Florida Department of Transportation

RICK SCOTT
GOVERNOR

605 Suwannee Street
Tallahassee, FL 32399-0450

ANANTH PRASAD
SECRETARY

STRUCTURES DESIGN BULLETIN C11-10

DATE: September 1, 2011

TO: District Directors of Production, District Design Engineers, District Structures Design Engineers

FROM: Robert V. Robertson, P. E., State Structures Design Engineer

COPIES: Tom Andres, Charles Boyd, Dennis Golabek, Andre Pavlov, Jeffrey Ger (FHWA)

SUBJECT: Elastomeric Bearing Pad Design

REQUIREMENTS

Replace the last sentence of January 2011 ***Structures Design Guidelines***, Section 6.5.1.A with the following:

> Do not apply the 1.20 load factor in ***LRFD*** Table 3.4.1-1 to the thermal movements (TU) for elastomeric bearing pad design when using ***LRFD*** Method B to determine the total shear deformation in each direction per ***LRFD*** 14.7.5.3.2. Include the effects of Dynamic Load Allowance for Live Load.

COMMENTARY

Application of an additional 20% thermal movement, when 65% of the total thermal movement is used to determine the pad thickness using ***LRFD*** Method B, is unnecessary based on historical performance using higher effective shear strains. The 1.2 load factor for thermal movement is used for ***LRFD*** Method A designs since no additional factoring is included in this design method.

BACKGROUND

Clarification of the Load Factor and Dynamic Load Allowance for Service Limit State design has been requested by designers due to ambiguity in ***LRFD*** and its deviation from previous design practice. The previous commentary in ***LRFD*** C14.7.5.3 which stated, “Increases in the load to simulate the effect of impact are not required” was removed in the 2009 ***LRFD*** Interims when the design provisions where

revised based on NCHRP Report 596. The general statement in ***LRFD*** 14.4.1, that bearings need not account for dynamic load allowance, has been determined not to apply to the revised elastomeric bearing design provisions considering the deletion of the commentary provision and the adoption of a 1.75 amplification factor for cyclic load effects in Eq. 14.7.5.3.3-1 rather than 2.0 recommended in NCHRP Report 596.

Elastomeric Bearing Pad design resistance is based on prevention of fatigue failure under the Service Limit State load combination. Using 65% of the total thermal movement for determining the shear deformation and elastomeric layer thicknesses under Method B potentially increases the minimum pad thickness by 30% when compared to design provisions prior to the 2005 ***LRFD*** Interims. Application of an additional 20% thermal movement factor is unnecessary based on historical performance of pads designed with higher effective shear strains. The seasonal nature of the extreme thermal movement ranges do not warrant any additional factoring considering the design provisions are based on higher cycle fatigue conditions.

IMPLEMENTATION

The contents of this bulletin are considered clarifications and are effective immediately on all projects that are less than 60% complete.

CONTACT

Andre Pavlov, P.E.
Assistant State Structures Design Engineer
Florida Department of Transportation
605 Suwannee Street, MS 33
Tallahassee, FL 32399-0450
Phone (850)-414-4293
andre.pavlov@dot.state.fl.us

RVR/AVP/SJN