

Collaboration is one of the keys to constructability.

## conference preview

# IT'S NOT ALL ABOUT ME: A HOLISTIC APPROACH TO CONSTRUCTABILITY

BY PHIL JONES, P.ENG., P.E.

**I HAVE GOOD NEWS** for the structural steel industry: The construction world continues to change and structural steel stands to benefit.

To elaborate, the evolution of construction contracts has largely moved beyond the stipulated sum, making way for countless variations of project contracts focused on shedding risk while improving cost and schedule certainty. The “dumb contractor” role of old has been pushed to the outskirts of the industry as owners and developers place higher expectations on general contractors to shoulder and better manage their risk. The excuse of “it wasn’t on the drawings” has been replaced with “I should have known to include that.” This is certainly evident in the public-private partnership (P3) model as contractors now are responsible for designing, constructing, financing, operating and maintaining projects. In the last ten years, the P3 model has quickly become a contract of choice for complex Canadian infrastructure projects (e.g., it now represents twice the “traditional” revenue for my firm). The P3 model is now emerging in the United States as well and is likely to gain much traction for its ability to assign risk and, at least for the client, mitigate legal conflicts of responsibility.

Of course, the corollary of evolving contract models for general contractors is a trickle-down effect to the subcontractors. The result has not necessarily been through a corresponding change to the contracts but rather in the expectations. While the proactive contractor must possess a greater variety of in-house technical skills and services, the need for collaboration with subcontractors has dramatically increased. We can no longer work within our black box of knowledge and scope but instead must blur the lines to achieve an understanding of how our work affects other sub-trades around us, in an effort to achieve true constructability.

### Defining Constructability

The word constructability implies a variety of definitions but for our purposes here, it is defined as “working to achieve efficient construction through optimization of labor, materials and cost.” Simply put, constructability is something that already exists at the core of the structural steel industry. Some of this has been driven by the trend towards delegating connection design to the fabricator, but arguably more so due to the preexisting reliance on the fabricator to incorporate and coordinate

the many other project typical details and the requirements of other sub-trades.

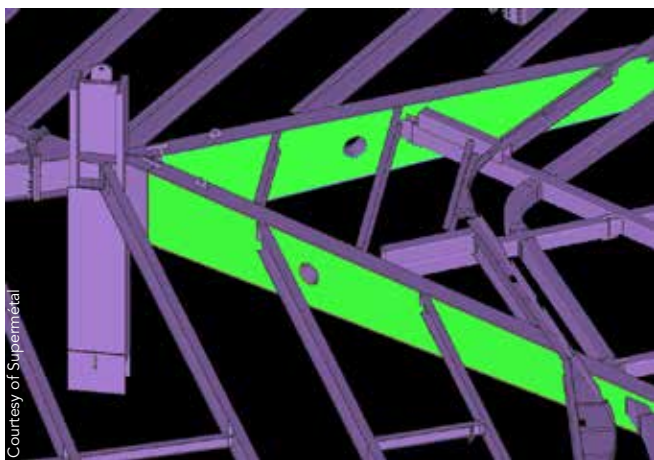
Incorporation of curtainwall connections, mechanical openings in slabs or beams and attachment points of secondary framing, for example, is something largely unique as a sub-trade requirement to structural steel when compared to cast-in-place concrete construction. This has pushed most of the structural steel fabricators to embrace 3D BIM software for modeling and collaboration well ahead of most consultants and contractors. For structural steel, the BIM revolution is old news as the rest of the construction industry now works to catch up. However, as the session and article title implies, this is not about you and it is not about me, but instead about *us* and how we all work together. With this experience comes great responsibility to operate as leaders and collaborators.

One secondary effect of 3D collaboration and clash detection is the noticeable increase in buildable architectural expressions and complexities. Even modest buildings seem to increasingly incorporate sloping columns, two-dimensional curvatures and intentional randomization of geometry. Modeling and coordination of these elements has become easier, but the need for constructability and holistic design approaches has grown significantly. In many cases, issues of poor constructability come from the delineation of scope—better known as the “by others” scapegoat—where the impact of one trade’s work creates costs to others and is not always captured in a scope of work. An example of this would be a temporary steel support located over a concrete slab below, requiring reshoring by oth-

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Courtesy of Supermetal

- ▲ Steel coordination of web penetrations for MEP systems and notches in the curved edge plates for curtainwall box-outs.
- ▼ Tower cranes for Brookfield Place take into consideration installation requirements of the various sub-trades.



Phil Jones

ers, instead of locating it on a column or wall. However, in most cases the difference between a solution of elegance and cost-effectiveness and a solution of significant expense and schedule implication is usually very subtle. Too often we are all reminded of this through 20/20 hindsight because these subtleties require extensive experience to conceptually plan a project at the macro level while taking into consideration the implications at the micro level.

Trades also must understand and accommodate the needs of each other. This includes a working knowledge of the other trades, including dimensional tolerances, construction methodologies and keeping an open mind to doing things differently to better the project. A good example of this was the Brookfield Place project in Calgary, Alberta, where the tower cranes were planned to suit the requirements of the structural steel framing and advancing self-climbing concrete core. Custom tie-backs were developed, taking into consideration the installation of the curtainwall mullions and worker headroom on the affected floors. Tie-back connection shoes and connection rods at the concrete core were detailed specifically to accommodate the core zone reinforcing and avoid interference of the connection rods with the elevator installation behind.

### Implementing Constructability

The simplest first step to constructability is having the right people involved in the preplanning, and this includes the general contractor and sub-trades at the conceptual and schematic design stages. Of course, this requires trusting relationships between all parties to work in the best interest of the project rather than themselves. Newer contract approaches, such as integrated project delivery (IPD), work towards this concept by involving various parties in a collaborative contract focused on reward for project success over individual success (for more on IPD, see “The Business Case for Integrated Lean Project Delivery” in the February 2015 issue, available at [www.modernsteel.com](http://www.modernsteel.com)).

While the IPD method takes this concept to a new level contractually, the core concept of collaboration for the sake of the project still applies to other delivery methods, often well ahead of any contract being in place. In my experience, the results of early collaboration and constructability efforts can be the difference between project viability and never being constructed. Unfortunately, the invitation to collaborate at project conception does not always come with immediate payment. The reward though can be well worth the investment should the owner decide to sole-source the construction contract. At the very least, this provides a leg up on the competition in understanding the project scope and the client’s needs when bidding.

As I stated at the beginning, the structural steel industry is well positioned to benefit from the changing landscape of construction. Your experience matters, and those who are willing to embrace deeper collaboration and freely exchange knowledge will succeed. Remember: We’re all in this together. ■

*This article is a preview of Session N14 “It’s Not All About Me: A Holistic Approach to Constructability” at NASCC: The Steel Conference, taking place April 13-15 in Orlando. Learn more about the conference at [www.aisc.org/nascc](http://www.aisc.org/nascc).*