Recurring Issues Identified During Construction

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Pipe Pile
Or
H-Pile
Driven Piling

Desirably, full-length piles shall be used where practicable.
Common reasons why full-length piles aren’t used:

- pile depths greater than approximately 55’
- specifications allow contractor to use cut-offs
Pipe Pile
Or
H-Pile
SplICES
Pile Splices

In order for a pile splice to perform acceptably, pile splices need to be able to transfer the full pile load in compression, tension, and bending.
Pipe Pile Splice
Current Pipe Pile Splice Drawing E 701-EPIL-04

FOR ROUNDED PIPE

Weld ring spacer or chill ring

Weld shall be ground flush with exterior pile face

1/4"

45°

WELDING DETAIL
H-pile Splice

Two Methods

• Diamond Plate
• Alternate (Commercial or Mechanical) Splicer
Suggested Method for Creating a Beveled Edge

Cutting torch

L 2 x 2 Guide

Pile flange

1/8"
Pile Preparation
H-Pile Splice Diamond Plate

Restrictions on Use

• None.

• Can be used in integral and semi-integral end bents and interior bents and piers.
H-pile Splice
Alternate
(Commercial or Mechanical)
Splice
Mechanical H-Pile Splice

• Generally manufactured as a strong unit prefabricated from carefully formed structural plate and accurately spaced to the thickness of the web for each weight of H-pile.
Why Use them?

• Makes the connection quicker and safer.

Once the H-pile enters the splicer, it is held against dangerous slippage from movement of the crane or wind gusts.
Mechanical H-Pile Splice Detail

**ELEVATION**

- **Pile splicer**
  - 45°
  - 1/4" backer plate or pile splicer
  - H Pile - upper section
  - H Pile - lower section
  - Weld shall be ground flush with exterior pile face

**WELDING DETAIL**

- B-U4a
- 1/4 45° G
H-Pile Splice Alternate Splice

Restrictions on Use

• Not allowed in integral end bents.

• Not allowed within 20 ft of the ground surface unless it is proven that the splice can transfer the loads.
Common Problems
Need a Complete Joint Penetration Weld
Fill the Gap!
Mechanical splicers should fit tight.
Ends of piling shall be restored to its original cross section shape.
701 Spec Changes

Effective with September 1, 2011 lettings

701.11 Splicing Piles

Full length piles shall be placed in the leads if practical. However, if splicing is necessary, the following methods shall be used.

(a) Steel Piles

Splicing of steel piles shall be made as shown on the plans. The top of the pile to be extended shall be restored to its original cross section shape. The mating end of the other pile shall be beveled as shown on the plans. A wire brush or grinder shall be used to remove any scale, dirt, slag, or other foreign material that is detrimental to fabricating a sound weld from all surfaces to be welded. For H piles, a mechanical splice shall not be used within 20 ft of the ground surface unless it is proven that the splice can transfer the full pile strength in compression, tension, and bending. Splices for pipe piles shall be watertight. All work shall be done with approved methods and materials and by welders qualified in accordance with 711.32. If the temperature of the piles is below 50°F, both piles to be spliced shall be preheated to a minimum temperature of 70°F in the vicinity of the splice immediately prior to welding. The temperature of the piles shall be maintained at a minimum of 50°F until the welding is complete. There shall not be more than 2 splices exposed to view in each length of piling after driving is completed. A mechanical splice shall not be used in integral end bents.
701.11 (a) Preheating required if pile steel temperature is below 50 degrees.

When the steel cools too quickly, it results in a brittle weld.
Mechanically-Stabilized Earth (MSE) Retaining Walls
731.08 – Excavation for MSE Retaining Wall.
MSE Retaining Walls

- Encasement
- Structure Backfill
- Ground Reinforcement
- B Borrow
- Borrow
- Leveling Pad
- Subgrade Treatment per Geotechnical Report
- Dimension A

Subgrade Treatment per Geotechnical Report.
731.09 - Lifting Device set in Upper Edge of Each MSE Concrete Face Panel
731.09 – MSE Wall External Bracing
731.09 – MSE Wall
Ground Reinforcing
(galvanized grids were used in this installation)
MSE Retaining Walls

731.10 & 901.10(b) – Joint Covering attached to rear face of the MSE Wall Concrete Face Panels
MSE Retaining Walls

901.10(b) Joint Covering and Adhesive
• shall be either:
  • non-woven needle-punch polyester geotextile, or
  • woven monofilament polypropylene
• Attached to rear face of panels using adhesive recommended by manufacturer.
MSE Retaining Walls

731.11 – Backfill Placement

maximum loose lift thickness is 8 inches
Pouring a Bridge Deck
(Pour Sequence Requests)
Pour Sequence

Typically shown on the plans

NOTE:
POUR NUMBERS INDICATE SEQUENCE OF POURES. POUR OVER THE INTERIOR SUPPORT SHALL BE MADE LAST TO REDUCE THE EFFECT OF THE SLAB DEADLOAD IN THE NEGATIVE MOMENT AREA. POUR NO. 4 WILL INCLUDE THE DIAPHRAGM AT THE INTERIOR SUPPORT AND SHALL BE HELD TO A 10 FOOT LENGTH. END BENT DIAPHRAGMS SHALL BE Poured WITH SLAB POURES NO. 1 AND NO. 3.
Pour Sequence

Transverse Joint Blockout for Pier Diaphragm
Pour Sequence

704.04 requires that the concrete deck pour sequence and procedure be submitted for approval. This applies even if the contractor plans to follow the pour sequence shown in the plans.
Generally Contractors will request to pour the bridge deck in one continuous pour, eliminating all transverse construction joints shown on the plans.
The revised pour sequence request may be acceptable, however because each bridge is different, each request must be reviewed and approved. 

*Construction Memo 11-02 provides additional guidance.*
Revised Pour Sequence Request

It is **NOT** acceptable to approve a revised pour sequence request based solely on the contractor’s pour rate exceeding the minimum pour rate of 25 ft/h currently shown in 704.04.
On Concrete Superstructures, it is **NOT** acceptable to partially or completely fill the interior diaphragms ahead of the deck pour.
How to Dry-Run a Bridge Deck
Bridge Deck Dry Run

Purpose:

• To verify that the current rail heights for the self-propelled finishing machine will provide the required concrete clear cover.

• To verify that the required minimum bridge deck thickness is provided.
• Check to see that coping beam is not deflecting due to the weight of the finishing machine. If the beam appears to be deflecting, the contractor should be advised to install temporary lateral bracing.
Bridge Deck Dry Run

- Dry run should be performed in the same direction as the deck pour. (i.e. if the pour is going to be from Bent No. 5 to Bent No. 1, the dry run should proceed from Bent No. 5 to Bent No. 1.)
Self-Propelled Finishing Machine
Bridge Deck Dry Run

General Checks:
• Check the beginning and ending transverse closure forms and any transverse joints to see that they match the deck cross-section and that the screed skims smoothly across them.
• Also check any bulkheads to see that they match the appropriate cross section.
General Checks:

• Visually check for any low spots by sighting across and down the deck. Suggest marking any low spots on the deck form so they can be checked during the dry run.
Bridge Deck Dry Run

General Checks:

• Check reinforcement to see that it is correct and that the longitudinal & transverse bars haven’t been switched.

• Also occasionally check the spacing between the top and bottom mat or reinforcing.
Bridge Deck Dry Run

General Checks:

• Check fillets to make sure they are not excessive. If you believe they are excessive, contact the designer. It is **NOT** acceptable to just thicken the deck to compensate for low beam camber.
Bridge Deck Dry Run

Transverse - What to check:

• Clearance from the bottom of the oscillating screed roller to the uppermost reinforcing bar of the top mat of reinforcement at several points across the deck.
Clearance (concrete clear cover) from bottom of screed roller to top of top mat of reinforcement.
Bridge Deck Dry Run

Transverse - What to check:
• Overall depth from the bottom of the oscillating screed roller to the upper corrugation on a permanent metal deck form or to the deck formwork.
Overall bridge deck thickness from the bottom of screed roller to the upper corrugation.
Bridge Deck Dry Run

Transverse Check Frequency:

• Check the deck depth on both sides of the beams, but not on top of the beams.

• Also always check the coping depth to ensure it matches the plans.
Bridge Deck Dry Run

Transverse Check Frequency:

[Diagram showing bridge deck with BULB-TEE TYPICAL SECTION and arrows indicating check frequency points.]
Bridge Deck Dry Run

Transverse Check Frequency:

MODIFIED BULB-TEE
TYPICAL SECTION
Bridge Deck Dry Run

Transverse Check Frequency:

I-BEAM
TYPICAL SECTION
Bridge Deck Dry Run

Transverse Check Frequency:

STEEL GIRDER
TYPICAL SECTION

Structure
Longitudinal Check Frequency:
• Recommend every 10 ft or at the tenth points along each span, whichever is greater.
• If measurement results are consistently good, then PE/S can choose to increase the longitudinal check spacing.
Curing a Bridge Deck
Bridge Deck Curing

• Must be *WET* cured continuously for 168 hours (704.06 & 702.22).
• Membrane forming curing compounds are **NOT** allowed in lieu of wet curing.
• The air in the protective enclosure must be maintained at 50° F for a minimum of 144 hours. This is regardless of beam breaks. (702.11)
Bridge Deck Curing

• Cannot uncover the coping and outer edge to place bridge rail or sidewalk formwork because the deck is exposed and drying out which is not in accordance with 702.22, WET cured continuously for 168 hours.
Bridge Deck Curing
Bridge Deck Curing
Submittals and Contract Requirements

• Schedules
• Pavements
• Structures
• Maintenance of Traffic
• Environmental
• Contract Closeout
Schedules

• **108.04 Prosecution of the Work**
  • 60 Calendar Days (NTP to CCD)
  • Bar Graph Type Schedule
  • **DO NOT START** without a schedule

• **Items Shown on Schedule**
  • All Major and Critical Activities
  • Order, Duration and Calendar Time
  • Entire Contract Time Frame
  • Review Activities shown as Critical
Schedules

• Important to Both Parties
  • Inefficiencies
  • Unforeseen Delays

• 108.08 Det. and Ext. of Contract Time
  • Weekly Reports Furnished
  • Contractor has 1 Week to Respond

• 105.16 Notice of Changed Condition and Claims
HMA Pavements

- HMA Pavements (401, 402 and 410)
  - DMF’s and JMF’s (DTE)
    - Mixture Adjustment Factor (MAF)
    - Lay Rates
  - ITM 803 Contractor’s QCP
    - 15 Days Prior to Operations
    - Certified HMA Field Supervisor
    - Contractors Entire Operation
  - PG Binder Index
Portland Cement Concrete Pavement

- PCCP (501, 502, 506 and 605)
  - CMDS and CMDP
    - District Testing Engineer (DTE) or PE/PS
    - Trial Batches
    - Talk to all Parties
  - ITM 803 Contractor QCP (501 Only)
    - 15 Days Prior to Operations
    - Certified PCCP Field Supervisor
    - Contractors Entire Operation
Structures

• Structural Concrete
• Shop and Falsework Drawings
• Painting Bridge Steel
Structural Concrete

• Concrete Mix Designs (PE/PS)
• 702.02 Classes of Concrete
• 702.03 Materials
• 702.05 Proportioning
• 702.07 Mixing
• 702.12 Consistency
• Other 702 References
Classes of Concrete and Materials

• Classes of Concrete and W/C Ratio
• Approved List (INDOT Website)
  • Cement – Cement Sources
  • Aggregates – Cert Agg. Producers
  • Admixtures – PCC Admix and Admix Sys.
  • Fly Ash – Pozzolan Sources
Proportioning

- **Cement Reduction / Fly Ash Ratio**
  - 20% Reduction
  - 1.25:1 Ash to Cement Replacement
  - April 1 to October 15 (Same Calendar Year)
  - Trial Batch Requirements

- **Fine Aggregate**
  - 35% to 45%
  - 50% for Slag Coarse Aggregate
Proportioning

- **Class C Concrete, Admixtures**
  - Air Entrainment
  - Requires one of the following:
    - Type A WRA (Both Temps below 65 Degrees)
    - Type D WRRA (Either Temp above 65 Degrees)
  - Dosage Rates (oz/cwt)
Mixing and Consistency

- **Admixtures - Class A and B Concrete**
  - Air Entraining
  - Type A or D Allowed
  - Type B, C or E Permission Only
  - Dosage Rates (oz/cwt)

- **Slump**
  - 1” to 4” (Point of Placement)
  - WRA and WRRA are to reduce water and not increase the slump.
Other 702 References

• 602 Concrete Barrier
• 604 Sidewalks
• 607 Paved Side Ditch
• 609 Bridge Approach
• 614 Concrete Header
Shop Drawings and Falsework Reviews

• INDOT Construction Memo 11-02
  • INDOT
  • LPA
• Standard Spec / Standard Draw
Painting Bridge Steel

• **Quality Control Plan**
  • Standard Specification 619
  • ITM 803, Sections 1-4 and 8
  • GIFE Checklist, Section 5.24.12
QCP, Painting Bridge Steel

• Where to Start?
  • ITM 803, Sections 1-4 and 8

• What you should be looking at?
  • GIFE Section 5.24.12
  • 34 Item Checklist
  • Cross Reference with SS for Additional Requirements
QCP, Painting Bridge Steel

• Sampling Proc. for Waste Residue
  • GIFE 5.24.7.1
  • When to take samples?
  • Who takes samples?
  • What to sample?
  • Size of sample?
  • What do you do with samples?
QCP, Painting Bridge Steel

- Sampling Proc. for Waste Residue
  - Sample results and additional actions

  - http://www.in.gov/idem/5029.htm

  - https://www.epa.gov/osw/inforesources/data/form8700/forms.htm
Maintenance of Traffic

• CWTS and ATSSA Requirements
• Weekly S&B Reports
• TWSLA
• MOT Changes
• Periodic Reviews
CWTS and ATSSA Requirements

- Construction Memo 08-13
- Standard Specification 801.03
Weekly Sign and Barricade Report

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* If device is not O.K., describe deficiency under Remarks.

Date Corrective Action Taken: ___________________________ Report Prepared By: ___________________________, Title: ___________________________
# Weekly Report of Temporary Worksite Speed Limit Assembly (TWSLA)

**District**

**Contract**

**Location**

**Contractor**

**Name of CWTS**

**Temporary Speed Limit**

** mph**

**Reporting From Date**

**To Date**

**Page**

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<th>TWSLA OFF</th>
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Report is to be completed weekly and submitted by the Contractor’s Certified Worksite Traffic Supervisor (CWTS) to the Engineer. Reporting is not required for signs that are not in operation during the reporting period. Reporting of the Advance Warning Sign Assemblies is not required. Reference post number must be used to define location of sign. Attach additional sheets as needed.

**cc:** District Traffic

Contract File
MOT Changes and Periodic Reviews

• MOT Changes
  • What constitutes a MOT change?
  • Must be Submitted for Review

• Periodic Reviews
  • Central Office
  • District Office
Environmental

• Erosion and Sediment Control Reports
• Permits

• Borrow and Disposal Areas.
  • 203.08 Borrow or Disposal
  • Construction Memo 08-05
Contract Closeout

- Pre-Final Packet
- Close Out Status
- CR-2’s and Custody Sheet
- FCR
Pre-Final Packet

- IC 639 Worksheet
- IC 686 Auth to Remove Signs
- Plan Evaluation
- Last Daily and Weekly
- IC 642 Comparison of Estimates
- CR-2’s
- Weekly FCR Update
Close Out Status

• When are documents due?
  • Report has empty blocks
  • Report has Target and Actual Dates
  • PE/PS to base dates on LDW
CR-2’s and Custody Sheet

• **Details, Details, Details**
  - Contractor did a good job?
  - Contractor did a bad job?
  - Dailies
  - Meeting Minutes
  - Specification References
  - Photographs

• **Custody Sheet**
  - Includes all contractors
  - Should be signed by Prime and PE/PS
Final Construction Record

• Starts at the Pre-Con if not Before!!
  • Based on Dailies or Field Book Entries
  • Measurements, Calculations, Stations
  • Don’t Build FCR off of Estimates
  • Poor Daily Documentation = Poor FCR
  • Everything is Justified

• Summary Sheets
• Referencing
• Check and Submit
QUESTIONS