



Steel Floor Deck Case Study CS-97-16

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401 YONGE STREET Toronto, Ontario

Speed, Strength, Simplicity = Steel

When facing a renovation in prime Toronto real estate with tight operating space, a client-mandated strong but lightweight exposed floor system with a 2-hour fire rating, and an aggressive time schedule, you need a solution as unique as the challenges. Such was the situation at 401 Yonge Street in Toronto. The existing building was a 3-storey wood structure with wood demising walls and a historically significant brick façade.

Thus a structure providing lateral support was necessary first to, in effect, build a new building behind the existing façade.

Consulting engineers Atkins + Van Groll Inc. of Toronto provided the structural design for the new building and temporary structures, as well as assisting with sound and fire rating requirements. Founding partner Raymond Van Groll adds, "The client wanted to create new retail space with a ground floor structure capable of supporting 200 PSF that when exposed

needed no additional material for fire rating, and with a minimal number of columns. Also a 2nd floor and room structure with the capability of adding a rooftop patio."

The solution? ComSlab®, a unique decking system combining steel and concrete cured together and bonded structurally as one element. Compared to traditional cast-in-place concrete floors, ComSlab can save up to 40% concrete, 50% steel rebar, and 50% in shoring costs. Being stronger and lighter than other floor systems it allows for shallow floor depths from 27cm (10.5") and clear spans of 10m (33'). In this project .036" galvanized was used for the 20cm (8") deep ComSlab and topped with 11cm (4.5") of concrete for a slab depth of 32cm (12.5") with clear spans of 6m (20'). About 1,208m² (13,000 sq. ft.) of ComSlab was used. It was installed using a structural steel grid configuration of approximately 6m x 6m (20' x 20').



A strong but lightweight exposed floor system with a 2-hour fire rating and new structural steel, allowed for the construction of a new building behind a historically significant brick façade

DESIGN AND CONSTRUCTION TEAM:

ARCHITECT:
Goldsmith Borgal & Company Ltd.
Architects

CONSULTING ENGINEER:
Atkins + Van Groll Inc.

COMSLAB SUPPLIER:
Bailey Metal Products Limited

COMSLAB INSTALLER:
Trancon Installations Ltd.

PHOTOGRAPHER:
R. Van Groll



Construction of new structural steel and ComSlab.

The previously 3-storey structure became two storeys plus lower level storage space. ComSlab’s attributes allow for higher ceilings, in this case about 6.825m (22’) between ground floor and 2nd floor, and 3.389m (11’) 2nd floor to ceiling. Bailey’s ComSlab system obtained its first UL listed 2-hour unprotected fire rating early in 2014 for a 32cm (12.5”) slab and later for a 32cm (12.25”) slab, providing a unique exposed slab 2-hour fire separation between ground level retail and second level office space.

Bailey Metal Products Ltd. manufactured and supplied the ComSlab and provided detailed shop drawings for installation, carried out by Trancon Installations. Bailey’s National Director, Business Development, Tony Di Giovanni says ComSlab’s maneuverability, light weight and quickly installed self-positioning interlocking system made it a ‘natural’ for this project. The extremely tight downtown site meant that the ComSlab be bundled and lifted into place with small machinery.

The year-long project was completed in September 2015. At the time of writing, a mezzanine is being added at a height from the ground floor of about 3.389m (11’), also with a ComSlab floor.



ComSlab at ground floor, ready for concrete.



- ComSlab**
- GROUND FLOOR AND ROOF:**
0.953mm (0.0375”) Z275 (G90) galvanized steel deck (1-hour FRR requirement with 267mm [10.51”] total slab depth).
- 2ND FLOOR LEVEL:**
1.257mm (0.0495”) Z275 (G90) galvanized steel deck (2-hour FRR requirement with 317mm [12.48”] total slab depth).
- TYPICAL BEAM:**
W410 x 54 – ASTM A992, A572 Grade 50
- COLUMNS:**
W250x73 – ASTM A500 Grade C.