



STEEL FRAMING INDUSTRY ASSOCIATION



CASE STUDY

ARCHITECTURAL FREEDOM, LESS MATERIAL, GREATER SPEED

CITY GREEN
MILWAUKEE, WISCONSIN

Steel Framing Industry Association
513 W. Broad Street Suite 210
Falls Church, VA 22046-3257
P 703.538.1613
F 703.538.1733
steel framingassociation.org

OVERVIEW

PROJECT

Use

Condominiums, apartments, commercial space

Size

3 buildings, 135 units, 1.2 acres

Total construction cost

\$45 million

Construction time

1-2 weeks per story above the PCC

Completion date

2007

PEOPLE

Owner

New Land Enterprises

Architect

Workshop Architects

Structural Engineer

Matsen Ford Design Associates

STEEL

Pre-fabricated cold-formed steel studs, joists and rim track

43-97 mils

Approximately 690 tons of cold-formed steel (not including rebar and hot-rolled steel)



Developer Gerry Burke says that 10-foot high ceilings help sell City Green units.

Large, Open Residences Are Cost-Effective to Build —and Salable

Standing in his penthouse, Gerry Burke shows a visitor the key strengths and selling points of the condos at City Green.

“We have 10-foot ceilings, no soffits and floor-to-ceiling glass windows,” says Burke, Director of Development at Milwaukee’s New Land Enterprises. “There are no drops for the mechanicals. Everything runs through C-joists.”

Burke is ecstatic. He feels his condos and rentals stand out from the competition’s. The structures’ cold-formed steel framing system, he says, helped create large, open residences that feel spacious and are salable.

Burke also feels that City Green

was cost-effective to develop. Why? Because the cold-formed steel system is lightweight, which meant that less material and less labor was required for construction. Also, the pre-fabricated cold-formed steel design made for speedy work. Finally, Burke believes City Green went up faster than it would have had another structural support system been used.

Architectural Freedom

City Green sits on a hill in East Town, Milwaukee. The 1.2-acre lot is shaped like a “T”.

The city put the property out for bid in the early 2000s, requiring that the winning developer preserve



Decks made with structural concrete panels were topped with poured gypsum underlayment to reduce sound transmission between units.



Construction used pre-fabricated cold-formed steel joists, rim track and structural blocking.



the site's existing 126 city parking spaces. New Land Enterprises came in with an ingenious design that preserved the city park spaces, while adding three towers (one is 10 stories above ground), 6,000 sqft. of com-

mercial space and resident parking. freedom with CF steel," says Patrick W. Ford, P.E., Principal, Matsen Ford Design Associates, Waukesha, Wis., whose firm designed the entire structure, including the cold-formed steel walls, floor joists,

less load on the foundation than would have other kinds of structures. In general, less load equated to lower put-in-place foundation costs. Burke believes New Land saved money on the project, since the cold-formed steel system allowed for a reduction in the amount of concrete needed for each footing.

Being pre-fabricated, the cold-formed steel installation helped shorten construction times and reduce onsite labor, but without any compromise to strength. The joists, for example, feature punched holes that accommodate HVAC, mechanical, plumbing and sprinkler runs. The perimeter of the holes are also rolled into stiffeners, leveraging the strength of the cold-formed steel system.

The steel was engineered to accommodate the geometries from top to bottom.

The design by Architect Scott Kindness, Kindness Architects + Planning, Milwaukee (a principal of Workshop Architects at the time), brought intriguing geometries to the neighborhood. City Green units are full of angles and have spectacular views of Lake Michigan and downtown Milwaukee.

"The walls are irregular. It shows that you can have architectural

roof joists and pre-fabricated cantilevered steel balconies.

"The steel was engineered to accommodate the geometries from top to bottom," he says.

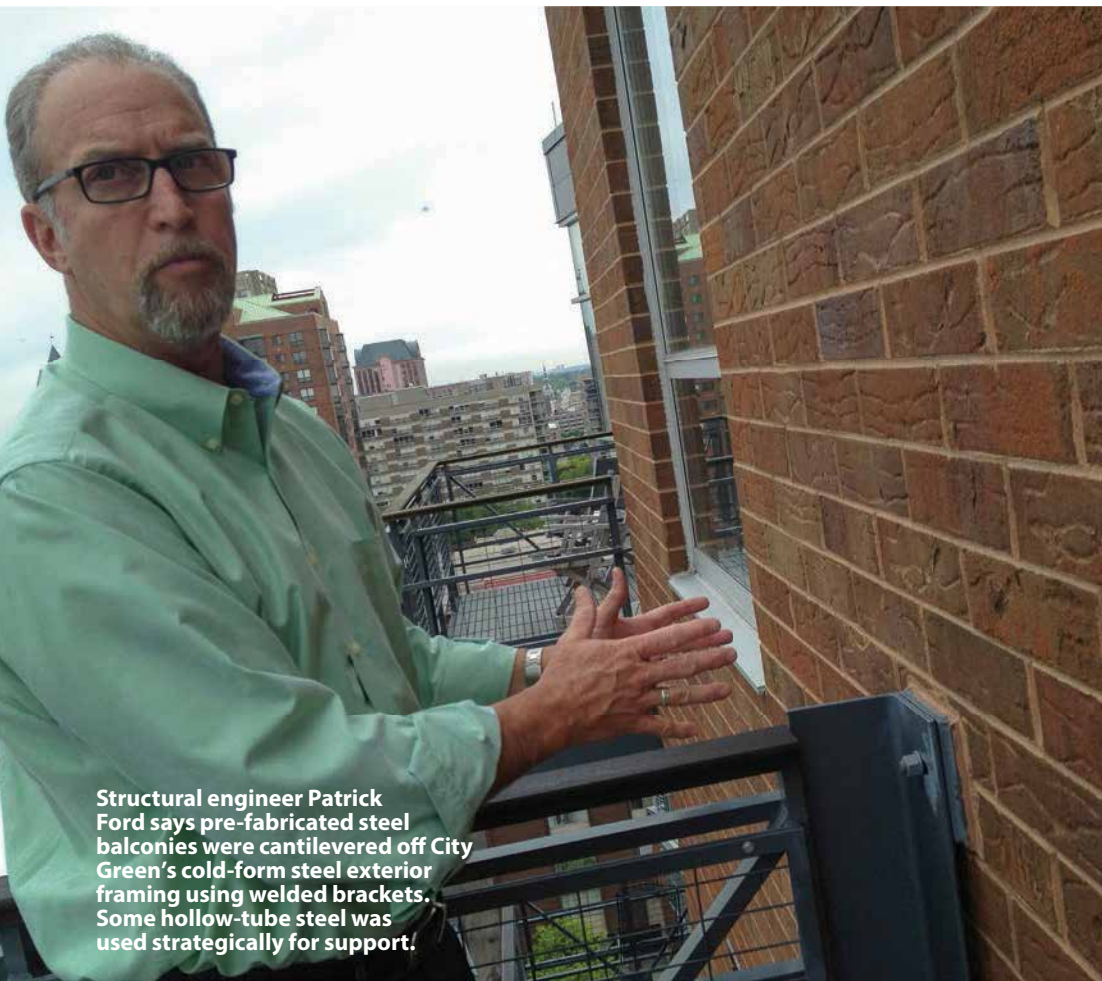
Less Material, Built Quickly

The three City Green buildings sit on cast-in-place and pre-cast concrete. Above the concrete, cold-formed steel structures carry the bulk of the loads.

The cold-formed steel design placed

More Strength Than Many Realize

The cold-formed steel assemblies have maximum, per-stud loads of 13.9 K at interior bearing walls, 9.3 K at exterior bearing walls and



Structural engineer Patrick Ford says pre-fabricated steel balconies were cantilevered off City Green's cold-form steel exterior framing using welded brackets. Some hollow-tube steel was used strategically for support.

1.0 K at exterior non-bearing walls. “Architects might not realize that cold-formed steel studs are this strong,” says Patrick W. Ford, P.E., Principal, Matsen Ford Design. “The exterior walls support nine stories and steel balconies.”

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The exterior walls feature cold-formed steel studs with some hollow-tube steel used at strategic locations to help support the balconies. And the roof joists (1200S200-68) accommodate long-span areas. They're strong enough to carry 100 psf terrace loads, including hot

tubs in some cases. New Land Enterprises helped pioneer the combination of structural concrete floor sheathing panels topped with a poured-in-place underlayment. The underlayment had mats both above and below it, which

helped the project achieve excellent sound attenuation scores of STC 55.5 to 59.77 and IIC 58.5 to 62.4. Everyone is pleased with the development. “We gave the city their tax base, and they just loved our design,” says Burke. “It has interesting angles.”

STRUCTURE

FOUNDATION

Net soil bearing
6,000 psf

Walls, lower slab and footings
Cast-in-place concrete

First floor and below:
Precast concrete with PCC interior post-and-beam

Second floor (transfer floor)
12" solid plank (some shallower areas,
3" topping at wet-cast areas)

WALL FRAMING
Cold-formed steel — 600S200-43
to 600S162-97 — 16" o.c.

Bridging
channel with clip angle in the
typical 6" stud walls.

Stud panels compressed for tight
seating intop and bottom track

FLOOR JOISTS
Cold-formed steel — 1200S200-68 — 24" o.c.,
fastened to pre-punched tabs on rim track

Track fastened to wall studs with
screws (field connections) or
welds (pre-fabricated connections)

Double 1000S162-97 used at walkout
decks above setback areas

Structural concrete panel flooring deck
over bearing walls and joists

Bridging at 6' to 8' o.c. with solid blocking and
RC furring substituted for continuous strap

ROOF JOISTS
Cold-formed steel — 1200S200-68 — 24" o.c.,
doubled up at some longer span locations

Structural concrete panels with EPDM roofing
Bridging at 6' to 8' o.c. with solid blocking and
RC furring substituted for continuous strap

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