Accelerated Bridge Construction in Illinois

Illinois Tollway – ABC Workshop

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March 6, 2017
Presentation Outline

• Float-in Truss
• Adjacent Box Beam Structures
• Partial Depth Deck Panels
• Full Depth Deck Panels
• Prefabricated Concrete Pier Caps
• SPMT Bridge Moves
  – Wells St., Torrence Ave., Bloomingdale Trail, One Other One???
• Bridge Slide-Ins
  – District 8 – near St. Louis
  – District 3 – near Kankakee
EDC-2 Innovations (2013-2014)

3D Engineered Models for Construction
Using 3D engineered models allows for faster, more accurate and more efficient planning and construction of transportation projects. EDC-2 encouraged a transition from traditional two-dimensional design to 3D modeling as a strategy for shortening project delivery and improving quality and safety on the construction site.

Accelerated Bridge Construction (ABC)
Accelerated bridge construction enables highway agencies to replace bridges in hours and reduce planning and construction efforts by years, reducing traffic delays and potentially lowering project costs. EDC-2 promoted three ABC technologies:

- Geosynthetic Reinforced Soil-Integrated Bridge System (GRS-IBS)
- Prefabricated Bridge Elements and Systems (PBES)
- Slide-In Bridge Construction (SIBC)

Alternative Technical Concepts (ATC)
The use of alternative technical concepts gives contractors the opportunity to propose innovative, cost-effective solutions that are equal to or better than the contracting agency’s
1993 – Every Day Didn’t Count

But Illinois was already busy !!!
1993

Truss over the Cal-Sag
Adjacent Box Beams

Can be considered ABC
Adjacent Box Beam Structures

Locals can build entire structure in 5 weeks
PPC DECK BEAM BRIDGES

HISTORY

MID 1960’s - BEGAN USING ON STATE ROUTES
PPC DECK BEAM BRIDGES
HISTORY

LATE 1970’s – CURTAILED USE ON STATE ROUTES

Heavy usage on the local system –”bread and butter” bridge of Illinois
1988 – NOTED WATER INFILTRATING BEAMS
PPC DECK BEAM BRIDGES

DETERIORATION
Partial Depth Deck Panels
Full Depth Deck Panels
Full Depth Deck Panels

- Illinois has 4 in the inventory (that we know of)
  - Excluding cable stayed bridge
    - Two on IL Route 29 – D6
    - One in Greene County – D8
    - One in Chicago area – Peoria St.

- Three built in 2000 – 17 yrs old
  - Peoria St – 2 years old
Route 29 Full Depth Deck Panels

Year Built: 2000
General Observations

• Looks very good for 12 year old deck
• No evidence of leakage anywhere
• Overlay performing well
• Precast parapets somewhat misaligned from construction, but performing fine
• A few panels had tight, hairline cracks running longitudinally along the length of the bridge (the few that had cracks there were two to four cracks) – doesn’t appear detrimental
The only joint leakage we could find – maybe from original construction?
The only leaching crack on the bridge
Greene County Structure
Greene County – Full Depth Deck Panels
Closure Pour for Microsilica Overlay?
Not sure why?
Peoria Street – Circle Interchange

- Full depth deck panels
- UPHC connections
- Pedestrian Bridge
- Latex Overlay
- Construction Season - 2015

- Goal: Try full depth panels and UHPC as a guinea pig project for Illinois

- NOTE: Not for purposes of ABC this time
Sikadur® 32, Hi-Mod
modulus, high strength, epoxy bonding/grouting adhesive

LIMITATIONS
- Use only for strength applications exterior concrete slabs. Consult Technical Service.
- Use only for strength applications exterior concrete slabs. Consult Technical Service.
- Shelf life: 12 months from date of manufacture. Keep container tightly closed. Consult Material Safety Data Sheet for more information.

CHEMICAL INGREDIENTS
- Silica, quartz: 14859-86-7
- Calcium carbonate: 471-85-0
- 2,6-Dimethylaminomethylphenol: 90-72-2

Trade Secret: NUTRIS Coatings
- 2,4,6-Tris(dimethylaminomethyl)phenol: 90-72-2
- 2,4,6-Tris(dimethylaminomethyl)phenol: 90-72-2
- 2,4,6-Tris(dimethylaminomethyl)phenol: 90-72-2
- 2,4,6-Tris(dimethylaminomethyl)phenol: 90-72-2
- 2,4,6-Tris(dimethylaminomethyl)phenol: 90-72-2

BATCH #: 3001259650

KEEP OUT OF REACH OF CHILDREN
NOT FOR INTERNAL CONSUMPTION
FOR INDUSTRIAL USE ONLY
KEEP CONTAINER TIGHTLY CLOSED
CONSULT MATERIAL SAFETY DATA SHEET FOR MORE INFORMATION

LIMITED LIABILITY:
- The information in this document is based on research and testing at the time it was written.
- No warranty is provided for the products or their use. Use of the products is subject to the information contained in this document.
- The user is responsible for assessing the suitability of the products for the intended use and for ensuring that all safety measures are followed.
- No liability is assumed for any injury or damage resulting from the use of the products.

Consult the Material Safety Data Sheet for complete information and safety precautions.
Prefabricated Concrete Pier Caps
8 Similar Pier Caps
Estimated Time Savings = 4-6 weeks

District is extremely interested in continuing this technology in the future
Bridge Slide-ins
Illinois’ First Attempt – US 40 over Shoal Creek

11/04/16 Letting
SECTION THRU BRIDGE PRIOR TO SLIDE-IN

Looking west at west abutment. East abutment at far right.
Lateral Slide Br Superstructure

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Bid Item is 15.2% of total contract
Work to Date

• 21 Day Closure Allowed

• Nothing Yet

• You’re probably invited if you want to see the slide-in later in the year
Illinois’ Second Attempt at SIBC

- Illinois 115 over Gar Creek
- Kankakee County
- March 2017 Letting – Last Friday
STATE OF ILLINOIS
DEPARTMENT OF TRANSPORTATION

PROPOSED
HIGHWAY PLANS

FAU 6188 (IL 115)
SECTION (39C) 1-BR
PROJECT ACM-6188(003)
BRIDGE REPLACEMENT
OVER GAR CREEK
KANKAKEE COUNTY
C-93-003-16

NO ARDS, SEE SHEET NO. 2

1. AND REPLACE THE SUPERSTRUCTURE BRIDGE WITH A SINGLE SPAN STEEL DECK. THE BRIDGE WILL BE REPLACED IN ALL FOUR LANE LANE AND PROJECTS. THE RAMPWAY ADJUSTMENT TO ACCELERATE THE ADJUSTMENT WILL BE REPLACED IN THE ADJUSTMENT OF DITCHES. TRAFFIC WILL BE DEMONSTRATED FOR THE BRIDGE. ACCELERATED BRIDGE ADJUSTMENT TO LIMIT THE ROAD CLOSURE PERIOD.

PROJECT BEGINS
STA. 315 + 00.00

PROJECT ENDS
STA. 314 + 00.00

STA. 315 + 00.00
REMOVE & REPLACE SINGLE SPAN BRIDGE
STA. NO. 644-0117 (6WIP)

STA. 314 + 00.00
PROJECT BEGINNIN

LOCATION MAP
NOT TO SCALE

RANGE 34W-2d P.M.

STATE OF ILLINOIS
DEPARTMENT OF TRANSPORTATION

SUBMITTED December 9, 2019

Kevin Meade
Director of Planning
Traffic Barrier Terminal
Type 6 (Sta 637.03H[Typ] to Sta 637.07H[Typ], 92'-0"
W36 (Composite Full Length)
E.W.S.E, El. 608.67

D.N.W., El. 636.90

Steel H-Piles, Typ.

溪床 El. 607.0

ELEVATION

Proposed R.O.W.

Stone Riprap Class A4

Stone Riprap Class A3

Typical @ N. Corners

See roadway Plans

Existing roadway to remain

Existent 42" Culvert with Flap Gate to remain

Existing roadway to remain

Existing roadway to remain

E. Bridge Sta. 317+85.00, El. 623.65

Aerial line to be relocated

Aerial line to be relocated by others

Temporary sliding platform for Superstructure prior to final placement (Typ.)

Existing roadway with Flap Gate to be removed and replaced,
See Roadway Plans

0.60'-0" Approach Slab typ.

Point of mini vert. cl.

B2'-0"

Bk. to Bk. of Abutment

Existing R.O.W.

Bk./ N. Abut.
Sta. 318+09.00
El. 623.65

E. Bridge Sta. 317+68.00,
El. 623.65

0.60'-0"

Point of mini vert. cl.

Aerial to be relocated by others

Gas line to be relocated by others

Temporary sliding platform for Superstructure prior to final placement (Typ.)

Existing roadway with Flap Gate to be removed and replaced,
See Roadway Plans

12-0'

Bk. to Bk. of Abutment

Elev. 615.85

22'-0"

Elev. 615.85

0.60'-0"
BRIDGE PLAN VIEW AT CONSTRUCTION POSITION

- 54'-7" to 54'-11"
- 3'-6" Min. Embedment
- 2'-11" E. Span, 5'-9" W. Span

Notes:
1. Jacking Device location for the 39'-2" Bridge Abutment.
2. Section A-A & B-B see sheets.

* 315x15.3 Roller Channel will not be attached to beam to allow realignment as needed during rolling.
Distance of lateral move = 41’1”
Spec Requirements

• 72 Hour - Road Closure
  – Can occur anytime between 6/15/17 and 10/31/17
  – Penalty: $2,000 per hour past 72 hours

• Prefabricated Elements
  – Abutment Pile Caps
  – Abutment Wing Walls
  – Full Depth Bridge Approach Slabs
SPMT Bridge Moves
In Illinois

• Wells Street Bridge
• Torrence Ave Bridge
• Bloomingdale Trail Bridge
Wells Street Bridge, Chicago - 2002

111-ft long, 25-ft high, 425-ton truss span installed over a weekend.
Torrence Avenue Bridge Move

- August 25, 2012 – Saturday
- About 6-7 hours to move into place
Boomingdale Trail

- Took Unused RR bridge from Ashland Ave.
- Moved it to yard to rehab/paint
- Moved it to Western Ave. for Relocation

- 200,000 lbs – bridge weight
- 70 feet long
- Old RR Thru girder bridge
22 Days Later

1.5 Mile Bridge Walk
Questions???