

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

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

Today's Agenda:

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

SLIDE-IN BRIDGE CONSTRUCTION (SIBC) 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
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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



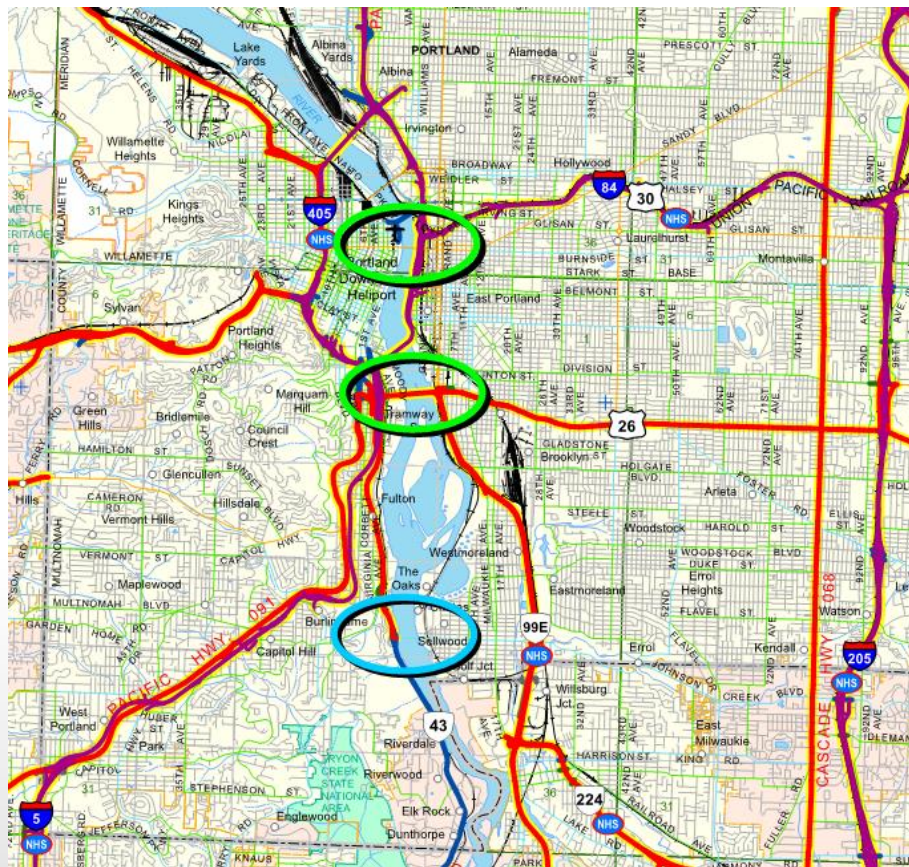
T.Y. Lin International
Scott Nettleton, P.E., Project Manager



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



☐ Shoofly alignment options 1 and 2

☐ Shoofly alignment option 2 only

Approaches in Place Truss Spans Translated



Option 1 Stage 1

Main Span Construction East Approach Staged



Option 1 - Stage 2, East approach first stage Construction

Complete East Approach



Option 1 - Stage 3, East approach
second stage construction

Finish Demolition

<http://www.sellwoodbridge.org>



Finished Bridge,
Options 1 and 2

CHALLENGES FOR ENGINEERING THE SELLWOOD SHOOFLY

Challenges for Engineering the Sellwood Shoo Fly

➤ Split responsibilities

- Contractor Engineer provided approach structural designs

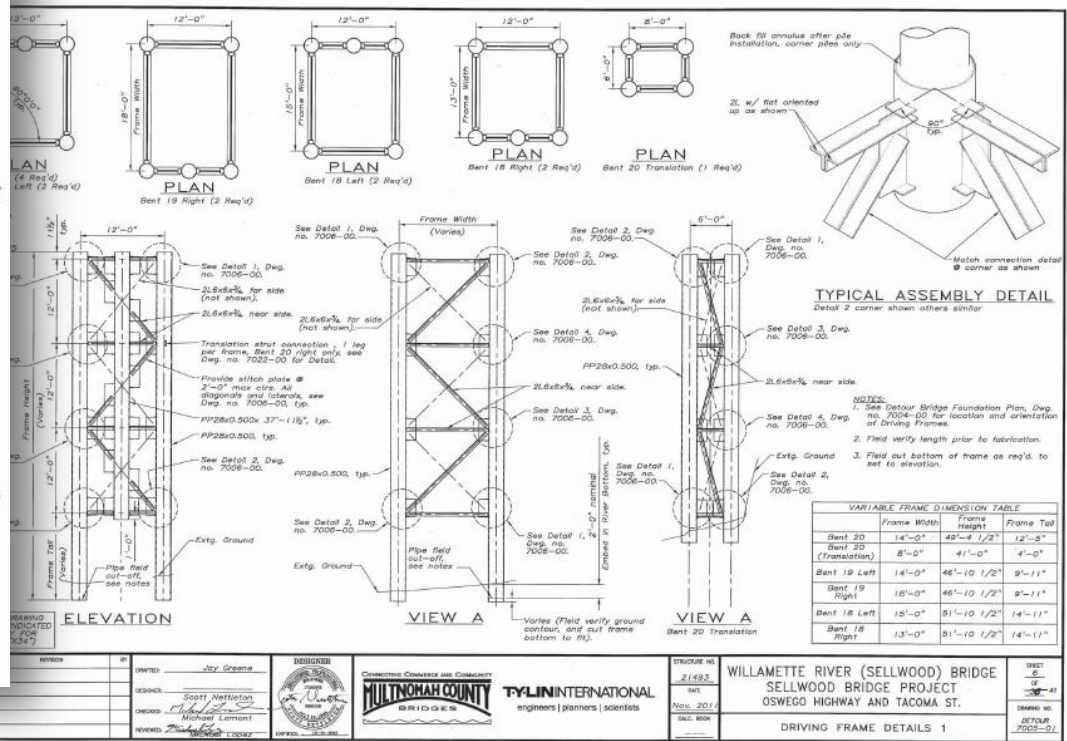
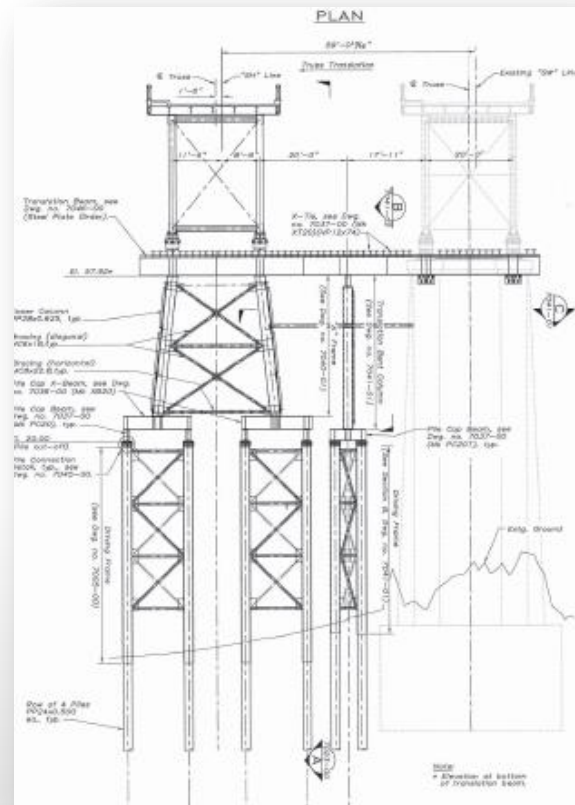
➤ Site Impacts

- Condos on NE side
- Coordination with City and Permitting
- Communication of Intent to Permitting Agencies

➤ Technical

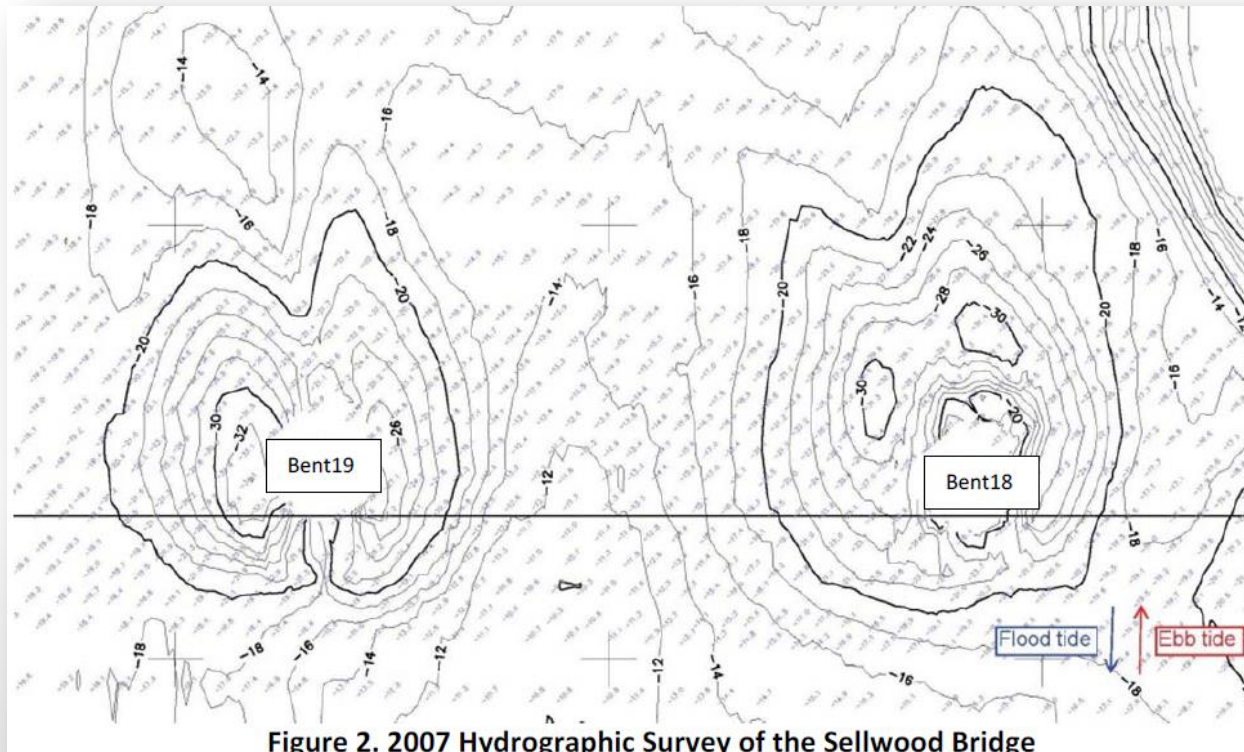
- Foundations
- River Flow, Scour and Flood
- Seismic Resistance
- Wind (Controlling load case)
- Staging
- Connection to old structure

Driving Frames and Vibratory Pile Installation



River Flow, Scour and Flood

Where is the flow coming from?



Tidal influence causes most long term scour

River Flow, Scour and Flood

Modeling of Proposed Construction

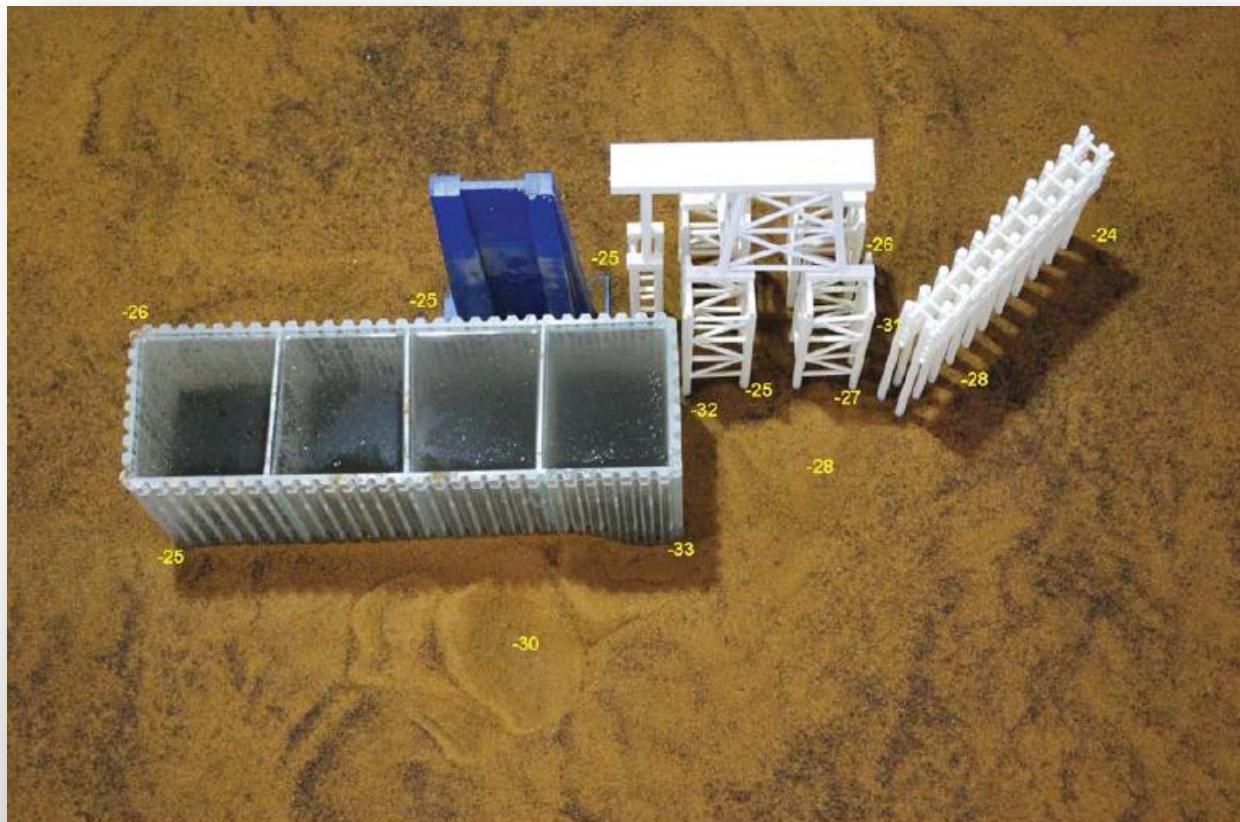
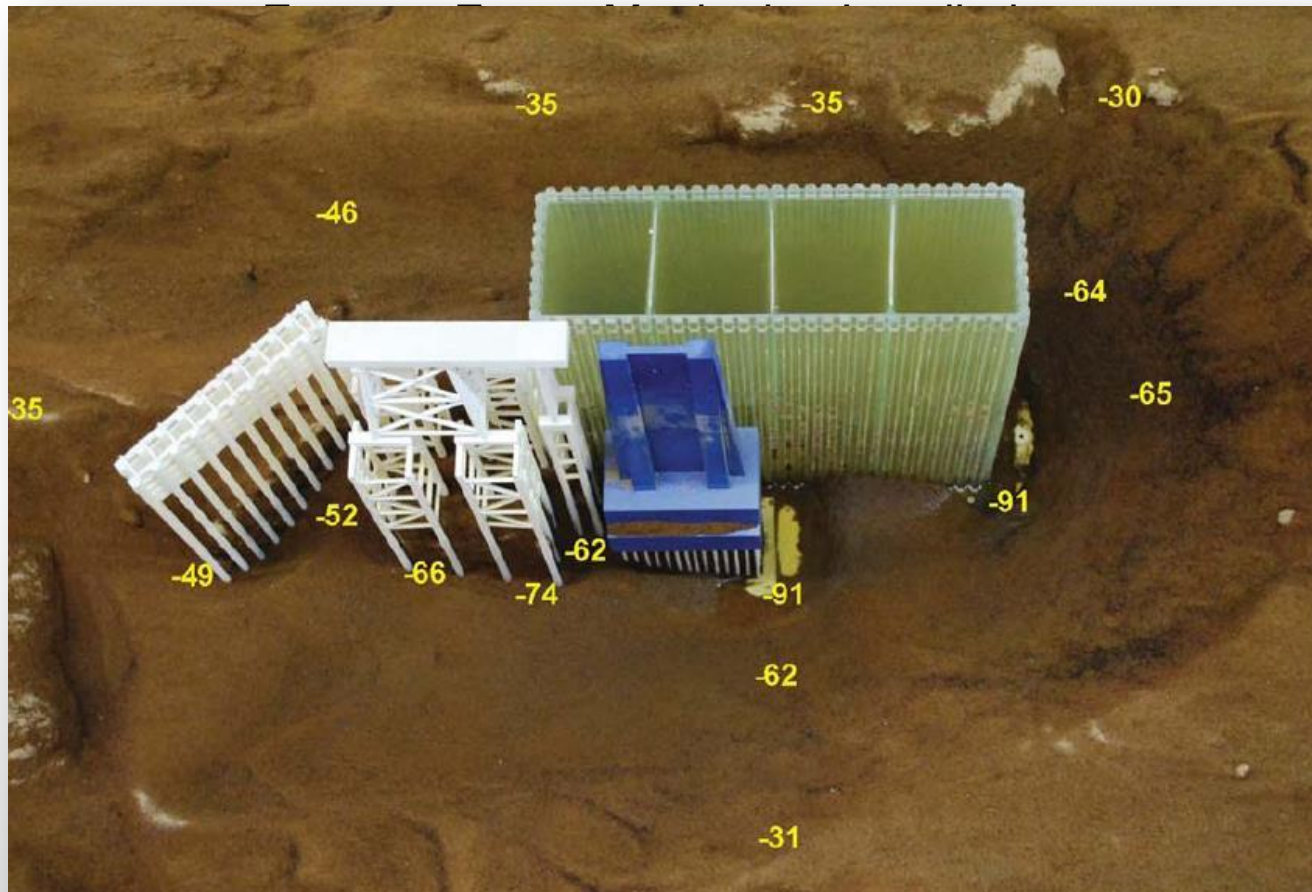


Photo 3. Flood-Tide Design Event Result (All Structures)

River Flow, Scour and Flood



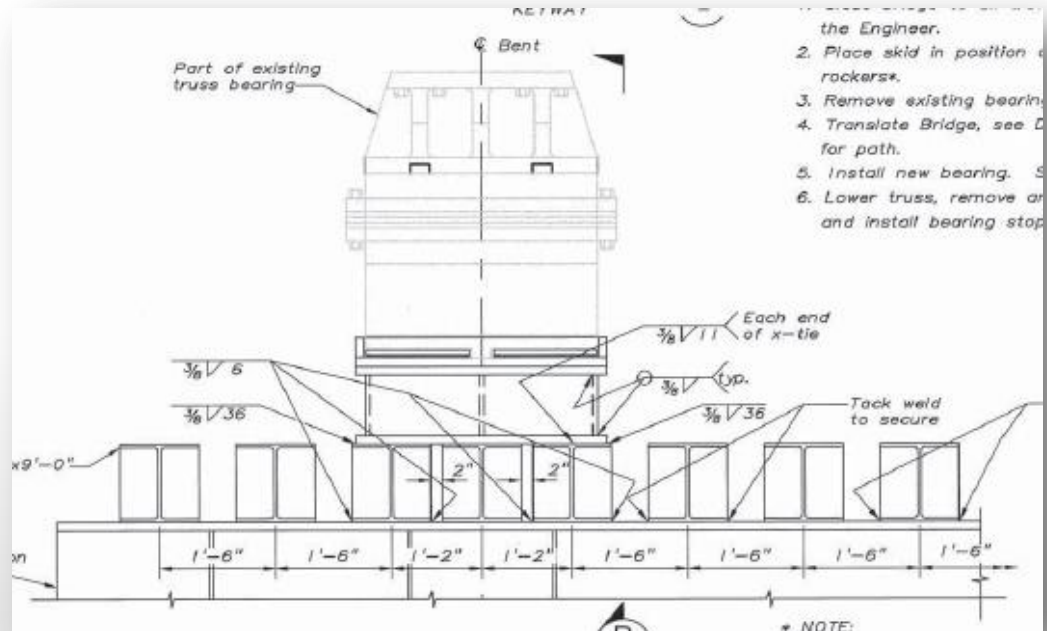
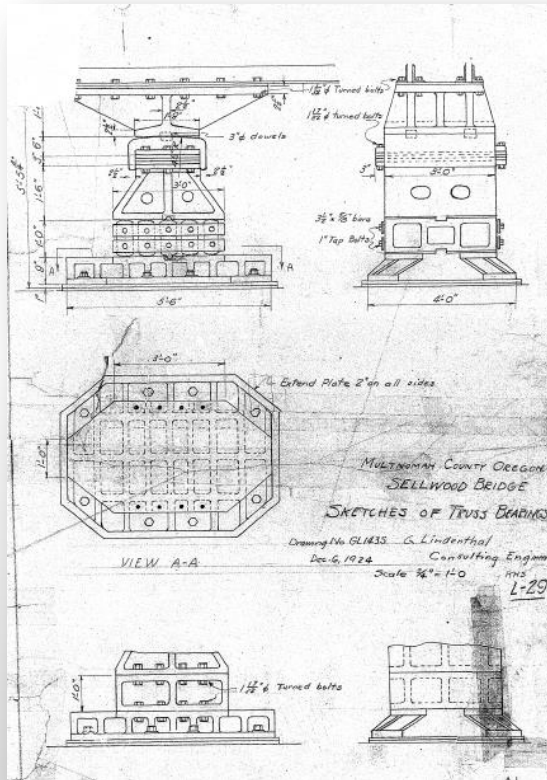
SEISMIC DESIGN AND WIND LOADING



Seismic Design

Use of Existing Superstructure

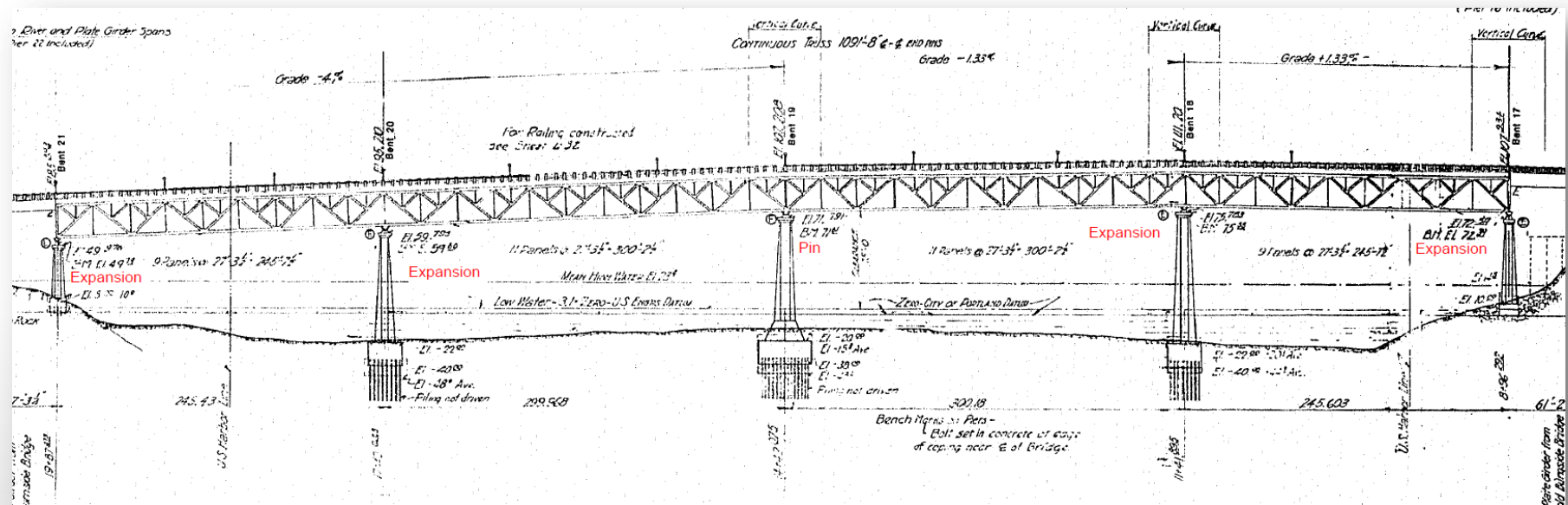
Seismic Accelerations Reduced by 2.5 for Temporary Works Per AASHTO Guide Specification



Transverse

Seismic Design

Use of Existing Superstructure



Longitudinal

Wind Loading

The Controlling Load

Period of Record...October 1940 - May 1999

	Climatic Averages		Extremes of Wind (1951-June 1999)							
			Highest Avg.		Fastest Mile ²			Peak Wind Gust		
Month	Dir.	Speed	Speed	Year	Dir.	Speed	Year	Dir.	Speed	Year
Jan.	ESE	9.9	15.1	1995	S	54	1951	SW	63	1990
Feb.	ESE	9.2	12.2	1993	SW	61	1958	S	68	1965
March	ESE	8.3	10.9	1956	S	57	1963	S	71	1971
April	NW	7.4	9.3	1981	S	60	1957	S	63	1972
May	NW	7.1	8.6	1963	SW	42	1960	SW	48	1971
June	NW	7.2	9.1	1974	SW	40	1958	SW	40	1994, '97
July	NW	7.6	8.9	1962	SW	33	1983	SW	35	1983
Aug.	NW	7.1	8.7	1966	SW	29	1961	E	38	1966
Sept.	NW	6.5	8.0	1961	S	61	1963	SW	61	1963
Oct.	ESE	6.5	8.4	1975	S	88	1962	S	104 ³	1962
Nov.	ESE	8.6	11.2	1979	SW	56	1961	S	71	1981
Dec.	ESE	9.5	12.9	1977	S	57	1951	S	74	1995 ⁴
Annual	ESE	7.9	8.8	1995	S	88	Oct 1962	S	104 ³	Oct 1962

WEST WIND LABORATORY, INC

761 Neeson Rd. #12, Marina, CA 93933 USA
 t 1.831.883.1533 f 1.831.883.1535
 www.westwindlaboratory.com e jraggett@westwindlaboratory.com

WIND STUDY
 WILLAMETTE RIVER TRANSIT BRIDGE
 PORTLAND, OREGON
 FINAL REPORT

for
 T. Y. Lin International

Job No. 10-03

9 August 2011

by

Jon D. Raggett, PhD, PE
 President, West Wind Laboratory, Inc.



exp 12/31/11

Historical Data, Comparison with Topography and available study
 Conclusion - 65 MPH Design Wind Speed

STAGING

Staging



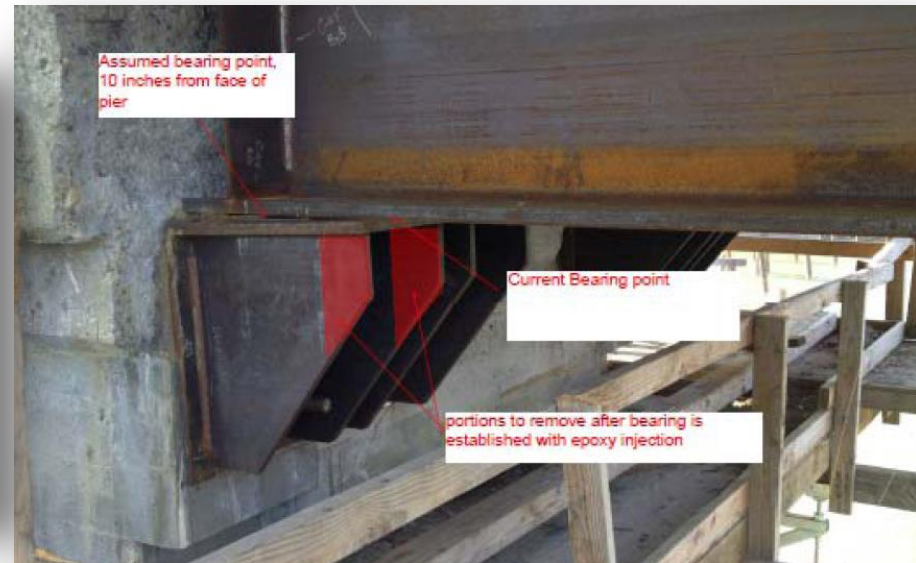
Additionally, the bridge width and the existing bridge rail do not meet current standards for a detour bridge

Connections to Existing Material Properties, Geometry

Testing results are for Informational Purposes only.

Specimen number	CH-2-1	CH-2-2	CH-3-1	CH-3-2
Location (Top of Core Depth)	1'3" to 1'11"	2'7" to 3'3"	0'0" to 0'8"	1'11" to 2'7"
Date tested	05/27/08	05/27/08	05/27/08	05/27/08
Nominal Maximum Aggregate Size	1 ½"	1 ½"	1 ½"	1 ½"
Length of specimen prior to capping	7.13	7.20	7.21	7.21
Length of specimen after capping	7.25	7.32	7.33	7.39
Direction of load in respect to	P	P	P	P
Moisture condition at time of testing	Surface Dry	Surface Dry	Surface Dry	Surface Dry
Average diameter of core specimen	3.66	3.66	3.66	3.66
Length to diameter ratio (l/d) *	1.98	2.00	2.00	2.02
Applied load at specimen failure (lbs)	72961	80508	61293	73125
Specimen area (sq. in.)	10.52	10.52	10.52	10.52
Uncorrected unit psi	6935	7653	5826	6951
Strength correction factor *	---	---	---	---
Corrected unit psi (nearest 10 psi)	6940	7650	5830	6950

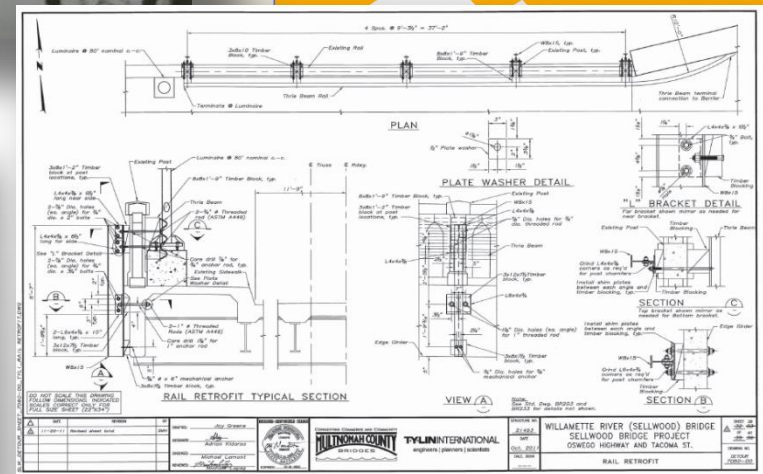
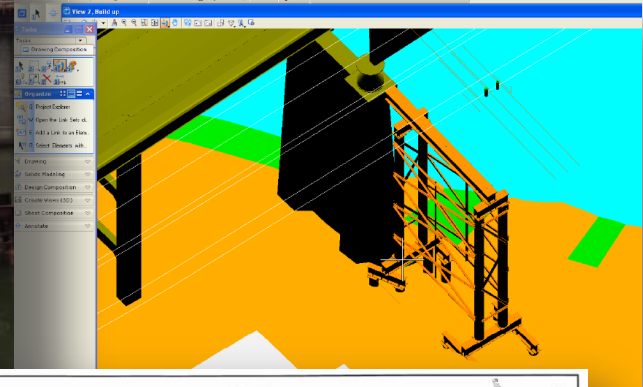
P - Perpendicular *Specimen correction factor applied when length to diameter ratio falls below 1.8.



Information gathering, corrections at final
Inspection

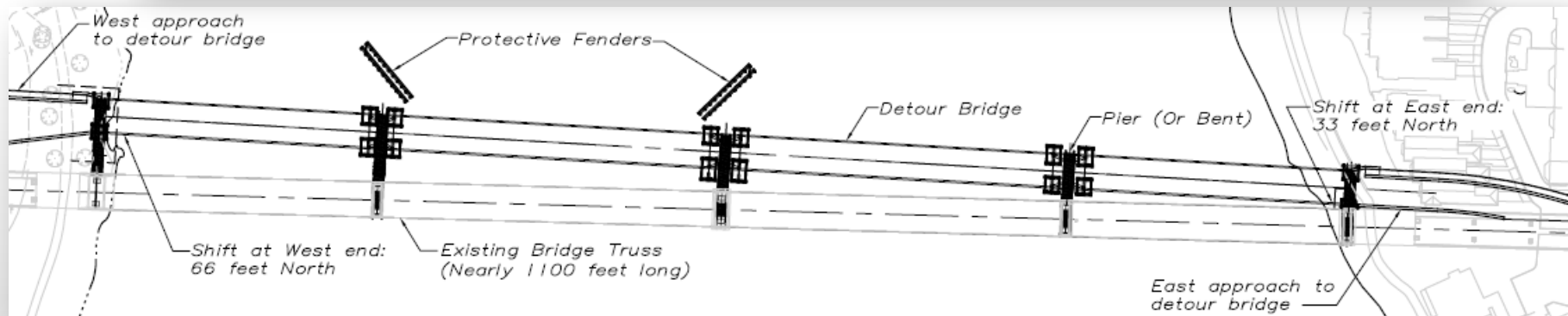
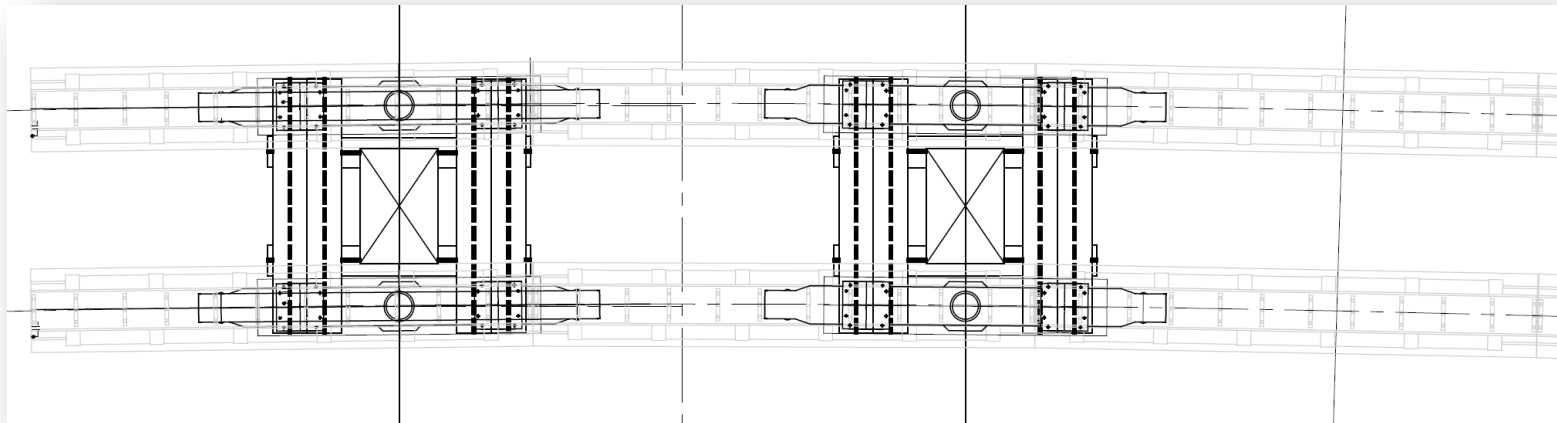
Other Considerations

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



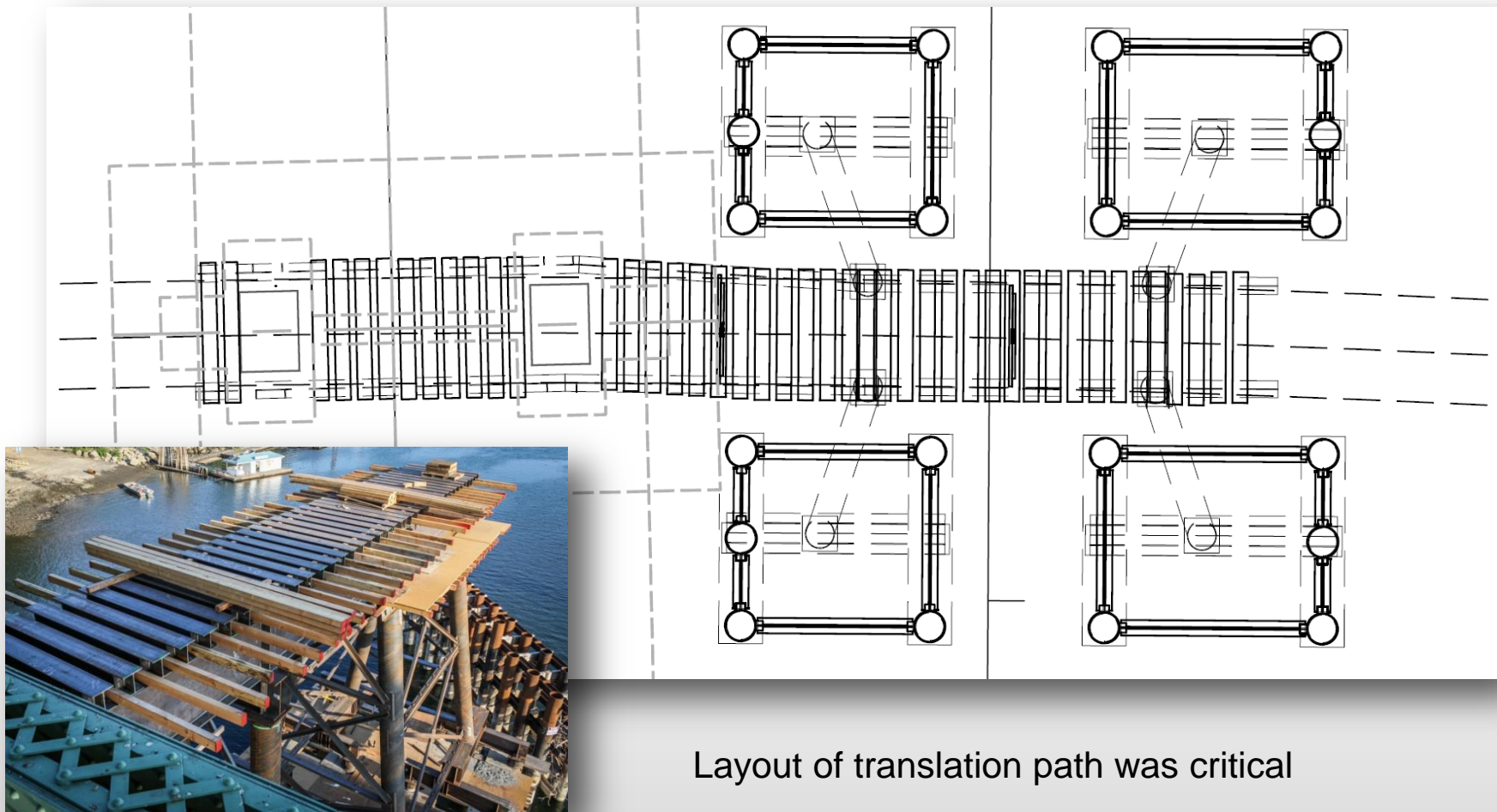
Truss Jacking System

Layout on a Radius



Original design assumed single support track

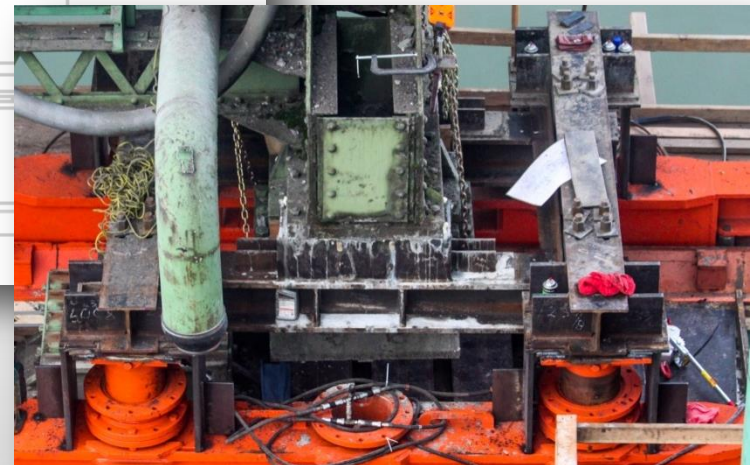
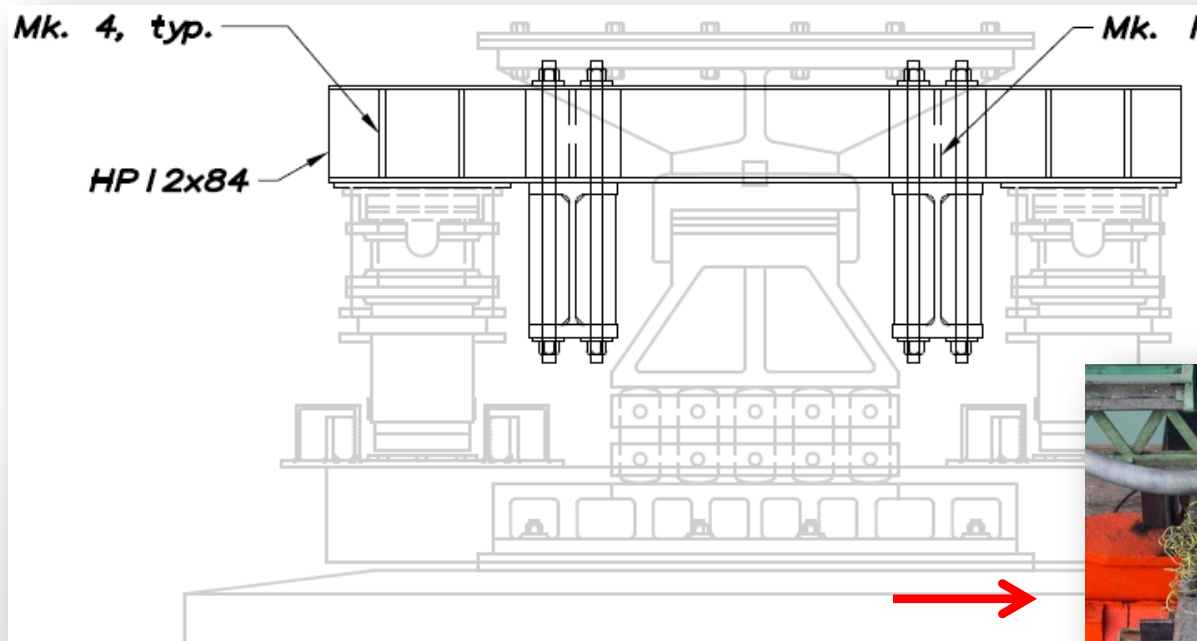
Truss Translation Layout



Layout of translation path was critical

Cradle Beam Design

Fitting Beams into Tight Spaces



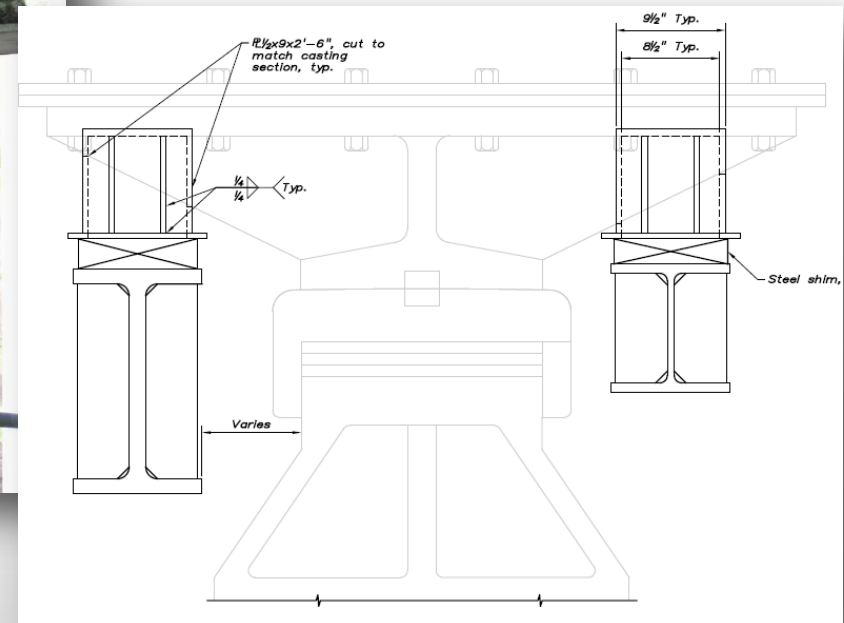
Temporary Bearing

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

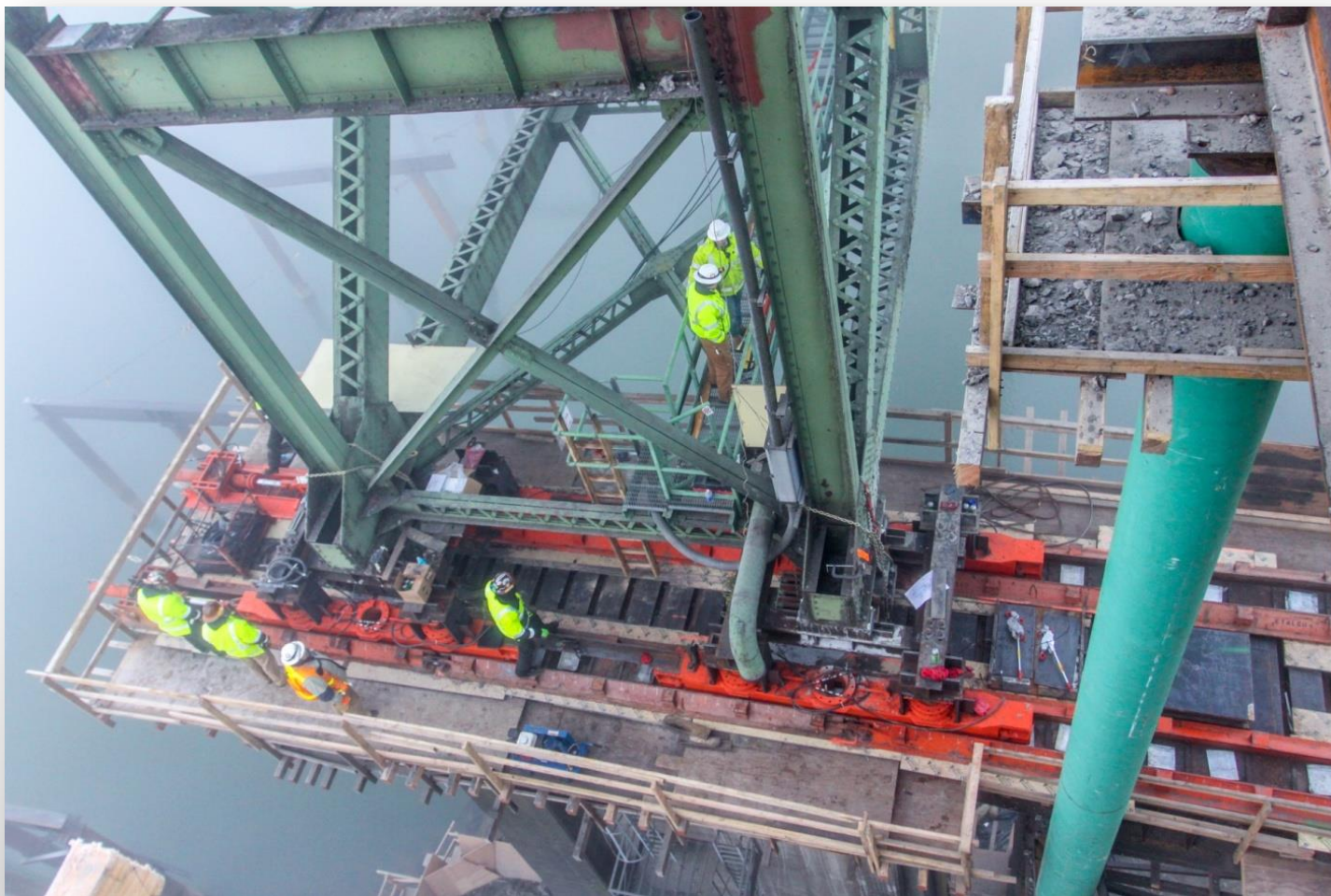
- Advancement measured with marks on skid track

PHOTOS

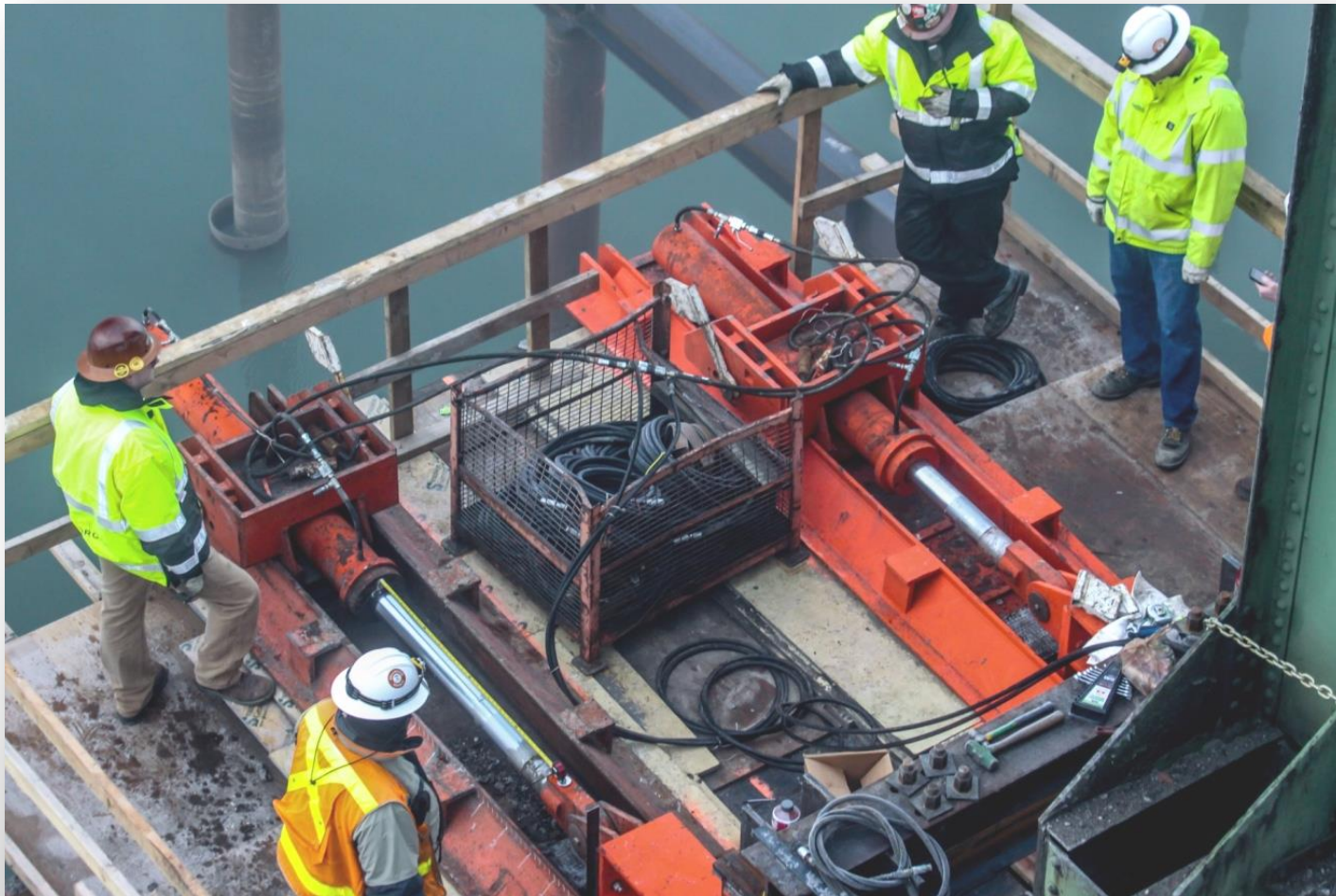
Photos of the Slide



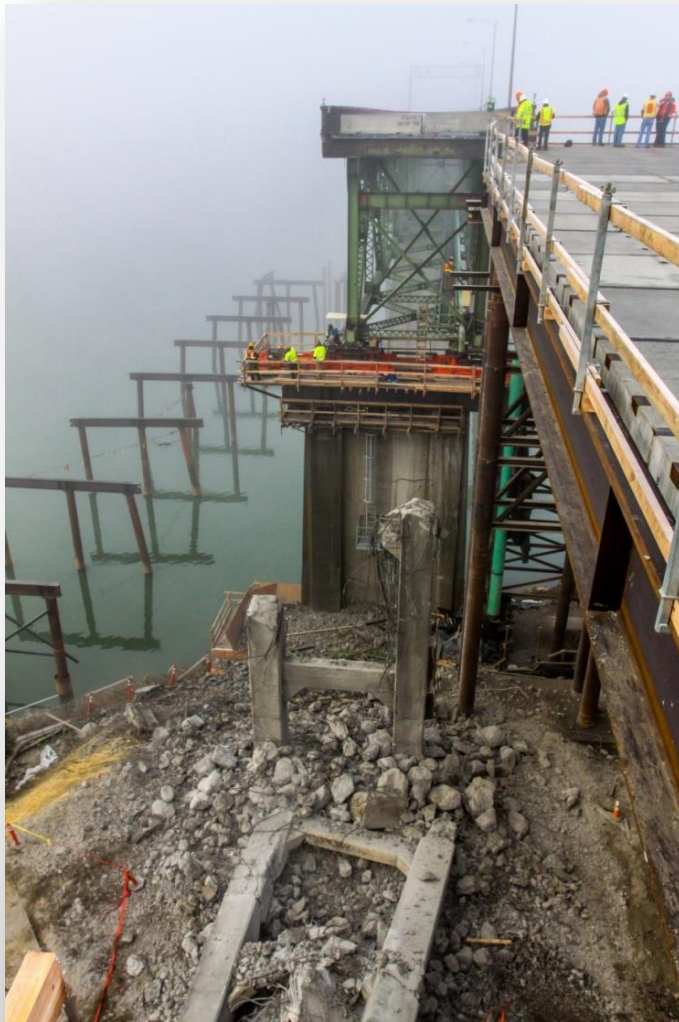
Photos of the Slide Cont.



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?



SELLWOOD BRIDGE
Project
MULTNOMAH COUNTY

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
 - <http://www.fhwa.dot.gov/construction/sibc/>
 - 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)



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