Bridge Deck Construction in Texas

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Texas Department of Transportation

April 25, 2025

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Item 422
Concrete Superstructures

1. DESCRIPTION

Construct reinforced concrete bridge slabs, decks, flat slabs, slab and girder units (pan formed), approach slabs, or other bridge superstructure elements as specified.

2. MATERIALS

2.1. **Concrete.** Provide concrete in accordance with Item 421, "Hydraulic Cement Concrete." Provide Class S or Class S (HPC) concrete for all cast-in-place concrete unless otherwise shown on the plans. Provide the class of concrete for precast components shown on the plans or in conformance with governing items.

2.2. **Reinforcing Steel.** Provide reinforcing steel in accordance with Item 440, "Reinforcement for Concrete."

2.3. **Structural Grout.** Provide grout in accordance with DMS-4675, "Cementitious Grouts and Mortars for Miscellaneous Applications," or as shown on the plans.

2.4. **Expansion Joint Material.** Provide materials in accordance with DMS-6310, "Joint Sealants and Fillers."

- Provide preformed bituminous fiber expansion joint material unless specified otherwise.
- Provide a Class 4, 5, or 7 low-modulus silicone sealant unless otherwise directed.
- Provide asphalt board that conforms to dimensions shown on the plans.
- Provide re-bonded neoprene filler that conforms to the dimensions shown on the plans.

2.5. **Foam Bedding Strips for Prestressed Concrete Panels.** Use extruded polystyrene in accordance with ASTM C578, Type VI (40-psi compressive strength) or as specified.

Provide a manufacturer's certification or data sheet stating the foam meets these requirements. Use an adhesive or bonding agent compatible with polystyrene as recommended by the polystyrene manufacturer.

2.6. **Evaporation Retardants.** Provide evaporation retardants in accordance with DMS-4650, "Hydraulic Cement Concrete Curing Materials and Evaporation Retardants."

2.7. **Curing Materials.** Provide membrane curing compounds in accordance with DMS-4650.

Provide cotton mats that consist of a filling material of cotton "bat" or "batts" (at least 12 oz. per square yard) completely covered with unsized cloth (at least 6 oz. per square yard) stitched longitudinally with continuous parallel rows of stitching spaced at less than 4 in., or tufted both longitudinally and transversely at intervals less than 3 in. Provide cotton mats that are free of tears and in good general condition. Provide a flap at least 6 in. wide consisting of two thicknesses of the covering and extending along one side of the mat.

Provide polyethylene sheeting that is at least 4 mils thick and free of visible defects. Provide opaque white sheeting when the ambient temperature during curing exceeds 90°F.

Provide burlap-polyethylene mats made from burlap impregnated on one side with a film of opaque white-pigmented polyethylene, free of visible defects. Provide laminated mats that have at least one layer of an impervious material such as polyethylene, vinyl plastic, or other acceptable material (either as a solid sheet or impregnated into another fabric) and are free of visible defects.

4. CONSTRUCTION

Obtain approval for proposed construction methods before starting work. Approval of construction methods and equipment does not relieve the Contractor's responsibility for safety or correctness of methods, adequacy of equipment, or completion of work in full accordance with the Contract. Attend the preconstruction (pre-pour) meetings for bridge slabs conducted by the Engineer. Provide and obtain approval for proposed finishing methods, interim curing methods, and final curing methods.

Ensure your pre-poor meetings are productive.

Discuss SSD and approximate timing before concrete is placed.

4.6.5. **Preparation of Surfaces**. Thoroughly wet all forms, prestressed concrete panels, T-beams, slab beams, and concrete box beams on which concrete is to be placed before placing concrete on them. Remove free water from the surface or beam lines before placing concrete. Provide surfaces that are in a moist, saturated surface-dry (SSD) condition when concrete is placed on them. Ensure the surface of the existing concrete is in an SSD condition just before placing subsequent concrete. Prewet the existing concrete by ponding water on the surface for 24 hr. before placing subsequent concrete. Use high-pressure water blasting to achieve SSD conditions 15–30 min. before placing the concrete if ponding is not possible. An SSD condition is achieved when the surface remains damp when exposed to sunlight for 15 min.

Ensure the subgrade or foundation is moist before placing concrete for bridge approach slabs.

4.1.10. **Inspection Hold-Points.** Notify the Engineer of progress of work and when work is complete before beginning the next stage of work.

- Beam erection and bracing
- Formwork, including setting of precast panels
- Placing reinforcing steel
- Screed dry run and pre-pour clear cover checks
- Attend pre-pour meeting conducted by the Engineer
- Post-curing crack inspection

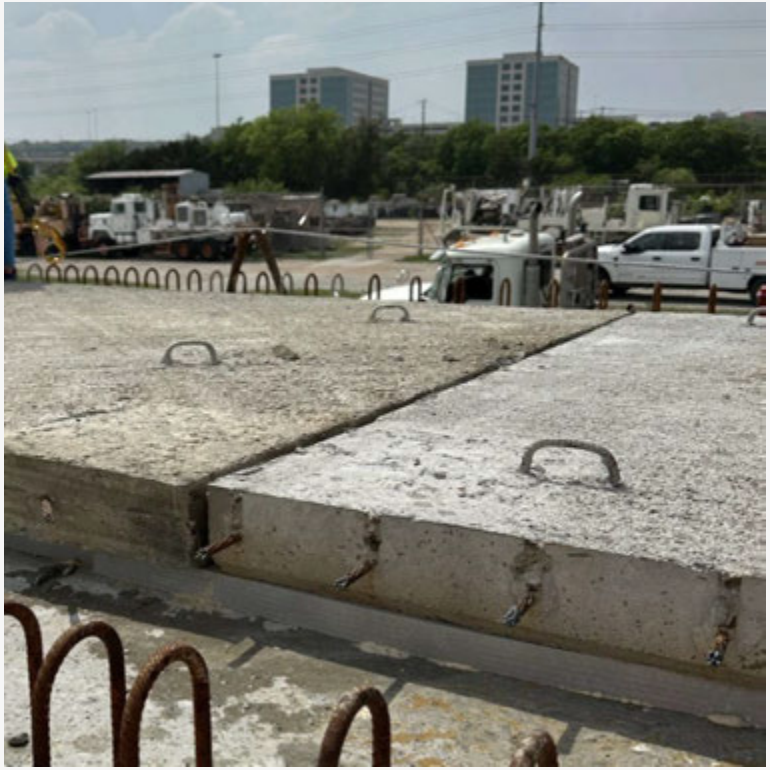
Is the curing operation completed?

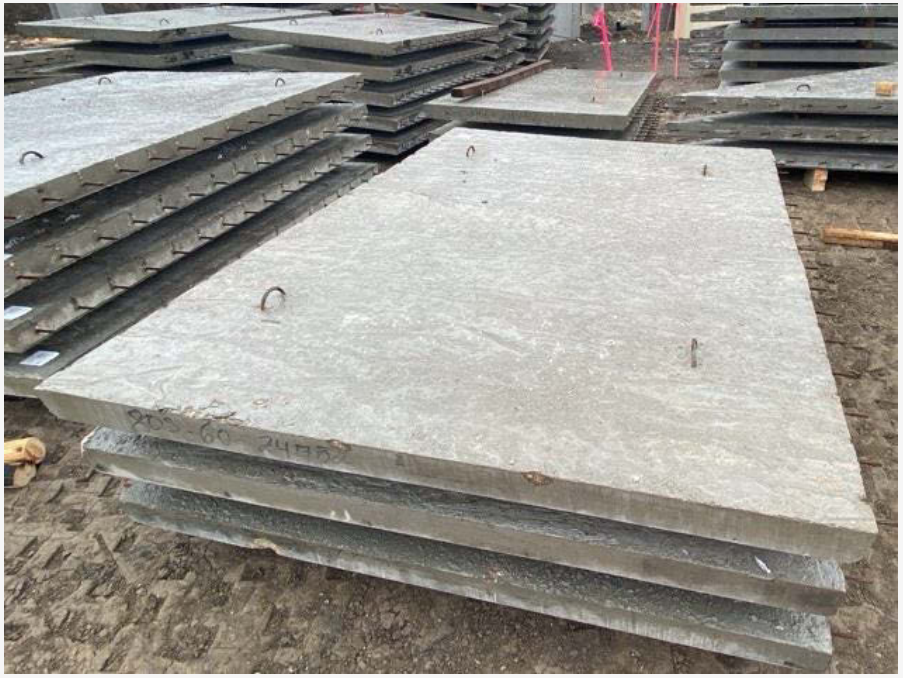
Why is it so important?

4.8. **Final Curing**. Obtain approval of the proposed curing methods, equipment, and materials at the pre-pour meeting before placing concrete. Inadequate curing or facilities may delay all concrete placements on the project until remedial action is taken. Apply final curing as soon as possible after interim curing without damaging the surface finish. Check the adequacy of the curing each day of the curing period. Take corrective action or modify the curing methods as needed to maintain a moist concrete surface.

The Engineer will inspect the deck or slab for plastic shrinkage and settlement cracking after completion of final curing and within 5 days after curing mats are removed. Seal any noted shrinkage cracks attributable to Contractor placing, curing, and finishing practices as well as transverse cracks over interior bents in continuous units using gravity feed crack repair as directed in accordance with Item 780, “Concrete Crack Repair,” at no cost to the Department.

Precast Concrete Panel Finish





Any flaking, scaling, or laitance must be removed prior to placing concrete.

Reference MTD Tech

Bulletin 7300-2 for PCP Inspection & Acceptance Evaluation

Laitance to be removed.

TXDOT Bracing Details Matter

GENERAL NOTES:

Bracing details for spans longer than 150' are not provided. The Contractor must submit proposed bracing details for such conditions to the Engineer for approval prior to erection.

Systems equal to or better than those shown may be used provided details of such systems are submitted to and approved by the Engineer prior to erection.

Use of these systems or details does not relieve the Contractor of the responsibility for the adequacy of the bracing and the safety of the structure.

Removal of bracing for short periods of time to align girders and beams is permissible.

All turn-buckles, come-alongs, anchors and other connections must be capable of developing the full strength of the cable shown.

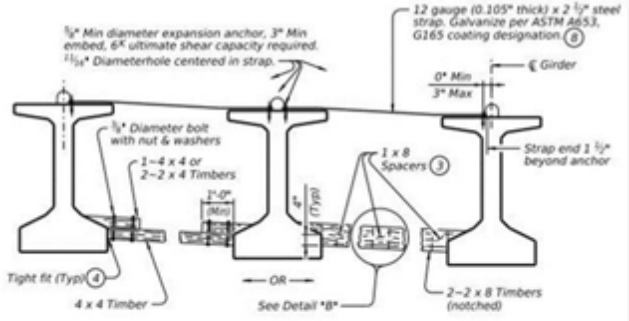
Furnish anchor bolts and nuts in accordance with Item 449, "Anchor Bolts."

ERECTION BRACING:

Erection bracing details shown are considered the minimum for fulfilling the bracing requirements of Item 425, "Precast Prestressed Concrete Structural Members."

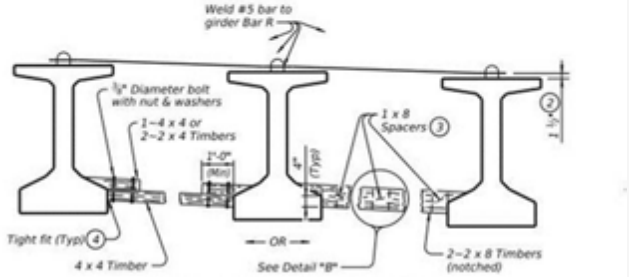
Required erection bracing must be placed immediately after erection of each girder and remain in place until additional bracing as required for slab placement is in place. This standard is needed in all cases to meet requirements for Slab Placement Bracing.

Use beam bracing as shown on the plans when overhang brackets are used on prestressed concrete beam spans with slab overhangs not exceeding 3 ft. 6 in. Provide and design additional support or bracing for the outside beams regardless of the type of beam used for spans with overhangs exceeding this amount.



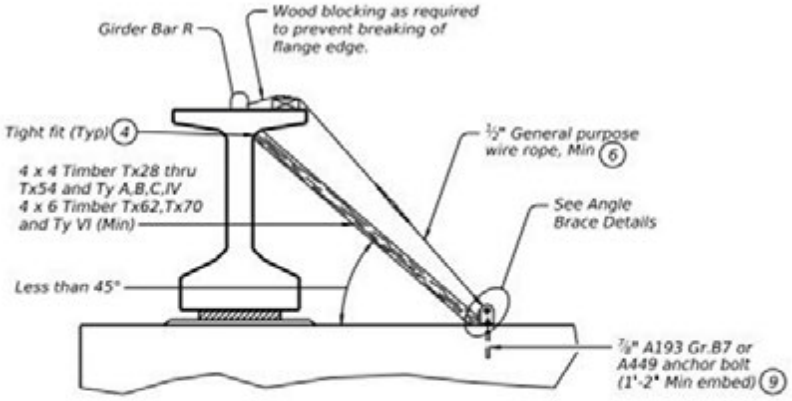
FOR ERECTION BRACING, OPTION 1

(This option is not allowed when slab is formed with PMDF or plywood.)



FOR ERECTION BRACING, OPTION 2

HORIZONTAL BRACING DETAILS 5

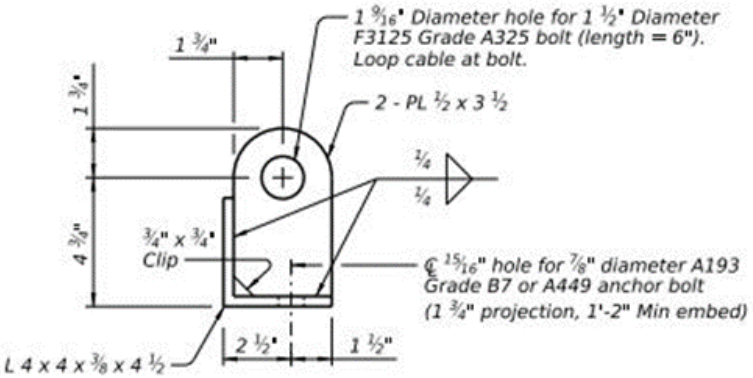


END VIEW

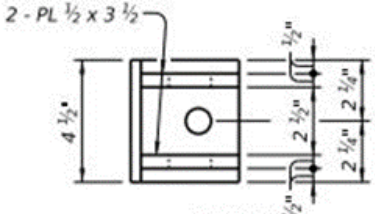
DIAGONAL BRACING DETAILS 5

(To be used on both ends of the first girder/beam erected in the span in each phase.)

9 *Anchor bolt may be drilled and epoxied in place. Provide 25k minimum pullout. Core drill hole.*

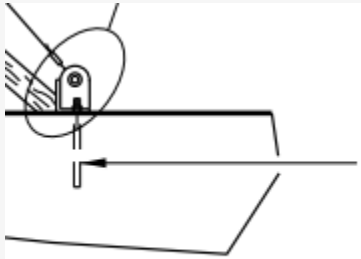


ELEVATION



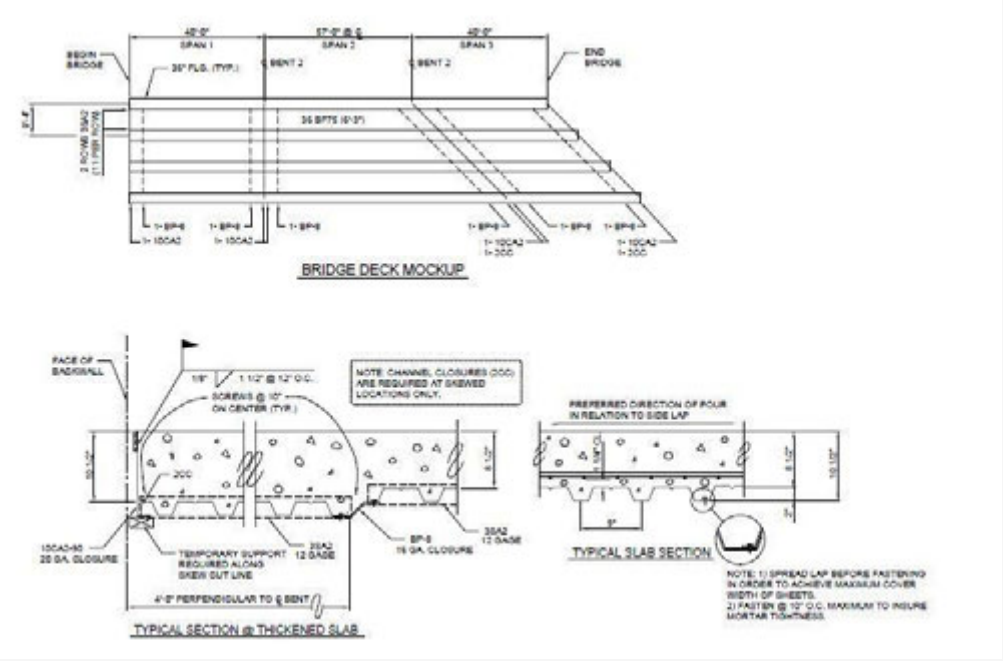
PLAN

ANGLE BRACE DETAILS



⅞" A193 Gr.B7 or A449 anchor bolt (1'-2" Min embed) (9)

(9) *Anchor bolt may be drilled and epoxied in place. Provide 25k minimum pullout. Core drill hole.*



4.2.2. **Permanent Metal Decking.** Submit signed and sealed design calculations in addition to the required formwork drawings. Design and install formwork as shown on the plans and formwork drawings. The plans will govern in cases where the plans and the formwork drawings conflict.

TXDOT Shop Drawing Review

IGEB – I Girder Elastomeric Bearings

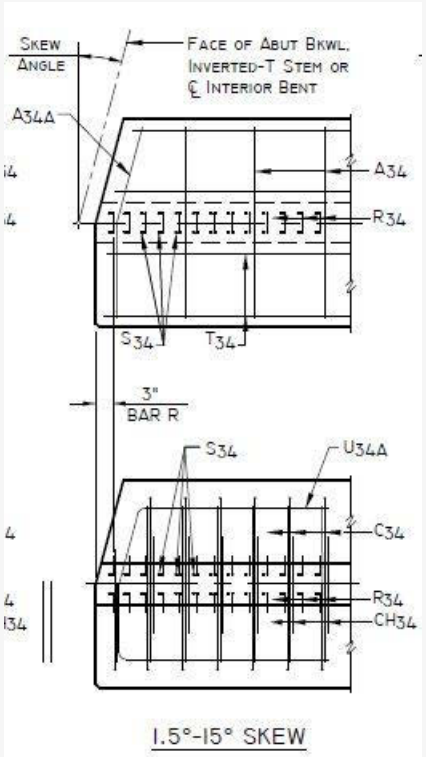
IGCS - I Girder Continuous Slab

IGMS – I Girder Miscellaneous Slab

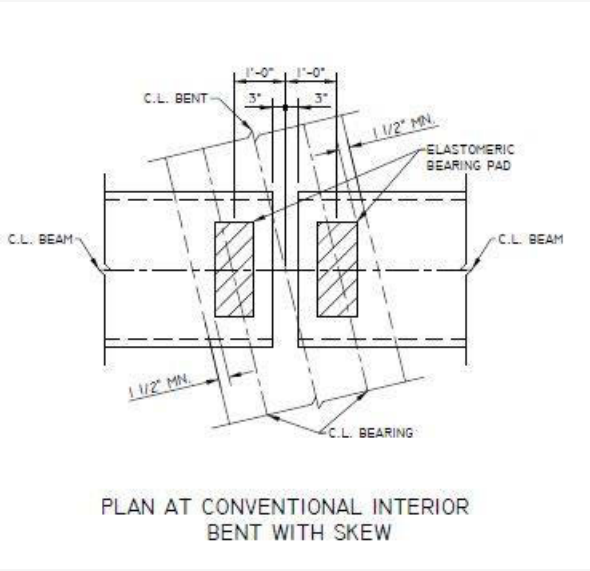
IGD – Prestressed I Girder Details

PMDF – Permanent Metal Deck Forms

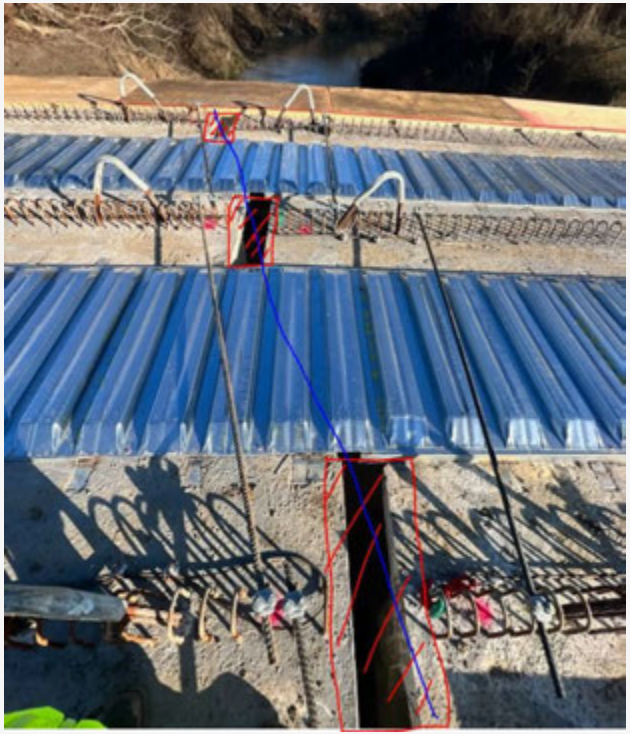
PCP – Prestressed Concrete Panels



1.5°-15° SKEW



PLAN AT CONVENTIONAL INTERIOR BENT WITH SKEW



Concrete Bridge Engineering Institute

CBEI provides multiple education opportunities for the Bridge Construction Industry.

Two Key Courses Available to date:

Bridge Deck Inspection Program

Concrete Materials for Bridges

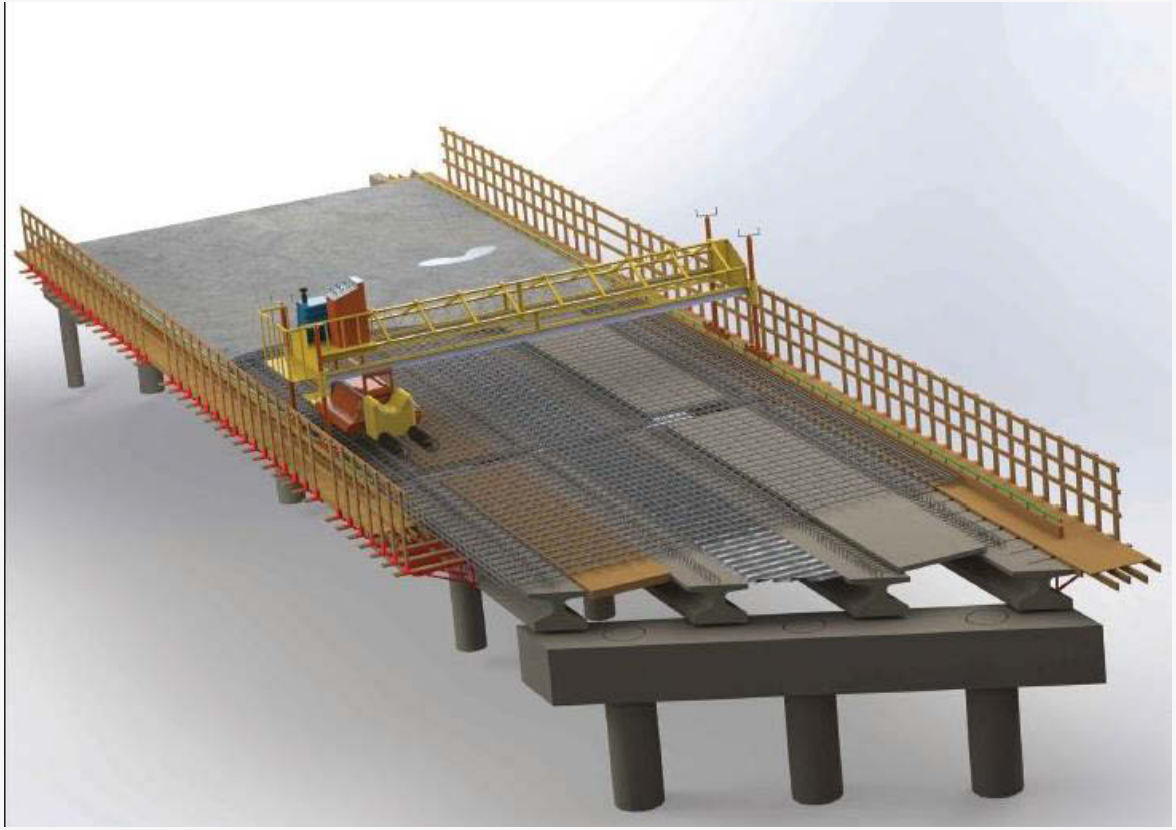
Concrete Materials for Bridges

- · Constituent materials used in concrete bridge elements
- · How to select appropriate mixture proportions
- · Supplementary Cementitious Materials (SCMs), including alternative SCMs.
- · Key durability issues that can affect various bridge components
- · Underlying causes of potential deterioration
- · How to minimize or avoid durability—related issues during the intended service life of a bridge
- · How to minimize concrete cracking, especially concrete bridge decks.
- · Current industry trends

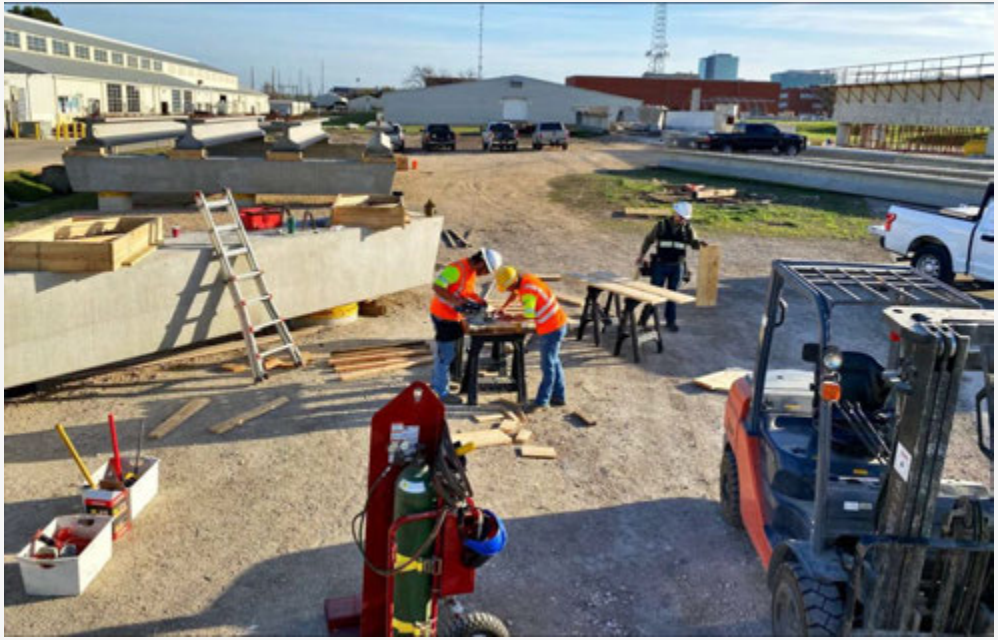
Bridge Deck Construction Inspection

- · Minimum Bracing and Forming
- · Setting Forms, Screeds, and Grading
- · Reinforcement
- · Pre-pour
- · Concrete Placement and Screed Operations
- · Finish and Cure
- · Final Inspection
- · Special Cases and Trouble Shooting

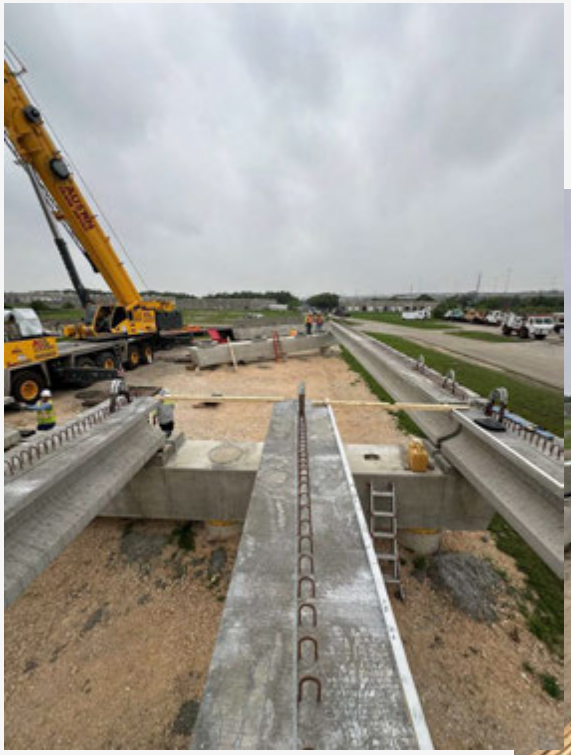
Mock Up

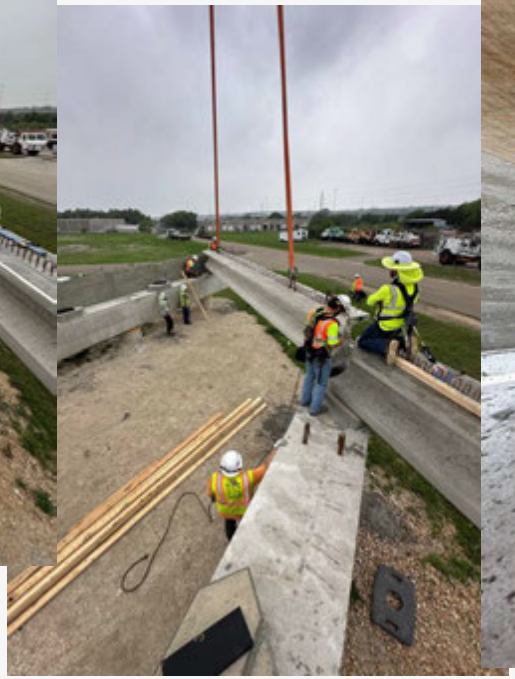


Progress Photos




SM-CAPS
C013 7 32'
PC-2 3-10-25
QA-111203





Concrete Bridge Engineering Institute

Deck Construction Inspection

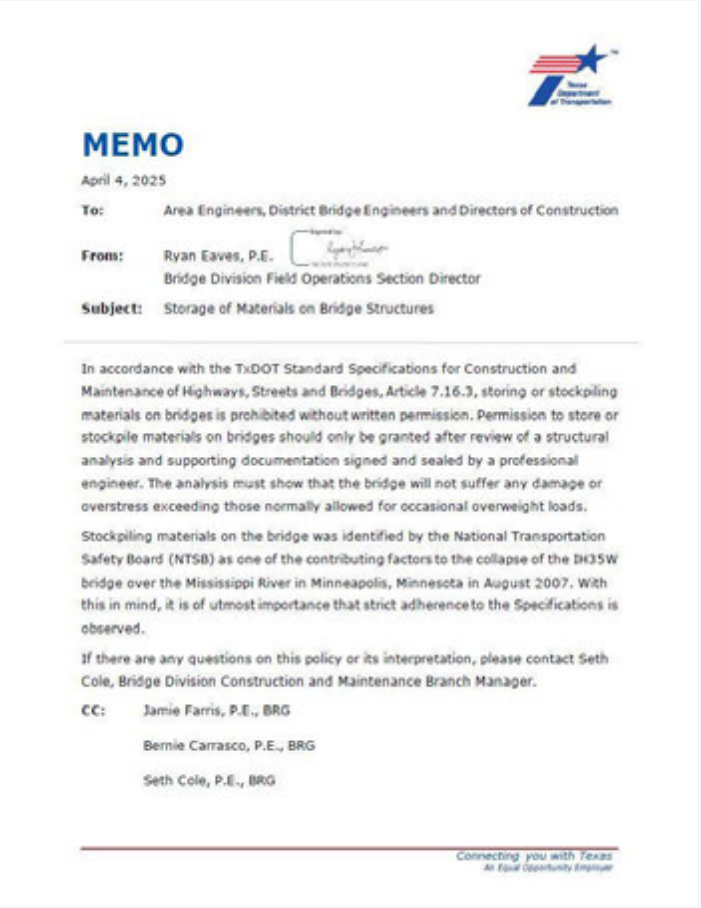
Concrete Materials for Bridges

State and Federal Partners

- Texas Department of Transportation
- Federal Highway Administration
- Iowa Department of Transportation
- Michigan Department of Transportation
- Minnesota Department of Transportation
- Georgia Department of Transportation
- Florida Department of Transportation
- Pennsylvania Department of Transportation
- Utah Department of Transportation
- Colorado Department of Transportation

State and Federal Partners - Cont

Storage of Materials



MEMO

April 4, 2025

To: Area Engineers, District Bridge Engineers and Directors of Construction

From: Ryan Eaves, P.E.
Bridge Division Field Operations Section Director

Subject: Storage of Materials on Bridge Structures

In accordance with the TxDOT Standard Specifications for Construction and Maintenance of Highways, Streets and Bridges, Article 7.16.3, storing or stockpiling materials on bridges is prohibited without written permission. Permission to store or stockpile materials on bridges should only be granted after review of a structural analysis and supporting documentation signed and sealed by a professional engineer. The analysis must show that the bridge will not suffer any damage or overstress exceeding those normally allowed for occasional overweight loads.

Stockpiling materials on the bridge was identified by the National Transportation Safety Board (NTSB) as one of the contributing factors to the collapse of the I35W bridge over the Mississippi River in Minneapolis, Minnesota in August 2007. With this in mind, it is of utmost importance that strict adherence to the Specifications is observed.

If there are any questions on this policy or its interpretation, please contact Seth Cole, Bridge Division Construction and Maintenance Branch Manager.

CC: Jamie Farris, P.E., BRG
Bernie Carrasco, P.E., BRG
Seth Cole, P.E., BRG

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Questions?

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Bridge Division – Field Operations Construction and Maintenance Branch

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