



## Florida Department of Transportation

JEB BUSH  
GOVERNOR

605 Suwannee Street  
Tallahassee, FL 32399-0450

JOSE ABREU  
SECRETARY

August 19, 2005

TO: District Directors of Operations, District Directors of Production,  
District Design Engineers, District Structures and Facilities Engineers,  
District Maintenance Engineers, District Construction Engineers, District  
Structures Design Engineers, District Materials Engineers

FROM: William N. Nickas, State Structures Design Engineer *William N. Nickas*  
David Sadler, Construction Engineer *David Sadler*

COPIES: Bob Greer, Jeffrey Ger (FHWA), Sharon Holmes, Brian Blanchard,  
Henry Bollmann, Steve Plotkin, Tom Andres, Robert Robertson,  
Jerry Pfunter, Rafiq Darji, David O'Hagan, Duane Brautigam,  
Steven Nolan, Marcus Ansley, Andy Keel, Tom Malerk

SUBJECT: Temporary Design Bulletin C05-13  
DCE Memorandum No. 20-05  
Bearing Plates on Prestressed Concrete Beams

### REQUIREMENT

#### Add the following to Section 4.3.1 of the Structures Design Guidelines:

- F. Provide embedded bearing plates in the ends of all prestressed concrete beams deeper than 60". This includes Standard AASHTO Type V, VI and Florida Bulb-T beams and any project specific designs meeting this criterion.

### COMMENTARY

Bearing plates add strength to the ends of the concrete beams to resist the temporary loadings created in the bearing area by the release of prestressing forces and subsequent camber and elastic shortening.

### BACKGROUND

As prestressed concrete beams become longer and heavier, an increase in the number of vertical cracks has been observed in the bearing area of prestressed concrete beams. Release of the prestressing force from the stressing bulkheads causes the beam to simultaneously shorten elastically and camber upward. The beam's upward camber temporarily loads the beam's end regions over areas that are much smaller than during its service life (on neoprene bearings). The resulting increased bearing pressure at the ends of the beam increases the beam's frictional resistance against the sliding that is necessary to accommodate the elastic shortening of the beam. In many long beams this frictional resistance is greater than the concrete tensile strength and thus vertical cracks form in the bottom flange of the beam bearing areas.

Temporary Design Bulletin C05-13  
DCE Memorandum No. 20-05  
August 19, 2005  
Page Two

The situation is aggravated by skewing the beam ends which further reduces the end bearing areas of the beam. Due to the shape of end of the beam, additional stress concentrations are introduced at the acute corner as the beam camber.

These cracks may become maintenance issues and thus in the past have been required to be repaired by the beam supplier. The repair of these cracks adds cost and lost production time to projects. The addition of the embedded bearing plates should assist in the elimination of these type cracks.

Smaller beams have relatively larger flanges, are lighter in weight and experience less elastic shortening and thus do not typically have the same cracking issues associated with the larger beams.

#### **IMPLEMENTATION**

Effective immediately, bearing plates may be added by contractors on current projects without additional compensation. If utilized, plates must conform to the requirements of Embedded Bearing Plate A, as shown on Structures Standard Index No. S-510. Shop drawings showing the embedded bearing plates must be submitted to the EOR for approval when bearing plates are not shown in the Contract Documents.

For ongoing projects and any project let prior to July 2006, any vertical cracks less than 0.012 inches within the bearing area may be repaired as described in Section 400-21. No repair submittal is required for cracks of these widths but project records must document the repair method used. Cracks wider than 0.012 inches should be evaluated by the EOR.

The 2006 Design Standards Index Numbers 20150, 20160, 20172 and 20178, 20500 and 20501 will be revised to require embedded bearing plates be installed in all AASHTO Type V, VI, and Florida Bulb-T prestressed concrete beams. Follow the current requirements for the use of additional Beveled Bearing Plates.

Beginning with the July 2006 letting, all projects shall utilize the Interim 2006 Design Standards for Prestressed Concrete Beams.

#### **CONTACT**

David C. O'Hagan, PE  
Assistant State Structures Design Engineer  
(850) 414-4283  
david.ohagan@dot.state.fl.us

WNN/DS/TM/or