August 4, 2015; 11:00am-noon (MST)

Today’s Agenda:

> Welcome/Overview (~5 min.)
> Engineer/Designer Perspective Presentation (~40 min.)
> Questions & Answers (~15 min.)
> Next Steps (~3 min.)

TARGET AUDIENCE: This training webinar was developed from the engineer/designer perspective.
Administrative Items

➢ To join the audio, click the “Communicate” option from the menu bar and select either “Teleconference” (for phone) or “Audio Broadcast” (for “VOIP”)

➢ Full screen view controls (bottom left corner of screen)

➢ During the webinar, please use Q&A box for questions (see panel on right side of WebEx screen)
  – Please direct questions to “All Panelists”
  – Submit your questions throughout the presentation

➢ If you have technical problems with the audio and/or visual portions of this webinar, please call 303-740-2616
Accelerated Bridge Construction (ABC)

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

August 4, 2015; 11:00am MST
Webinar Agenda

- Featured Presentation: Engineer/Designer Perspective (~40 min.)

- Questions & Answers (~15 min.)

- Next Steps (~3 min.)
SELLWOOD BRIDGE

PROJECT

T.Y. Lin International
Scott Nettleton, P.E., Project Manager
Presentation Outline

- Bridge History and Project Overview
- Goals of the Diversion
- Challenges for Engineering the Sellwood Shoo Fly
- Seismic Design and Wind Loading
- Staging
- Photos
- Lessons Learned
Bridge History and Project Overview

PORTLAND’S LINDENTHAL BRIDGES
GOALS OF DIVERSION
Goals of Diversion

Provide Full Service Detour, **Improved Safety**, Speed Construction and Cost Savings
Approaches in Place
Truss Spans Translated
Main Span Construction
East Approach Staged

Option 1 - Stage 2, East approach first stage Construction
Complete East Approach
Finish Demolition

http://www.sellwoodbridge.org
CHALLENGES FOR ENGINEERING THE SELLWOOD SHOO FLY
Challenges for Engineering the Sellwood Shoo Fly

➤ Split responsibilities
  – Contractor Engineer provided approach structural designs

➤ Site Impacts
  – Condos on NE side
  – Coordination with City and Permitting
  – Communication of Intent to Permitting Agencies

➤ Technical
  – Foundations
  – River Flow, Scour and Flood
  – Seismic Resistance
  – Wind (Controlling load case)
  – Staging
  – Connection to old structure
Foundations

Driving Frames and Vibratory Pile Installation
River Flow, Scour and Flood

Where is the flow coming from?

Tidal influence causes most long term scour

Figure 2. 2007 Hydrographic Survey of the Sellwood Bridge
River Flow, Scour and Flood
Modeling of Proposed Construction

Photo 3. Flood-Tide Design Event Result (All Structures)
River Flow, Scour and Flood
SEISMIC DESIGN AND WIND LOADING
Seismic Design

Use of Existing Superstructure

Seismic Accelerations Reduced by 2.5 for Temporary Works Per AASHTO Guide Specification
Seismic Design

Use of Existing Superstructure

Longitudinal
Wind Loading

The Controlling Load

Historical Data, Comparison with Topography and available study

Conclusion - 65 MPH Design Wind Speed
STAGING
Additionally, the bridge width and the existing bridge rail do not meet current standards for a detour bridge.
Connections to Existing
Material Properties, Geometry

Testing results are for informational purposes only.

<table>
<thead>
<tr>
<th>Specimen number</th>
<th>CH-2-1</th>
<th>CH-2-2</th>
<th>CH-3-1</th>
<th>CH-3-2</th>
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</thead>
<tbody>
<tr>
<td>Location (Top of Core Depth)</td>
<td>1&quot;3&quot; to 1&quot;11&quot;</td>
<td>2&quot;7&quot; to 3&quot;3&quot;</td>
<td>0&quot;0&quot; to 0&quot;8&quot;</td>
<td>1&quot;11&quot; to 2&quot;7&quot;</td>
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<td>Date tested</td>
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<td>05/27/08</td>
<td>05/27/08</td>
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<td>Nominal Maximum Aggregate Size</td>
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<td>1 ½&quot;</td>
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<td>1 ½&quot;</td>
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<td>Length of specimen prior to capping</td>
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<td>7.20</td>
<td>7.21</td>
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<td>Length of specimen after capping</td>
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<td>7.33</td>
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<td>Direction of load in respect to</td>
<td>P</td>
<td>P</td>
<td>P</td>
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<tr>
<td>Moisture condition at time of testing</td>
<td>Surface Dry</td>
<td>Surface Dry</td>
<td>Surface Dry</td>
<td>Surface Dry</td>
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<tr>
<td>Average diameter of core specimen</td>
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<td>Length to diameter ratio (l/d) *</td>
<td>1.98</td>
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<td>Applied load at specimen failure (lbs)</td>
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<td>Specimen area (sq. in.)</td>
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<td>Uncorrected unit psi</td>
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<td>7653</td>
<td>5826</td>
<td>6951</td>
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<td>Strength correction factor *</td>
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<tr>
<td>Corrected unit psi (nearest 10 psi)</td>
<td>6940</td>
<td>7650</td>
<td>5830</td>
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</table>

*Specimen correction factor applied when length to diameter ratio falls below 1.8.

Information gathering, corrections at final Inspection
Other Considerations

- Collision Fender
- Guard Rail Transition
- Piling Conflict Bent 17
- Support at Bent 21
- River Isolation
- Lighting
Truss Jacking System

Layout on a Radius

Original design assumed single support track
Truss Translation Layout

Layout of translation path was critical
Cradle Beam Design
Fitting Beams into Tight Spaces
Temporary Bearing
Steel Box Filled with Grout

Sides cut to fit irregular shape of the bearing casting

Truss chords unable to take load
Structure Translation

➤ Equipment
  – Pushing tugs and skids were rented, widely available
  – Teflon skidding surface lubricated with dish soap
  – Public was well informed = Good Press

➤ Loads
  – Structure was vertical loads 336 kips at ends, 900 kips interior
  – Skid force to move, estimated at less than 5%

➤ Monitoring
  – Advancement measured with marks on skid track
PHOTOS
Photos of the Slide
Photos of the Slide Cont."
Photos of the Slide Cont.
Photos of the Slide Cont.
VIDEO
LESSONS LEARNED
Lessons Learned

- Coordination and Planning pay off
  - Closure schedule was met
  - Opened 14 hours early
  - Public was well informed = Good Press

- Very specific in Provisions Concerning Limits
  - Drawings were used to define “ownership” of the work, specific repeat in the provisions would have been appropriate
Credits

Owner: Multnomah County

Engineers: T.Y. Lin International (Main Span Bridge)
          CH2M HILL (Roadway & Geotechnical)
          McGee Engineering (Approach Bridge)

CM/GC: Slayden-Sundt Joint Venture

Slide Subcontractor: Omega Morgan

Quick Facts:

Truss Length = 1,091 feet
Truss Weight = 3,400 Tons
Time to Slide = 13 hours
Questions?
QUESTION & ANSWER PERIOD

Travis Boone, AECOM Moderator (~15 minutes)
NEXT STEPS

Travis Boone, AECOM Moderator (~3 minutes)
Websites/Resources

➤ SIBC Webinar Training Project Website
   – www.slideinbridgeconstruction.com
   – Future webinar registration, a recording of today’s webinar, presentation slides, video, and Q&A results will be posted within 10 business days

➤ FHWA SIBC Representative
   – Mr. Jamal Elkaissi, Resource Center, Lakewood, CO
   – 720-963-3272
   – jamal.elkaissi@dot.gov

➤ FHWA SIBC Website
   – SIBC Implementation Guide now available
   – Recently released: Slide-In Bridge Construction Cost Estimation Tool Guidelines (and spreadsheet)
Future SIBC Training

- Construction Perspective
  - Tentatively set for November 2015

- Web-based Training
  - 3 Modules: SIBC Part 1, Part 2, and Part 3
  - Each goes “live” with the associated webinars above
  - Module 2 will be available tomorrow at http://slideinbridgeconstruction.com
Accelerated Bridge Construction (ABC)

THANK YOU FOR YOUR PARTICIPATION!

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