Delegating Design Responsibility

By Jim DeStefano

There is a disturbing trend in our profession for engineers to delegate design responsibility for structural elements to the contractor. Post-tensioned concrete slabs are a common example. There are a variety of reasons for this.

Very few universities actually teach engineering students anything about pre-stressed concrete. It is unusual for an undergraduate program to do any more than give students a brief overview of what pre-stressed concrete is. Many universities don't even offer a graduate level course in pre-stressed concrete. Consequently, the majority of practicing structural engineers are incapable of engineering a post-tensioned concrete structure.

Furthermore, some structural engineering businesses view delegating design responsibility as an effective technique to increase their profitability. By minimizing the structural elements that they actually engineer, less fee is expended.

The post-tensioning suppliers have adapted to this trend and have become fairly competent at engineering their system, either with in-house engineers or outside consultants. Many post-tensioning suppliers developed in-house engineering capabilities as a marketing tool that allowed them to offer competing designs on projects that were engineered as reinforced concrete.

Delegating design responsibility to a specialty engineer hired by the contractor is not a new concept. It has become standard practice with pre-engineered metal buildings, wood trusses, precast concrete and light gage metal framing. This practice is not always in the best interest of public safety.

When designing a post-tensioned concrete structure, there are a number of issues that need to be considered in the design phase such as appropriate column positioning, configuring and detailing shear-walls in a manner that does not restrain elastic and creep shortening of the structure due to pre-stress forces, etc. If the structural engineer of record does not understand the principals and limitations of post-tensioned concrete, how can he or she possibly give appropriate design advise to the Architect during the early phases of project design? By the time the post-tensioning supplier's engineer becomes involved, it is too late to correct flaws in the initial design.

How can a structural engineer of record even review shop drawings and calculations for a post-tensioned structure if he or she does not have an understanding of the basic principals?

Almost 20 years ago, a lift-slab building collapsed during construction in Connecticut, killing 28 workers. One of the many contributing causes of the collapse was deficiencies in the post-tensioning design that had been delegated to the contractor. The only indication of the primary structural system on the structural drawings was a note "7 inch Post-tension Slab."

There is a mistaken belief that, by delegating design responsibility to a specialty engineer hired by a contractor or material supplier, we can divest ourselves of liability and responsibility. Nothing could be further from the truth. When there is a failure, everybody involved with the project is drawn into the litigation. There is no place to run and hide. In the case of the lift-slab collapse, every insured entity connected with the project contributed to the final settlement, including the drywall contractor who had not even started working on the project and the guy who drove the lunch truck on the site.

When we delegate design responsibility, we are doing a disservice to our clients. How can we, as a profession, expect to garner respect and recognition when we attempt to shirk responsibility for the design of the primary structural system on our projects?

We should make it our business to educate ourselves on the structural systems that we employ on our projects and take responsibility for the design of them. Otherwise, we risk becoming irrelevant.▪

Jim DeStefano is the Senior Partner of DeStefano Associates located in Fairfield, CT. Jim is the Past-President of the Connecticut Structural Engineers Coalition and has been a Director of NCSEA. He is the chairman of the STRUCTURE magazine Editorial Board. Jim can be reached at **chair@structuremag.org**