

Shop Drawing SNAFU Elicits Reader Response

January's letter from Ronald Jensen (describing the fabrication and erection problems, available online at www.modernsteel.com) prompted many reader comments. Letters have been edited for length. —Editor

Mr. Jensen's solution was to require the structural engineer to check the geometry and dimensions of the shop drawings. No! The structural engineer, for about one percent of the construction cost, takes liability for structural design. The steel detailer gets about twice that to detail structural steel. To give the EOR the responsibility and liability to check the dimensions of shop drawings is wrong. Detailers should check their own work for the fee they get. The general contractor also must review the shop drawings as required by Standard AIA Contract. The structural engineer's responsibility is only to see the design carried forth.

I am a Principal of a medium-size structural engineering firm. Our procedure is to check shop drawings to see if sizes are indicated correctly, connections are correct as we have detailed them, and that the drawings are complete. Anything beyond that is the detailer's responsibility.

With this kind of thinking, as well as the unfortunate Section 3.1 of the March 2000 *Code of Standard Practice for Steel Buildings and Bridges*, AISC has taken it upon itself to determine the contractual relationship between structural engineers and their clients as to what should be present on the engineer's drawings. This is wrong, and I omit these Sections when referring to the *Code of Standard Practice*. At least, wherever it states "structural design drawings," it should be changed to "design drawings." Often architectural and mechanical drawings show details unrelated to the structural drawings, but which affect the structural steel. And there is no way the structural engineer can chase down every detailed dimension. With today's buildings' complex geometry, the basic geometry must be described in architectural, not structural drawings.

The structural engineer cannot increase fees for added responsibilities or liabilities. If successfully shifted, the structural engineers would be out of business.

—Richard (Dick) Phillips

The problem started with the general contractor. He gave the job to a fabricator "not well experienced at this level of construction." The fabricator hired a draftsman "not well experienced at structural steel detailing." Could this lead to anything except a fiasco?

The author states with surprise that the steel erector was kept out of the loop of shop-drawing review. In more than 40 years in steel detailing, I have never seen the steel erector involved in shop-drawing review. The erector should be consulted before shop-drawing production, but not in the approval/review process. This would muddy the waters of the existing process, since most steel erectors lack the training or experience to review shop drawings.

While "there was no indication that anyone performed a serious review in the approval process and this resulted in numerous fabrication errors," it is not the responsibility of anyone but the steel detailer to check shop drawings. Most others don't have the ability to properly check shop drawings. If the fabricator questioned the detailer's ability, he should not have given him the job, or should have checked the drawings himself.

The erector was remiss in allowing all the arbitrators to be general contractors. As an arbitrator for the American Arbitration Association, it is my experience that each party has input into the choice of arbitrators, unless the erector forfeited his right to do this in his agreement with the general contractor.

The suggestion that steel detailing should be under the aegis of the structural engineer will not solve problems. Engineers have trouble turning out a complete error-free set of contract drawings. What makes anyone think they could turn out a complete error-free set of fabrication drawings? Engineers would assume the additional liability for detailing errors.

Another suggestion was to require more shop-drawing review by structural engineers for detailing errors. With the emphasis that engineers place on avoiding responsibility, do you expect them to check shop drawings? The approval/review process is based on reviewing only for adherence to the basic concepts of the project. This also would spread responsibility for accuracy between more than one company, impairing the

check, back-check, modify and sign-off procedure, inducing more chaos. With modern 3D-model detailing, it would be virtually impossible for anyone but the detailer to check shop drawings.

The suggestion that you can create perfect work by requiring a detailer's license has many counterarguments. Do licensed engineers produce perfect contract documents?

The tools for a perfect steel erection project are already available: IF the steel-fabrication contract was awarded to an AISC-certified company; IF the fabricator had demonstrated past competency; IF the detailing company was NISD-certified or had demonstrated past competency; and IF the general contractor and the steel fabricator had been more prudent in their selection of subcontractors, there might not have been a Shop Drawing SNAFU.

—Norman Alterman, P.E.

Mr. Jensen suggests that the detailer work directly for the EOR; that detailers become licensed professionals; and that the erector should be part of the shop-drawing review process. I don't think these suggestions solve the problems and could exacerbate the situation. It is easy to find fault with the fabricator and sub-standard detailing, and to blame the shop-drawing review process. But I don't buy the excuse Mr. Jensen offers for the architects and the engineers—feeling they don't get paid enough to do a thorough shop-drawing review is a cop-out and a slap in the face to hard-working professional detailers. Not to mention the detailer's lament of disparity in wages. While more accountability in detailing is an admirable goal, a more effective approach would be "some" accountability from the architects and the engineers.

The root of the problems was with the G.C./construction management team. The fabricator's abilities were unknown. A low bid was probably the only criteria for the contract award. The erector worked under a separate contract from the fabricator, and was omitted from the shop-drawing review process.

The most successful steel projects are where the detailer, fabricator and the erector work together in an "alliance": The fabricator works under contract to

the G.C., with the detailer and erector under contract to the fabricator. Fabricators provide a complete package. Taking the responsibility for detailing and erecting the structure from the fabricator, as Mr. Jensen suggests, is a recipe for disaster. It limits the fabricator's ability to ensure the level of service from detailing through erecting. If the fabricator does not have the responsibility of detailing or erecting the steel, who will? Who will provide expertise? Who will the construction management teams rely on to ensure steelwork is carried out professionally? Although the detailer working for the engineer could help solve RFI and review-process issues, and a G.C. might want to subcontract directly with an erector, this is detrimental to the steel-fabrication industry as a whole.

—Kevin T. Towns

blame the City for accepting an inexperienced fabricator and passing it onto the contractor to save a buck. The inexperienced fabricator hired a draftsman to detail the structural steel instead of a steel detailer—the fabricator probably went with the low bid. The contractor hired an erector and kept him out of shop-drawing review.

The contractor should have been hired to do the whole project. Once the owner breaks up the project, the responsibility also is broken up. But if you subcontract everything to one company, the responsibility is with a single company.

Nobody adequately checked the shop drawings, because they probably subcontracted the checking to a low bidder,

or worse, they didn't have the job checked at all.

Including detailing with the engineering package works for structural steel, but not for misc. iron, which involves the architect. This would put more responsibility on EORs, who have enough to worry about with structural design. Leave detailing to detailers.

More thorough shop drawing review by EORs isn't a substitute for poor detailing skills, or not having enough money to do the job right. Don't structural engineers learn AISC detailing standards in school? If not, they should hire detailers to review shop drawings, and bid the job with enough money to do it correctly.

While different shops might have different detailing practices—all detailers can tell if a job will fit together or not. Mr. Jensen suggests that standards be raised, we get licensed and that we be held accountable. He isn't analyzing the whole picture. While the checking shop details is important, the fabricator already is accountable for the detailer's work, and is back-charged if the steel doesn't fit. The fabricator has to fix errors at his own expense and compensate everybody for losses. Detailers are back-charged and banned from the list of detailing contacts. Is that not accountability?

Why not have licensed checkers instead of licensed detailers? Where do the misc. iron detailers stand? Will they work at the architect's office? Will they detail misc. iron as part of their design responsibility?

—Edward Borg

Do you have an opinion?

Modern Steel Construction would like to hear from you! Please send your comments to Scott Melnick, melnick@aisc.org.