

Owners and project teams can benefit from early, in-depth collaboration on complex, expensive and fast-paced projects.

Healthy Collaboration

BY DAVID MERRIFIELD AND WILL IKERD, P.E.

HENRY FORD SAID, “Coming together is a beginning. Keeping together is progress. Working together is success.”

While Ford’s experience was clearly based in the automotive industry, the same way of thinking translates to other industries. In construction, the delivery method of integrated project delivery (IPD) embodies this concept of coming together, staying together and working together throughout a project—though the success part really depends on the team itself and other specifics of the project.



David Merrifield (dmerrifield@alphasteelusa.com) is senior vice president with Alpha SteelFab, Inc., McKinney, Texas. **Will Ikerd** (wikerd@ikerd.com) is principal at IKERD Consulting in Dallas. He is a member of AISC’s Technology Integration Committee and co-chairs both the Structural Engineering Institute’s national BIM Committee and the Designers Forum of the AGC BIM Forum.

Healthcare projects can especially highlight the benefits of IPD, as these buildings typically have high complexity, require substantial investment and are almost always tied to aggressive schedules. However, for owners to fully experience the benefits of an integrated team approach, they must pay attention to the details of the team.

First on the Block

A building is viewed as the vessel for delivering goods or services to the marketplace, and in the world economy being first to market can mark the first step toward profit and return on investment. A steel framing system can provide time savings to a project, and this is especially the case if the contract takes advantage of involving the steel team early in the design process. While the more traditional methods of design-bid-build (DBB) and construction manager at risk often tend to involve the fabricator later in the process, IPD, like design-build (DB), brings the fabricator on board much earlier.

A true IPD contract is a multi-party agreement between owner, designer and contractor. It can include key sub-contractors and is generally based on speed to market. Accordingly, there is a risk-reward system within the contract. Cost is based on GMP (guaranteed maximum price) and the starting document for fabricator involvement is usually the RFP (request for pricing).

Setting budgets involves historic costs and price per square foot for the type project being built. One important factor is deciding on how to carry contingencies. In the more traditional methods, subcontractors and the construction manager each carry separate contingencies. With



▲ Texas Health Harris Methodist Hospital Alliance, an IPD steel project, was detailed and fabricated by Alpha/SteelFab after they assisted in converting the design from the original concrete concept.

an IPD system, a pooled contingency is usually set and is drawn on as changes to the design occur.

In both DB and IPD, fabricators see themselves as playing dual roles of designer and supplier. This view requires that the fabricator take “ownership” of the steel design—i.e., as a stakeholder in the budget, any additions, changes and modifications result in changes to cost and profit. However, as an active team member, the fabricator can and should share insights with the design team to mold their choices and decisions to not only meet the project requirements, but also to maintain its own profitability.

BIM as a Collaboration Tool

In nearly every delivery method today we see a BIM (building information modeling) element specified in the contract. It's mostly used for clash detection and for the main structural elements the construction subcontractors are working on around the steel frame. The problem almost always is that the structural and architectural miscellaneous steel that may not be included in the model, due to the cost of detailing. This can be a significant issue in healthcare projects in particular, due to the interstitial space between the ceiling and the floor above. IPD projects should consider a complete modeling approach to avoid it.

Each of the four project delivery methods mentioned has a different approach to BIM. We have found that a true IPD or DB project, where the steel fabricator is involved as an original team member, also requires early steel modeling and detailing. Because all the changes in design are happening at the same time as the fabrication model, it changes the traditional role of detailing and may affect the final detail-

ing cost. Compensating the detailer and project manager to interface with the design and construction team can lead to sticker shock for those who are not prepared.

Even so, it is almost impossible to imagine a true collaboration process without BIM. Although some IPD purists may argue that IPD and BIM are completely separate and that IPD can be done without BIM, truly collaborative construction processes are more enabled by BIM-based workflows. Structural modeling can only be as helpful for coordination as the modeling of accompanying trades, such as mechanical, electrical and plumbing (MEP). In an integrated project, owners can substantially help the overall project by bringing on competent BIM-enabled MEP trade contractors alongside steel fabricators and detailers during design for early coordination.

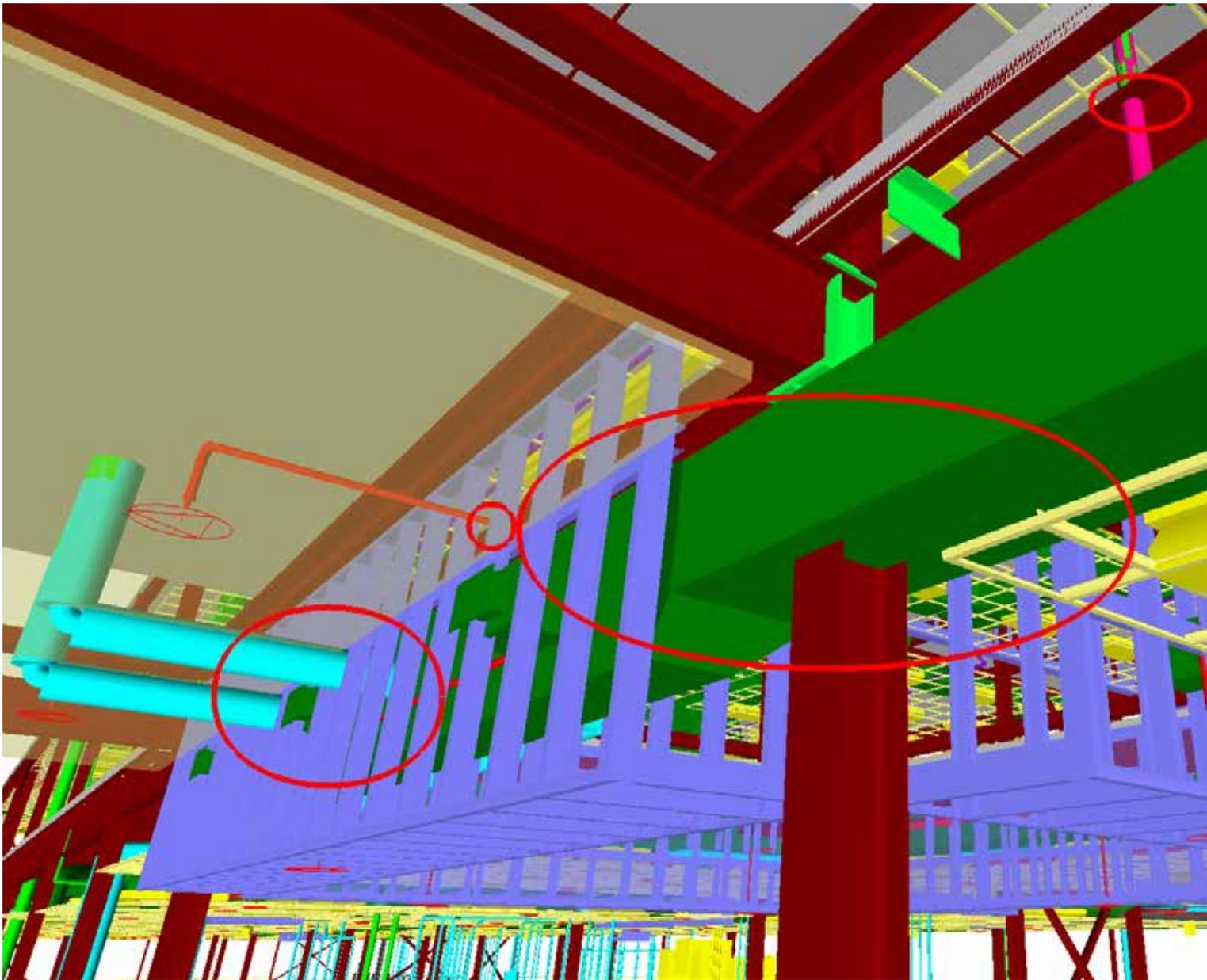
Shared Risk Concepts

For successful implementation, owners and their teams must take a holistic view of the role of the structure in integrated projects by looking at “building system teams.” This is a difficult concept to adopt for those who have been using the DBB model. But it can be done!

The concept behind these integrated system teams is to look at a building project in the form of five clearly defined scopes and sub-GMP target prices:

- ▶ Exterior skin
- ▶ Structure
- ▶ MEP
- ▶ Interior
- ▶ Site

This approach recognizes that each of the five system costs



is predominantly controlled by a clearly identified group on the project that crosses lines between design and construction.

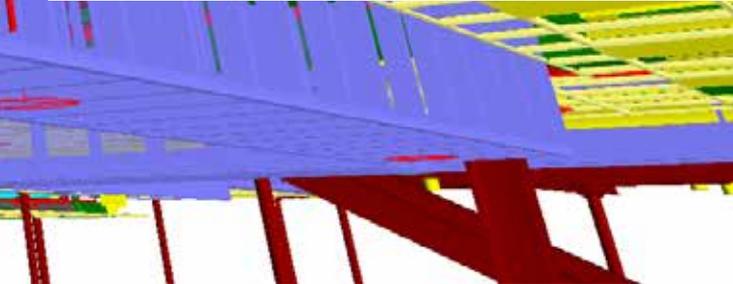
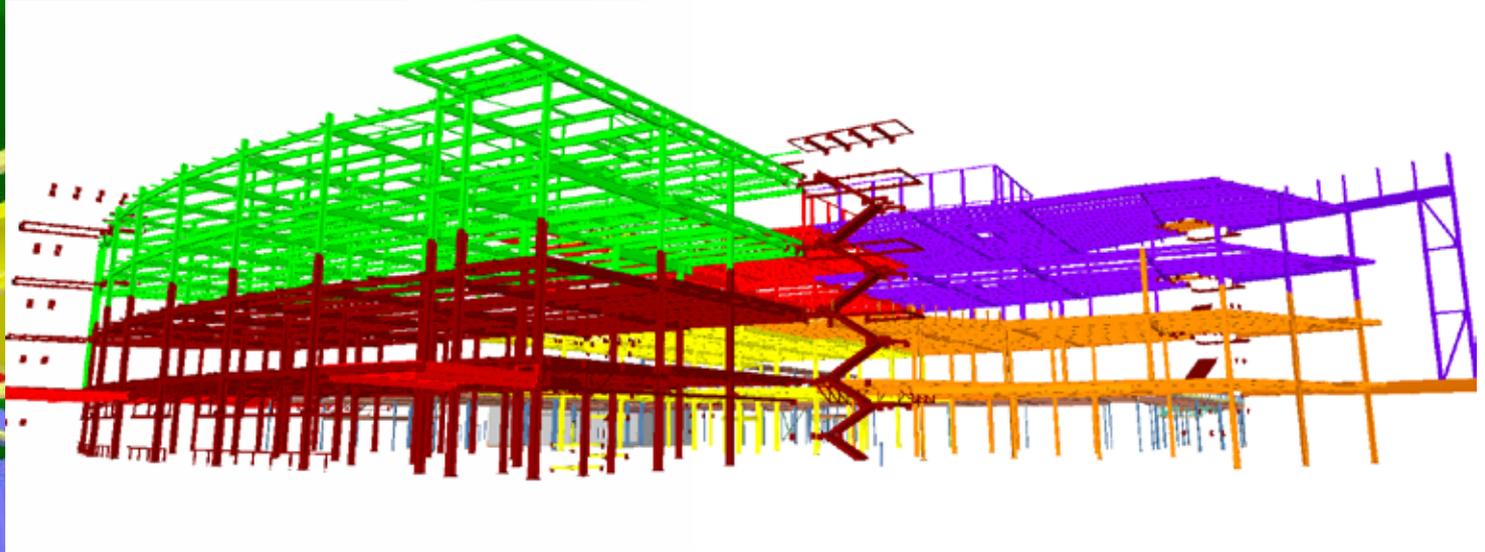
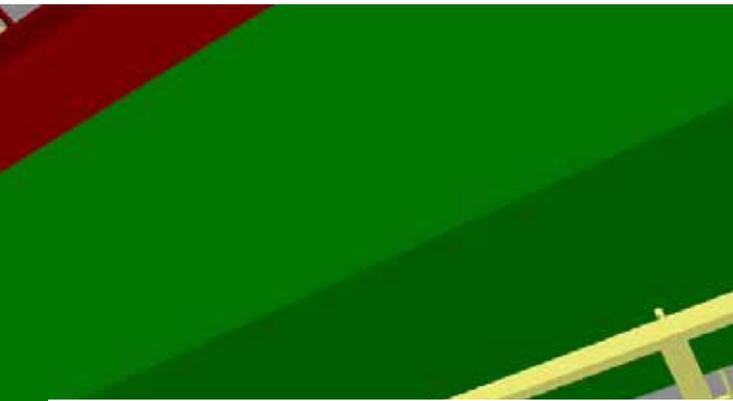
A significant point for owners to observe is that the steel team is the critical path for three other teams: MEP, exterior and interior. These three “following” systems must either fit around, hang from or be formed by the structural systems. This fact alone makes the value of this system far more important than the 10% to 16% of project cost that the structural system is thought to represent. The true value of the structure can be seen only when viewed relative to the project schedule.

What would the value of a structural team be if it could deliver the structural system of a hospital three or even six months ahead of a traditional schedule? That team is creating value that will often far exceed any perceived “savings” through hard bidding and buyout of the structural system. However, such results only come from owners changing the traditional team alignment related to the structural system.

Instead of conceptually dividing a project between design and construction, the team approach seeks to align and reward groups with the building systems they should respec-

tively control. The key designers of each group should be selected early in the conceptualization phase of the project based on their understanding of the systems team concept. Ideally all members of the structural team would be aligned so that they had contractual incentives attached to structural goals of overall structural cost, schedule and quality.

While teams cannot contractually create trust and a spirit of collaboration, it is possible to cause contractual barriers to a structural team’s ability to work together. This is done when lead designers or construction managers enter tri-party agreements sharing risk and reward, but do not include any incentives for their consulting engineers or specialty trade contractors. A less-than-ideal situation is when the structural engineer is a sub-consultant to the architect in a traditional fixed-fee contract and the fabricator has guaranteed a maximum price to the construction manager. What can happen in such a case is that the structural engineer and fabricator are cast into traditional roles that do not include the extra effort and fee for them to properly plan in an integrated, collaborative way. Much of the benefits of IPD can be undermined when this situation occurs with structural engineers and fabricators in traditional



- ▲ A 4D sequencing model of the Texas Health Harris Methodist Hospital Alliance, prepared by IKERD Consulting in Navisworks.
- ◀ An example of early conflicts on MEP coordination around structural steel detailing models on an IKERD Consulting project. This model highlights the need to include a BIM-enabled MEP contractor that has 3D modeling capability for all of their systems early in the design of healthcare buildings.

subcontracts. It is not surprising that part of the success of IPD projects is due to the additional effort and planning that take place early in the process. Part of this success is found in including the structural engineer, fabricators and other members of the structural team as full IPD partners.

Setting a New Course

One case that shows the potential for success is the Texas Health Harris Methodist Hospital Alliance. The recently opened facility, in Ft. Worth, was conceived as an IPD project where the fabricator, Alpha SteelFab of McKinney, Texas, (an AISC Member/AISC Certified Fabricator), was instrumental in the team's decision to convert the design from concrete to steel. Alpha worked alongside the project architect Perkins + Will, The Beck Group (which provided construction services) and structural engineer L.A. Fuess Partners to create a solution that accelerated the project 12 weeks ahead of a typical fabrication schedule (approximately 1,200 tons of steel were used). Will Ikerd initially assisted Perkins and Will in developing the project's BIM execution plan, while he was founding director of Raymond L. Goodson, Inc.'s

IPD department. (Later, with his own firm, Ikerd developed 4D scheduling models for Alpha from their detailing models in SDS/2.) The IPD approach, powered by BIM, made the project successful for all.

From Concept to Delivery System

Many contracts are looking to apply IPD without an actual teaming agreement. The concept shows up in many forms such as a BIM requirement or some form of collaboration statement in the contract. These are certainly beneficial tactics that can help foster a collaborative spirit, but they are construction concepts or principles as opposed to a true delivery system. For the most part owners are struggling with the need for IPD and how to get the best value and lowest price. In public projects the requirement of multiple bids precludes pure IPD. However, in healthcare projects, even if they are public in nature, teams should find ways to implement as many of the IPD concepts as possible. This is how owners and their projects will truly achieve what Ford meant by his statement that "working together is success."

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