

Structural Shotcrete Reinforcing

By Marcus H. von der Hofen

Complicated Questions with Complex Answers

One of the biggest topics I run into while working on structural shotcrete is reinforcing steel. What size? What spacing? Contact splices or noncontact splices? What can we do? These are not simple questions and are certainly not questions with cut-and-dry answers. As a contractor who deals with these issues every day, here are a couple of ideas that might help you answer these questions as they apply to you. In any case, reinforcement should be sized, spaced, and arranged to facilitate the placement of shotcrete in meeting the structural design requirements by the American Concrete Institute's "Guide to Shotcrete (ACI 506R-05)."

Size of Steel

For the most part, configuration seems to play a greater role than the size of steel. Large (No. 7 and larger) vertical reinforcing can consistently be encased when spacing and configuration allow the nozzlelemen good access. Large horizontal reinforcing is a different story and is more a difficult task for good encapsulation. In general, a

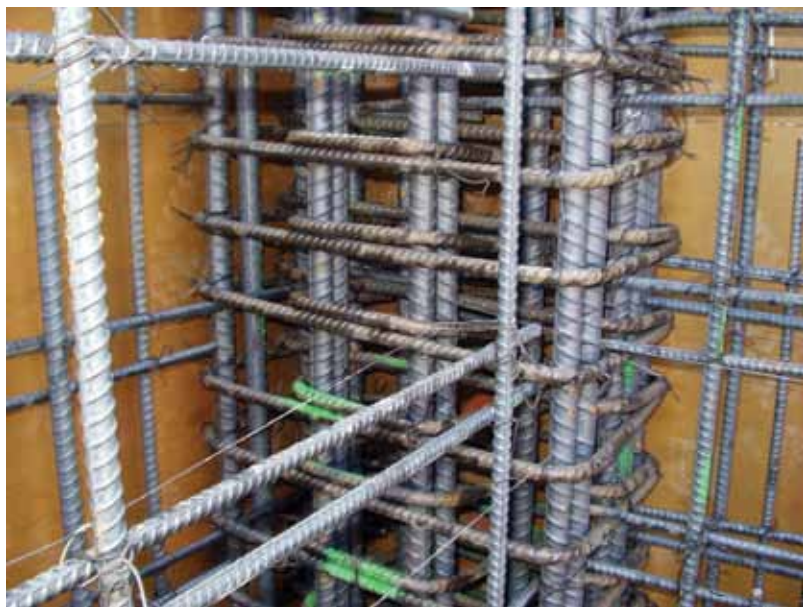
design with bigger, but fewer, vertical bars can give you more spacing between; and smaller, but more, horizontal bars limit sloughing or sagging.

Contact Versus Noncontact Splices

The soundest shotcrete is usually obtained when the reinforcement is designed and positioned to cause the least amount of interference with the placement of shotcrete ("Guide to Shotcrete (ACI 506R-05)"). Commonly called "noncontact splices," the obstruction areas where bars overlap can be reduced by separating an approximately 2 in. (51 mm) space with reinforcing bar at the splice, which will allow flow around two smaller obstructions rather than just one larger one. This is typically the preferred method, but it's not always the case. In highly congested areas, this method may cause interference to the nozzlelemen.

Talk to Your Shotcrete Contractor

These issues and their answers are subjective and the experts in the field can often disagree. It's important to allow the input of the shotcrete contractor to ensure that the final structural design will facilitate proper shotcrete placement in a way that is best suited to his or her vision and skill set. We don't all do or see things the same, so it is communication more than any set rule that I find to be the most productive.



Noncontact splices used in open area boundary element done with contact splices for better access



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