

One-of-a-Kind Structural Solution For the Multi-Use Building on 34th Street

The 34th Street multi-use building just off Manhattan's Eighth Avenue is a striking new addition to one of the city's key east-west thoroughfares. Under the slick aluminum and glass exterior lies a very urban combination of retail and residential spaces. Bringing the complex to life was an unusual structural design that brought both considerable economy and speed to construction of the project. At the heart of the design is a 900-ton steel platform, covered by a concrete pad, that rests on top of double height steel columns. On the platform sits the 28-story residential tower.

The design is the work of DeSimone Consulting Engineers (DCE), structural engineers for the project, who recognized that both steel and concrete had a place in the building. DCE developed the structural solution based on the innate strengths of both materials and their appropriateness in supporting each separate area of the building complex.



Steel and Concrete: Complementing Forces

In a sleek contemporary profile, the 35-story project features a variety of retail uses on the ground floors below the apartment tower. Below grade, the building consists of 45,000 square feet of parking and a concourse retail level. At grade is a mix of retail and building support space on floors 1 and 2. Floors 3 to 6 house the 108,000-square-foot Loews 14-theater cinema complex. Above the theater is the 590,000-square-foot apartment tower, which includes one floor of amenities and a terrace for common usage on the 28th floor.

DCE recommended that concrete be used for the base and sub-base of the building. Steel was specified in the theatres to create the necessary clear spans: The theatre features 60-foot clear spans formed of 40-inch and 44-inch deep steel beams and girders.



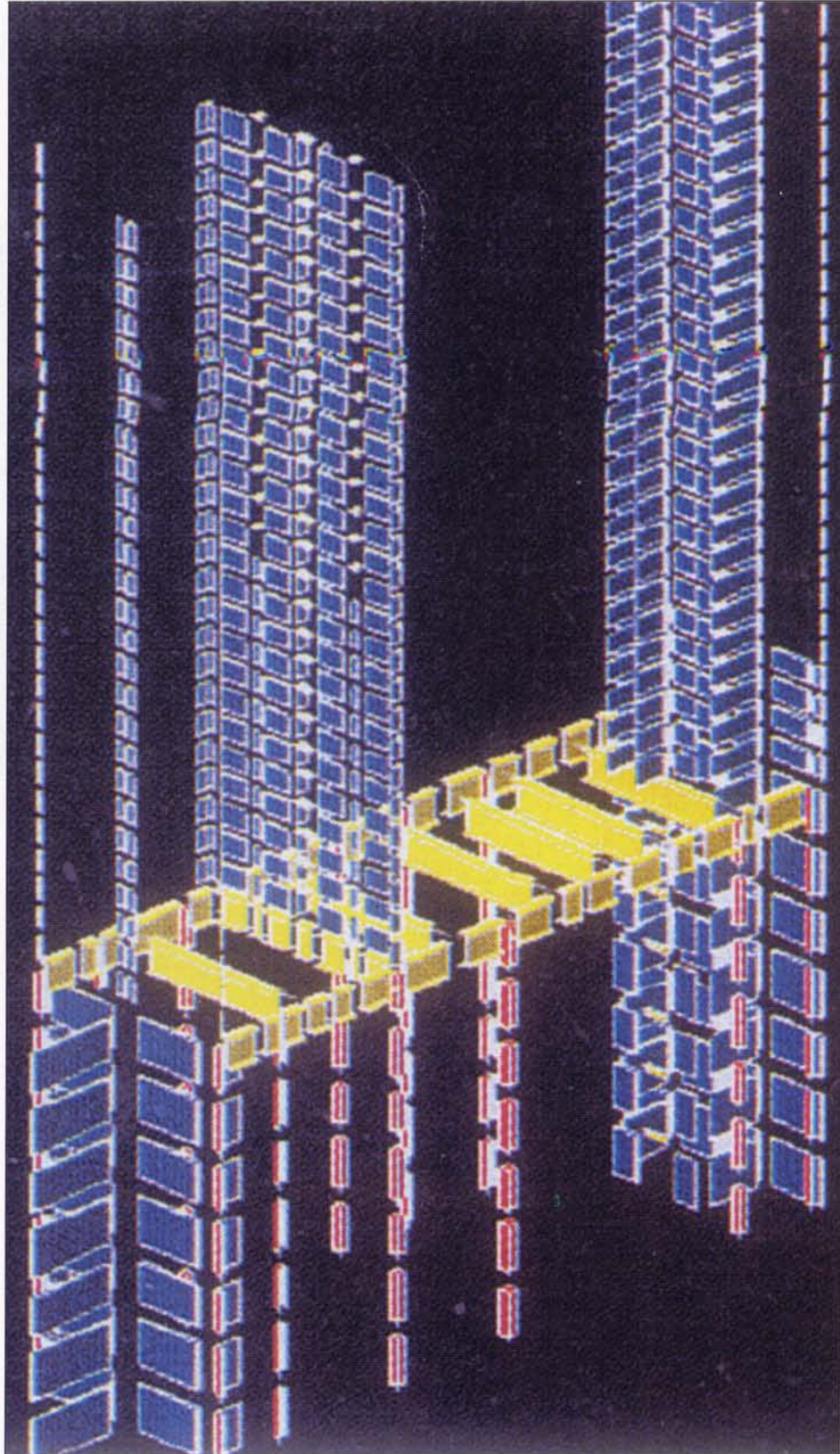
“We put steel columns right ‘out of the hole’ through the four floors of retail space,” explained Vince DeSimone, chief executive officer of DCE. “When it came to the residential level, we used closely spaced columns down the corridor and along the perimeter. That scenario added flexibility to the apartment layout and a stronger reinforcing capacity.”

Photos these pages: Fran Solomon

Supporting the Tower

The key to the structural integrity of the building is the 900-ton steel platform, formed from interwoven steel plate girders, that supports the residential tower. DeSimone considered trusses and plate girders to pick up the weight of the residential space, and eventually went with Grade 50, 10-foot-deep steel plate girders on the advice of steel industry experts.

Supporting the tower through the plate girders are nine columns that are steel up to the sixth floor, and then concrete above that. The nine heavy double-steel columns are 33 inches by 33 inches. These mega columns, which carry the enormous load of the towers, are made of economical W-14 by 550 steel. Due to the heavy loads, the steel columns are fastened to the steel plate girders via bearing connections. The steel columns are supported by concrete columns down to the foundation.



*Schematic of framing system courtesy of:
DeSimone Consulting Engineers*

A Matter of Preheating

Falcon Steel Co., and Helmark Steel Inc., both Wilmington, Delaware-based firms, fabricated and erected 4,300 tons of steel for the project. Because of a substantial backlog of work, Helmark contracted out a portion of the steel fabrication work, gaining a valuable one-month jump in beginning the steel erection process before the onset of cold winter temperatures further complicated a challenging construction effort at the busy downtown Manhattan site.

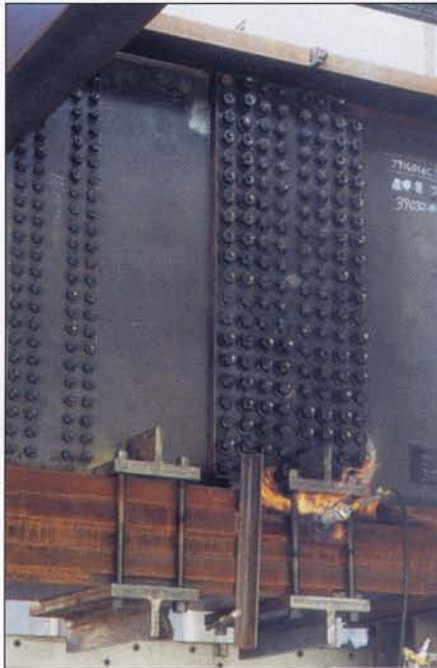
Steel was shipped for arrival on site in November. A sustained effort to preheat the steel, maintains DeSimone, was the key to a successful steel erection phase.

"There was a tremendous amount of steel to preheat, and the preheating had to be controlled very carefully," said DeSimone, who noted that during the cold November and December months, steel members were covered in thermal blankets and often pre-heated over night before they were welded into place.

The difficulty of lifting the enormous Grade 50 steel plates and girders prompted "judicious" splicing. For example, 80-foot span plate girders, which were too heavy to lift in one piece, were spliced and lifted in three pieces.

"Everything was kept warm, and then welded in a specific sequence so as to avoid locking in stresses," DeSimone pointed out. "Another concern was lamellar tearing, a situation in which, within the thickness of a steel plate, tears or cracks occur. Lamellar tearing is a serious problem well known in the industry. But pre-heating the steel virtually prevents that from happening."

The new building on 34th Street is a testament to the versatility of steel. An innovative structural design coupled with careful fabrication and erection have resulted in a very successful project.



MULTI-USE BUILDING

Owner: West 34th Street LLC,
New York, NY

Architect: SBLM Architects, PC,
New York, NY

Construction Manager:
M.D. Carlisle Construction Corp.,
New York, NY

Structural Engineer:
De Simone Consulting Engineers,
New York, NY

Steel Erector: Falcon Steel Co.,
Wilmington, DE

Steel Deck Erector: A.C. Associates,
Lyndhurst, NJ