Dramatic structural changes produce a "new" world headquarters

In the 1950's, a revolutionary architectural style was born, provoking a new era in steel-framed New York City office structures. When brick and stone facades, gothic cornices and rococo decor were in vogue...when the steel-framed Empire State Building dominated the New York skyline...270 Park Avenue was on its way to becoming one of the first of this new genre.

Steel and glass office towers were rising in that decade, dwarfing almost everything around them. 1952 saw the Lever Brothers Building emerge, 1956, the Seagram Building—both on Park Avenue. But the tallest of the stainless steel-clad office towers came along in 1960: 270 Park Avenue.

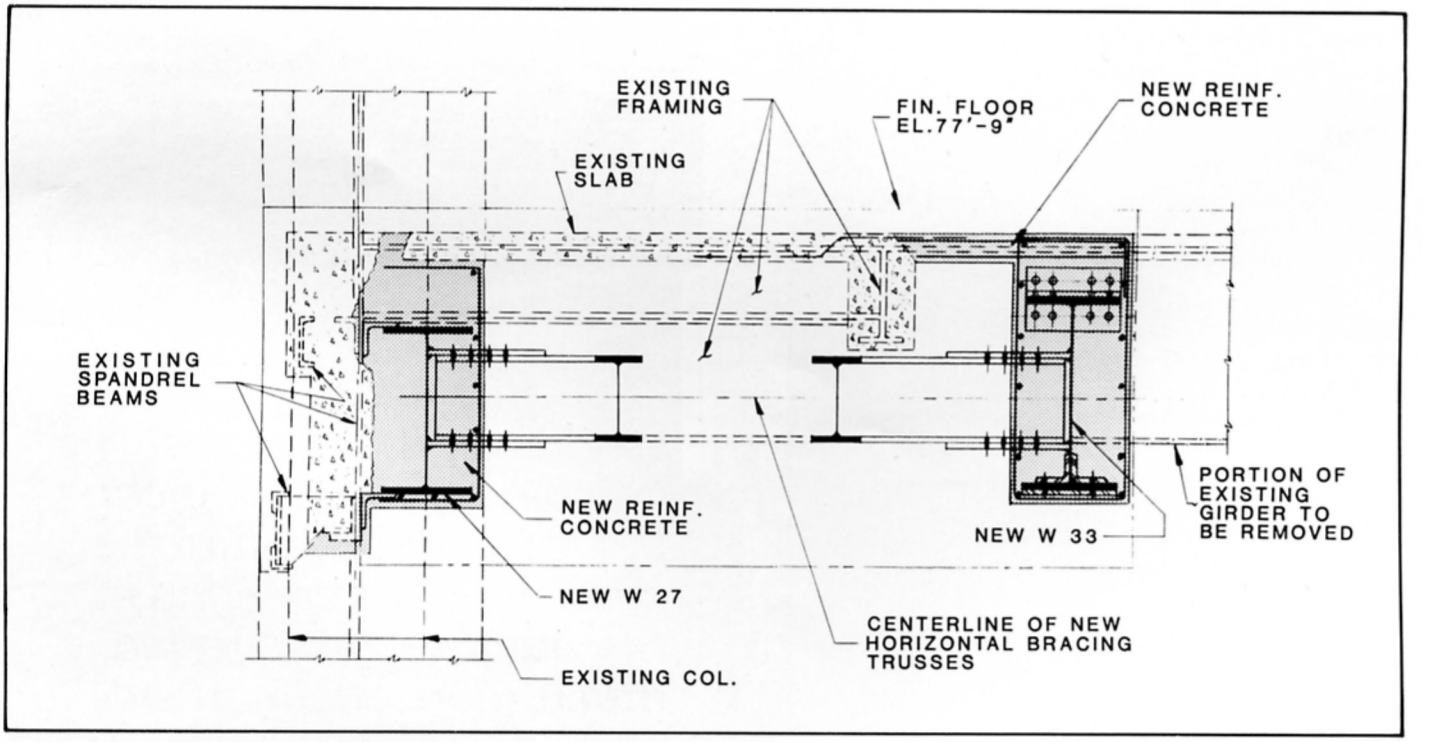
Designed by Skidmore, Owings & Merrill for Union Carbide Corporation, the structure was known as the Union Carbide Building until the early 1980s when that company moved its headquarters to Danbury, Connecticut, and sold the New York building to Manufacturers Hanover Corporation.

What followed, according to Manufacturer's Hanover Vice President William C. Walker, Jr., who supervised the building's retrofit on a day-to-day basis, was a massive alteration of 270 Park Avenue. The entire mezzanine floor was removed to create a dramatic atrium that serves as a new and impressive building entrance. In addition, the building's eighth and ninth floors were gutted to bare floors and completely renovated to create an executive gallery, while other floors in the 52-story, 1.5 million square foot building were altered to present a new look incorporating stainless steel and miscellaneous iron, including a lobby logotype of polished stainless steel.

Why take over an existing, award-winning modern classic and renovate its interior rather than build new? A Manufacturers Hanover spokesman answered the question as follows: "It was estimated that to reproduce our World Headquarters in today's economy would have been prohibitive, because the original was constructed of the finest materials available. Literally miles of stainless steel and glass grace its distinctive facade. This use of quality materials, as well as its design, is what made 270 Park Avenue an architectural gem and enabled it to stand the proverbial test of time, literally and aesthetically.

"In selecting this impressive edifice, we recognized that some changes were inevitable. We determined, however, that in modifying the interior geometry of the building, the integrity of its distinguished architecture would be retained. To this end, the architectural firms and specialty consultants, who originally created the building, were engaged once again—this time to remold the building to suit the new age of global banking with its attendant advanced technology," said Kent Stewart, Senior Vice President of MHT.

It was Manufacturers Hanover objective to transform 270 Park into a visible representation of the corporation. Almost immediately after signing an agreement to purchase the building in 1978, a major analysis of every component, down to its most



minute detail, was undertaken. Before any renovation could begin, many studies were conducted and every conceivable aspect of business life was thoroughly considered—from the building's core composition to the makeup of the menus its dining rooms would offer. Still, futurism was not to be achieved at the expense of aesthetics and historic value.

Structurally, the most fascinating aspect of the renovation, and the most delicate, was in the lobby, where girders supporting the building's 25,000 tons of structural steel had to be rebraced to create the desired atrium. Following preliminary work that began in April 1982, the structural steel erector installed a series of massive horizontal trusses. The trusses braced the girders once the second floor was removed to create the three-story-high atrium. This labor-intensive process was accomplished working 12-hour days on a seven-day-per-week basis from July to November 1982.

John Shmerykowsky, Associate Partner in Weiskopf & Pickworth, structural engineers for the original building as well as for the renovation, noted that the Union Carbide structure spanned three generations in the Weiskopf & Pickworth history. The conceptual structural system for the 52-story tower was set by the firm's founding partners, now both deceased. The design and construction phase was under the supervision of Anthony F. Nassetta, who was a new partner in the late 1950s. In 1979, renovation plans were assigned to Mr. Shmerykowsky to supervise, with senior partner Nassetta providing the necessary guidance.

The continuity provided was essential for two reasons. Firstly, the original tower's structural design was challenging because the building sits atop two levels of the old New York Central's railroad tracks. These two levels alone contain 5,000 tons of structural steel because of the transfer system necessary to accommodate train clearances. Secondly, the architects for the original as well as for the renovation, Skidmore, Owings & Merrill, came up with a design to open up the ground floor lobby by means of a 42-foot-high atrium.

Said Mr. Shmerykowsky, "The original structural design relied on the

These photos, supplied by Empire City Iron Works, Inc., show the egg-shaped stair as it was fabricated in the firm's Long Island City plant. Below is the finished product. All of the stair's splice plates were welded up and ground smooth before the final wood finish was added.

building's second floor to brace the exterior columns to the core. But could the second floor framing be removed, thereby leaving the exterior columns, which support all 52 floors above, unbraced for 42 feet? Since these columns were not designed for this unbraced length, the solution was to rearrange the second floor framing system so that the columns would remain braced without a floor diaphragm."

First, the heavily loaded 52-story columns would have to be continuously braced during installation of the new bracing system. "No error in construction sequence could be tolerated; therefore, close inspection by engineers was very important," Mr. Shmerykowsky said.

A horizontal truss system at the tower's periphery was installed to brace the exterior columns. On the tower's north and south sides, these new trusses span 92 ft., 8 inches. They brace two columns, each carrying over 6,000 kips of load. The truss system was designed to restrict horizontal deflection to plus- or minus-one half inch under two percent of column vertical load. To further increase stiffness in these large-sized steel members, truss chord members were encased in concrete to act compositely with the steel.

Other structural modifications were required because the original tower's wind system, above the fourth floor, had been designed as a rigid frame with an additional braced core. However, due to transfers mandated by the two levels of railroad tracks in the "basement," the core below the fourth floor had been designed and built to take all the wind shear. The original fourth floor's framing sytem featured diagonal crossbracing to transfer the wind shear from exterior column lines to the braced core.

Finally, the engineers designed a 120-foot truss to brace the columns in the east-west direction as well as to brace them at two points with girders against the core.

"A carefully orchestrated construction sequence was mandatory for many reasons," Mr. Shmerykowsky said. "The existing steel floor members had to be incorporated into the truss system. The existing slab could not be removed because it served as a diaphragm tying the floor to the braced core frame. The exterior curtain wall, featuring stainless steel mullions, could not be touched. Finally the building was still functioning as a busy headquarters while reconstruction was underway. Access to the escalators leading from the ground to the second-floor lobby had to be maintained."

The construction sequence proceeded as follows. First, new steel members were installed underneath the second floor. In the process, only as much concrete was removed as necessary to make welded connections. Once the required bracing was in place, the column and slab removal phase began. "Each plate, weld and bolt was installed in a specific sequence, until the jigsaw puzzle was in place," Mr. Shmerykowsky said, adding that headroom restrictions were another challenge. "New steel had to be fitted within the five-foot depth limit and yet without disturbing existing HVAC ducts, lighting systems, or connections for the glass wall enclosures."

Meanwhile, the miscellaneous iron contractor was building an oval steel stair designed by the engineers to provide an ornamental link between the building's new chief executive floors. An entire steel bay was removed and new steel installed to accommodate the moments and loading of the new, cantilevered stair. The stair was produced in three months in the shop of Empire City Iron Works in Long Island City. (See previous page.)

Empire City Iron Works' Harvey A. Heffner explained that the key to the stair's successful production was in its layout. "An elliptically shaped stair, with its balluster railing, requires a watchmaker's precision to put together," he explained, "because of the geometry inherent to an ellipse and the difficulty in translating that geometry into shop layout processes. By comparison, production of a circular stair is relatively easy. A circular stair has one focal point and its scribing can be done with the equivalent of a large compass."

The elliptical stair, with its shifting focal points at the top adding to its complexity, consumed two weeks of mathematical problem-solving before the shop scribing layout began. This layout was performed by utilizing a coordinate system for locating many closely-spaced points along the varying curves of the "compound" ellipse.

THE "NEW" LOBBY

Stainless steel plays an important and colorful role in the building's new lobby, the focus of which is a stainless steel satin finish "MHT" logo set against a brilliant red, extruded aluminum core wall. Herbert Koenig, whose firm, Allied Bronze Corporation, furnished and erected the logo, explained that the material consists of a series of four sections of stainless steel tubing, each 16 feet in length,

that were assembled, then welded together, and polished to a satin finish. Then, the 22 ft. high wall was tied back to the structure.

The red core wall is a rectangle, with the long sides 75 feet and the shorter sides 50 feet. Here, according to Bernard Liebman, of Melto Metal Products Company, Inc., the firm that furnished the core wall as well as the new lobby ceiling, special dies were made and extruded to meet the architects' specifications. Backed by channel furring, the 4-inch interlocking tongue-and-groove corrugated wall appears to be one continuous monolith. Material gauge is .0625, coated with a US Red Endurashield (UC Red) supplied by Tnemec Company. The wall soars the full 42-ft. atrium height in some lobby areas, 17 in others.

The stainless steel lobby ceiling was constructed by first forming the material into pans, Mr. Liebman said, then sandwiching these pans into a honeycombed core, and treating them with a 22-gauge, galvanized backing. There is a total of 5,200 stainless steel ceiling panels, each measuring 1 ft., 9 inches square.

The same material used on the logo (stainless steel polished to a satin finish) clads the two new steel trusses. Here, the panels are a sheet material, Mr. Koenig explained, while on the logo the material is square tubing. Allied Bronze also furnished the new stainless steel mullions, which articulate the lobby area and match the original mullions installed some 25 years ago.

In the new employee cafeteria, on the second floor, features include mirror-finish bronze tray slides and serving counters, Mr. Koenig said. His firm also supplied the mirror-finish bronze gates that close off certain portions of the dining area. These gates were constructed with three-quarter inch bronze bars welded together to give the gates a basket-weave effect.

The end result is a world headquarters whose components are as impressive individually as they are awesome in the aggregate. "This final result was achieved through a carefully engineered construction sequence and the teamwork of the construction manager, steel detailer, steel fabricator and steel erector," Mr. Shmerykowsky said.

CREDITS: Manufacturers Hanover Trust World Headquarters

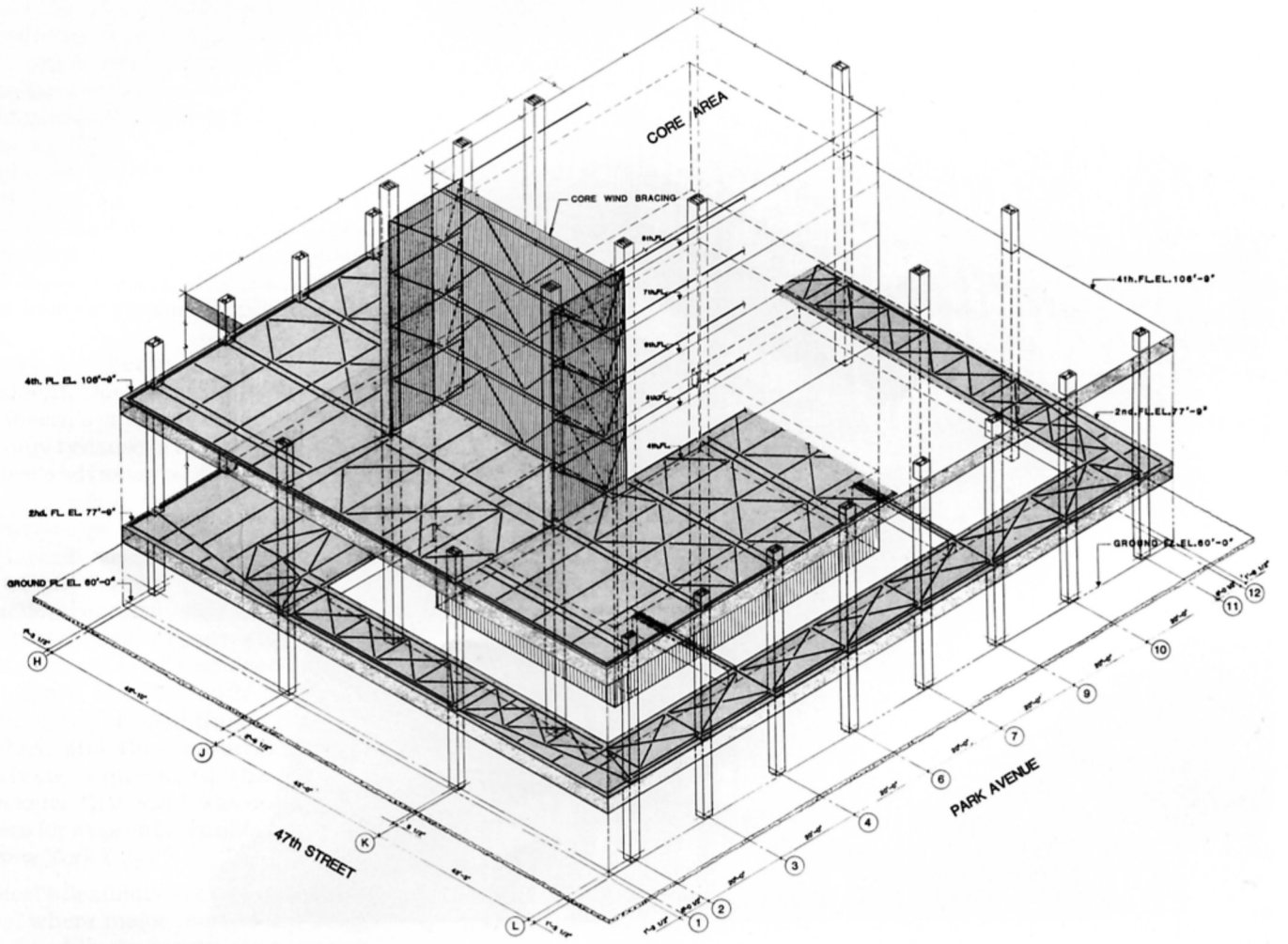
Owner: Manufacturers Hanover Corporation, New York, New York

Architect: Skidmore, Owings & Merrill, New York, New York

Structural Engineer: Weiskopf & Pickworth, New York, New York

Construction Manager: HRH Construction Corporation, New York, New York

Structural Steel Fabricator: Empire City Iron Works, Long Island City, New York



Structural Steel Detailer: Reiffman-Greenblatt, West Hempstead, New York

Structural Steel Detailer (Misc. Iron and Stairs): Empire City Iron Works, Long Island City, New York

Structural Steel Erection: Atlas Erectors Company, Inc., Valley Stream, New York

Miscellaneous Iron Work: Empire City Iron Works, Long Island City, New York

Stainless Steel Specialty Items: Allied Bronze Corporation, Long Island City, New York

Atrium Ceiling: Melto Metal Products Company, Inc., Freeport, New York

Tonnage (Structural Steel and Miscellaneous Iron): 1000

Type of Steel: A 36