Florida Department of Transportation

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ANANTH PRASAD
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STRUCTURES DESIGN BULLETIN 13-04

(FHWA Approved: May 28, 2013)

DATE: May 29, 2013

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

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

COPIES: Tom Byron, Brian Blanchard, Duane Brautigam, David Sadler, Bob Crim, Charles Boyd, Jeffrey Ger (FHWA)

SUBJECT: Superstructure Continuity Requirements for Bridges Subject to Vessel Impact Forces

This bulletin modifies the Department's design policy regarding superstructure continuity for multi-span bridges subject to vessel impact forces to allow for concrete girder bridges made continuous for live load only.

REQUIREMENTS

1. Delete ***Structures Design Guidelines*** Section 2.11.7, the associated Commentary and the associated Modification for Non-Conventional Projects box and replace with the following:

   2.11.7 Channel Span Unit

   A. The length of the channel span between centerlines of piers at the navigable channel must be based upon the Coast Guard requirements, the Vessel Collision risk analysis (in conjunction with a least-cost analysis), and aesthetic considerations.

   B. When vessel traffic volume at high level fixed bridges is such that the risk analysis results in channel pier strength requirements in excess of 1,500 kips provide a channel span unit consisting of one of the following:

      1. A minimum 3-span steel continuous unit in which the channel span is not an end span of the unit.

      2. A minimum 3-span continuous post-tensioned concrete unit in which the channel span is not an end span of the unit.

      3. Prestressed beams made continuous only for live load with a minimum 3-span continuous deck slab and a single monolithic full-width continuity diaphragm at each interior pier. The channel span shall not be an end span of the continuous unit.

Commentary: For channel span units subject to high vessel impact loads, structural redundancy is required from a risk standpoint to maximize survivability of the unit in the case of a vessel collision with one of the piers.

2. Delete ***Structures Design Guidelines*** Section 4.1.7 and replace with the following:

4.1.7 Continuity of Precast Beams

A. Use only post-tensioning to splice beam segments within simple spans and/or to establish continuity between adjacent spans except as defined below.

B. For channel span units subject to vessel impact loads in excess of 1,500 kips, continuity can be established with post-tensioning or by providing precast simple span beams made continuous only for live load and meeting the following requirements:

1. Provide beams of the same type, depth and spacing for all spans within the main span unit.

2. Provide full depth continuity diaphragms monolithic with the bridge deck at all internal supports.

3. Provide bottom tension ties between beams in adjacent spans over the interior supports. Design the ties to resist camber growth due to the force effects of temperature and time dependent creep and shrinkage.

4. Design deck reinforcement in the negative moment regions to resist the force effects due to live load, superimposed dead load, creep, shrinkage and temperature.

5. Provide a deck casting sequence as follows:

a. Cast the bottom section of the diaphragms after the beams have reached a minimum age of 90 days.

b. Cast the positive moment regions of the deck after the bottom section of the continuity diaphragms have cured for a minimum of 72 hours.

c. Cast the remainder of the continuity diaphragms and the negative moment regions of the deck.

C. Simple spans made continuous for live load are not allowed for structures that are not subject to vessel impact, or the approach superstructure units of structures with channel span units that are subject to vessel impact.

BACKGROUND

In the past, bridges subject to high vessel impact forces (greater than 1,500 kips) were limited to minimum 3-span continuous steel, minimum 3-span segmental, or minimum 3-span post-tensioned spliced concrete beam bridges. This new policy allows for the addition of precast concrete simple beam bridges made continuous for live load in these situations. The restriction for requiring other structures to be discontinuous for live load assures ease of repair in case of damage.

IMPLEMENTATION

These requirements are effective immediately on all design-bid-build projects in Phase I design development (less than 30% complete). These requirements may be implemented immediately on all design-bid-build projects in Phase II, III or IV at the discretion of the District.

These requirements are effective immediately on all design build projects for which the final RFP has not been released. Design build projects that have had the final RFP released are exempt from these requirements unless otherwise directed by the District.

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