



101b THIRD AVENUE, EARTHQUAKE HOUSE OTTAWA, ONTARIO

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ArcelorMittal Dofasco Steel Design, Fall
2012)

DESIGN AND CONSTRUCTION TEAM

ARCHITECT:

Vandenberg & Wildeboer
Architects Inc.

STRUCTURAL ENGINEER:

Cleland-Jardine Engineering Ltd.

GENERAL CONTRACTOR:

RGB Group

LIGHT STEEL FRAMING SUPPLIER:

Morin Bros. Building Supplies

STEEL STUD MANUFACTURER:

Steelform Building Products

SPECIALTY STEEL & CLIPS

MANUFACTURER AND SUPPLIER:

The Steel Network Inc.

The steel-framed, four-level duplex is one of only two houses in Ottawa to hold an earthquake rating. But that's not all. The house was also built to meet the stringent LEED Platinum green building standard.



101b Third Avenue, Ottawa Earthquake House



The new house on Third Avenue in Ottawa's Glebe neighbourhood, built by The RGB Group, has attracted a lot of attention – even from the City's Fire Chief. Fire prevention is a top priority so, when a noncombustible material is the choice for construction, one can't help but be excited. And the fact that the steel-framed, four-level duplex is one of only two houses in the city to hold an earthquake rating, is all the more impressive. The house was also built to meet the stringent LEED Platinum green building standard.

LEED is an internationally recognized certification program that attests to a building, or community, incorporating strategies aimed at improving performance, increasing energy and water efficiency, reducing carbon emissions, utilizing natural resources and improving indoor environmental quality.

To the RGB Group, finding sustainable alternatives as a better way to build is a sound economic strategy. "We're always attempting to set the bar higher and enjoy using new construction methods and materials," says Rolf Baumann, founder and CEO of the RGB Group, noting that steel was the obvious material of choice for this project because of its non-combustibility, recyclability and it allowed for more precise construction of a large home on a small lot. The house is 6.4m x 16.2m long (21' x 53') and sits on a 7.62m x 30.48m (25' x 100') lot. The interior of the 372m² (4,000 sq. ft.) duplex is open concept with 2.75m (9') ceilings on each floor. Since there are minimal interior walls, the steel structure had to be carefully designed to carry the load.

"The constraints of the narrow site led to unique design solutions to ensure the spaciousness expected of a high-end urban duplex," explains Malcolm Wildeboer of Vandenberg & Wildeboer Architects. "The proximity to the lot line required the use of non-combustible materials including steel stud framing, which in turn led to the development of an entire light gauge steel design."

To meet the Ontario Building Code standards, the two property line walls had to be of non-combustible construction and fire rated for one hour, as well as having a thermal protection for heat transfer in case of fire. Again, the decision to use steel made sense.

Morin Bros. Building Supplies Inc. sold the concept

and supplied the steel which included paperless fire rated exterior sheathing and exterior mineral insulation for the steel structure. "We used balloon framing which provides excellent sound transmission and fire protection," says Gerry Morin. "Basically there were three levels of exterior walls stacked on top of each other supporting the three floors. The floor systems are attached to the exterior load bearing walls which are 10.44m (30') high. The clear span of the steel floor joist was 6.1m (20')." Commenting further on steel's value to the project, Gerry continues, "There is no waste with steel as 95% of the steel used was pre-cut at manufacturing, and the balance 100% recycled. Lightweight is another huge factor. We did not use concrete for the non-combustible floor system. Instead, the LevelRock CSD from USG is used to provide the fire rating and excellent sound ratings. The dead load of the complete floor system is not more than 9.07 kg (20 lbs.) per square foot, compared to a minimum for concrete of 22.68 kg (50 lbs.) per square foot. Also, the lower cost for insurance of a building under construction is another advantage."

Colin Davies, with Cleland-Jardine Engineering Ltd., Structural Engineer on the project, explains that the building matches the quake ratings on commercial buildings and leads the way in exceeding Ottawa's recently bolstered seismic residential building standards due to the city sitting on a known fault line. Ottawa is ranked third for earthquake risk among Canadian urban centres. "It was interesting to work on a challenging project that shows what is possible with new building techniques."

Contemporary in its construction and interior space, the duplex integrate comfortably with the heritage fabric of the Glebe neighbourhood through the extensive use of brick and the articulation of its façades with porches.

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“Non-combustible light steel framing contributes significantly to the overall design”

- Malcolm Wildeboer of Vandenberg & Wildeboer Architects



Canadian Sheet Steel Building Institute
652 Bishop St. N., Unit 2A
Cambridge, ON N3H 4V6
Tel: (519) 650-1285
Fax (519) 650-8081
www.cssbi.ca

SPECIFICATIONS:

1st level walls
 362S162-54 mils, 3 5/8" stud,
 1/5/8" flange, 54 mil (.054")

2nd and 3rd level walls
 362S162-43 mils, 3.625" stud,
 1/5/8" flange, 43 mil (.043")

Floor joists
 MegaJoist 1200S200-68 mils,
 12" C joist with 2" flange
 68 mil (.068")

Shear post
 X braces attachment boots and
 braces varied from
 two 362C200-118 mils (2" x
 3.625" x 2" stud x .118") to
 362C200-43 mils (2" x 3.625" x
 2" stud x .043")
 Braces were 6" x 54 mils 50 ksi
 single flat length

Special jamb studs
 Supplied to frame the doors,
 windows and CFS beams varied
 from 362J250-97 mils to 362J250-
 43 mils (3.625" x 2.5" x .5" x .5"
 x .097" to 3.625" x 2.5" x .5" x
 .5" x .043")
 Connections clips with engineering
 values were also used.



The interior of the 4,000 sq. ft. duplex is open concept with 9 foot ceilings on each floor. Since there are minimal interior walls, the steel structure had to be carefully designed to carry the load.



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