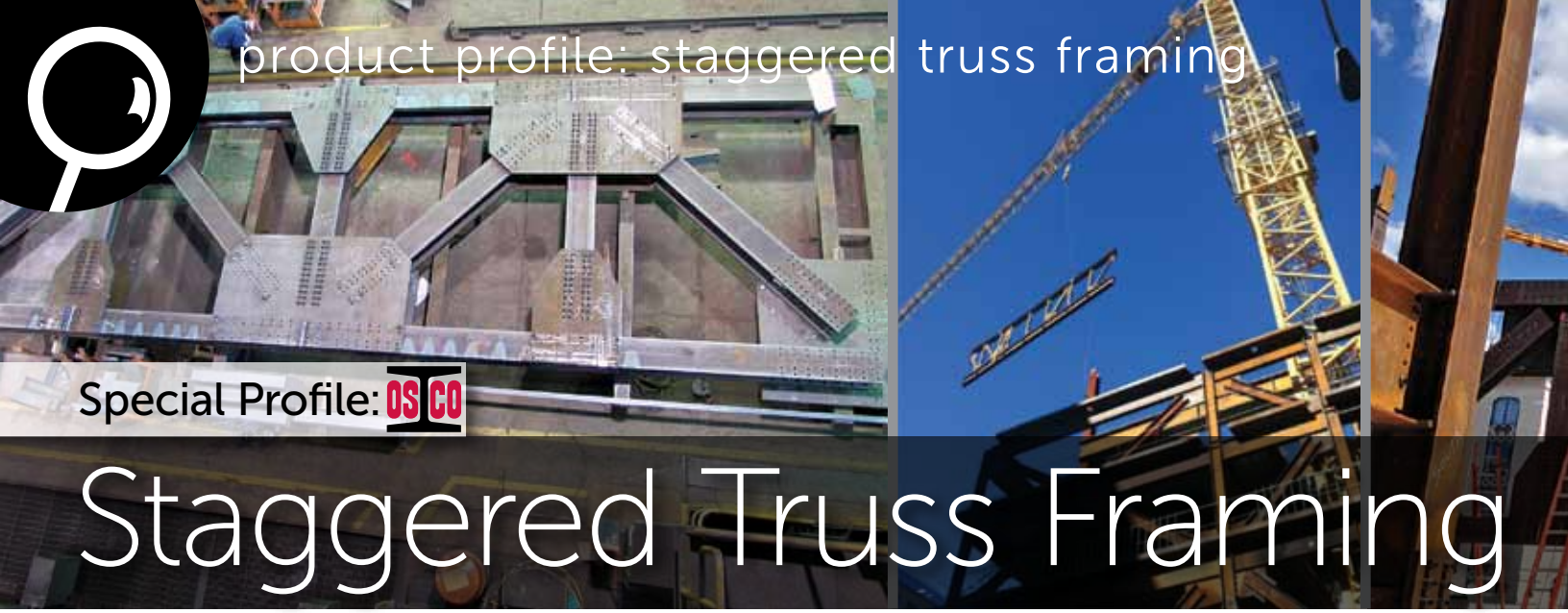


Special Profile: OSCO

Staggered Truss Framing

What is Staggered Truss Framing?

The staggered truss system consists of a story-high truss that spans across the full width of the building. The truss framing alternates from floor to floor and, when combined with a precast plank system, creates a safe and efficient structural system that resists both gravity and lateral loads while also providing a low floor-to-floor height.

Advantages of the staggered truss system

- Improved layout flexibility due to elimination of interior columns
- Reduced structure weight
- Faster erection due to fewer pieces

Advancements in staggered truss systems

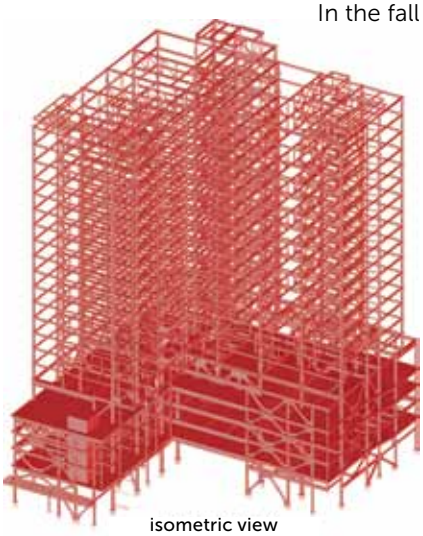
" Since the introduction of the 2008 International Building Code and the wide adoption of seismic design criteria, the design of staggered trusses evolved to include new developments. These new developments make staggered trusses more compatible with seismic design and provide benefits for erectors and fabricators.

One example is the use of braced staggered trusses. This modification eliminates high diaphragm stresses and allows lateral forces to remain within a single truss without traveling between trusses at each floor. Braced staggered trusses have additional benefits as well. They eliminate column curvature during erection thus reducing column sizes.

Another example is the use of specially designed horizontal truss bracing. This new design is used to simplify and reduce the amount of temporary bracing required during erection. This new bracing is located within the floor depth and between trusses and reduces the extent of temporary rods and cables used during erection while making erection safer and faster.

Overall these new designs do not result in increased costs while at the same time they improve the staggered truss system. When designed with due consideration of its challenges, benefits and applications, the staggered truss system provides great benefits, as proved at the Summer Street Project.."

-Neil Wexler PhD, PE, Wexler & Associates



isometric view

Summer House Project

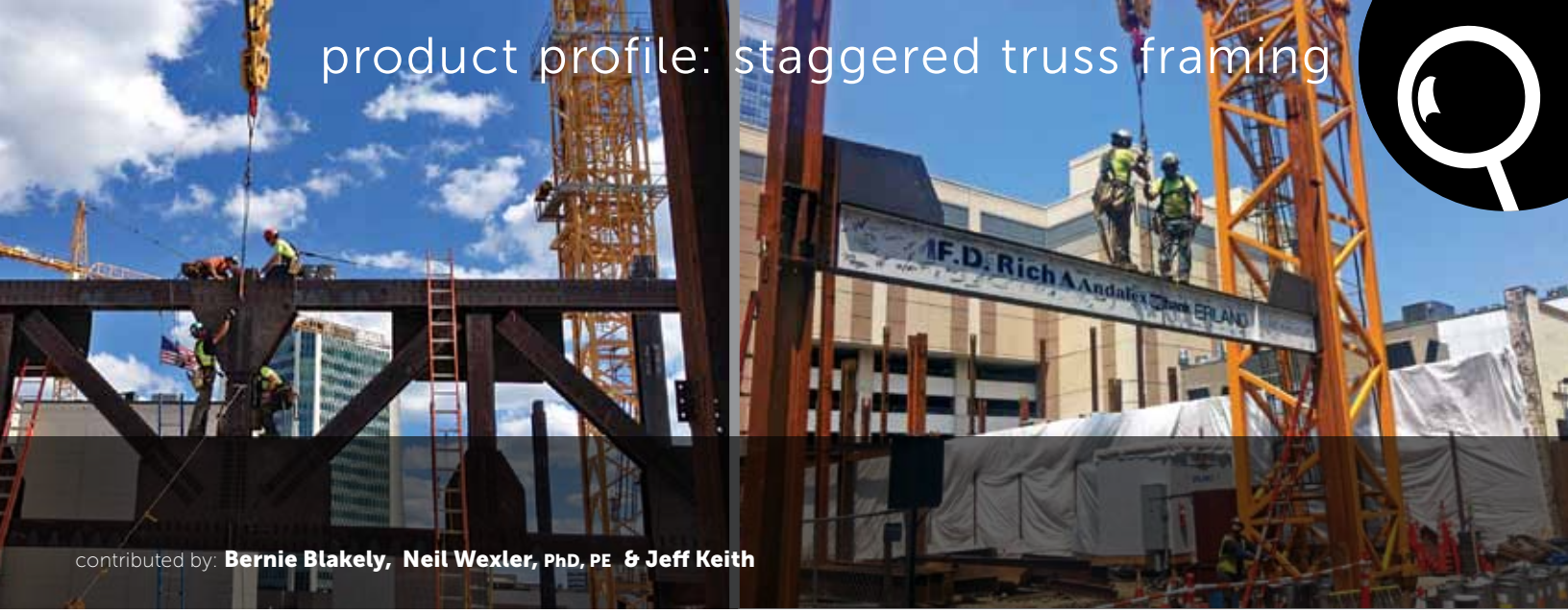
Ocean Steel's first staggered truss project was the Mystic Marriot Hotel in Groton, CT completed in 2004.

In the fall of 2013, Ocean was awarded the Summer House luxury apartment residential project in downtown Stamford, CT. Coincidentally, the Engineer of Record for Summer House - Wexler & Associates, was the same Engineer on the Mystic Marriot project.

Summer House consists of 222 residential units and 2200 square feet of retail and restaurant space, a roof deck and a fifth-floor pool overlooking lower Summer Street.

Owner: **Summer House, LLC**
Developer: **F.D. Rich Company**
Construction Manager: **Erland Construction, Inc.**
Architect: **Lessard Design, Inc**
Engineer: **Wexler & Associates**
Erection: **American Steel & Precast Erectors ASPE**
Detailing & Connection Design: **Ocean Steel**

product profile: staggered truss framing



contributed by: **Bernie Blakely, Neil Wexler, PhD, PE & Jeff Keith**

Ocean Steel's Scope

The overall frame for Summer House was 2,436 tons. A total of 56 shop-assembled staggered trusses were fabricated with some as large as 14' wide x 63' long.

The steel was all fabricated in our Conklin, NY plant with the exception of the jumbo columns and one heavy transfer truss which was made in our Saint John, NB plant.

All trusses were shop welded with W-Shape chords and HSS web members.

The 22-story building's first steel beam was put in place on July 23rd, 2014 and erection will continue through to February 2015.

Project Challenges & Solutions

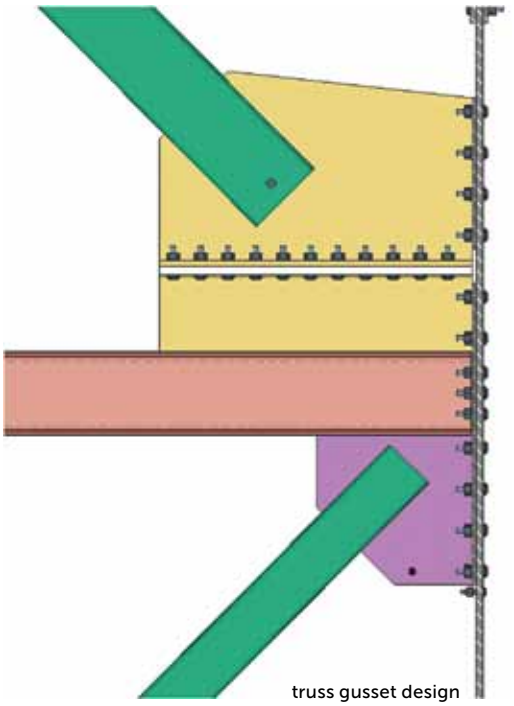
The heavy transfer truss, spanning between the 5th and 6th floors, required special attention. This truss design had a W14 x 500 top chord and W14 x 257 bottom chord. The heaviest individual member weighed 18 tons, while the total assembled weight was 42 tons. After careful planning it was decided to field bolt this truss. The entire truss was trial fit in the shop (including each of the 2,120 bolts) in order to ensure that the in-position stick building on site went smoothly.

The location was a tight urban site in downtown Stamford with limited laydown area. This required good team work and constant communication between Erland, Ocean, and the erector. For this project, Ocean turned to trusted steel and precast erector American Steel & Precast Erectors (ASPE) who was the first erector in North America to hold the status of Advanced Certified AISC erector, Certified PCI Erector, and CWB certification.

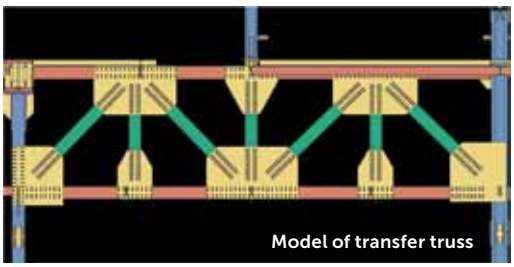
Another challenge faced by the in-house connection design team was the development of the truss gusset plates for seismic braces while minimizing the notching of precast hollow core planks, meeting truss width shipping restrictions, and staying within interior wall thicknesses.

More and more in our industry, we are seeing the implementation of Building Information Modeling (BIM) that enables the project team to "build" the project in a virtual environment early on in order to flush out any potential field conflicts.

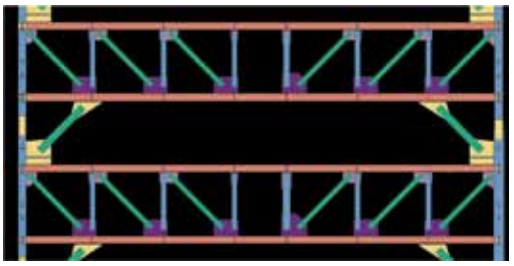
Weekly coordination meetings were held on this project with the Consultants, Construction Manager, and Ocean Steel to review concerns and prioritize work in order to maintain the aggressive schedule. With today's technology Ocean Steel can easily execute such projects and sees great benefits as additional trades get on board.



truss gusset design



Model of transfer truss



staggered truss framing model