RETHINKING Multifamily Residential

Braced staggered steel trusses provide a superior solution for a new residential tower in Connecticut.

BY NISSIM ELMANN, ALI MAHER, PE, AND NEIL WEXLER, PE, PhD

Marc J. Harary, City Architectural Photography

Nissim Elmann (nelmann@nwexler.com) is a project engineer, **Ali Maher** (amaher@nwexler.com) is a principal and **Neil Wexler** (nwexler@nwexler.com) is principal and founder, all with Wexler Associates in New York.

STAMFORD, CONN., IS ALL BUSINESS.

Well, perhaps not entirely, but the city does boast the largest financial district in the New York City metropolitan area outside of New York itself and is home to multiple Fortune 500 and 1000 companies.

And a new residential tower will soon rub shoulders the city's more business-minded edifices. Located on Summer Street in downtown Stamford, Summer House comprises 16 stories of residences above a six-story parking garage that also houses a gym and retail stores. The L-shaped building is constructed to property lines, but because adjacent properties had retail tenants and are also owned by the same developer, the tower needed to extend 8 ft to 15 ft over these properties and be constructed without any interruption to the exisiting tenants.

The project was originally intended to be concrete. However, high costs associated with the material, difficult site logistics, a complex program with multiple tenant types and a challenging foundation scenario led the owners to explore other framing alternatives. Structural steel was recommended by contractor Erland Construction, and a mixed-type structure—with steel beams and columns and precast plank floors—was further proposed by the steel fabricator, Ocean Steel.

Wexler Associates was chosen as the structural engineer, thanks to its experience designing towers on small and tight urban sites with difficult logistics and constructability challenges, with the expectation that its new steel design would deliver a building within the original budget. Wexler redesigned the tower in stages. At each stage, budgets were prepared to verify that expenses did not exceed targets. By the time schematic design drawings were complete, the estimates verified that costs met expectations. The redesign took approximately eight weeks and construction proceeded on time according to the original schedule.

◀ ▼ The L-shaped Summer House project is constructed to property lines and extends 8 ft to 15 ft over adjacent properties owned by the same developer.

Marc J. Harary, City Architectural Photography

Marc J. Harary, City Architectural Photography

▲ ▼ The project's framing system was switched from concrete to steel, and the redesign took approximately eight weeks—with construction proceeding on time according to the initial schedule.

Ocean Steel


Marc J. Harary, City Architectural Photography


Marc J. Harary, City Architectural Photography


Marc J. Harary, City Architectural Photography


Ocean Steel


Ocean Steel

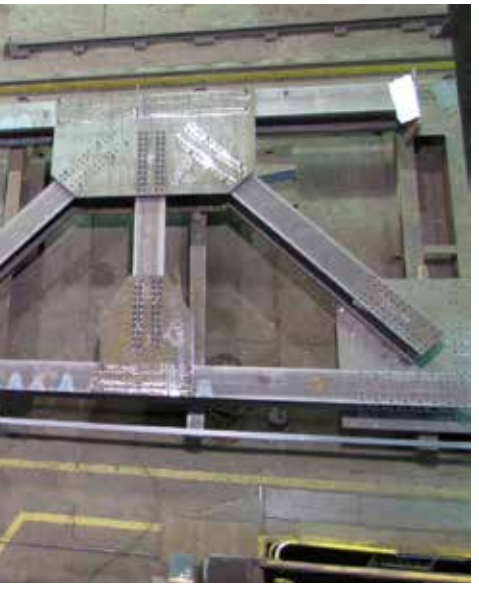
- Views of the 16-story tower during construction.
- Because building tenants required uninterrupted access to the streets, storage area for materials was nonexistent outside of the building footprint
- The residential levels use a system of braced staggered trusses supporting plank floors. This modified version of a typical staggered truss reduces diaphragm demands and also provides structural redundancies with little increase in weight and cost.

Hanging Out

From the start, the challenging site conditions could have had a significant cost impact. The tower was designed to cantilever over adjacent occupied buildings, and access for erection was limited to a narrow corridor. Because building tenants required uninterrupted access to the streets, storage area for materials was nonexistent outside of the building footprint, cranes and hoists needed to be embedded into and through the superstructure and access to adjacent buildings and rear yards could not be used for staging.

The team built a deep foundation, with caissons drilled 30 ft down into rock, and underpinned adjacent properties and grade beams 10 ft to 12 ft down. Long-span steel framing with composite deck was used for the garage levels, and a staggered truss system with plank floors was designed for the residential floors. A transfer level integrated the tower and the garage. Retail was easily incorporated at the lower levels, and a health club, pool and other amenities were located on the fifth floor.

Above the garage, the residential levels use a system of braced staggered trusses supporting plank floors. Braced staggered trusses, a modification to a more typical staggered truss system, are a good solution for seismic zones because they reduce diaphragm demands and also provide structural redundancies with little increase in weight and cost. They also reduce column bending during construction, thus decreasing column sizes. Additional horizontal bracing, located between the trusses and within the depth of the floor construction, helped reduce the use of temporary rods and cables during erection, thus speeding up the process.



Marc J. Harary, City Architectural Photography

Located on Summer Street in downtown Stamford, the project comprises 16 stories of residences above a six-story parking garage that also houses a gym and retail stores.

In addition, the regular geometry provided by the staggered trusses reduced both structural material and structural labor. Because the trusses are shop-built, field erection is limited to the column splices, spandrel beams and miscellaneous incidental steel. Interestingly, erecting the six-story garage took longer than erecting the 16-story tower on top.

The efficient use of steel kept the framing system to the desired quantity of 13 lb of steel per sq. ft. Together with the resulting reduction in floor-to-floor distance and more efficient foundations, the savings over the original concrete option were substantial. And in a part of town where efficiency and smart business practices are no doubt appreciated, the building stands as a positive example of structural steel's efficiency. ■

Owner
Summer House, LLC, Stamford, Conn.

General Contractor
Erland Construction, Inc., Burlington, Mass.

Structural Engineers
Wexler Associates, New York

Architect
Lessard Design, Inc., New York

Steel Fabricator and Detailer
Ocean Steel Corporation, Conklin, N.Y.