

Rigolets Pass Bridge



“Evaluation of Prestress Losses in High-Strength Concrete Bulb-Tee Girders for the Rigolets Pass Bridge” in the Winter 2011 issue of *PCI Journal* is an interesting and useful addition to the material on high-strength concrete in prestressed concrete applications. It has many parallels with work done on three prestressed concrete I-girder bridges that were instrumented by the University of Illinois for the Illinois Department of Transportation (IDOT) starting in 1967 and extending for a decade or more. That was, of course, before high-strength concrete existed outside of laboratories.

The results of those studies essentially led to the loss-of-prestress equations in the American Association of State Highway and Transportation Officials’ *AASHTO Bridge Specifications* (not LRFD [load and resistance factor design]) after about 1975. Several proposals were submitted to IDOT to do similar studies on much stronger concretes, but none were funded.

The paper speaks of the difference between the initial prestress forces and those measured just before transfer of the stress from the abutments to the beams. Much of the reduction in force was probably due to heating of the strands, given that the peak temperatures were about 60 °F (33 °C) higher than at tensioning. This increase would cause a stress loss of about 11 ksi (76 MPa), or about 5.5% of the initial force. There would have been some relaxation during that period, but one needs the yield stress of the strands actually used in the girders to evaluate this.

The discussion of Fig. 9 speculates about the trend reversal at about 450 days. I expect that this was mostly due to weather and climate. The bridges in the much harsher climate of central Illinois exhibited some very large seasonal changes in strains, which we attributed to much higher average relative humidity in the winter than in the summer. I sometimes viewed the bridges as very large, slowly reacting hygrometers.

I do not know the details of the AASHTO LRFD loss calculations but would observe that one is unlikely to ever develop a loss calculation method that always gives an answer that agrees with measurements in the field. There are simply too many variables, large and small. The best agreement, available only after the fact, will be with a time-step analysis using creep and shrinkage properties measured on concrete taken from the specific girders and decks in question, stored with the bridge, and then with appropriate size (volume–surface ratio) corrections. The AASHTO methods should of course be the best that they can be, and the clarifications suggested in the paper will be important to that task.

One can always take comfort in the fact that an uncertainty in the loss-of-prestress value has no discernable effect on the flexural moment capacity. The cracking moment is affected, but not the strength.

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COMMENTS?

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ERRATA

A number of errors were detected in Part 1 of “State of the Art of Precast/Prestressed Concrete Sandwich Wall Panels,” second edition, which appeared in the Spring 2011 issue of the *PCI Journal*. Rather than publish the errata, we have made the corrections and posted the corrected version on the PCI website at www.pci.org/publications/journal/archive.cfm?bv=1&season=Spring&year=2011. The corrected version is also available as a separate report. Please refer to the corrected version rather than the hard copy published in *PCI Journal*.