case study
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Ontario Cast-In-Place Concrete Development Council

William Osler Health Centre Hospital

Traditional lumber formworks remain the common approach for concrete construction projects. Though functional, large scale projects generally require a significant reserve of skilled labour and copious man-hours for installation and removal of the forms and shoring. This can translate into significant costs for the project. During the construction of the William Osler Health Centre Hospital in Brampton Ontario, an alternative system for form construction was explored in an effort to improve the project's economics and overall efficiency.

The idea to develop a column-hung forming system for the hospital's construction stemmed from pre-construction discussions between Aluma and EllisDon, the project's General Contractor. Being a public-private partnership (3P) project, the incorporation of design changes and innovations to meet both cost and timeline restrictions was in the interest of all parties.

Developing a column-hung forming system for this project would offer a distinct advantage over conventional shored formworks. A column-hung system eliminates the "forest" of vertical re-shoring by hanging the flooring forms on the building's own structural columns. Consequently, the mechanical, electrical and plumbing sub-trade workers could gain earlier access to the newly poured floors. This would tremendously speed up the construction timetable. Previous to the Brampton project, Aluma had worked on a similar forming system for the casinos in Las Vegas. By developing the system further, a technique and product could be made that would enhance the Brampton project.

The Aluma design team set about developing a column-hung forming system of a size and strength never before used in construction. The innovative end result, the Aluma "Hi-Flyer" system, was designed with 36-inch deep castelite beams spanning between columns and connected up to 96 feet in length. These beams were transversely connected with adjustable aluminum trusses. A modified Aluma Beam, specially extruded at 44 feet in length, was incorporated longitudinally across the trusses with plywood used as sheeting. The groundbreaking beam length allowed for far fewer joints and easier laying of the plywood sheeting. Overall, a forming area measuring 30 feet x 90 feet was created.

Owner: *In joint jenture*
Ellisdon Corporation and
Carillion Canada Inc.

Architects of Record:
- Parkin Architects Limited
- Adamson Associates Architects

Engineers of Record:
- Marshall Macklin Monaghan
- Stephenson Engineering Ltd.

General Contractor: EllisDon Corporation

Formwork Supplier: Aluma Systems Inc.

Concrete Supplier: Canada Building Materials

Formwork Contractor: Avenue Building Corporation

Reinforcing Steel:
- Harris Rebar
- Gilbert Steel Limited

Additional Participants:
- Liuna Local 506
- Ironworkers Local 721
- Carpenters Local 27

Project Facts:

- 90,000 ft^2 of Aluma Hi-flyer was used to form 580,000 ft^2 of concrete slab on four floors
- Entire product was extruded or fabricated in Canada
- First Canadian innovation by Aluma Systems

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The size of the bays and thickness of the concrete floors dictated that special column screwjacks would be needed at each column to support the massive forming system. These jacks were innovations in themselves, as no existing jackscrews could provide the 90,000 pound safe working capacity demanded of the project. A two-piece bracket and screw with rocking "U" head was designed, with bay width adjustment capable of accepting the reduction in column size as the building progressed.

Designing the column-hung system for such loads and spans was one thing, but to be truly timesaving, the system had to be easily repositioned. The table needed to be rolled forward into each new pour position, and be able to "fly" to the next slab level in the building. With a system of hydraulic wrenches, jacks and pumps supported on standard shoring towers, and in conjunction with small fork trucks, the Hi-Flyer panels could be readily moved on special rollers set in the "U" heads of each jack after the previous pour had reached 80% of its design strengths. The system was so easy to move that the 2,700 square foot table could be stripped, rolled and lifted into its next position by five men in only 20 minutes. This simplicity allowed for remarkable production rates during construction.

Aluma began delivering material and fabricating the Hi-Flyer tables in January. By March, the first tables were in position, awaiting pouring of the suspended slabs. By August, construction of the floor slabs was complete, pre-cast outer panels were erected, and the sub-trades were well on their way to completion. In all, 90,000 square feet of Aluma Hi-Flyer was used to form 580,000 square feet of concrete slab on four floors of the health centre. All of the innovations for the Aluma Hi-Flyer system came from the Canadian sales and design team at Aluma. It was a first and real Canadian innovation by Aluma Systems.

2006 Ontario Concrete Award winning project for Specialty Concrete Applications

In 2000, the Ontario Cast-In-Place Concrete Development Council (OCCDC) was formed to aid the owner/developer, architect/engineer and design-build contractor in the decision-making process of choosing the best construction material for the framing system of new cast-in-place structures.

OCCDC promotes the benefits of reinforced concrete as the construction material of choice based upon the following advantages:

- *fast-track construction*
- *costs savings*
- *structural advantages*
- *environmental considerations*
- *local economy benefits*

The Members of the OCCDC incude (alphabetical order):

Aluma Systems Inc.
Carpenters District Council of Ontario
Concrete Forming Association of Ontario
Ironworkers District Council of Ontario
LIUNA—Ontario Provincial District Council
Ontario Formwork Association
PERI Formwork Systems Inc.
Ready Mixed Concrete Association of Ontario
Reinforcing Steel Institute of Ontario

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