Florida Department of Transportation

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September 18, 2008

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

FROM: Robert Robertson, State Structures Design Engineer

COPIES: Brian Blanchard, Lora Hollingsworth, Duane Brautigam, Timothy Lattner, Tom Malerk, David Sadler, Tom Andres, Marcus Ansley, Sam Fallaha, Larry Jones, Andre Pavlov, Jeffrey Ger (FHWA)

SUBJECT: Temporary Design Bulletin C08-05
Stay-In-Place Metal Forms for Concrete Bridge Decks

This design bulletin revises the requirements and limitations on the use of Stay-In-Place (SIP) metal forms for concrete bridge decks. These requirements and limitations are consistent with revisions to Specification Section 400-5.7 that will become effective with the January 2009 Workbook.

REQUIREMENTS (4)

1. Delete the current Structures Design Guidelines Section 2.2.C and replace it with the following two sections:

   C. Stay-in-Place Forms: Design all beam and girder superstructures (except segmental box girder superstructures) to include the weight of stay-in-place metal forms. For clear spans between beams or girders greater than 14 feet, verify the availability of non-cellular forms and include any additional dead load allowance greater than 20 psf or specify the use of cellular forms or non-cellular forms with cover sheets.

   D. See SDG 5.5 Miscellaneous Loads for common component dead loads.

2. Delete the current Structures Design Guidelines Sections 4.2.13.B, C, D and E and replace them with the following three sections:

   B. Design and detail for the use of stay-in-place metal forms for all beam and girder superstructures (except segmental box girder superstructures) in all environments.

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C. Precast, reinforced concrete, stay-in-place forms may be used for all environmental classifications; however, the bridge plans must be specifically designed, detailed and prepared for their use.

D. Composite stay-in-place forms are not permitted.

3. Delete the current Detailing Manual Examples Sheet No. EX-13, Superstructure Details (Sheet 1 of 2) and replace it with the attached revised Sheet No. EX-13.

4. Delete the current Preferred Details Sheet No. S-25, Stay-In-Place Metal Forms for Steel Girders, and Sheet No. S-26, Stay-In-Place Metal Forms for Steel Box Girders, and replace them with the attached revised Sheet Nos. S-25 and S-26, respectively.

COMMENTARY

None.

BACKGROUND

Effective with the January 2009 Workbook, per Specification Section 400-5.7, polymer laminated non-cellular SIP metal forms will be permitted for forming bridge decks of superstructures with moderately or extremely aggressive environmental classifications.

In addition, the flutes of non-cellular SIP metal forms may be filled with concrete or polystyrene foam at the contractor's option. During the design phase it cannot be determined which option the contractor will select and thus what the actual weight of the combined forms and fill material will be. Thus the 20 psf load that has been historically used for the SIP metal forms and the concrete required to fill the flutes is to be used for the design and load rating of beams and girders, calculation of the build-up dimensions for prestressed concrete beams and the calculation of camber diagrams for steel girders. The 20 psf load may be reevaluated in the future if the use of polystyrene foam to fill the form flutes becomes dominant.

A summary of the requirements of Section 400-5.7 from the January 2009 Workbook is shown in the following table.

Summary of January 2009 Workbook Section 400-5.7 requirements for the use of Polymer Sheeting and Polystyrene Foam with Cellular and Non-cellular Stay-In-Place Metal Forms			
Form Type	Superstructure Environmental Classification		
	Slightly Aggressive	Moderately Aggressive*	Extremely Aggressive*
Non-cellular with concrete filled flutes	No polymer sheeting required	Polymer sheeting required on outside**	Polymer sheeting required on outside**
Non-cellular with polystyrene foam filled flutes	Polymer sheeting required on inside	Polymer sheeting required on both sides**	Polymer sheeting required on both sides**
Cellular	No polymer sheeting required	Not permitted	Not permitted

*Moderately and Extremely Aggressive Environment classifications due to proximity to salt water.
**Polymer sheeting not required on outside of form located within box girders.
Outside = exposed or bottom side of form; Inside = top side of form
All stay-in-place forms are required to be galvanized.

Section 400-5.7 will be further revised in the future to also address non-cellular SIP metal forms with cover sheets (plates). Historically, FDOT has called this type of form a cellular form when in fact it is not.

A true cellular SIP metal form comprises a fluted sheet on the top (similar to a non-cellular SIP metal form) and a cover sheet on the bottom. The two sheets are spot welded together along the flute valleys during shop fabrication and the resulting cellular form is supplied as a complete unit. The open flutes on the top of cellular SIP metal forms get filled with concrete just as in typical non-cellular SIP metal forms. The cover sheet on the bottom of cellular SIP metal forms is considered to be an aesthetic feature.

In contrast, non-cellular SIP metal forms with cover sheets are field assembled with screws using standard non-cellular SIP metal forms on the bottom and flat cover sheets on the top. The form flutes do not get filled with concrete due to the presence of the cover sheet on the top. The bottom of non-cellular SIP metal forms with cover sheets present the same corrugated appearance as do typical non-cellular SIP metal forms, i.e. the flutes remain visible.

IMPLEMENTATION (4)

1. This requirement shall be implemented immediately on all projects that are at 30% and less.

2. For projects that allow the use of SIP metal forms let January 2009 and later, revise the SIP metal form support plan notes and details to match the attached revised Detailing Manual Examples Sheet No. EX-13 and Preferred Details Sheet Nos. S-25 and S-26.

3. Implementation of this requirement on other projects that are at 60% and later is at the District's discretion.

4. Effective January 2009, for projects that are under construction, the use of polymer laminated SIP metal forms and polystyrene filled flutes in accordance with Section 400-5.7 of the January 2009 Workbook is at the District's discretion.

CONTACT

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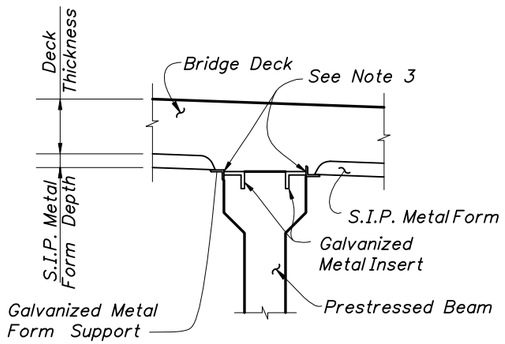
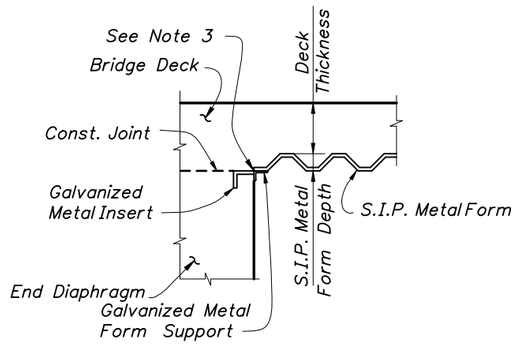
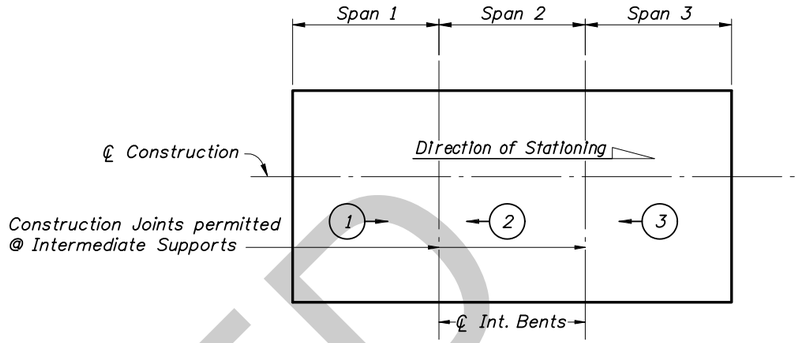


DETAIL "A"



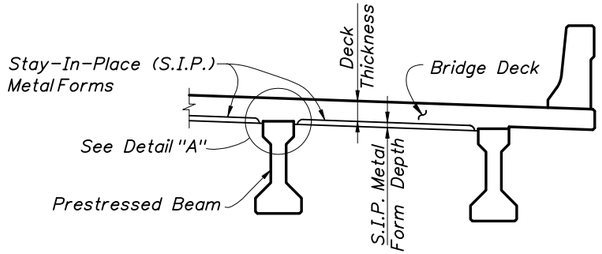
PARTIAL SECTION THRU END OF SPAN



DECK POURING SCHEDULE

(X) → Direction and sequence of deck pour

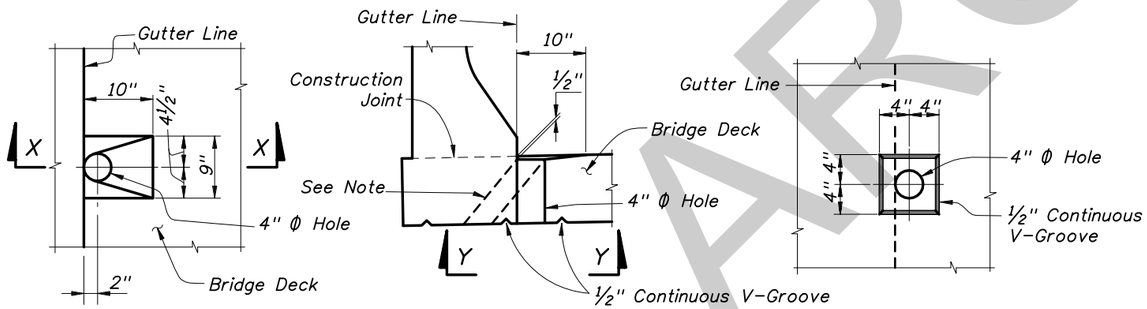
DECK POURING NOTES:
1. Place no unit adjacent to a previously placed unit which is not a minimum of 72 hours old.
2. After placement of the first unit, begin succeeding placements at the end away from and proceed toward the previously placed unit.
3. A revised casting sequence may be submitted for approval. Submit structural analysis and its effect on the Camber Diagram. Revise per Chapter 28 of the Plans Preparation Manual – Volume 1.



PARTIAL SECTION THRU SUPERSTRUCTURE

STAY-IN-PLACE METAL FORM NOTES:
1. The Superstructure Concrete Quantities shown do not include the concrete required to fill the stay-in-place metal form flutes.
2. The cost of the stay-in-place metal forms, the concrete required to fill the flutes, the metal form attachments and accessories and all miscelleneous items required to install the forms shall be included in the Contract Unit Price for the Superstructure Concrete.
3. See Section 400 of the Specifications for installation requirements for S.I.P. Forms and support components. Electrical Grounding to reinforcing steel is prohibited.

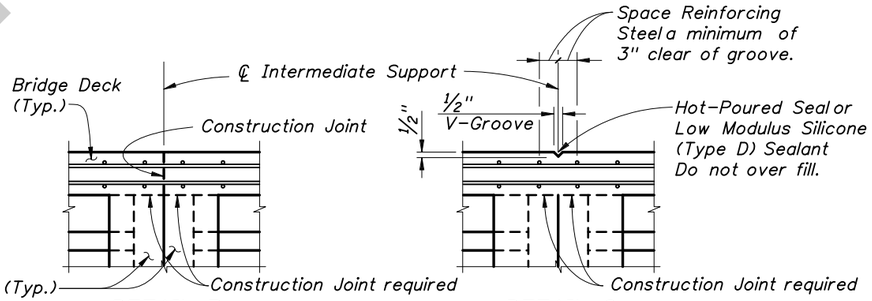
STAY-IN-PLACE METAL FORM DETAILS



PLAN | SECTION X-X | VIEW Y-Y

NOTE: 4" Ø Hole need not be plumb, however do not direct drainage onto the girder below.

SCUPPER DETAILS



DETAIL B (@ Construction Joints) | DETAIL C (@ Continuous Joints)

JOINT NOTES:
1. Use Detail B where a pour terminates at an intermediate support.
2. Use Detail C where deck pours are continuous over intermediate supports.
3. Cost of constructing Detail C shall be included in the deck concrete. Construct either a tooled groove or V-groove placed prior to the concrete obtaining initial set.
4. Low Modulus Silicone (Type D) Sealant may be used in lieu of Hot-Poured Seal in groove. Ensure groove is clean and free of grease and debris before filling the groove.

DECK CONSTRUCTION JOINT DETAILS AT INTERMEDIATE SUPPORTS

BRIDGE NO. XXXXXX

REVISIONS					
DATE	BY	DESCRIPTION	DATE	BY	DESCRIPTION

	NAMES	DATES
DRAWN BY	ABC	MO-YR
CHECKED BY	DEF	MO-YR
DESIGNED BY	GHI	MO-YR
CHECKED BY	JKL	MO-YR
APPROVED BY	MNO	

ENGINEER OF RECORD.
EOR Name, P.E.
Registration/P.E. No. 000000
Engineering Co. Name/Logo
Address
Certificate of Authorization No.

FLORIDA DEPARTMENT OF TRANSPORTATION

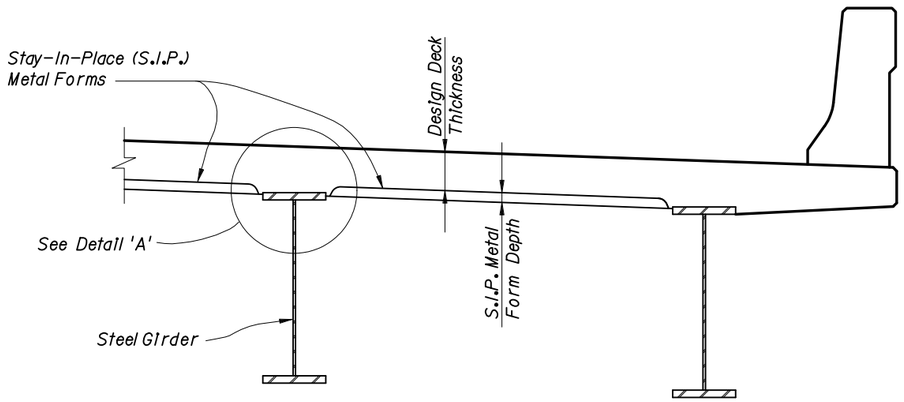
ROAD NO.	COUNTY	FINANCIAL PROJECT ID
XXX	XXXX	123456-1-52-12

SHEET TITLE.
SUPERSTRUCTURE DETAILS (SHEET 1 OF 2)

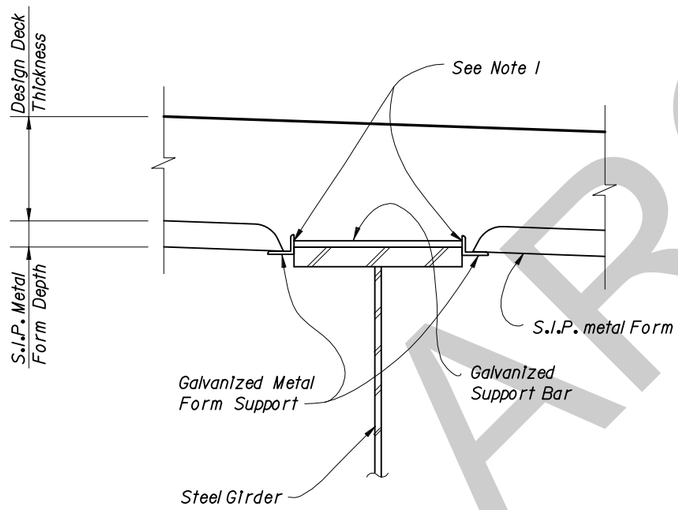
PROJECT NAME.
DETAILING MANUAL EXAMPLES

SHEET NO.
EX-13

$USER$ $DATE$ $TIME$ $FILE$



PARTIAL SECTION THRU SUPERSTRUCTURE
(Showing Typical Details and Notes for S.I.P. Metal Forms)



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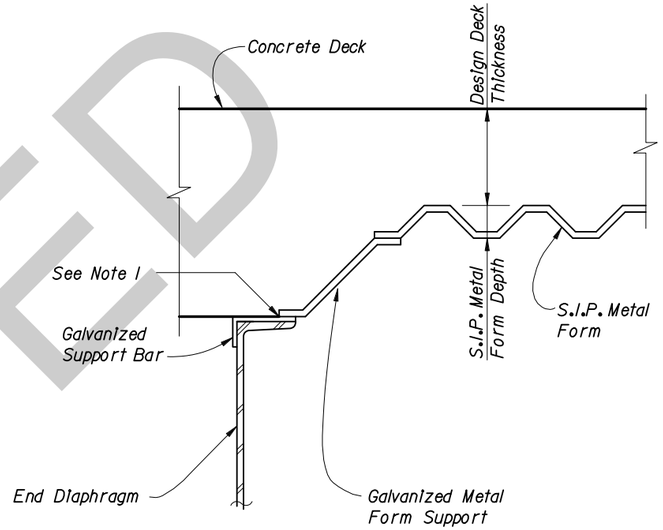


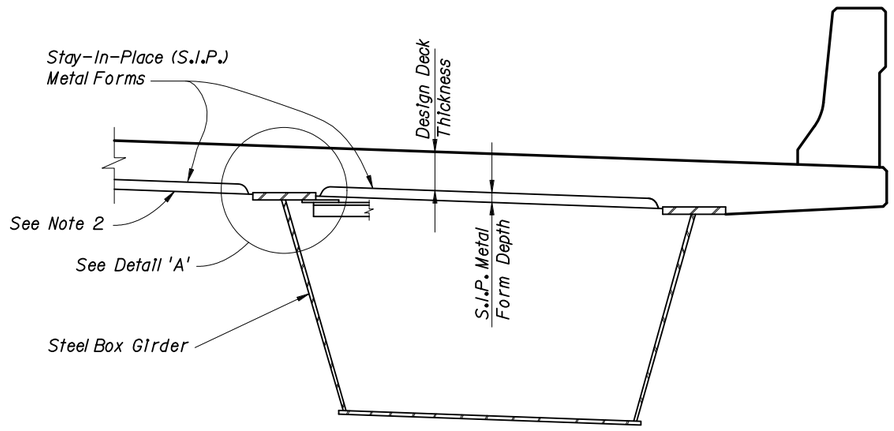
PARTIAL SECTION THRU END OF SPAN

NOTE 1: See Section 400 of the Specifications for installation requirements for S.I.P. Forms and support components. Electrical grounding to Structural Steel and Reinforcing Steel is prohibited.

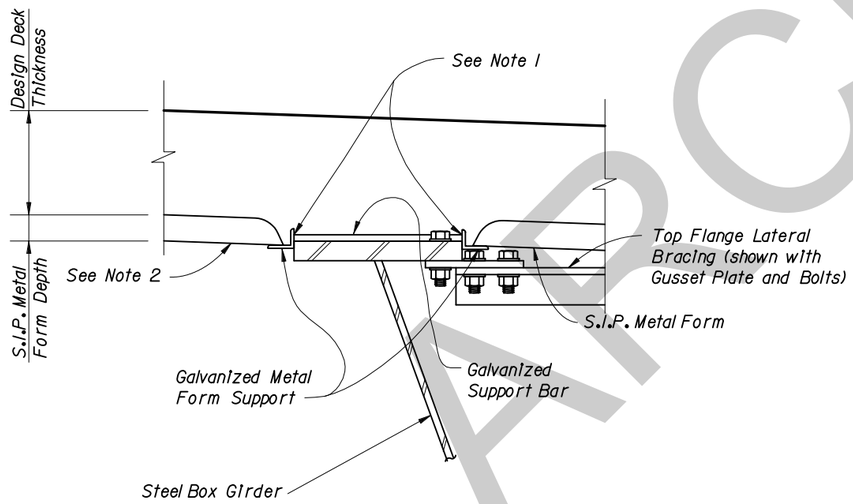
Coordinate S.I.P. forms and girder framing Shop Drawings. Ensure that S.I.P. forms will not conflict with top flange lateral bracing.

PROJECT NAME:
STAY-IN-PLACE METAL FORMS
FOR STEEL GIRDERS

SHEET NO.
S-25



PARTIAL SECTION THRU SUPERSTRUCTURE
(Showing Typical Details and Notes for S.I.P. Metal Forms)



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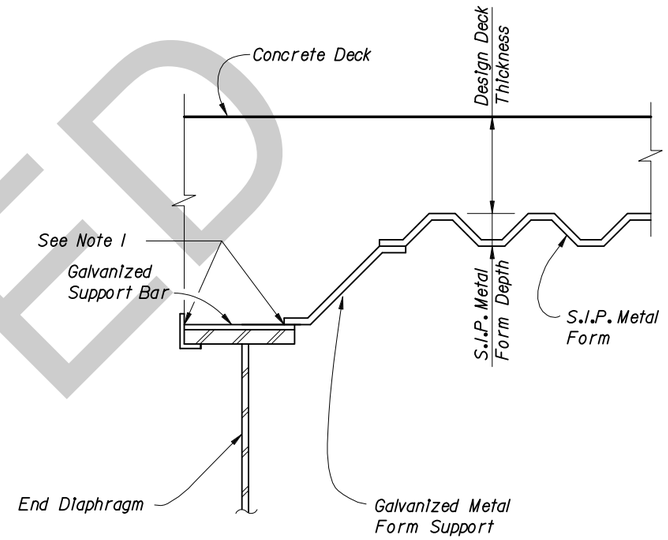

PARTIAL SECTION THRU END OF SPAN

NOTE 1: See Section 400 of the Specifications for installation requirements for S.I.P. Forms and support components. Electrical grounding to Structural Steel and Reinforcing Steel is prohibited.

NOTE 2: As required by design, either a stay-in-place corragated galvanized metal form or a smooth removable form shall be used.

Coordinate S.I.P. forms and box framing Shop Drawings. Ensure that S.I.P. forms will not conflict with top flange lateral bracing.

PROJECT NAME:
STAY-IN-PLACE METAL FORMS
FOR STEEL BOX GIRDERS

SHEET NO.
S-26