the Martins an opportunity they had never thought they would see. Cho wanted his friend's company to take charge of the design for the 2.7-acre site.

New high-rises are rare in Los Angeles, and when they do come along, the competition among architects is fierce.

The Martins knew they weren't starchitects like Frank Gehry. Their company had a sterling repu-

tation in Southern California but little visibility outside the region. Designing the tallest skyscraper in the West, a building both structurally sophisticated and beautiful, could change that.

But they knew there were no guarantees. Cho had been loyal, but loyalty can be fickle, especially on a high-stakes project like this, budgeted at \$1 billion.

Martin remembered a commission in Jakarta that his firm lost to I.M. Pei when the wife of the owner ran into the acclaimed architect at a cocktail party. Martin knew it was not uncommon for other architects to horn in on big projects once the city permits were secured.

Until the city approved the Wilshire Grand and Cho greenlighted the concept, the Martins wouldn't feel secure.

So they worked fast. The project manager, Thomas Properties Group, began negotiating city approvals, and David Martin began detailing the site with a plaza and a 45-story hotel with condominiums and a 65-story office building with



Photographs by MEL MELCON Los Angeles Times

tion by a crane into the core of the Wilshire Grand tower in downtown Los Angeles.

TEAMWORK

1.5 million square feet of space. The City Council approved the project in March 2011, and everything seemed to be falling into place. Then the unforeseen happened. The two towers no longer penciled out. The market for office space had collapsed.

If a skyscraper is raised on the speculation that businesses will support it, then hope is raised on its aesthetic allure. The equation is a delicate one, and in Los Angeles in recent years, neither had balanced out.

“Following the stock market crash of ‘87, we thought that was it for Los Angeles,” David Martin said. By the time the economy rebounded in the early ‘90s, businesses were shifting away from traditional office space toward more mobile work forces, he said. “No more big buildings.”

Cho hoped to reverse that trend, and early estimates had supported his gamble. The footprint of the project, including the height of the towers, had been calculated so that the value of each floor, based on use, would pay the cost of construction. But by 2011, that calculation had soured. The demand for downtown office space plunged during the recession, recalled Ayalushim Getachew, who worked for Thomas Properties in managing the project. With vacancy rates climbing to 19%, tall buildings were emptying out. Bringing 1.5 million square feet of new office space on the market suddenly made no sense. Cho’s advisers searched for new ideas. They wondered if they could develop the project in phases: first the hotel, and then the office tower when conditions improved. But that idea introduced problems. Would guests want to stay at the hotel once construction started on the adjoining office tower? Other suggestions followed: Could they swap the towers, putting the hotel and condos in the taller one? Or could both buildings become hotels, one more upscale than the other? Cho’s team ran hundreds of financial projections. None added up. Looking for answers, Cho began

to doubt Thomas Properties’ role in managing the project. During interviews for the job, Jim Thomas had shown a bold vision that set him apart from other candidates, whose presentations frustrated Cho because they lacked specifics. “These people have traveled halfway around the world to hear your ideas,” Martin recalled Cho telling one candidate. “Tell us about the project, or I’ll throw you out of the room.” Thomas, whom Martin had known for 25 years, recommended demolishing the old hotel, and Cho hired him immediately. But two years later, Thomas Properties seemed “stuck in office buildings, and there was never any progress,” Cho recalled. Cho asked Martin to take over management of the project. No, Martin recalled saying. “That’s what Jim Thomas is for.” The impasse over the design broke when Cho’s daughter, an executive vice president with the family’s company, presented a new idea. A graduate of Cornell University’s School of Hotel Administration and USC’s Marshall School of Business, Heather Cho managed operations of the hotels owned by Korean Air. She had had reservations about building an office tower. “We are a hotel and hospitality company and should rely more on our core values and expertise,” she said. No one Heather Cho spoke to could justify adding so much office space. She proposed combining the two towers into a single taller one with much less room for offices. Her father swiftly signed on, but he remained adamant about replacing Thomas Properties. Martin finally agreed to take over and broke the news to Thomas, who according to Getachew felt betrayed. Thomas declined to comment for this story. On April 19, 2012, David Martin unveiled the design for a 73-story building with 900 hotel rooms and 400,000 square feet of office space, nearly a quarter of the original amount. “When we went to one tower, all the pieces fell into place,” he said. All but one. Martin and the engineers didn’t have enough information about the stability of the building site that was to support

the massive structure.

In the borehole, Rosalind Munro rotated the cage, her headlamp illuminating the closed-in walls. Down there, the musty air was tinged with the smell of petroleum and hydrogen sulfide, the odor of rotten eggs. She hacked at the rock with her pick, careful not to trigger a cave-in, and uncovered a seashell, a fragment of calcium carbonate nearly 4 million years old, encased in stone. She was looking for soil the consistency of Play-Doh, or for sediment that had changed color. Each would signal a weak bed for the foundation. At the bottom of the hole, she suddenly heard the alarm. Oxygen levels had been falling as the sedimentary rock absorbed the element. She had completed her research. It was time to get out. “Bring me up.” The cage jerked in its ascent. She passed the layer of sand, silt and gravel deposited from the streams and rivers that had poured off the San Gabriel Mountains 100,000 years ago. She passed the layer of fill, dirt packed with wood fragments, brick and concrete hauled here more recently. It could date to 1873, when Samuel Calvert Foy built a home thought to be the first three-story building in the city. Or maybe it went back to the days of the Studebaker dealership built after the Foy mansion was moved. Or perhaps it had been shoveled here in 1950 after the Paul G. Hoffman Studebaker agency was leveled to make room for the new hotel. Munro’s couldn’t guess. Her findings confirmed what her employer, the geotechnical consulting firm AMEC, had learned from previous tests. Set upon bedrock known as the Fernando Formation, the Wilshire Grand was going to have as perfect a base in the Los Angeles basin as any engineer could hope for. Compressed by an ocean that once lay on top of it, the siltstone could be clawed, scraped and shaped for any foundation. As the cage rose out of the hole, the drilling crew swings it to a side and lowers it to the ground. Face streaked with dirt, Munro stepped into the sunlight, its rays catching the tarped relic of the old hotel slowly being torn down.

Descent into the borehole

On Feb. 23, 2013, geologist Rosalind Munro with the geotechnical firm AMEC stepped inside an open-air cage and was lowered into a borehole, 86-feet deep, at the corner of Wilshire Boulevard and Francisco Street. She conducted a visual inspection of the soil that was excavated to support the Wilshire Grand.

Special equipment

Rock shield keeps dirt and rocks from falling inside the cage.

Aluminum cage provides a platform to stand on, approximately 21 inches in diameter and 7 feet tall.

Hard hat comes equipped with LED headlamp

Air hose blows fresh air into the borehole.

Walkie-talkie allows Munro to talk to a colleague, positioned at the opening of the borehole to take notes and watch and listen for any emergency.

Safety harness attaches to the cage.

Boots are fabricated with a steel shield over the toes.

Observation tools

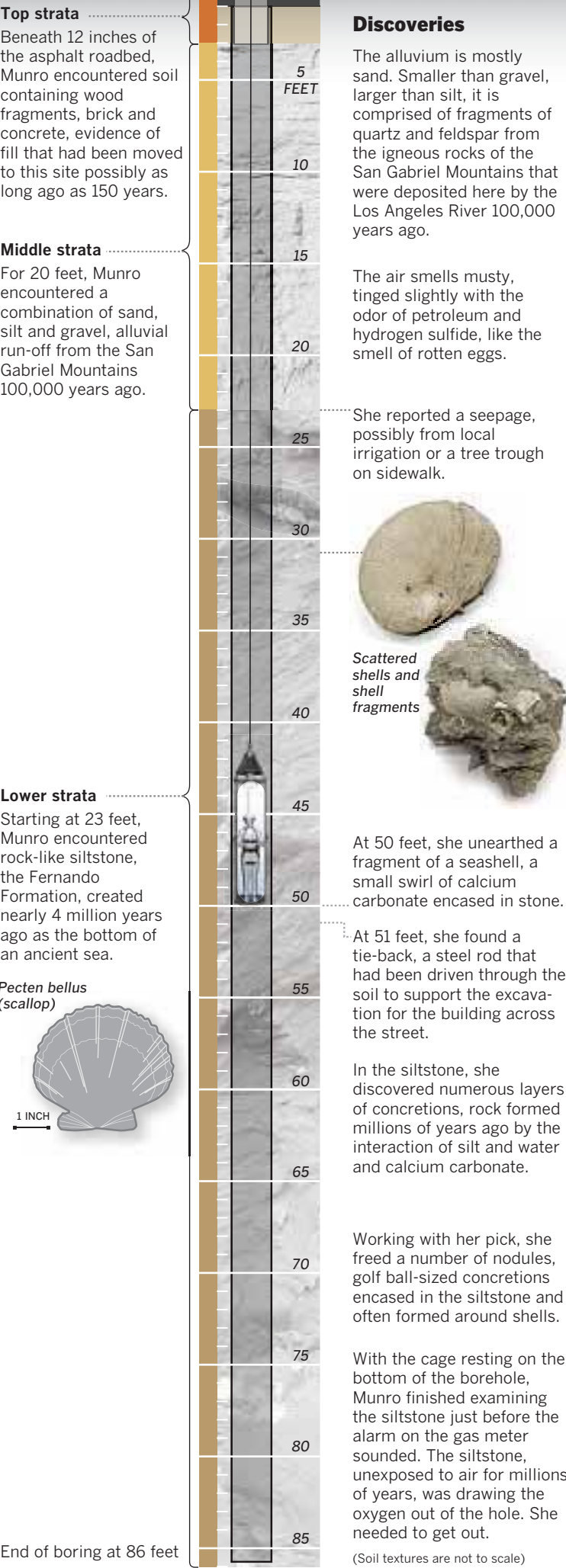
- Screw-driver
- Compass
- Knife
- Rock pick

Drilling rig creates the borehole. Working for at least six hours, the crew drilled a hole that was 24 inches in diameter and 86 feet deep.

Collar protects the rim of the hole from caving in and from rocks falling in.

Gas meter detects dangerous gases and a drop in oxygen levels.

Underground



Sources: AMEC, Shoring Plan, Cefali & Associates, California Academy of Sciences
Graphics reporting by THOMAS CURWEN
LORENA ELEBEE, JAVIER ZARRACINA Los Angeles Times

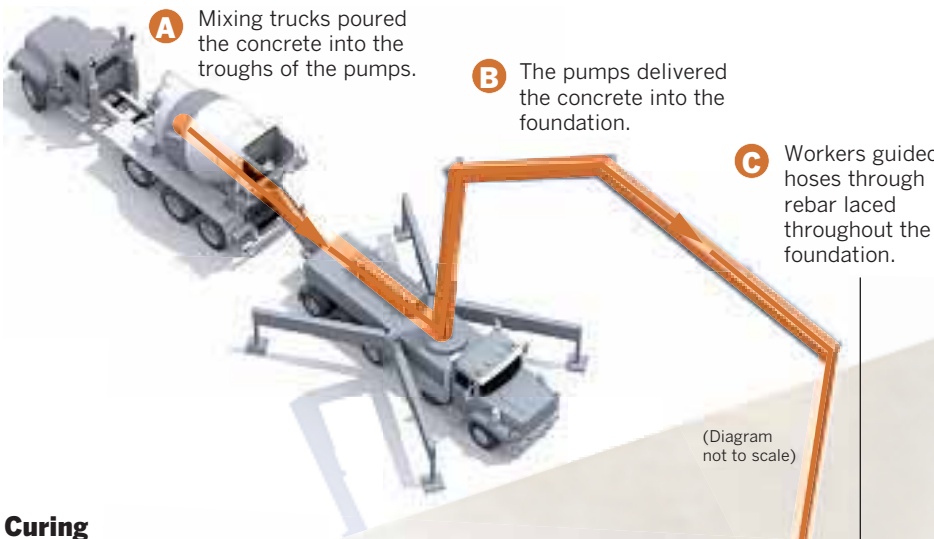
WILSHIRE GRAND THE RISE OF A NEW SKYLINE

The footprint of a giant

The Wilshire Grand is the tallest structure in Los Angeles. On the weekend of Feb. 15, 2014, construction crews, led by Turner Construction Co., laid the concrete foundation for the building that transformed the skyline of Los Angeles.

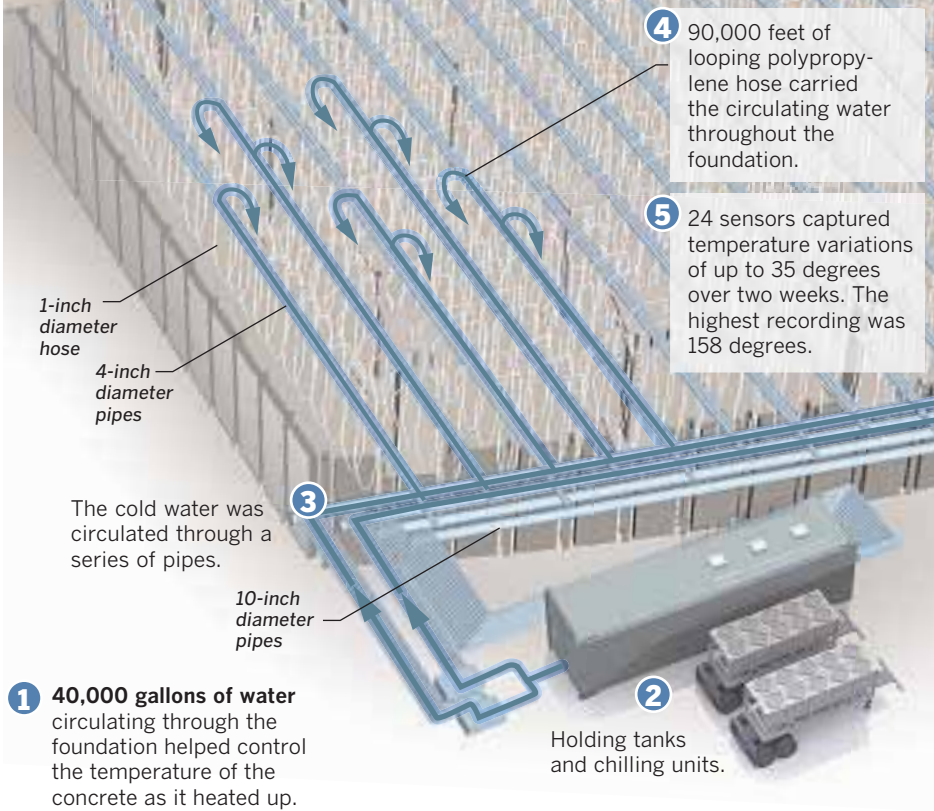
Pouring

Nothing on this scale had been recorded since 1999, when the foundation of the Venetian in Las Vegas was poured. The success of the Grand Pour put the Wilshire Grand in the Guinness Book of Records for the largest continuous concrete pour.



Curing

After the pour was completed, the concrete began to harden, a process that raised temperatures inside the new foundation. During the early stage of the curing phase, it was crucial to keep the concrete below 160 degrees to prevent cracking. A special cooling system was designed.



Sources: Turner Construction Co., Brando & Johnston, Inc., AC Martin Inc. Graphics reporting by THOMAS CURWEN, LORENA ELEBEE

The Wilshire Grand

The hotel and office complex include:

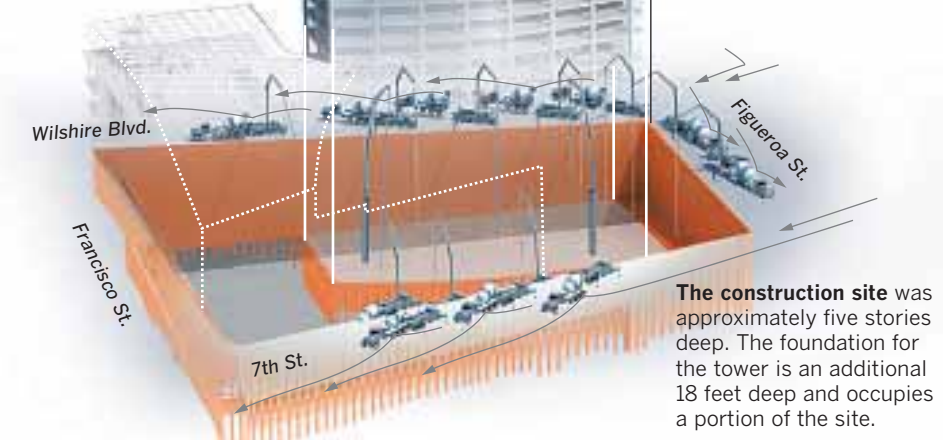
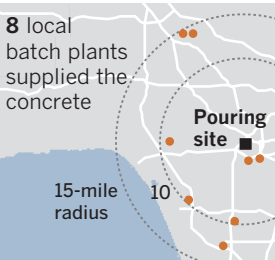
- 889 rooms
- 376,441 square feet of office space
- 53,556 square feet of restaurant and retail space
- 5-level underground garage with 1,092 parking spaces
- Terrace on the 73rd floor

The Grand Pour ballet

Organized and timed deliveries of concrete were crucial in the pouring of nearly 82 million pounds of the slurry, which had to be laid within 90 minutes of the initial mixing.

By the numbers

- 262 drivers
- 227 mixing trucks
- 19 pumps
- 13 hoses



The foundation

The 2.8-acre area bears a 73-story tower, a seven-story podium with ballrooms, terraces and a pool. The tower's foundation was specially designed to help the building withstand earthquakes and windstorms.

The construction site was approximately five stories deep. The foundation for the tower is an additional 18 feet deep and occupies a portion of the site.

LORENA INIGUEZ ELEBEE, JAVIER ZARRACINA Los Angeles Times

THE GRAND POUR

Orchestrating the laying of an ambitious concrete foundation was job of a lifetime

Michael Marchesano gazed out the window of his third-floor office in downtown Los Angeles and didn't like what he saw. In a far corner of an excavated pit, five stories deep and the size of a city block, stood a mound of dirt as big as a small house. It wasn't supposed to be there.

The weekend construction crew, looking like toy figures, was occupied with other jobs: tying together steel reinforcing bars, stringing polyethylene tubing, arc-welding a raker beam into a lag wall.

It would be three more years before the completed Wilshire Grand tower would rise 1,100 feet above the corner of Figueroa Street and Wilshire Boulevard. With an open promenade and an enormous swoop of glass above the entrance, the translucent airplane wing 73 stories tall promised to redefine architectural possibilities in a city not known for its tall buildings.

Beneath its design was the engineering of what is arguably the most complicated high-rise ever built in the United States. Calculated to sway during powerful Santa Anas and absorb ground movement during the most severe earthquakes, it is wedded aesthetically and technically to the unique footprint of the region.

But what mattered in early 2014 was a pile of dirt.

Marchesano, a general superintendent for Turner Construction Co., knew he had no time to haul it away. A countdown clock on the wall gave him 7 days, 11 hours, 36 minutes, 7.8 seconds before the start of the Grand Pour, an ambitious attempt to lay the foundation of the building's central tower in one overnight session.

Of all the sites Marchesano had worked in the course of 30 years, none had been this complicated.



MEL MELCON Los Angeles Times

MICHAEL MARCHESANO, left, general superintendent, and **Bill Depasquale**, field operations superintendent, on the foundation. "How could you not want to be part of this?" Marchesano asks.

Nor, he suspected, would any be in the future.

This skyscraper, the tallest structure in the western United States, represented a career-defining moment, a daunting and glorious job that had to be approached one step at a time if sanity was to prevail.

The dirt mound was the next step. Just off to a side, they would have to work around it until it could be removed.

Then they would be ready to receive 2,120 truckloads of concrete in a hole 18 feet deep and nearly two-thirds the size of a football field. It had to be poured without interruption in less than 30 hours.

Nothing this size had ever been recorded. In 1999, construction of the Venetian in Las Vegas included

a continuous pour that made the Guinness Book of World Records. If the Grand Pour succeeded, it would be bigger.

Marchesano and his team had begun preparing nearly a year earlier: filing permits for street closures, having bus lines rerouted, ordering backup equipment and calculating drive times.

More than 350 workers would be on site, and 227 trucks on the road, looping from batch plants to downtown and back. Any glitch, injury, accident or freeway snarl would jeopardize the plan, and that wasn't even taking into account the weather. Rain or a heat wave could force delays. God would weigh in on that.

For a system as finely tuned as a rocket launch, everyone banked on

success, leaving Marchesano to worry about failure.

Let other skyscrapers in other cities be built upon piles and caissons driven into bedrock. The foundation for the Wilshire Grand is a concrete slab.

Its specifications were drawn up by engineers who, after calculating the height and weight of the tower and the forces associated with earthquakes and windstorms, determined that it needed to contain 21,200 cubic yards of concrete and 7.1 million pounds of reinforcing steel.

By some calculations, those ingredients are enough to build an entire 10-story office building.

Design decisions are compromises driven by safety and cost. If the slab were to contain less concrete and be more shallow, it would require more reinforcing steel, and if it were to contain less steel, it would have to extend deeper into the bedrock. Eighteen feet was the middle ground.

For a time there had been talk about layering the foundation in two pours, each 9 feet deep. But given how difficult it would be to connect the two slabs, the idea was shelved.

The numbers for the Wilshire Grand — including 900 hotel rooms and 400,000 square feet of office space — had always impressed Marchesano, who at first was uncertain whether the pour would be possible.

To pull it off, he knew he would need to find room for all the equipment on an already crowded site. He would also have to find a supplier who could make and deliver that quantity of concrete. Neither was a sure thing.

Such problems didn't exist in the open fields of Orange County where Marchesano learned the construction business in the 1980s. After graduating from high school in Irvine and digging trenches for an underground utility, he turned to construction.

He opened a demolition and concrete-cutting company that he named after his wife and children, but the economy turned on him. He lost his home. His mother died. His father had a stroke, and he and his wife split up.

Leaving the state in 1990, he found work on a cattle ranch in Colorado, earned the nickname "Hollywood" and moved up from cleaning feed troughs to riding and doctoring the herd. A year later, a phone call brought him back to Orange County to work for a local builder. He rented an apartment on Balboa Island where he lived with his three children, and he eventually remarried.

He joined Turner in 1999 and supervised the construction of such projects as Disney's Grand Californian Hotel and the Terranea Resort. [See Foundation, S15]



A Note from the Chairman

The Wilshire Grand is the realization of a dream and the completion of a promise.

When we purchased this property in 1989, we knew it had an elegant past but had seen the best of its days. I dreamt of a luxury hotel, stunning offices, high-end stores, popular restaurants and public plazas that would invite relaxation. The Wilshire Grand Center today is that dream come true.

We promised Los Angeles a unique property that would attract the best of the best. We delivered the crown jewel of Figueroa Street with 900 luxury hotel rooms, the first new downtown offices in 30 years, and architecture that redefines the essence of downtown.

The Center's tower is the tallest structure in the west and is creating a new Los Angeles skyline. Its unique exterior LED lighting will make the Center an iconic new landmark for the region.

I know the Wilshire Grand Center's InterContinental Hotel Downtown will help draw the international community to this beautiful site and the new hotel rooms will add to the City's ability to attract conventions and the Olympic Games.

The Wilshire Grand Center symbolizes our trust and faith in the strength and power of Los Angeles, the Capital of the Pacific Rim. Los Angeles is my second home and I am proud to make this contribution to its future success.

Some say the Wilshire Grand Center is perfect. But, according to the famous Buddhist monk Bubjung,

*Perfection is not something that already exists;
Perfection lies in the in the ever-changing moments that comprise our lives.*

This is one of those moments.

Thank you.

Yang Ho Cho
Chairman
Korean Air & Hanjin Group

Yang Ho Cho
Chairman
Korean Air & Hanjin Group



John H. Johnson	Robert Johnson	George Johnson	William Johnson	George Johnson	John H. Johnson	John H. Johnson	George Johnson	George Johnson	John H. Johnson	George Johnson	George Johnson	George Johnson	George Johnson	George Johnson
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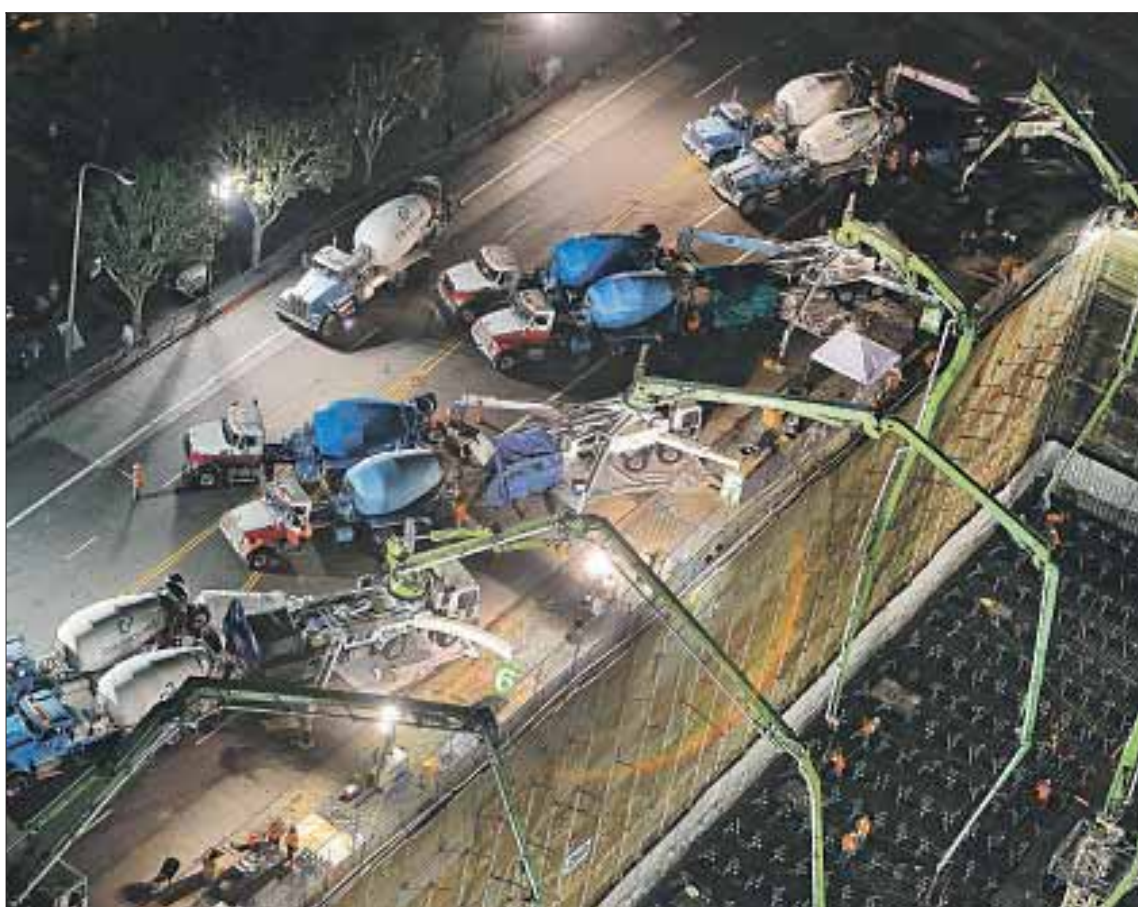


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THE FIRST, BIG STEP

They found room for 19, more than enough, and calculated their placement, each within a foot. Anything out of alignment, and Marchesano would have a safety hazard and traffic jam on his hands.



TRUCKS DUMP their loads into pumps that send concrete through booms into the foundation. The trucks' positions were plotted to the foot to ensure room.

Often described as a fruitcake, concrete is a mixture of cement, aggregate and, in this case, fly ash that heats up when water is added, forming crystals that lend the material its strength. The heat typically dissipates in most pours, but the size and the depth of this slab

As the countdown clock ap-

At that point, only a lightning storm would delay the pour. The booms, angling into the pit, could serve as conductors.

By late afternoon on Feb. 15, under clear skies and with temperatures dropping from a high of 78 degrees, the convoy of mixing trucks had followed their instructions: Exit the I10 Freeway at 6th Street and either continue to Flower and turn right on 7th, or turn on Figueroa, before being directed to the site.

And now he could get rid of that mound of dirt.

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We are proud to be a team member
on this iconic project that has
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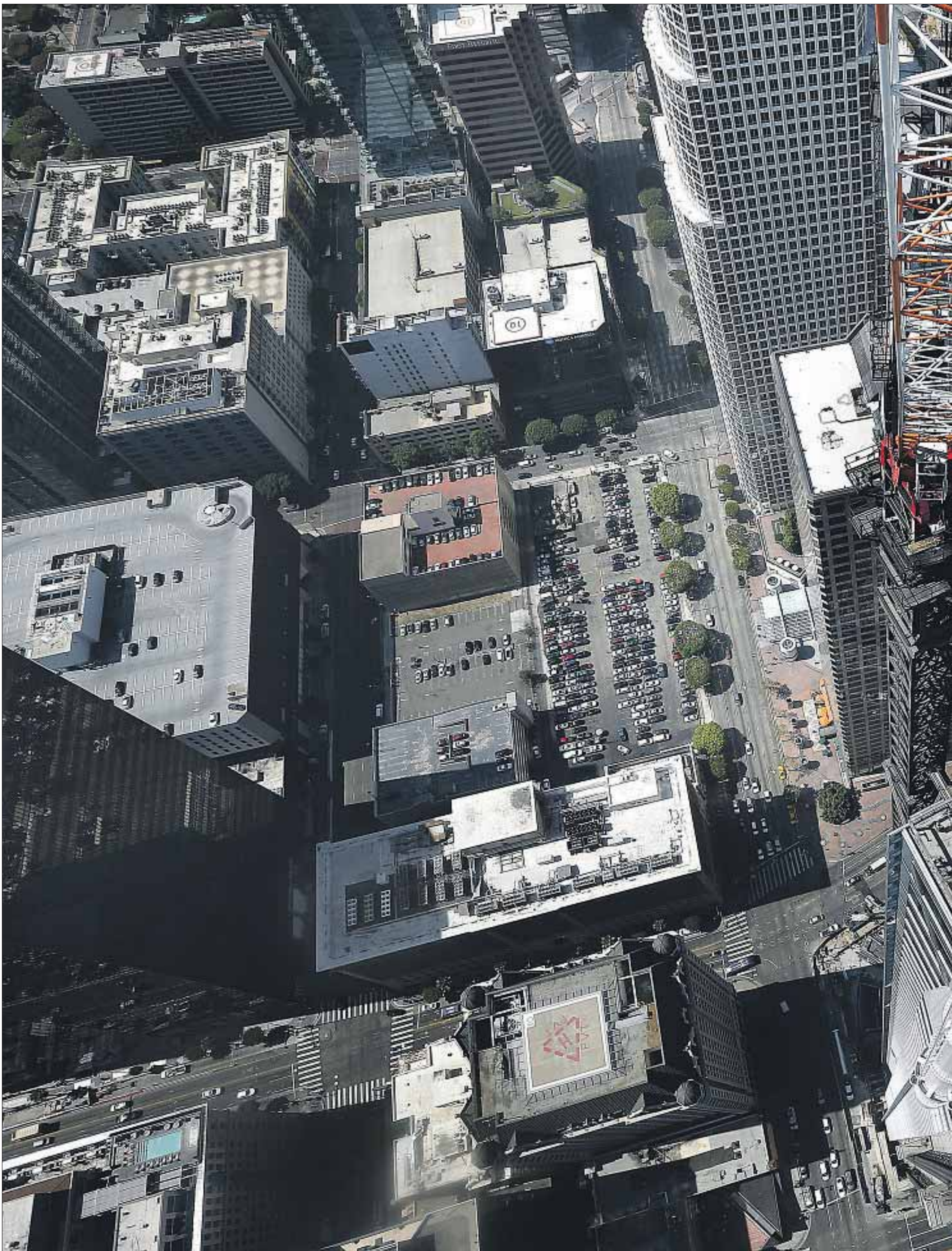
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WILSHIRE GRAND THE RISE OF A NEW SKYLINE

LIFTED ABOVE

For all its 21st century grand effects and engineering feats, the Wilshire



IRON WORKERS Pete Veliz, Vince Parker, and Ray Shoats can almost touch the sky from inside the spire attached to the Wilshire Grand. Rising 1,100 feet — not counting



WORKERS POSITION pipes into place while standing above an 18-foot hole that will be filled with concrete to form the foundation for the project.



CEMENT FINISHER Jaime Velasquez, center, smooths out a concrete deck after it is poured on the 9th floor of the concrete core of the Wilshire Grand.

THE HORIZON

Grand is a throwback to a time when Los Angeles dared to dream tall



Photographs by MEL MELCON Los Angeles Times

a 2-foot lightning rod attached to the top — the towering high-rise at Figueroa Street and Wilshire Boulevard has earned a place in history.



IRON WORKERS perform a delicate ballet amid towering walls of rebar. Structural crews are known for an intensity that comes from the dangers of the work.



A WELDER attaches clips onto a steel column at Schuff Steel in Phoenix, where the Wilshire Grand project's steel was fabricated.

WILSHIRE GRAND THE RISE OF A NEW SKYLINE



ARCHITECT DAVID MARTIN'S concept for the Wilshire Grand's skylight was inspired by the Yosemite Valley and the Galleria Vittorio Emanuele II in Milan. Photographs by MEL MELCON Los Angeles Times

A VISION'S QUEST

That signature skylight, inspired by Yosemite, was almost scrapped. Here's how it overcame financial realities and engineering concerns.

Construction manager Scott Borland had no doubt that the skylight rising above the entrance to the Wilshire Grand would be spectacular. But then, everything looks good on paper. Draped between the 1,100-foot skyscraper and its seven-story companion, the skylight runs nearly the length of a football field, dropping 65 feet — like a ski slope — as it flows between the two buildings and marks the entrance to the hotel.

Architect David Martin called it the signature element of the project, a river of glass inspired by the Yosemite Valley. Martin also evoked the Galleria Vittorio Emanuele II in Milan, the glass-ceilinged arcade located between the city's cathedral and opera house, known as il salotto di Milano, Milan's living room.

But neither a living room nor Yosemite came to mind as Borland studied the plan. "You've got to be kidding me," he thought.

Twenty years' experience on high-rises in Manhattan had made Borland a practical man. As construction executive in charge of day-to-day operations for the Wilshire Grand, he found the skylight an extravagance that would certainly cost more than the \$3-million estimate.

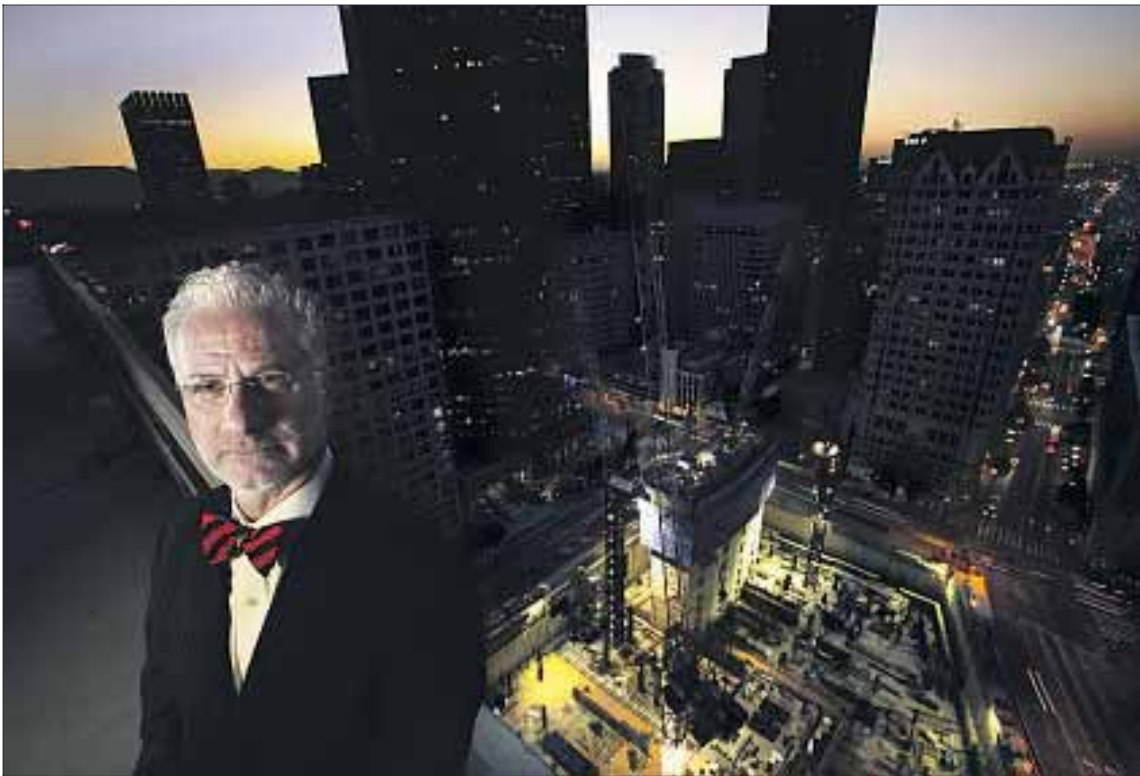
He wondered if it were even possible to build such a structure. Then how would it react during an earthquake? Could it support the weight of a cleaning crew?

Martin and his design team might not like what Borland had to say, but he couldn't keep his opinion to himself.

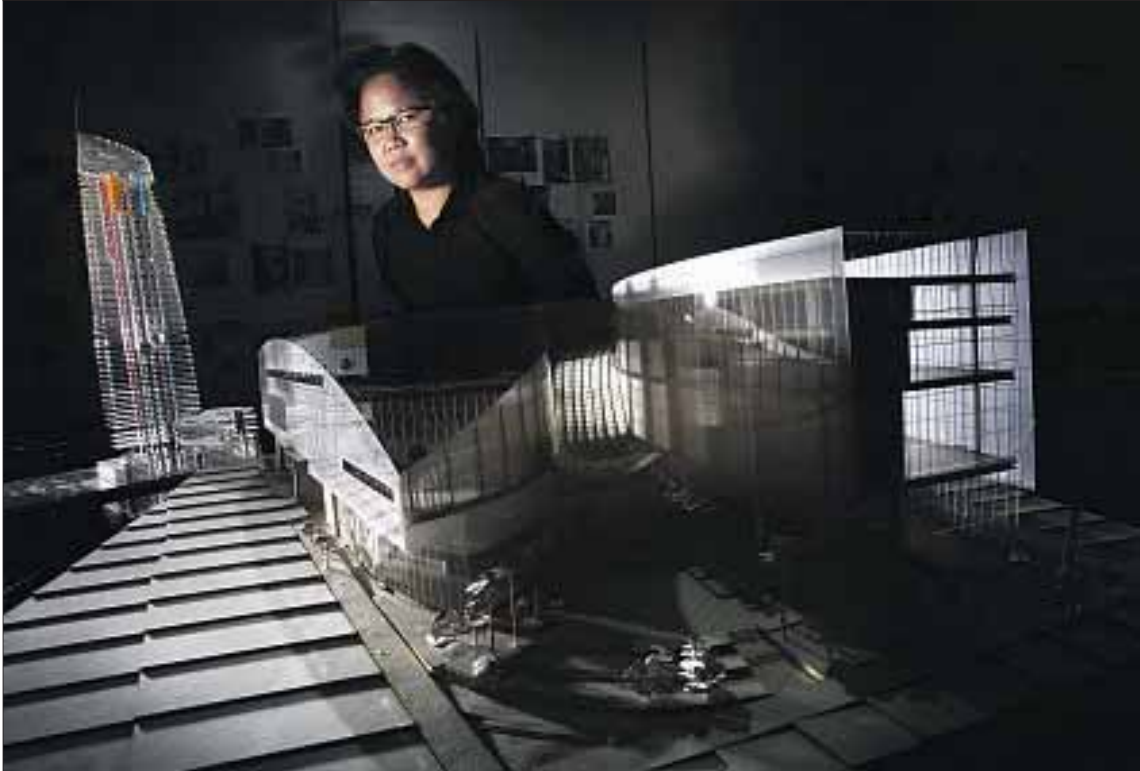
Raising a tall building is an exercise in compromise and negotiation, a choreographed clash of disciplines intended to make the project better or safer — and economical.

Architects advance designs. Engineers, accountants and consultants step up with their critiques.

Forget vanity or hubris: The principal function of a tall building



KENNETH ASPIS was responsible for keeping the Wilshire Grand project within budget. "We're not always viewed as the friendliest people in the room," he says.



TAMMY JOW, senior designer with A.C. Martin, defended the skylight concept as "lyrical and poetic" in design. "In the eyes of estimators and contractors, anything square is better," she says.

is to make money, and beauty, if it doesn't bring in tenants and guests, can become a heated point of discussion.

Martin likened the debate to a game of poker, with each design element a hand to be played.

"You have to know when to hold

them and when to fold," he said.

The stakes for the Wilshire Grand were especially high. The project presented Martin with a once-in-a-lifetime opportunity to build a landmark in downtown Los Angeles, much as his grandfather did with City Hall and his father did

with a number of high-rises, including the Department of Water and Power Building.

He had never expected to dream this big. By the fall of 2014, he was 71 and had spent more than 50 years at the family firm watching as market conditions limited his aspi-

ration.

All that changed in 2009. A friendship that his cousin and business partner, Chris Martin, had struck with South Korean businessman Yang Ho Cho, the chairman of Korean Airlines, led to a coveted commission. A.C. Martin Partners would design a hotel and office complex at Figueroa Street and Wilshire Boulevard.

David Martin began by dusting off plans shelved in 2005. He had designed a 55-story tower for the Grand Avenue Project near City Hall, but the project was awarded to the city's most celebrated architect, Frank Gehry.

The decision was a blow for Martin. He retreated a little before finding his way back, said senior designer Tammy Jow, who has worked with Martin for two decades. Creating a 73-story skyscraper, the tallest building in the West, gave him a new reason for coming into the office. "He was very accomplished before this, but this was the icing on the cake," Jow said.

A window ledge in Martin's modest downtown office grew cluttered with cardboard and plastic models. Pages in his sketchbook filled with ideas.

Rendered in black ink and a blue wash, the tower's beveled and faceted facades described a surprisingly slender building that, in spite of its height, seems light, even gauzy.

"Diaphanous," Martin said.

With echoes of the Case Study houses in Los Angeles, the arcade in Milan and all the piazzas in Europe that he visited as a student years ago, he hoped to create a more intimate space, an invitation for visitors to explore, linger and, as he explained, "develop a relationship with the property."

He poured himself into the project, and even though he knew he had the support of the owner, he prepared for the clashes.

Opening salvos were fired during weekly progress meetings. Seated around a long table each Tuesday, more than 20 of the project's engineers, architects and managers discussed every element of the design.

Concrete versus drywall. Wood versus vinyl. Paint versus wallpaper. Stone versus carpet.

The start of big projects is often quarrelsome, and the Wilshire Grand was no exception. One of the first arguments took place in the fall of 2012 and came from an unexpected quarter.

The Metropolitan Transportation Authority objected to the excavation plan for the foundation, arguing that the dig, nearly 100 feet

WILSHIRE GRAND THE RISE OF A NEW SKYLINE



MEL MELCON Los Angeles Times

FOR MORE THAN two years, Leonard Joseph has been consumed by the challenge of making the skyscraper stand up to Southern California’s fierce quakes.

BUILT TO STAND FIRM

One of the tallest towers to be erected in an earthquake hot zone is a hard-fought compromise between safety and style

On engineer Leonard Joseph’s computer screen, the Wilshire Grand was an apparition of white lines floating calmly in black space. Then Joseph clicked his mouse, and the 73-story tower began to move, slowly at first, then more violently, as a simulated earthquake, magnitude 7.8, shook its foundation. The skyscraper bowed, swayed and wobbled. Joseph was incredulous. “It’s like those inflatable figures on the roadside,” he remembered thinking. If the tower were to dance like that, he realized, it would never stand. The more it bent, the more the gravity load would increase the bending, and down this billion-dollar hotel and office project would fall. Joseph knew the computer had amplified the movements 50-fold to make the trouble spots obvious, a 150-foot bend being more conspicuous than a three-foot bend. Even so, he found the images disturbing, a reminder of the risk of raising a skyscraper in Southern California.

The structure at the corner of Wilshire Boulevard and Figueroa Street is one of the tallest ever built in a seismic hot zone. Its design has undergone the most sophisticated earthquake modeling performed on a building in Southern California. But even that has its limits. “Earthquake design is a fuzzy proposition,” said Joseph. “You can’t ask an engineer to guarantee that a building will never collapse in an earthquake. That is not fair....” “You can ask that it will behave as well as possible, meeting at least the code requirements. Even that’s a heavy responsibility.” By the fall of 2014, the challenge of making the Wilshire Grand stand up to fierce ground movements had consumed Joseph for two years. Early tests showed that the tower needed special bracing at three points to prevent catastrophic failure, but there was another problem. On the top floor, an earthquake could deliver a whiplash up to 4gs of acceleration, more than space shuttle astronauts experienced during launch. The results doomed the architect’s original vision for the top of this soaring edifice: a filigree of steel encased in glass and topped by a spire. Rising 300 feet above the tower, the features — too tall, too light — would never survive those top-floor forces. On that point, there was no room for debate. “There are some things you can’t negotiate. You can’t negoti-

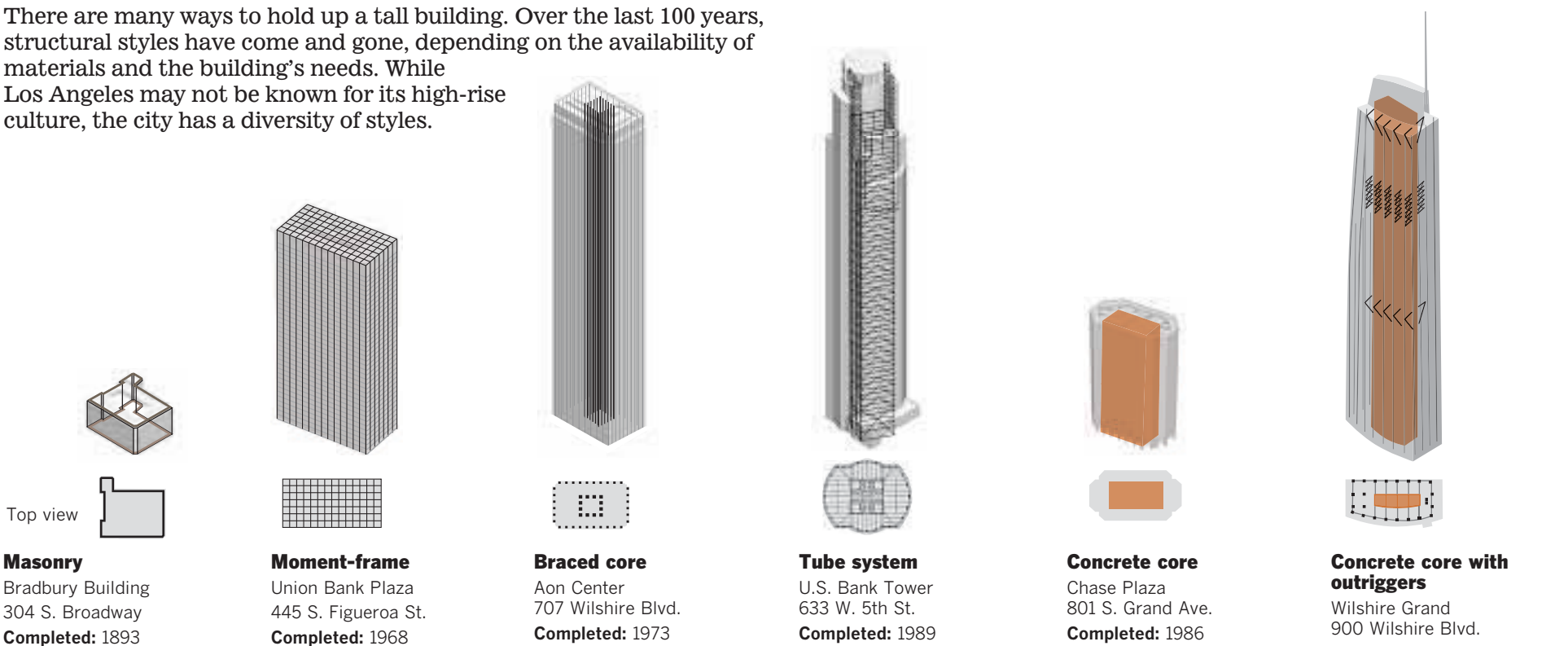
ate with God or Isaac Newton,” Joseph said. If every building is an act of defiance against the laws of physics, then a skyscraper is a brazen assault. Vertical forces push down, and lateral forces push sideways, each capable of damaging if not toppling the structure. Before leading a team of engineers who designed structural elements of the Wilshire Grand, Joseph had helped shape some of the world’s most distinguished skyscrapers: the Petronas Towers in Malaysia, Taipei 101 in Taiwan and Shanghai Tower in China. Los Angeles’ tower, however, proved to be in a class by itself. Architect David Martin wanted large windows in every room, which required a relatively new style of construction using a concrete core. To make space for an adjoining plaza, he pushed the tower to a corner of the site, limiting the size of the foundation. To increase energy efficiency, he gave the skyscraper two narrow sides and two broad ones, like a domino standing on end. The result was a slender, airy design whose purpose was to be a beautiful hotel, not a fortress against earthquakes. The engineers were left with the job of having to fortify it. The Wilshire Grand’s design had to have the right combination of structural elements to keep the building erect when pushed down by gravity or pushed sideways by

windstorms and earthquakes, the principal forces that lead to failure. In 1884, William Le Baron Jenney designed the 10-story Home Insurance Building in Chicago using steel columns and beams instead of bricks and mortar to support the building. For most of the next century, steel girders angled like jungle gyms above American streets. But steel-frame buildings lose their efficiency at about 60 stories. In the 1970s, a new technique allowed buildings to shoot skyward. In place of the jungle gym, buildings were held aloft by perimeter columns. With its twin towers standing 110 stories, New York’s World Trade Center was the nation’s grandest example. The perimeter columns had one drawback, however. They obstructed views. In the 1990s, advances in concrete technology had led to the conception of a high-rise as two interdependent structures: A concrete core, rising the height of the tower, serves as the central support for a skyscraper built around it. Exterior columns are still necessary, but they are much smaller. High-rises with narrow concrete cores can be additionally supported with structural elements known as outriggers: braces that form giant triangles with horizontal and diagonal members extending from the core to the perimeter columns. Together, the outriggers and columns act like ski poles for the concrete core, helping to resist vertical and lateral forces. The style met Martin’s require-

ments for the Wilshire Grand. Thirty outriggers, positioned between the 28th and 31st floors, the 53rd and 59th floors and the 70th and 73rd floors, extended from the core. But that didn’t mean the tower could survive earthquakes. To engineer Marty Hudson, earthquakes are like fingerprints. No two are alike, which makes it impossible to design a building as unusual as the Wilshire Grand from the equations found in building codes. Hudson was asked to create simulated earthquakes to test the tower design. Working with data prepared by the California Geological Survey and the Southern California Earthquake Center, he began by cataloging nearly 100 local faults, poring over analyses of their geometry, type, slip rate and maximum possible magnitude. Hudson studied how waves of energy, generated by earthquakes ranging from magnitude 4 to the low 8s, moved through the earth across Southern California. From that, he extrapolated how the earth movements would translate into shaking at the corner of Wilshire Boulevard and Figueroa Street. The goal was to evaluate the greatest jolt that the building could experience. Hudson then needed to understand how that energy would play out, second by second, as the earth

The evolution of building design

There are many ways to hold up a tall building. Over the last 100 years, structural styles have come and gone, depending on the availability of materials and the building’s needs. While Los Angeles may not be known for its high-rise culture, the city has a diversity of styles.



moved. So he turned to records of actual earthquakes around the world that came from faults similar to those in Southern California and were transmitted through comparable soil conditions.

Data in hand, the next step was to test the information against the Wilshire Grand's specifications.

Engineers turned to their computers, entering 112,500 lines of information that included such details as the size and location of the beams, columns and walls, along with their strengths, springiness and behaviors when overloaded.

Then they began running a program that pitted Hudson's earthquakes against the building.

The computations were so complicated that the computer needed nearly three days to run the simulations. The results provided visual representations of the building's movements and numeric spreadsheets that pinpointed failings.

The team scrutinized the data. Blue numbers meant that a brace or a wall had survived the shaking. Red numbers were trouble.

The tests helped the engineers refine the size and depth of the foundation, which would need to resist as much as 13.2 million pounds of force pulling up and 25 million pounds of force pushing down on each of the 20 perimeter columns as the tower swayed during an earthquake.

The numbers also pointed out a major problem. Strained by the force of Hudson's earthquakes, the outriggers jammed into the core, delivering more stress than the concrete could absorb. The inside walls between the elevators and stairwells were failing. Joseph saw wide cracks forming in the core.

Looking for solutions, engineers settled on a device known as a buckling-restrained brace. It consisted of a long steel bar encased in a steel box filled with grout. When a building moves, the steel box allows the bar to compress or stretch like taffy without buckling.

Joseph replaced each of the original wide-flange diagonal braces with one or more buckling-restrained braces.

He ran new tests, and the core survived. The Wilshire Grand would have 170 of these braces.

Joseph wasn't finished. He kept returning to the animation.

The 7.8 earthquake — derived from the one that struck Tabas, Iran, in 1978 — turned the skyscraper into a snake with broad undulations coursing throughout the structure. He knew the building could sway up to 8 feet in an earthquake, but these cobra-like movements were different.

Much as harmonics, overlapping vibrations, arise from a plucked guitar string, multiple vibrations occur in a building that has been shaken by an earthquake. These vibrations are waves of movement that travel up and down the structure.

Because of the height of the Wilshire Grand, it can produce more than 200 of these harmonics, jiggling that is caused and compounded by the speed and duration of the seismic waves.

Movement at the base of the tower could amplify into a roller coaster ride at the top. With possible accelerations of 4gs, engineers worried that the crown and spire might buckle or even land in the street "like a Hollywood production," Joseph said.

Removing those architectural elements was out of the question.

Luminous by day, illuminated by night, the sail-like crown was the building's hood ornament, a distinctive mark in the city's skyline. As an aesthetic decision — to show off its musculature — the sail was surrounded by glass.

Architect Martin wanted it to look delicate and lacy with long, A-frame diagonals. He had hoped that its light weight would enable it to withstand strong lateral forces. A magazine editor looked at drawings for the concept and said it looked like the Eiffel Tower, and the analogy stuck.

But Joseph knew that this Eiffel Tower would be unsafe. He had hoped that the reinforced outriggers would solve the problem by controlling the movement of the tower.

They didn't.

Engineers considered anchoring the sail to the building with long cables that would allow a gentle rocking. But further tests showed the sail would rock so violently that it would damage the concrete core.

A redesign of the sail into a shorter feature offered no advantage, structurally or financially.

Skeptics talked of eliminating the sail entirely, especially as its cost started to rise.

Martin insisted that it remain. But he had to compromise. The sail had to be sturdier, less light and airy.

Engineers refigured his Eiffel Tower into a 500-ton complex of wide-flange braces, ranging from 22 to 44 feet in length, crisscrossing like a cat's cradle. "We decided to go with brute force," Joseph said.

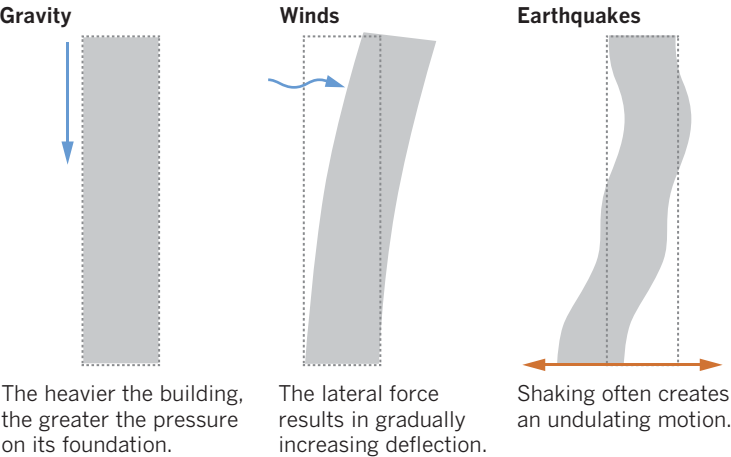
For Martin, the solution meant that the Wilshire Grand would retain its soaring prominence. Not flat-topped like the city's other high-rises, it could join City Hall as Los Angeles' other crowned edifice, adapted to the precarious reality of Southern California.

Man vs. nature

The Wilshire Grand is one of the tallest structures raised in a severe seismic zone. Its unique requirements forced engineers to find the right combination of structural elements that would keep the building standing during a catastrophic earthquake.

Physics 101

For every force in nature, there is an equal and opposite reaction. In the design of skyscrapers, gravity, winds and earthquakes are the greatest forces that the building reacts to.

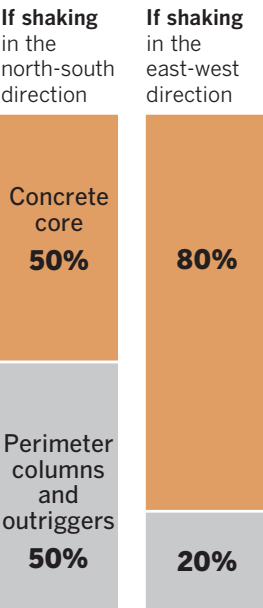


Underlying support

The architect's requirements for the Wilshire Grand — large windows and a narrow profile — helped determine the basic structural elements for the skyscraper.

Combined strength

All structural elements of the Wilshire Grand play a role in supporting the skyscraper.



Concrete core

Conceived of as a building within a building, the Wilshire Grand has a concrete core that serves as the central support for the tower built around it. The strength of the core allows for smaller exterior columns and uninterrupted views from the rooms. The core is 841 feet, 6 inches tall, with walls 4 feet thick at the base, tapering to 2 feet near the top.

Outriggers

The concrete core is supported with a series of structural elements known as outriggers. These braces form giant triangles extending from the core to the exterior columns. There are 30 outriggers located on floors 28-31, 53-59 and 70-73.

Perimeter columns

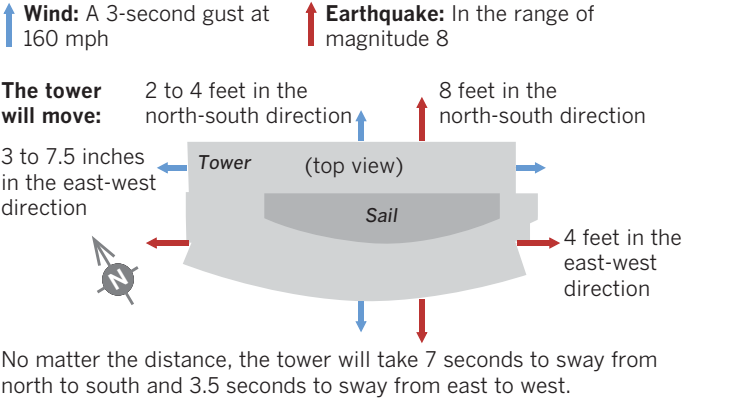
Surrounding the concrete core and defining the faces of the building, 20 columns work with the outriggers, helping to resist lateral and vertical forces that come from gravity, winds and earthquakes. The columns are concrete-filled steel boxes.

Foundation

The most crucial element of the Wilshire Grand is its foundation, which was designed to carry the weight of the building and to resist forces from the movement of the tower. Eighteen feet thick, the foundation contains 21,200 cubic yards of concrete and 7.1 million pounds of reinforcing steel.

From the 73rd floor

Guests on the top floor of the Wilshire Grand will need to hold on tight in the event of a major earthquake. Computer simulations and wind-tunnel tests allowed engineers to calculate movement during "maximum considered events."

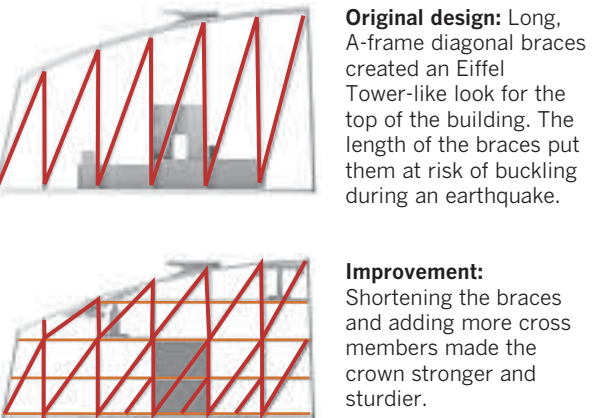


Refining the design

The Wilshire Grand underwent an extensive series of tests that led to significant changes in two aspects of its structural design.

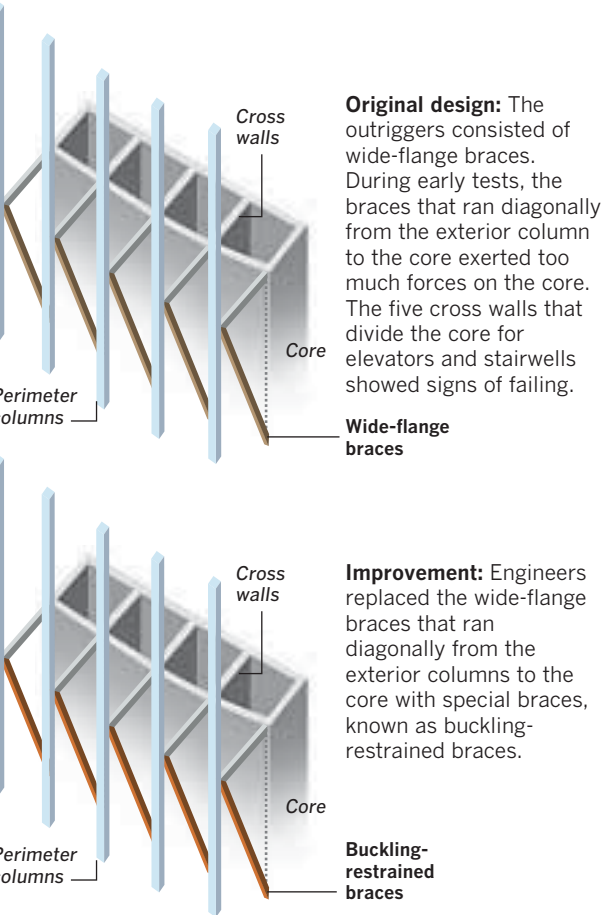
Crown

During a severe earthquake, the top of the building would experience up to 4gs of lateral shaking. This acceleration forced changes to the original design of the crown: a decorative filigree of steel surrounded by glass.



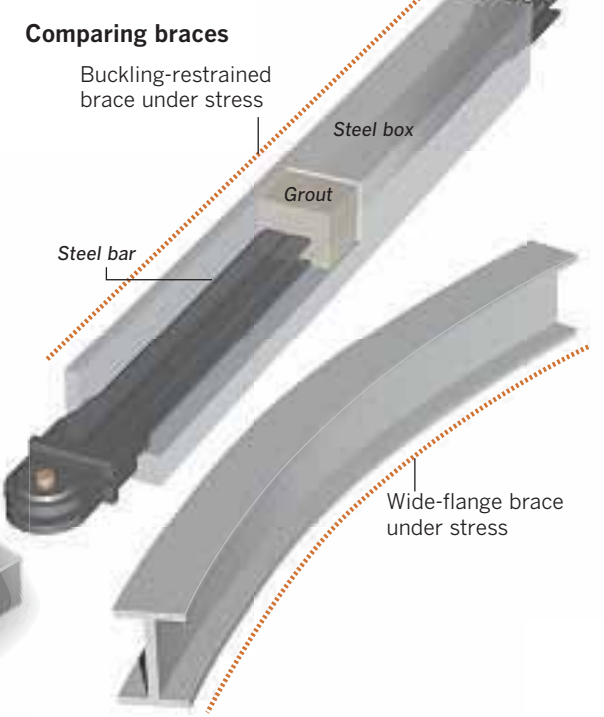
Buckling-restrained braces (BRBs)

The undulating motion that occurs in the skyscraper during an earthquake exerts unique forces on the outriggers. Early tests showed that these forces would damage the core.



A closer look at the BRBs

There will be 170 of these braces, with some outriggers receiving more than one. Each consists of a long steel bar encased in a steel box that is filled with grout. As the building moves, the bars compress or stretch without buckling.



Sources: Leonard Joseph, Thornton Tomasetti; Tammy Jow, Joseph Varholick and Noel Moreno, A.C. Martin; Steve Carroll, Schuff Steel; Ian Aiken, SIE Inc.; Nippon Steel Engineering USA. Graphics reporting by **THOMAS CURWEN**

WILSHIRE GRAND THE RISE OF A NEW SKYLINE



IRON WORKER Javier Jimenez guides a rebar wall into position as it hangs from a crane above. Rebar, which provides strength to concrete that would otherwise crack

NEW FRONTIER OF

Skill, daring and ego were as essential as steel and concrete as hundreds of workers pushed the ambitious project skyward

The elevator doors snapped shut behind Otto Solis and his fellow ironworkers. With a quick shudder, gears kicked in for a rattling 90-second ascent through the concrete structure rising at the corner of Wilshire Boulevard and Figueroa Street in downtown Los Angeles.

The men huddled in the confined space. Wearing hard hats, bandannas, kneepads and gloves, they looked like gladiators ready to fight.

It was the start of their 6:30 shift, a dark morning in December 2014 under drizzling skies at the construction site for the Wilshire Grand hotel and office project.

Foreman Solis and his crew of 10 belong to a class of ironworkers known as rod busters. Their job that day was on the 24th floor, where they would place steel that in three days would be encased in concrete, taking the structure up another story.

Consisting of small-diameter rods known as rebar, the steel provides strength to concrete, which would otherwise crack and crum-



GLASS FOREMAN Gary Wahlenmaier, right, looks on as glaziers Carlos Riviera, left, and Joe Guevara sign their names on a 35-foot-long, 2,100-pound steel beam bound for the 72nd floor.

ble over time. Rebar is a crucial component of this skyscraper that at 1,100 feet is the tallest building west of Chicago.

The central element is the concrete structure known as the core. It houses the elevators and stairs and is surrounded by a skeleton of structural steel that supports the rest of the building.

The elevator jerked to a stop at the 19th level. The rod busters stepped onto a small platform and

started climbing. Stairs, suspended from a deck nearly 30 feet overhead, swayed in rhythm to their steps.

Their final ascent was up a series of ladders. Twelve rungs to the first deck, then 20 to the second, 12 to the third and 24 to the top level — the gantry — open to the sky.

Even with the concrete core standing just a third of its eventual height of 73 stories, the view was spectacular. To the northwest: the

observatory at Griffith Park and the Hollywood sign. To the west where Ballona Creek reaches the sea: a small blue line of ocean, obscured by squalls.

On Figueroa Street below, pedestrians with umbrellas moved like dots on the sidewalks.

Rain fell harder as Solis put on his tool belt: 15 pounds of equipment, including wrenches, tape measure, torpedo level, pry bar, pliers and a spool of annealed wire.

He stepped into his safety harness, straps wrapping over his shoulders, around his hips and groin.

He made sure the lanyards extending from the harness were not tangled. When snapped onto the steel, the lines would catch him if he fell.

Twelve years ago, Solis was working maintenance for a McDonald's in Hollywood for \$7.75 an hour. He had come to this country from Guatemala and never dreamed that in his first year as a rod buster he would make \$36 an hour.

He has a home in La Puente, where he lives with his wife and three children.

"This is dangerous work," he said, "but it can change your life."

The rebar in the Wilshire Grand began its journey in a Rancho Cucamonga scrap yard.

Crushed steel was dissolved into liquid using a 3,000-degree furnace and amended with carbon, manganese, silicon and sulfur. The molten brew then was cast and cooled into 20-foot-long billets, 6 inches square, which were run through a series of rollers that shaped them into 225-foot lengths of rebar.

Cut and bent, the rebar was stacked in a crosshatched pattern and wired together by hand to create three-dimensional checkerboard structures through which concrete could flow. The structures, averaging 3 feet deep, 8 feet wide and 19 feet tall, are known as cages.



Photographs by MEL MELCON Los Angeles Times

and crumble over time, is a crucial component of this skyscraper that at 1,100 feet is the tallest building west of the Mississippi.

SKY COWBOYS

Assembled in San Bernardino, cages were trucked to the construction site, stitched together on the ground to form even larger cages and lifted by a crane to the top of the concrete core.

Once the cages were positioned, steel plates were attached to their sides and concrete poured into the gap, enveloping the rebar. After the concrete hardened, the plates were removed. Every four days, a new story was added to the core.

Suspended midflight, the first cage sailed over Solis and his men.

J.C. Cortez and Alvaro Reyes grabbed ropes hanging from either end of the structure and pulled it into position. Thirty feet wide, it weighed 22,000 pounds.

“Cuidado con los dedos,” one man called out. Watch your fingers.

In December 2014, nearly 400 workers were on the job at the Wilshire Grand site, almost a third the number that would be there when the workforce peaked. They included ironworkers and the concrete gang, as well as carpenters, plumbers, electricians, glaziers and other specialists, each trade defined as much by ego and pride as by skill.

The various crews had learned how to negotiate a site no bigger than a city block.

Crowded with rebar, plywood, structural iron, scaffolding and machinery, the Wilshire Grand space offered little room for storage or staging.

Each day, project managers oversaw a carefully scripted sched-

ule of truck deliveries and crane lifts for the immediate placement of materials.

“We knew that this job and this site would require patience and collaboration,” said Michael Marchesano, a general superintendent for Turner Construction Co. “We needed to get into a rhythm with one another.”

That rhythm was tested by a new phase of construction: the erection of the structural steel — beams, columns, braces and girders weighing up to 51,000 pounds — that would surround the concrete core.

On their first day working the Wilshire Grand, structural ironworkers Miah Thomas and Paul Graham performed a ballet 15 feet above a concrete deck.

With safety lanyards fastened beneath them, they walked a 7½-inch-wide beam as if it were a sidewalk, spud wrenches hanging from their belts like swords. With wedges and crowbars, they aligned drill holes and bolted the beam into place.

“Being a structural ironworker,” said Chris Ahrens, a welder who watched the performance, “well, there is not much higher than that as far as being in the building trade.”

Structural crews are known for their swagger and an intensity that some argue comes from the dangers of the work. Some working in other trades view them as prima donnas whose willingness to take risks makes it easy to question their intelligence.

Round bolt, round hole, one carpenter said as Thomas and

Graham worked. How hard is that?

“Now being a carpenter, that takes brains,” he continued. “Most project managers began as carpenters. Jesus Christ was a carpenter. That’s all I’m saying.”

Structural crews know they have a reputation as daredevils and hard partyers — and are trying to move beyond it.

“We cannot be viewed as the ‘crazy guys up there,’” the union advised its membership in an article on its website. “We must replace myths and lies with the truth.”

The Wilshire Grand crew turned down repeated interview requests from The Times.

“I learned to do as the old-timers taught me,” said foreman Craig Castor. “Keep your mouth shut and work hard.”

On the gantry, as the rain continued to fall, Johnny McCormack with the concrete company Conco gave the go-ahead to a pump operator working with the mixer trucks as they arrived off 7th Street.

From the pump, the mix flowed through a 5-inch-diameter pipe across the construction site and up 300 feet.

McCormack manipulated two toggles on a wireless remote control board hung around his waist, directing the movement of a long robotic arm that held a nozzle for dispensing the concrete.

Thirty years ago, delivering concrete to such a height would have been impossible, but chemical breakthroughs have changed

that.

Special additives introduce tiny air bubbles, which act like ball bearings to help the mixture’s flow. Other chemicals make the concrete movable and cohesive like gelatin, and some put a negative electrical charge on the grains of cement so they don’t stick together.

Balancing on top of a rebar wall, a worker positioned the nozzle over a steel cage. The concrete dropped with the sound of a coffee percolator. Two men snaked electric vibrators through the rebar and into the mix, knocking out any air pockets.

If concrete is poured too fast, it will place too much pressure on the steel walls and they will bow out. If poured too slowly, the concrete will start to set and not bond to the next layer.

Five passes were needed to fill the western half of the core, a process that took almost 10 hours.

A little before noon, Solis decided that the weather had become dangerous. Wind gusts were clocking up to 20 knots, unsafe for flying steel, and satellite images of the storm showed showers increasing for the rest of the day.

Solis halted the work. He had hoped to fly seven cages, but they managed just three.

The rod busters headed to the ladders that would take them to the stairs and the elevator.

Solis stashed his tool belt in an equipment locker and grabbed his lunch cooler.

They would have to make up for lost time the next day.

The height of daring design

With a steel spire as its calling card, the skyscraper offers a preview of what a more liberated skyline might look like

Lying in unremarkable repose, the last piece of steel to be raised atop the Wilshire Grand skyscraper rested among the dirt and debris of the job site, a baton awaiting the performance.

At 7:22 a.m. on Sept 3, the tower crane began to lift the 58-foot section of the building’s spire on an eight-minute journey to the top, where, once bolted into place, it would give the Wilshire Grand the distinction of being the tallest building in the western United States.

Rising 1,100 feet — not counting a 2-foot lightning rod attached to the top — the towering high-rise at Figueroa Street and Wilshire Boulevard has earned its place in history as one of the loftiest structures to be built in an active earthquake zone.

But for Angelenos, the Wilshire Grand is most remarkable for changing the skyline of Los Angeles.

After years of negotiations in its early planning stages, its architects won concessions from city officials to shake off the old requirements of high-rise design — boxy and flat-roofed — and create a more stylish, vertical ornament for the building’s roof.

For more than 40 years, the skyscrapers of Los Angeles have followed a building code that required landing sites for helicopters on top of all high-rises to be used in the event of emergencies. Architects for the Wilshire Grand, however, proposed an alternative that took a more modern approach to safety, which the city accepted and soon adopted for future construction.

Today the Wilshire Grand offers a preview of what a more liberated skyline in the city might look like. Urban designers and architects have applauded the change, believing that one day the airspace above the ubiquitous sprawl will incorporate the more daring and aesthetic shapes that have emerged in cities around the world.

“The flat-topped building has created one appearance to the high-rises of downtown,” said Los Angeles-based architect Michael Maltzan, “but this evolution allows architects to do more and to have a broader palette.”

The spire, designed in tandem with an adjoining structure of steel and glass known as the sail, serves as the Wilshire Grand’s calling card. Its final 18 feet, a column of perforated stainless steel, glows with one of four LED lights: red, blue, green or gold.

Luminous by day, illuminated by night and branded with the logo of the building’s owner — Korean Airlines — the spire and the sail are visible throughout the region and, for visitors downtown, an invitation from the street to gaze skyward to some imaginary vanishing point.

“Who knows what this will lead to and how skyscrapers will continue to evolve in the city?” said Maltzan.

For architect David Martin, who viewed the spire’s final assembly from a rooftop two blocks away, the end of construction culminated a dream put in motion nearly 10 years ago when he first began drawing a concept for the \$1-billion complex.

He never doubted he would succeed.

“The nature of being an architect,” he said, “is to be a dreamer.”

By 8:06 that morning, ironworkers finished bolting together the inside collar of the spire assembly, and the connection to the crane was released. The FAA navigational beacon on its tip glowed red.

“Towers first and foremost represent the ambitions, aspirations and identity of the developers and the corporations inside of them,” Maltzan said, “but they also represent the city that they are in.”

Reaching New Heights

AC Martin is proud to be a part of reshaping & reimagining downtown Los Angeles.

Congratulations to the over 11,000 people who were a part of this historic achievement.



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