



U.S. Department of Transportation
Federal Highway Administration

SLIDE IN BRIDGE CONSTRUCTION (SIBC) FROM THE ENGINEER/DESIGNER PERSPECTIVE

January 28, 2014; 10:00am MST

SIBC Webinars



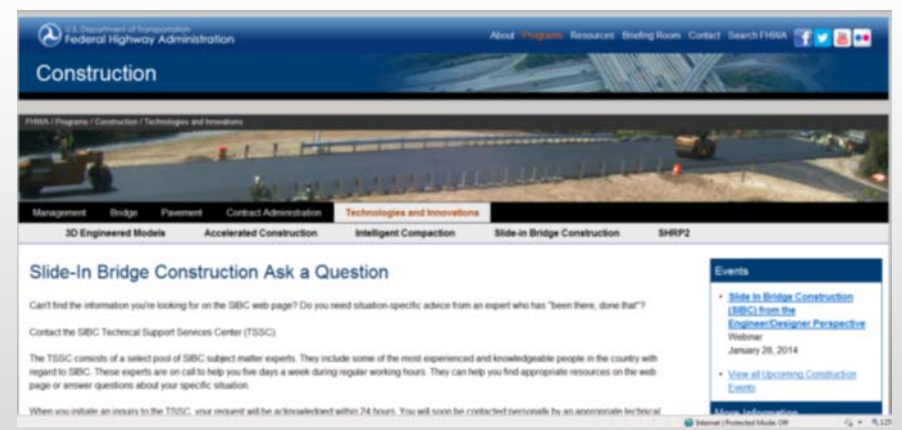
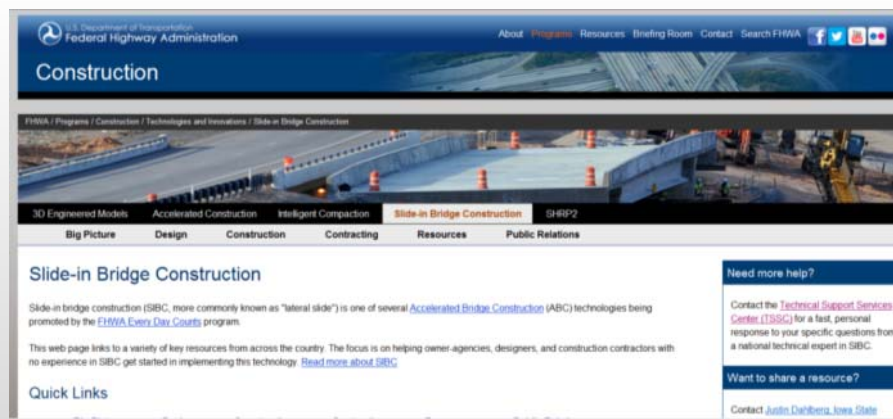
- Owner/Policy Maker Perspective
 - November 2013 (complete)
 - 2nd session scheduled later in year
- Engineer/Designer Perspective
 - January 2014 (today: Massena Bridge Slide, Iowa)
 - 2nd session scheduled for early April 2014 (Rocky Ford Bridge Slide, Colorado)
 - 3rd session scheduled later in year
- Contractor/Constructor Perspective
 - March 6, 2014
 - 2nd and 3rd sessions scheduled later in year

Webinar Agenda

- National Update (~2 min.)
- Featured Presentation: Engineer/Design Perspective (~40 min.)
 - James Nelson, P.E., Transportation Engineer Manager, Office of Bridges and Structures, Iowa Department of Transportation
- Questions & Answers (~15 min.)
- Next Steps (~3 min.)

National Update

- FHWA SIBC website operational
<http://www.fhwa.dot.gov/construction/sibc/>
- Technical Services Support Center (TSSC) open for business
<http://www.fhwa.dot.gov/construction/tssc/sibc/ask.cfm>
- SIBC Implementation Guide available soon



National Update (cont'd)

- FHWA Division Offices report increase in lateral slides
- Request for Information (RFI) posted for next round of Every Day Counts (EDC)
- Timothy H. Cupples, P.E., DBIA
 - Bridge and Tunnel Construction Engineer, Federal Highway Administration
 - Office of Asset Management, Pavement and Construction
 - Construction Management Team, HIAP-40
 - Room E73-473, 1200 New Jersey Avenue, SE Washington, D.C. 20590
 - 202.366.1342 (v) 202.366.9981 (f)
 - timothy.cupples@dot.gov

MASSENA LATERAL BRIDGE SLIDE

James S. Nelson, P.E.
Transportation Engineer Manager
Iowa DOT, Ames, IA

Presentation Outline

- Project overview
- Design and detailing considerations
- Construction
- Lessons learned



Project Location

- IA 92 over small natural stream, 1.0 mile west of Junction IA 148



Project Location (cont'd)



Existing Structure – 40' x 30' Steel I-beam

- Structurally deficient
Sufficiency rating 38.2
- Bridge is not adequate for
legal loads – posted “One
truck at a time”



Proposed Replacement Bridge

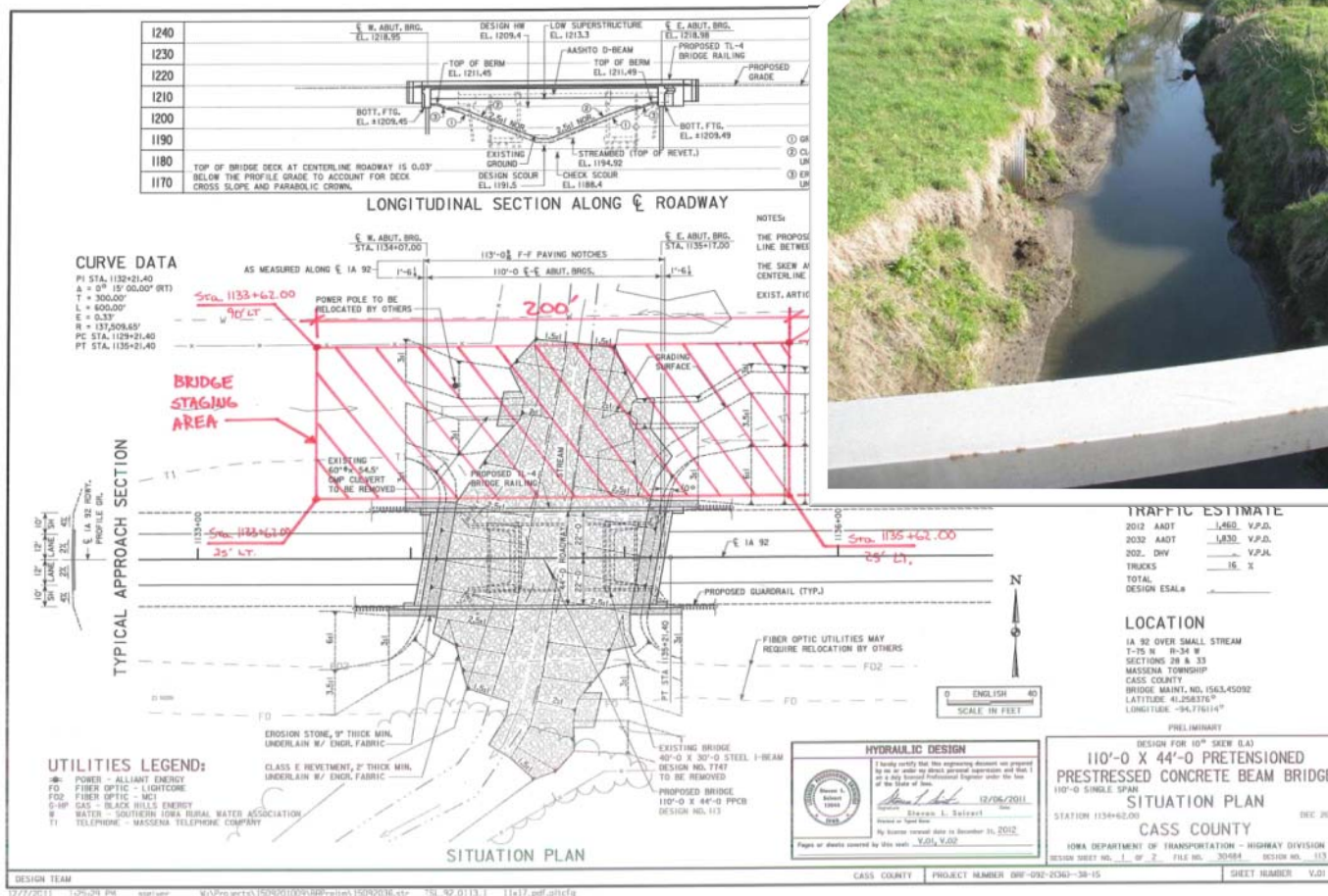
- Pretensioned Prestressed Concrete Beam (PPCB) Bridge



Mobility Impacts

- Detour traffic for duration of construction
- 7 miles out of distance travel – 13 mile detour
- AADT (2012) – 1,460 w/ 16% trucks
- User costs for 180 day detour
 - Indirect \$437,000
 - Direct \$15,000 (county road maintenance and detour signing)

Project Staging Area



Design and Detailing

- Design – Bid – Build
 - Division of responsibility
 - Constructability meeting
 - Pre-bid meeting

Design and Detailing (cont'd)

- Design – Bid – Build
 - Division of responsibility
 - Constructability meeting
 - Pre-bid meeting
- Design Risk Management
 - Research
 - Technology transfer (learning from others)
 - Structures lab testing

Utah DOT Wanship Bridge Slide



Structures Lab – Slide Shoe Testing



Structures Lab – Pile Pocket Testing



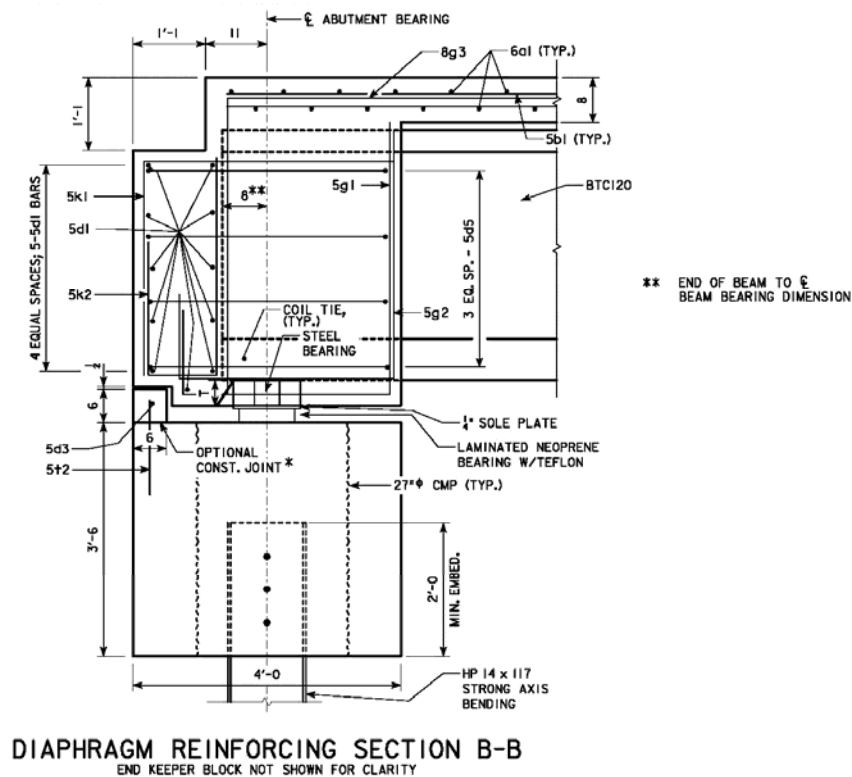
Design and Detailing (cont'd)

- Design – Bid – Build
 - Division of responsibility
 - Constructability meeting
 - Pre-bid meeting
- Design Risk Management
 - Research
 - Technology transfer (learning from others)
 - Structures lab testing
- Contract Documents
 - Unique plan details
 - Specifications

Plan Design and Details

- Semi-integral abutment details
- Abutment diaphragm
 - Jacking pockets for lifting
 - Block for pushing/pulling the prefabricated superstructure
- Precast abutment footing
 - H-Pile connections
- Precast wingwalls
 - H-Pile connections

➤ Abutment Diaphragm Details



STEEL BEARING	
BEAM LINE	STEEL BEARING THICKNESS (T) (IN)
C, D	4.5
B, E	2.5
A, F	0.5

STEEL BEARING - 3 x 2'-4 1/2" x T
WEIGHT OF THE STEEL BEARING INCLUDED
IN THE BID ITEM "STRUCTURAL STEEL".

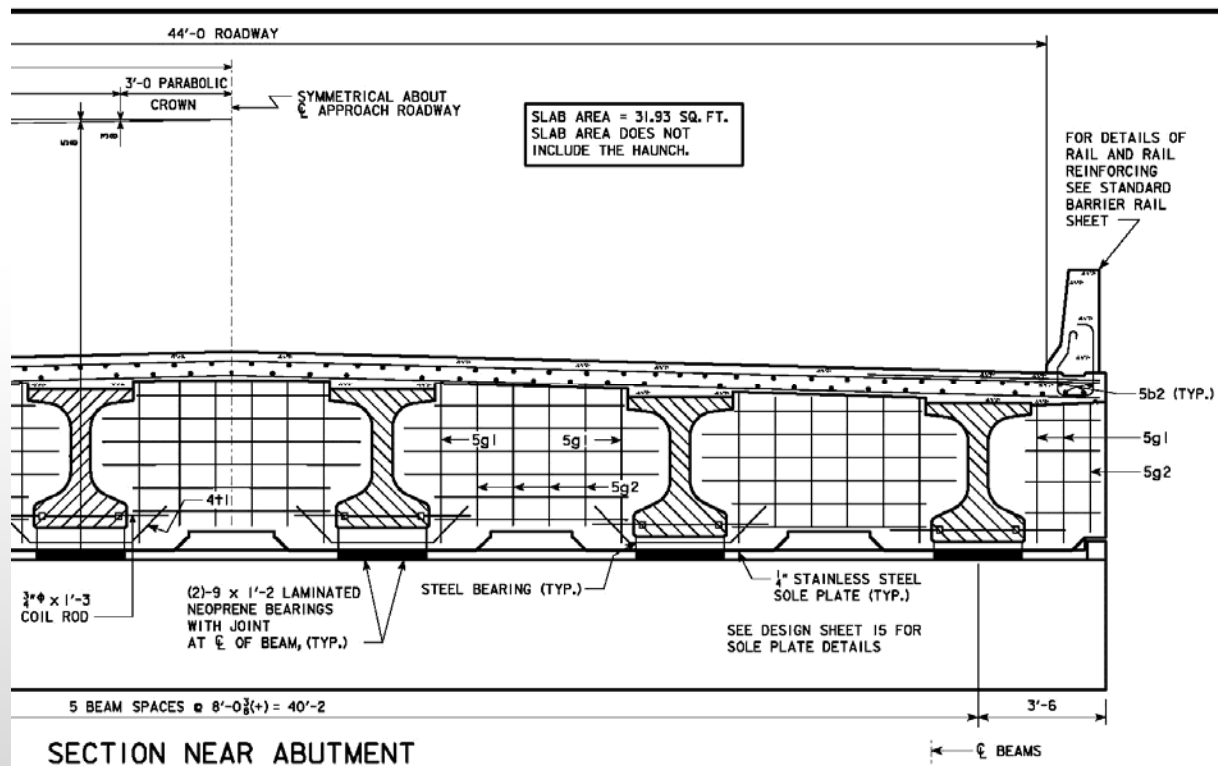
* OPTIONAL CONSTRUCTION JOINT ON EAST AND WEST ENDS AND SOUTH SIDE OF PRECAST ABUTMENT FOOTING. INTENTIONALLY ROUGHEN OPTIONAL CONSTRUCTION JOINT SURFACE TO $\frac{1}{4}$ " AMPLITUDE. SEE KEEPER BLOCK DETAIL ON DESIGN SHEET 10 FOR ADDITIONAL INFORMATION.

SEE DESIGN SHEET 14 FOR BEARING PAD DETAILS.
SEE DESIGN SHEET 18 FOR COIL TIE LOCATION.

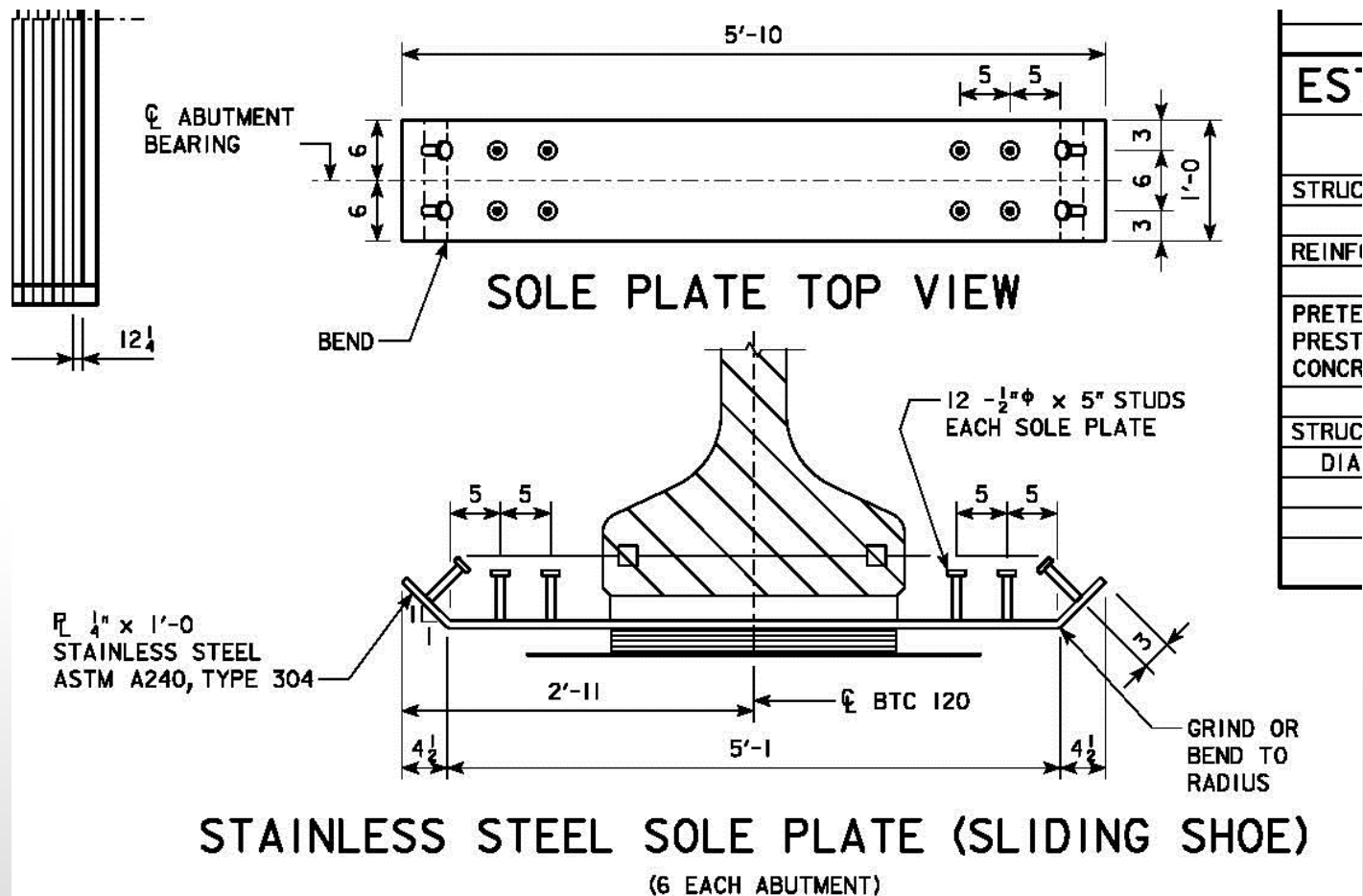
DESIGN FOR 0° SKEW
120'-0 x 44'-0 PRETENSIONED
PRESTRESSED CONCRETE BEAM BRIDGE
120'-0 SINGLE SPAN
ABUTMENT DIAPHRAGM DETAILS
STA. 1134+61.00 (1A 92) FEBRUARY, 2012
CASS COUNTY
IOWA DEPARTMENT OF TRANSPORTATION - HIGHWAY DIVISION
DESIGN SHEET NO. 13 OF 25 FILE NO. 30484 DESIGN NO. 113

Jacking Pocket

- Superstructure Details
 - Bonded PTFE surface on bearing pad detail



Sliding Shoe



Specifications

- Developed based upon Utah DOT specifications
- Called it “Special Provisions for Prefabricated Bridge Superstructure Move”
 - Falsework
 - Prefabricated superstructure move systems

Bridge Construction Visualization

**~2-MINUTE VIDEO RENDERING OF
BRIDGE CONSTRUCTION/MOVE**



Construction

- Let April 16, 2013
- Winning bid \$1.3 Million
- Traditional construction estimate \$977,000
- Bridge unit cost - \$112/SF
- Typical PPCB bridge unit cost - \$85/SF

Costs “avoided” include construction of temporary bridge, diversion/shoo-fly, temporary ROW, mobilization, etc.

Bid Highlights

- Removal of existing bridge - \$60,000 (3x)
- H-piling - \$167,200 (1.3x)
- Mobilization \$100,000 (8%)
- Prefabricated bridge superstructure move \$172,000 (1.7x)

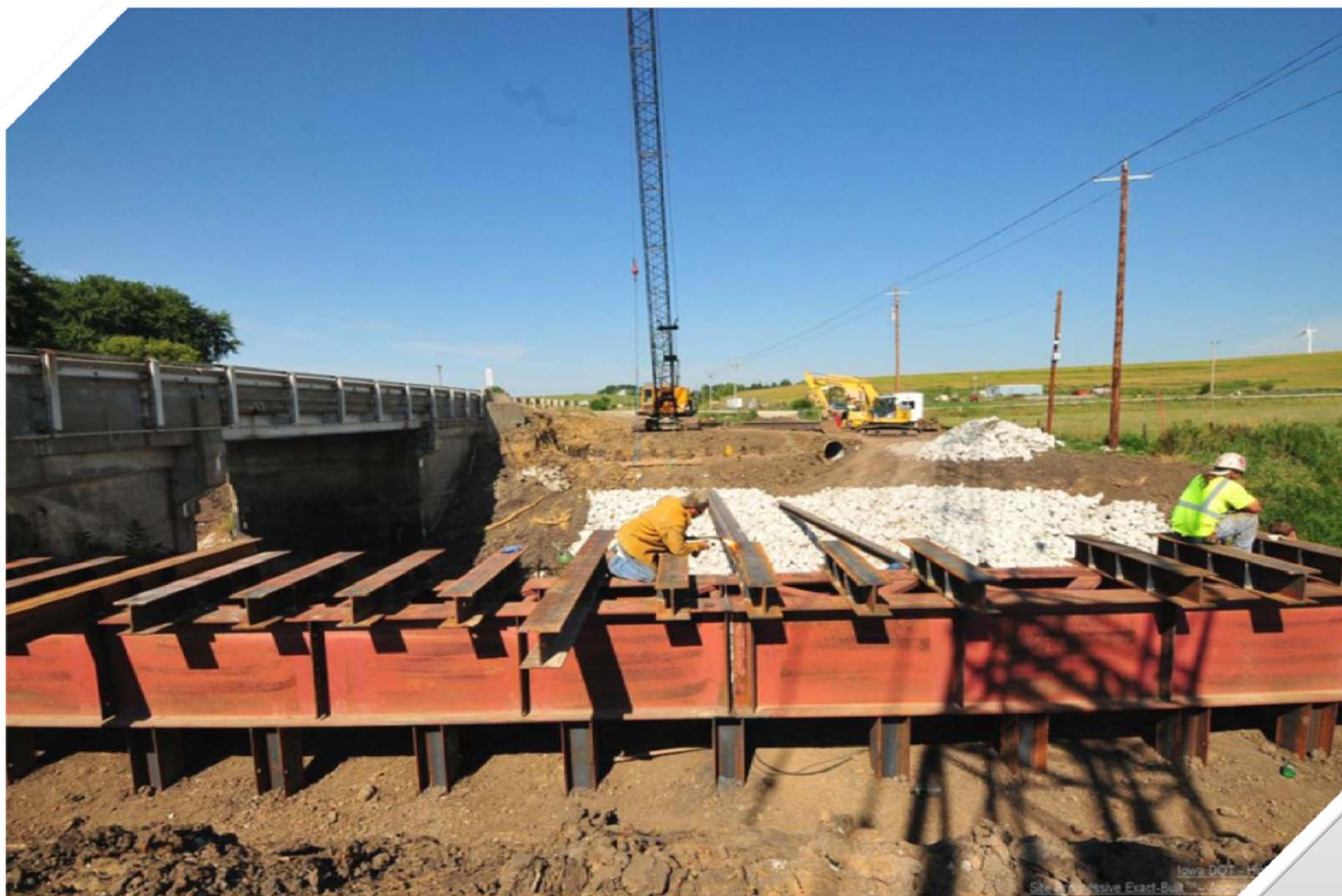
Construction Milestones

- July 8 – Contractor moves in to site
- August 12 – Falsework completed
- September 6 – Bridge deck placement
- September 18 – Bridge test slide (roll)
- September 27 – Begin critical closure
- September 30 – Bridge slide
- October 6 – End critical closure

Critical Closure Schedule

	Day								
Activity	1	2	3	4	5	6	7	8	9
Start Critical Closure	9/27/2013								
Bridge Removal and Grading									
Pile Driving									
Revetment									
Abutment Footing									
Bridge slide									
Precast wings									
Granular Backfill									
Bridge Barrier Rail									
Approach paving									
Barrier End Sections									
Steel Guardrail									
Longitudinal Grooving									
Pavement Marking									
Finish Critical Closure	10/6/2013								

Falsework



PPC Beams and Decking



Superstructure Complete



Pre-tied Cage for Abutment Footing



H-pile Template



High Strength Rods



Roller



Jacking Frame



Slide Transition



Bridge Jacking and Roller Removal



Precast Wingwalls



Lessons Learned

► Designer/Owner

- Let ABC projects similar to steel bridges (fall letting)
- Incentive/disincentive specification definitions
- Precast/CIP option for substructure units
- Be prepared to fully evaluate impact of contractor method changes
 - Elimination of stainless steel sole plate
 - Rolling in jacking pockets
- Do not allow re-use of laminated neoprene bearings
- Add a specification requiring falsework design engineer to inspect and accept falsework construction

Lessons Learned (cont'd)

➤ Designer/Owner

- Driven pile acceptance criteria need to be modified from the standard specification
- More smaller piling is preferred to the fewer larger piling due to pile splice time
- More storage space
- Separate the falsework bid item from the prefabricated bridge move bid item
- ABC project design team time

Design Team Time

- Design Engineer – 97 hours
- Detailer – 338 hours
- Check Engineer – 168 hours
 - Total 603 hours
- Submittal Review Engineer – 137 hours
 - Structural steel – 2 hours
 - Falsework plans and calculations
 - Precast wingwalls
 - Prefabricated superstructure move plans and calculations
 - Prefabricated superstructure move procedures 9/25/13

Google: Massena Iowa DOT

The screenshot shows the Iowa Department of Transportation website for the Massena Lateral Bridge Slide project. The browser address bar displays www.iowadot.gov/MassenaBridge/index.html. The website header includes the Iowa Department of Transportation logo and a navigation menu with links to INDEX, DOT Home, About, Phone Book, and Contact. A search bar is also present.

The main content area features a large banner image of the bridge. Below the banner, there is a sidebar with links to project information, including "Massena bridge project home", "Project information", "Detour information", and "Contract documents".

The main text area is titled "Massena Lateral Bridge Slide" and contains the following information:

About the project

This project consists of replacing the existing bridge to increase structural capacity, improve roadway conditions, and enhance safety by providing a wider roadway. Construction zone safety will be greatly improved due to the introduction of innovative accelerated bridge construction (ABC) methods. Traffic will be detoured for nine days.

The replacement structure will be a single span 120' x 44' bridge with precast abutment footings, precast wingwalls and a precast superstructure fabricated adjacent to the existing bridge and moved into position by lateral slide.

Project location

A map view is shown with a blue arrow indicating the project location. The map includes a "Show labels" checkbox and a "Map" button. The map data is credited to Google and DigitalGlobe.

Below the map, there is a video player titled "Massena Lateral Bridge Slide from Iowa DOT". The video shows a 3D rendering of the bridge structure and the lateral slide mechanism. A caption at the bottom of the video reads "position RTFE sliding pads ahead of bridge".

Acknowledgements

- Designer – Iowa DOT
- Constructability Review – Michael Baker Corporation
- ABC Tech Transfer – Utah DOT & FHWA
- ABC Detail Testing – Iowa State University
- Construction Administration – Iowa DOT
- Prime Contractor – Herberger Construction Co., Inc.
- Contractor's Engineer – Tometich Engineering, Inc.
- Precast Wing Supplier – Cretex Concrete Products
- Precast Beam Supplier – Cretex Concrete Products
- HfL Grant – FHWA

QUESTION & ANSWER PERIOD

Kevin Thompson, URS Moderator (~15 minutes)

Q&A Panel

- Kevin Thompson, P.E., URS Corporation
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- Curtis M . Brown, Herberger Construction Co. Inc.
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- Jeffrey Dobmeier, P.E., S.E., Jacobs Engineering
303.820.4892, jeffrey.dobmeier@jacobs.com
- Michael Arens, P.E., S.E., Michael Baker Jr., Inc.
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- Travis Boone, P.E., URS Corporation
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NEXT STEPS

Kevin Thompson, URS (~3 minutes)

Websites/Resources

- SIBC Webinar Training Project Website
 - www.slideinbridgeconstruction.com
 - Webinar registration, a recording of today's webinar, presentation slides, video, and Q&A results will be posted within 10 business days
- FHWA SIBC Website
 - <http://www.fhwa.dot.gov/construction/sibc/>
- Technical Services Support Center (TSSC)
 - <http://www.fhwa.dot.gov/construction/tssc/sibc/ask.cfm>
 - Instructor-led training courses available in June 2014

Future SIBC Training

- Contractor/Constructor Perspective
 - Thursday, March 6, 2014; 11am Mountain Time
- Engineer/Designer Perspective
 - **2nd Session:** early April 2014, Jeff Dobmeier, Jacobs Engineering, Colorado Bridge Slides
- Web-based training modules available in spring 2014

SPECIAL NOTICE: Next FIU ABC Center Webinar "*Geotechnical Solutions for Accelerated Bridge Construction projects, SHRP2 Solutions - GeoTechTools (R02)*"
Thursday, February 27, 2014 (1:00 – 2:00 p.m. Eastern)

Slide



BRIDGE
LATERAL MOVE
TECHNOLOGY



U.S. Department of Transportation
Federal Highway Administration

THANK YOU FOR YOUR PARTICIPATION!

For issues or questions regarding this training or
the www.slideinbridgeconstruction.com website,
please e-mail sibc@urs.com