

ORIGINATION FORM

Date: 5/2/2014

Originator: Ben Goldsberry

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Specification Title: Concrete Structures

Specification Section, Article, or Subarticle Number: 400-4.4

Why does the existing language need to be changed? The current specification language does not address the issue of screed rails supported by bridge deck overhang falsework on steel I-girders during deck placement. The deck overhang falsework, which bears against steel I-girders webs during deck placement, supports the overhang formwork, wet deck concrete, screed machine and any construction loads. The steel I-girder supporting this falsework can experience excessive web plate deformations, top and bottom flange lateral bending deformations, and out-of-plane rotations, especially between cross frame bracing points. The girder deformations and rotations translate to vertical deflections of the screed rails which can result in poor bridge deck profiles, loss of structural bridge deck concrete thickness, loss of concrete cover for bridge deck reinforcing steel, and ponding of water along the toe of concrete railings. See SR 20 over the Apalachicola River for an example.

The Contractor's Specialty Engineer should be responsible to investigate the need for temporary bracing because the construction loads and deck overhang falsework geometry are only known at the time of construction. The AASHTO LRFD Bridge Design Specifications require that the effects of forces from deck overhang falsework acting on the fascia girders be considered (Article 6.10.3.4). This evaluation is mostly intended as a strength check. When designers consider these forces, the assumptions of construction loading (screed machine load, formwork, etc.) and bracket geometry are usually not listed in the plans. For conventional design-bid-build projects the designer can't possibly know or accurately predict what bracket size and spacing the contractor will use. Even in a design-build scenario the designer will not likely have the necessary information from the contractor to properly consider the need for temporary bracing during the design.

Section 400-15.2.5.5 (smoothness evaluation for long bridges) requires that a minimum of 1/4" of the deck be planed off, and allows up to 1/2" of deck planing to meet the smoothness criteria; however, it is not preferred or recommended to eat into the 1/4" of reserve thickness. A sensitivity analysis performed by the Structures Design Office shows that if bridge deck overhang falsework bears more than 6" above the bottom flange and/or the concrete deck overhang is 4 feet or greater, the deflections of the screed rail between cross frames can well exceed 1/4", with some deflections well exceeding 1/2". These deflections may or may not be correctable with grinding of the deck.

Summary of the changes: Add Subarticle 400-4.4 to require the submittal of shop drawings and calculations for bridge deck overhang falsework under certain geometric conditions.

Are these changes applicable to all Department jobs? Applicable to all bridge projects with cast-in-place concrete decks on steel I-girders.

If not, what are the restrictions?

Will these changes result in an increase or decrease in project costs? Temporary bracing, if required, will likely consist of lumber between cross framing bracing points which is considered negligible. There is an anticipated increase in the contractor's engineering costs, but this cost will be easily offset by the costs of correcting problems with the bridge deck, which have a much greater potential of occurring under the geometric conditions identified in the proposed changes. Therefore, the long term total net effect of this change is considered to be a decrease in project costs.

If yes, what is the estimated change in costs? Unknown.

With who have you discussed these changes? Dan Hurtado, State Construction Office; Robert Robertson, Tom Andres, Charles Boyd, Dennis Golabek, Vickie Abalo and Christina Freeman, State Structures Design Office.

What other offices will be impacted by these changes? None.

Are changes needed to the PPM, Design Standards, SDG, CPAM or other manual? Section 11.5 is being added to the Structures Design Guidelines for analysis requirements. It is recommended to update the Office of Construction document titled "Critical Structures Construction Issues Self Study Course" to include more detail on this particular issue.

Are all references to external publications current? Yes.

If not, what references need to be updated (please include changes in the redline)?

Is a Design Bulletin, Construction Memo, or Estimates Bulletin needed? No.

Contact the State Specifications Office for assistance in completing this form.

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ANANTH PRASAD, P.E.
SECRETARY

MEMORANDUM

DATE: May 14, 2014
TO: Specification Review Distribution List
FROM: Daniel Scheer, P.E., State Specifications Engineer
SUBJECT: Proposed Specification: 4000404 Concrete Structures.

In accordance with Specification Development Procedures, we are sending you a copy of a proposed specification change.

The changes are proposed by Ben Goldsberry of the State Structures Design Office to require the submittal of shop drawings and calculations for bridge deck overhang falsework under certain geometric conditions.

Please share this proposal with others within your responsibility. Review comments are due within four weeks and should be sent to Mail Station 75 or to my attention via e-mail at SP965DS, or daniel.scheer@dot.state.fl.us. Comments received after **June 11, 2014**, may not be considered. Your input is encouraged.

DS/ft
Attachment

CONCRETE STRUCTURES.
(REV 5-2-14)

SUBARTICLE 400-4 is expanded by the following new Subarticle:

***400-4.4 Bridge Deck Overhang Falsework for Steel I-Girders:** Locate the lower contact point of bridge deck overhang falsework supporting screed rails within 6 inches of the bottom flange. If the lower contact point of the overhang falsework bears more than 6 inches above the bottom flange and/or if the deck overhang is 4 feet or greater, submit to the Engineer shop drawings and calculations in accordance with Section 5 and Chapter 11 of the Structures Design Guidelines (SDG). The deck overhang is measured from the centerline of the girder supporting the overhang falsework to the outside edge of the concrete deck.*