

9330000 Prestressing Steel

COMMENTS FROM INTERNAL/INDUSTRY REVIEW

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 Womble, Steve

Comments: (5-29-12) I have reviewed the proposed changes for Section 933 and have the following comments:

1. In the first section I would suggest that the reference to using only Lo-Lax strands be omitted. From time to time we have to repair older bridges constructed with 250 ksi S.R. strands, and in those cases our practice has been to replace/restore in kind. For example, in bridges over water all along we have to splice in some new 7-wire strand due to corrosion, and in other cases where heavy damage is done to a beam due to vehicle impact damage, we have to splice in new strand. I suppose that it could be argued that using Lo-Lax in such cases would not matter, and that may be a reasonable argument. But at least the issue ought to be discussed. This would apply to the question of 270 ksi versus 250 ksi steel as well. We should ask what would be the purpose of replacing one or two strands of original 250 ksi steel in an old beam with 270 ksi steel?
2. The title for Section 933-2 is "Bars for Post-tensioning," and this has been changed to "prestressing." It appears that the intent in this section is to replace entirely the term post-tensioned, with the term prestressed. However, there has long been a distinction between the two practices, post-tensioning versus prestressing. See the discussion below, from the web.* In fact, in a large rehab project just completed on the Skyway Bridge transition columns, we installed some solid post-tensioned bars.
3. If our Gainesville Lab staff have not reviewed these proposed changes, I suggest that Mario Paredes and Ivan Lasa be asked to review them.

***From the Web: What are the differences between prestressed, pretensioned and post-tensioned concrete?**

Prestressed concrete is concrete that has had internal stresses introduced to counteract, to the degree desired, the tensile stresses that will be imposed in service. The stress is usually imposed by tendons of individual hard-drawn wires, cables of hard-drawn wires, or bars of high strength alloy steel. Prestressing may be achieved either by pretensioning or by post-tensioning. To pretension concrete the steel is first tensioned in a frame or between anchorages external to the member. The concrete is then cast around it. After the concrete has developed sufficient strength the tension is slowly released from the frame or anchorage to transfer the stress to the concrete to which the tendons have by that time become bonded. The force is transmitted to the concrete over a certain distance from each end of a member known as the transfer length. Note that in this case there are no permanent local anchorages at the ends of the tendons, or bars.

Post-tensioned concrete is made by casting concrete that contains ducts through which tendons can be threaded. An alternative is to cast the concrete around tendons that are greased or encased in a plastic sleeve. When the concrete has sufficient strength the tendons are tensioned by means of portable jacks. The load is transmitted to the concrete through permanent anchorages embedded in the concrete at the ends of the tendons. Ducts are usually grouted later or filled with grease to protect the tendons against corrosion. In some applications the post-tensioning tendons are run alongside the concrete member. One advantage of post-tensioning is that it permits using tendons that are curved or draped. (This can be achieved in pretensioning but not so easily.) Post-tensioning can be done on the jobsite without any need of heavy temporary anchorages.

Anchorage are needed for each tendon, however, which is a significant cost item.

Response:

1. The use of 250 ksi strand as well as stress relieved strand, is no longer an industry standard for new construction. The Standard Specifications are implemented on a statewide basis and intended for use on new projects. If alternate materials are preferred on specific retrofit projects by the Districts than a Technical Special Provision or Modified Special Provision may be used. The Maintenance Office is not bound by the Standard Specifications. No change required.
2. As indicated above in the web summary, the term prestressing is more generic and broadens the use of strands, wires, and bars, to both pre-tensioning and post-tensioning applications. No change required.
3. SDO and SMO worked together to revise and develop this Specification.

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Comments: (6-19-12) Specification Section 450 references Section 933 for Steel Strands and Steel Bars. 933-5.2 and 933-5.3 states that the Engineer selects samples once per shipment at a frequency of one sample per manufacturer, per size of strand or bar, per shipment. This contradicts the Materials Manual 8.1.5.3.2.2, where Verification Inspectors get samples twice per year. This Specification should be clarified as to what sampling is required at the project site and what sampling is required at the plant.

Response: Per the State Materials Office, Standard Specifications are directed to the contractor and the acceptance of materials on the project site. For precast pre-stressed (450), the element is accepted at the project site. The verification testing of the component materials at the plant are covered in Section 450-4.2.1 and the Materials Manual. No change required.

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D4 Construction

Comments: (6-20-12) D4 Construction has the following comments 933-5 Required Tests for Reinforcing Prestressing Steel. "the Department shall be privileged to have all tests witnessed by its Inspectors." This is not revised text but suggest we consider revising to be clear as to our intent.

Response: Agree, change made.
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