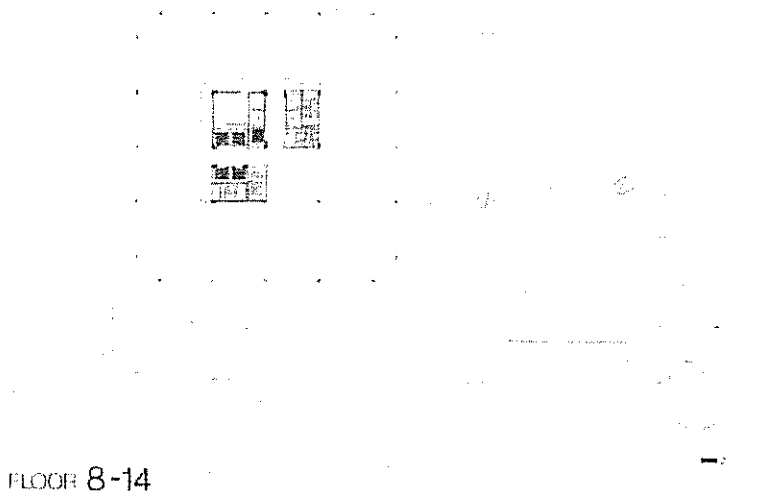


Energy efficiency keeps improving

Columbia Centre has many angles . . . to its facade and its energy-conserving design

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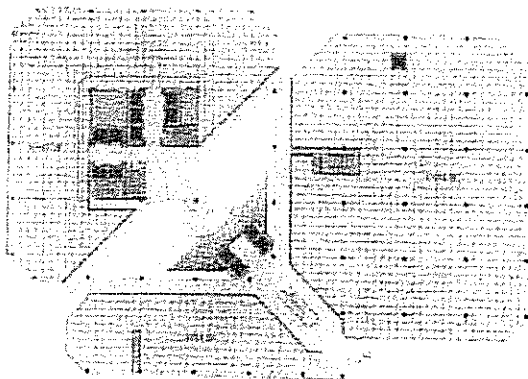
Columbia Centre



FLOOR 8-14

Floors one through seven of Columbia Centre step back to form a series of garden terraces, a theme which is repeated on floors 21 through 27.

Columbia Centre



MAIN FLOOR

The ground floor of Columbia Centre in San Diego features a 7,000-sq.-ft. triangular atrium, traversed by bridges at the third through sixth levels.

By Rose Thomas, Senior Editor

In the design stage, a lot of buildings claim to be energy conserving. Not all of them achieve their goals, however. And even fewer of them actually improve their energy efficiency once they're in operation. Columbia Centre, perched near the edge of San Diego's Harbor, is one of those rare exceptions.

One year after completion, this 27-story office and retail center consumes 37% less energy than it did when it opened its doors. This translates into a 25% reduction in energy costs. At the same time, Columbia Centre's occupancy tripled and the cost of energy jumped 27%.

How were these wonders achieved? Basically, it is a combination of successful design by the Hope Consulting Group and conscientious fine-tuning by the owner, developer Torrey Enterprises, Inc., both of whom now maintain headquarters in the building.

"Very simply, we have the finest equipment available, which is being continuously updated and reprogrammed for lighting, heating and cooling efficiency," explained Charles C. Garrett, vice president of realty operations for Torrey.

Slashing for horsepower

Instead of one HVAC system, Columbia Centre has, in essence, 27 individual systems — one on each office floor, one for the seven-story atrium and its three levels of retail space and a system for the three below-grade garage levels. Heating is provided by a gas-powered hot water boiler and a variable air volume system on each floor.

Reheat coils are located in the perimeter zones. The system features a frequency inverter that can reduce the rated horsepower of the motors to 1/16th of the normal output with only a corresponding decrease of just over

The 350-ft.-tall Columbia Centre towers over San Diego Harbor located just three blocks away.

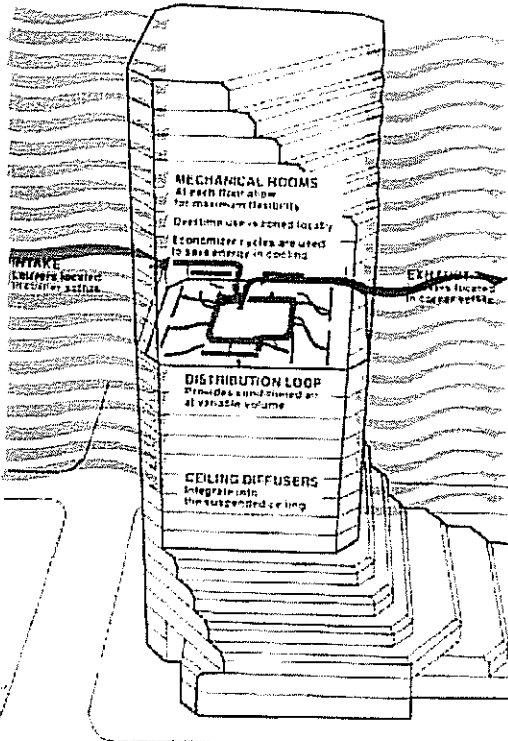
Photos: Michael Campos / Campos Photography

Light levels drop during lunch

Construction Costs Columbia Centre

Time: Sept. 1980 to July 1982
Area: 815,000 gross sq. ft.

Concrete, reinforced steel	\$6,000,000
Structural steel, deck	8,800,000
Curtain wall	5,750,000
Drywall, plaster	2,000,000
Mechanical equipment	7,000,000
Electrical	2,900,000
Elevators	3,000,000
Ceramic tile, pavers	500,000
Sitework	2,500,000
Carpentry/masonry glass/misc.	7,950,000
Total	\$46,500,000



Two of the chamfered corners on Columbia Centre feature 13-ft.-long vents at each level where outside air is pulled into the building from the north and exhausted to the south. In effect, each floor of the 27-story tower has its own independent HVAC system.

half of the volume of air delivered. The end result is that a 20-horsepower motor can be reduced to an effective 1 1/4 horsepower motor, reducing energy consumption from \$2.80/hr. to \$.20/hr. There was also an appreciable decrease in the amount of noise produced, noted Sid Bilal, the project's mechanical engineer at Hope.

The units also feature an economizer cycle that can use 100% outside air. The chamfered northeast corner of the building houses a 30-in.-by-13-ft., 6-in. intake vent on each level and the southeast corner contains similar exhaust vents. And since each floor's HVAC system operates independently, outside air can be used on, say, the lower six levels when it would be inefficient to use it on the upper floors where the temperatures might be higher.

The entire system is controlled by a Honeywell Delta 1000 computer located in the main engineering room on the first floor. The system provides a CRT reading, a keyboard for making any program changes and a printer that provides a daily report of energy use. The computer analyzes inside and outside temperatures and humidity and implements the most energy efficient approach.

Before settling on this customized approach to air handling, the designers also considered a more conventional system that would service three or four floors.

"The other approach would have required more field fabrication of ductwork," explained Bilal. "Plus, we would have had to have 16-ft. floor-to-floor heights on the mechanical levels the other way and here we can keep all of the heights at 12 ft., 6 in. Also, if a system goes down for some reason, only one floor is affected, instead of four."

Time-of-day lighting

The building's lighting system is also state-of-the-art. Each office floor is divided into eight lighting zones that can be programmed according to desired foot-candle levels and/or times

of the day.

Light-sensitive photocells are located just inside the tinted vision glass of the curtain wall throughout the building and communicate outside and perimeter lighting levels to a General Electric computer that controls the entire system.

"The lights are programmed so that half of them come on half an hour before the work day begins and the other half come on twenty minutes later," said Raleigh Wong, Hope's electrical engineer for the project. Half the lights are extinguished during the lunch hour.

In the evening, the janitors initiate a special cycle that illuminates one quarter of the building at a time to accommodate cleaning.

If employees want to work on the weekends or beyond 5 p.m., they merely dial a computer access number and the number for their particular light zone and the computer automatically activates the lights for two hours and then turns them off.

The offices are illuminated with 2-ft.-by-4-ft. fluorescent units with an economizer lamp. The fixtures are located every 96 sq. ft. The lower two garage levels feature high pressure sodium lamps that provide a high light level and low energy consumption. "And although the owner probably had to pay a 10% to 15% premium for the lights, the payback from the energy cost savings was just over six months," noted Wong.

Since Columbia Centre presently has no restaurants in it, the building contains no domestic hot water heater. Instead, it has a tempered water system.

"When a restaurant does move into the third floor area, it will get its own hot water heater," noted Bilal. "In the meantime, we don't waste energy." In accordance with California laws, water consumption is carefully monitored, and special time-type faucets with reduced-spray features are used.

The pumping system also has an off-hours feature that puts 60 psi pressure on both the cold and tempered

They wanted a technical showcase

water systems so that the pumps need not operate continuously when there are only a few employees in the building.

Just 40,000 BTUs

The end result of these many energy-conserving details is a building that uses less than 40,000 BTUs/sq. ft./yr., according to Torrey's Garrett. He noted that the General Services Administration standard for energy consumption was 55,000 BTUs/sq. ft./yr.

"We wanted our building to be a technical showcase," explained Garrett. "This isn't a speculative office and there is nothing of a secondary nature in the building. It's not necessarily cheap to run, but it is readily maintainable with a minimal staff."

Although it may seem as though Torrey put no limits on its investment in energy efficiency with Columbia, it did take a bottom line approach to the project.

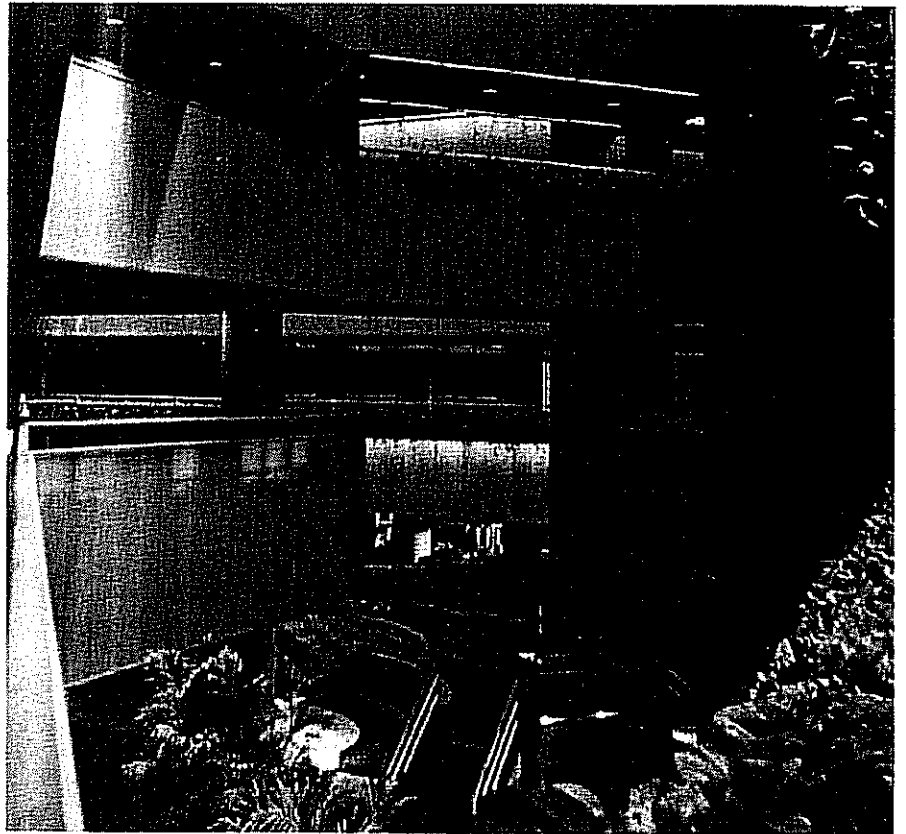
Hope did cost/benefit analyses and offered several possibilities that Torrey turned down.

"We looked at a turbo modulator for the chiller as opposed to the inverter that is now on the VAV system," recalled Bilal. "The cost would have been \$30,000 for one chiller with a payback of 4½ years, and so the idea was rejected."

The owner also considered a ceramic cooling tower that would have cost \$120,000 more, with a six year payback, but decided against it.

The glass and steel office tower is noteworthy not just for its mechanical and electrical design, but also for its architecture. Its crystalline-like tower is systematically stepped back with six levels of terraces on the south and west sides. This theme is repeated again at the top of the tower as the southwest corner is cut back beginning at the 23rd floor and ending with the 27th level.

The ground level setbacks, which provide public patios, help minimize the scale of the tower somewhat for the benefit of several recently renovated three-story buildings across the street from Columbia Centre, according to



Finishes in the seven-story atrium at Columbia Centre include terra cotta and brick pavers, white oak hemlock.

the project architect Allen Turner. Visitors can walk from one terrace level to the next by way of two stairway clock towers that, in fact, are also the garage exhaust towers. They stand 30 ft. high on the south side of the building.

The building takes up the entire site which meant that the staging area for construction materials had to be located four blocks away and the form yard for concrete work was six blocks away, noted project manager Tom Hedges of Morrison-Knudsen Co., San Francisco, the general contractor.

Atrium bridges

As visitors enter the 350-ft.-tall tower, they are welcomed into a seven-story triangular atrium traversed with bridges at the third through sixth levels.

Atrium finishes include dark brown terra cotta and brick pavers, ribbed

white oak and hemlock. Four atrium elevators carry visitors from the parking levels below up to the sixth floor. Nine separate core elevators service the office tower.

The custom curtain wall was prefabricated and preglazed by PPG. It features a split, two-piece mullion but no neoprene gaskets. Instead, the glass is applied to the face of an aluminum frame and held in place by silicone. The units were assembled on the floor and hung in place from the concrete slabs on metal decks. Each reflective spandrel and vision glass unit measures 5 ft. by 6 ft.

Justifiably proud of Columbia Centre, Garrett concludes, "We are terribly pleased with this building and the performance standards it has attained. We didn't set out to reinvent the wheel. We're just trying to improve the tire . . . and the ride." □