NEW CONCRETE PAVEMENT STANDARDS

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TxDOT, CSTM&P TxDOT

2014 Construction, Pavements, and Materials Conference
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1. Background

2. CRCP(1)-13 Standard

3. CRCP(2)-13 Standard

4. TA(CP)-99 Standard
Background

CRCP(1)-13, Continuously Reinforced Concrete Pavement
One Layer Steel Bar Placement, 2013 version, has two sheets and replaces:

- CRCP(1)-11, Continuously Reinforced Concrete Pavement
  One Layer Steel Bar Placement, 2011 version, and

- CRCP(1A)-12, Continuously Reinforced Concrete Pavement
  One Layer Steel Bar Placement for Low CoTE Concrete, 2012 version
**Background**

CRCP(2)-13, Continuously Reinforced Concrete Pavement Two Layer Steel Bar Placement, 2013 version, has two sheets and replaces:

- CRCP(2)-11, Continuously Reinforced Concrete Pavement Two Layer Steel Bar Placement, 2011 version, and

- CRCP(2A)-12, Continuously Reinforced Concrete Pavement Two Layer Steel Bar Placement for Low CTE Concrete, 2012 version
To: District Engineers
From: Mark A. Marek, P.E.
Director, Design Division

Subject: Revised Roadway Standards

The following changes have been made to the roadway standard sheets.

The sheets will be applicable to all new construction projects beginning with the May 2014 letting. The use of these sheets prior to that date is at the option of the district. The new standards are available from the Roadway Standards web page in Microstation® “dgn”. See http://www.dot.state.tx.us/business/standards/index.htm. Please distribute this information to the appropriate district staff and area offices, as well as consulting engineers working on TxDOT projects.

The following represents a summary of the individual sheet changes:

**CRCP(1)-13** (2 sheets), CRCP(1)-13 replaces CRCP(1)-11 and CRCP(1A)-12.

Sheet 1 of 2:
- Removed slab thicknesses of 6.0 in. and 6.5 in.
- Reorganized details on the cover.
http://www.txdot.gov/inside-txdot/division/design/cad.html

- TxDOT website – www.txdot.gov
  - Select Business
  - Scroll to Resources
    - Select Statewide Standard CAD Files
  - Click “I accept”
  - Select Roadway Standards
  - Scroll to the Pavements

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GENERAL NOTES

1. DETAILS FOR PAVEMENT WIDTH, PAVEMENT THICKNESS AND THE CROWN CROSS-SLOPE SHALL BE SHOWN ELSEWHERE IN THE PLANS. PAVEMENTS WIDER THAN 100 FT. WITHOUT A FREE LONGITUDINAL JOINT ARE NOT COVERED BY THIS STANDARD.

2. USE COARSE AGGREGATES TO PRODUCE CONCRETE WITH A COEFFICIENT OF THERMAL EXPANSION (CTE) NOT MORE THAN $5.5 \times 10^{-6}$ IN/IN/$^\circ$F.

3. ALL THE REINFORCING STEEL AND TIE BARS SHALL BE DEFORMED STEEL BARS CONFORMING TO ASTM A 615 (GRADE 60) OR ASTM A 996 (GRADE 60) OR ABOVE. STEEL BAR SIZES AND SPACINGS SHALL CONFORM TO TABLE NO. 1 AND TABLE NO. 2.

4. WHEN LOW CTE CONCRETE (NOT MORE THAN $4.0 \times 10^{-6}$ IN/IN/$^\circ$F) IS PRODUCED, TABLE NO. 1A MAY BE USED FOR LONGITUDINAL STEEL AS APPROVED BY THE ENGINEER.

5. STEEL BAR PLACEMENT TOLERANCE SHALL BE +/- 1 IN. HORIZONTALLY AND +/- 0.5 IN. VERTICALLY. CALCULATED AVERAGE BAR SPACING (CONCRETE PLACEMENT WIDTH / NUMBER OF LONGITUDINAL BARS) SHALL CONFORM TO TABLE NO. 1 OR TABLE NO. 1A.

6. PAVEMENT WIDTHS OF MORE THAN 15 FT. SHALL HAVE A LONGITUDINAL JOINT (SECTION 5.2 OR SECTION 4.21). THESE JOINTS SHALL BE LOCATED ALONG THE CURB OR THE CURB/EDGE OF THE PAVEMENT. JOINT WIDTHS SHALL BE AS CONTAINED IN THE PLANS.
### Table NO. 1 Longitudinal Steel

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<th>Regular Steel Bars</th>
<th>First Spacing at Edge or Joint</th>
<th>Additional Steel Bars at Transverse Construction Joint (Section X-X)</th>
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CRCP(1)-13, Typical Pavement Layout

CRCP(1)-13
Pavement Thickness
of 7 to 13 in.
CRCP(1)-13, Transverse Construction Joint

**Transverse Construction Joint**

**Section X - X**

- **Joint Sealing Material**
- **Transverse Bars**
- **Longitudinal Bars**
- **Additional Steel Bars**
- **L = 50 inches**
- **T/2**

No splices allowed within 10 ft of the joint.
LONGITUDINAL CONSTRUCTION JOINT
SECTION Y - Y

TIE BARS MAY BE IN SAME PLANE AS TRANSVERSE BARS

JOINT SEALING MATERIAL

50" FOR #6 BAR, 42" FOR #5 BAR

25" FOR #6 BAR
21" FOR #5 BAR

MIN. CLEAR 2"

LONGITUDINAL BARS
TRANSVERSE BARS
CRCP(1)-13, Longitudinal Contraction Joint

LONGITUDINAL CONTRACTION JOINT
SECTION Z - Z

GENERAL NOTES

7. THE SAW CUT DEPTH FOR THE LONGITUDINAL CONTRACTION JOINT (SECTION Z-Z) SHALL BE ONE THIRD OF THE SLAB THICKNESS (T/3).
Steel Continuity in Longitudinal Direction, in CRCP

- Steel continuity in longitudinal direction is important to ensuring good pavement performance.
- Continuity of longitudinal steel is achieved by overlapping individual steel bars.
- Minimum lap requirements per Item 440, Table 5.

Testing has shown:
- Stresses in one steel bar can effectively be transferred to the next steel bar
- Stresses are transferred via the surrounding concrete
Steel Continuity in Longitudinal Direction, in CRCP
CRCP(1)-13, Lap Configuration

LONGITUDINAL REINFORCING STEEL SPLICES

EDGE OF CRCP PAVEMENT OR LONGITUDINAL JOINT

12-FT WIDTH BY 2-FT LENGTH

12-FT WIDTH BY 2-FT LENGTH

STAGGER THE LAP LOCATIONS SO THAT NO MORE THAN 1/3 OF THE LONGITUDINAL STEEL IS SPLICED IN ANY GIVEN 12-FT, WIDTH AND 2-FT, LENGTH OF THE PAVEMENT. ANY OTHER LAP CONFIGURATION MEETING THIS REQUIREMENT WILL BE ALLOWED.

EXAMPLES OF LAP CONFIGURATION

PLAN VIEW (NOT TO SCALE)
CRCP(1)-13, Transverse Tie Joint Detail

Option A: Drill and Epoxy
Plan View (Not to Scale)

Option B: Breakback and Lap
Transverse Tie Joint Detail
Existing CRCP to New CRCP
ITEM 361
Completely fill tiebar hole with epoxy before inserting tiebar into hole
1. Partial depth saw cut
2. Break the concrete by lightweight Jack hammers as approved
3. Expose min. 36 in. existing bars
1. Before widening work, demonstrate that the bond strength of the epoxy-grouted tie bars meets the requirements of pull-out test specified in Item 361.
2. Space tie bars at 24" spacing. Use #6 tie bars for 8" and thicker slabs, use #5 tie bars for less than 8" thick slabs.

**Longitudinal Widening Joint Detail**
CRCP(2)-13, Typical Pavement Layout

CRCP(2)-13
Pavement Thickness
of 14 in. & 15 in.

* TIE BARS MAY BE IN SAME
  PLANE AS TRANSVERSE BARS
  L=50"

LONGITUDINAL CONSTRUCTION JOINT
SECTION Y - Y

| TABLE NO. 3 |
|------------------|------------------|------------------|
| TWO LAYER STEEL PLACEMENT |
| HEIGTH OF STEEL MATS |

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TA(CP)-99, Anchor Lug System
Research Project 0-6326

- Three terminal systems used to protect bridge structures in Texas
- Research Project 0-6326
  - Performed from 09/2008 to 08/2011
  - Investigated movement of CRCP near bridges and
  - Effectiveness of three terminal systems
- Researcher: Dr. Moon Won
- Project Director: Tomas Saenz, P.E.
El Paso - EJ
Wichita Falls - EJ
Atlanta 1 - WF
Atlanta 2 - AL
Lubbock 1 - AL
Lubbock 2 - AL
Waco - WF
Waco (PTCP)

Data Log of Measurements
- from 6 months to 3 years
- Varied by location
Annual Movement per 100°F. in.
Terminal Type
2 years after
New data, at least 0.43

EJ1: 0.96
EJ2: 0.97
WF1: 0.45
WF2: 0.26
AL1: 0.02
AL2: 0.05
AL3: 0.36
Stresses generated in soil due to slab expansion at lug walls are large enough to result in permanent deformations in soils.

Soil does not retract with lug when pavement contracts.

Permanent deformation results in voids between the soil and lug walls.
Research Project 0-6326, Findings

- Subbase friction restrains slab movements effectively

- Using rough textured subbase might be most effective tool to control slab movement

- Anchor lug system is not effective in the long run

- Simple expansion joint system or wide-flange system is effective in accommodating slab movement
TA(CP)-99 Replacement

- **TA(CP)-99 Deleted** and not replaced
- Transverse Expansion joint detail at Bridge Approaches
  - Replacement shown on sheet 2 of CRCP(1)-13 & CRCP(2)-13
- Detail adapted from Fort Worth district standard

**Transverse Expansion Joint Detail**

- 1½" Expansion Joint (See Note 12)
- Sawed Contraction Joints
- T/3 Saw Cut Depth
- Bridge Approach Slab
- Two layers 30 lb roofing felt
- HMAC (Underlayment)

**At Bridge Approach**
THANK YOU!