Slide LAT

BRIDGE
LATERAL MOVE
TECHNOLOGY

Accelerated Bridge Construction (ABC)

U.S. Department of Transportation
Federal Highway Administration

SLIDE-IN BRIDGE CONSTRUCTION (SIBC) FROM THE CONSTRUCTION/ CONTRACTOR'S PERSPECTIVE

December 15, 2015 at 11:00am MT

COLORADO
Department of
Transportation

TARGET AUDIENCE: ***This training webinar was developed from the Construction/Contractor's perspective.***

Today's Agenda:

>Welcome/Overview (~5 min.)

>Construction/Contractor's Perspective Presentation (~40 min.)

>Question & Answer (~15 min.)

>Next Steps (~3 min.)

Administrative items

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- 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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DESIGN AND CONSTRUCTION OF THE I-5 SKAGIT RIVER BRIDGE REPLACEMENT

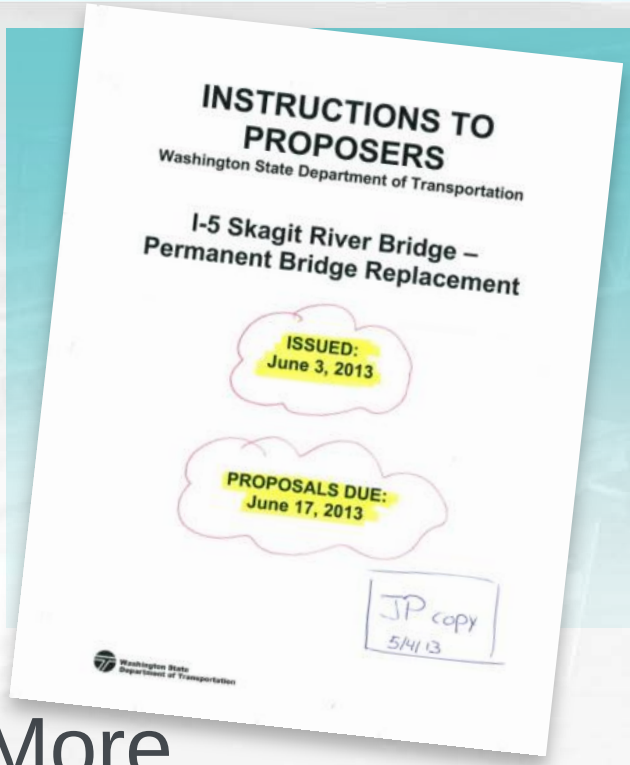
Max Kuney

Christopher Vanek, PE

DESIGN AND CONSTRUCTION OF THE I-5 SKAGIT RIVER BRIDGE REPLACEMENT

KUNEY SINCE 1930 CONSTRUCTION GENERAL CONTRACTORS
PARSONS BRINCKERHOFF
OMEGA MORGAN STRENGTH AND TRUST

RFP Highlights



- Two Week Procurement
  - Project Approach
  - Schedule
  - Estimate
- Best Value = Price + Time + More Time
  - I-5 Closure = $660,000 per 24 hours
  - Contract Time = $50,000 per day

The Kuney/PB Pursuit Strategy

- **High Priority:** Minimize I-5 Closure
- **Medium Priority:** Minimize Contract Time
- **Lower Priority:** Low Construction Cost

WIN THE SCHEDULE!
Our Goal: Less than 24 hour closure

Strategies to Minimize I-5 Closure

- **Option 1:** Construct on Land
  - Roll in via I-5
- **Option 2:** Construct on Water

Float in on barges

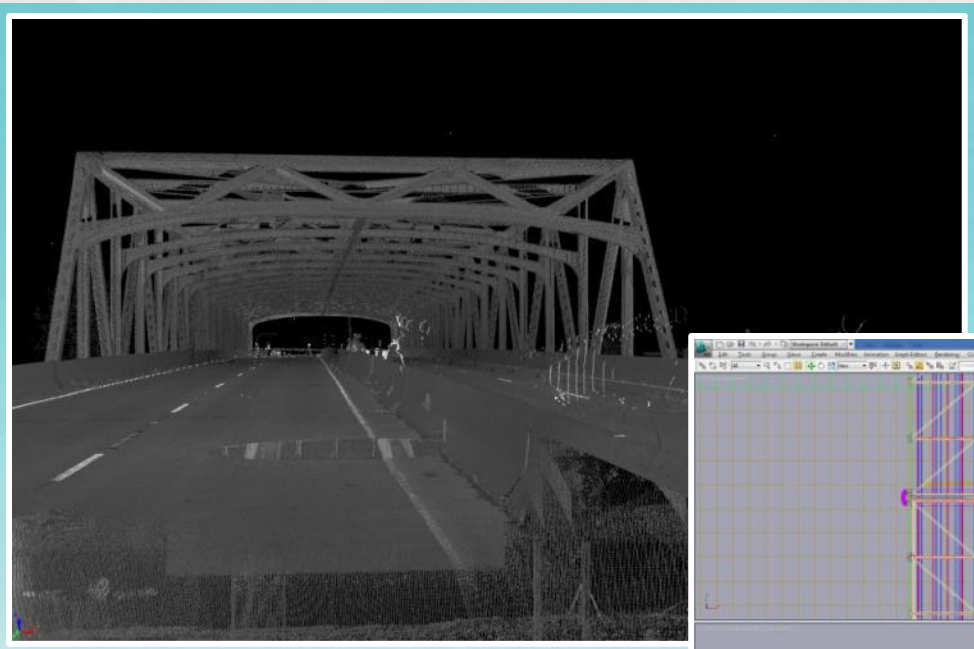
Skid in on beams

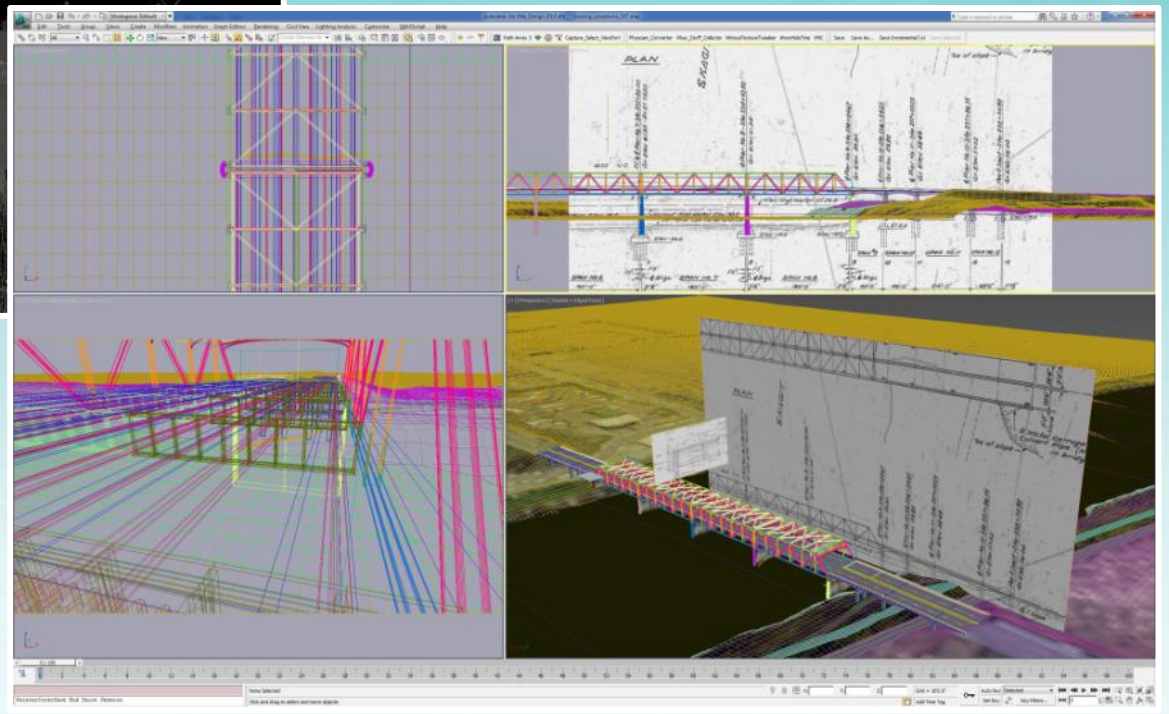
Approach to Using Visualizations

Allows the team to:

- Plan the construction
- Identify critical path
- Verify construction tolerances

Three-Dimensional Modeling





Visualization of Alternatives

Floating Alternative

Skidding Alternative

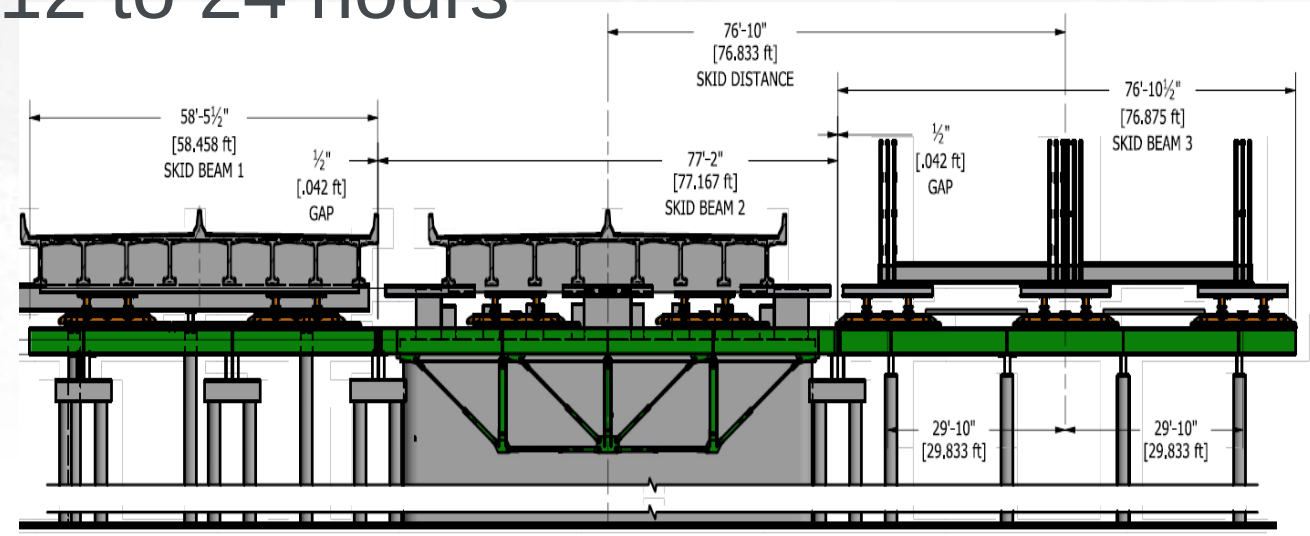
Floating alternative initially selected

Schedule Review (Bid minus 4 days)

- Floating Operation Finalized
  - Significant infrastructure on barge
  - Variable water levels
  - Several risk items
- I-5 Closure: 24 to 48 hours

Revisit Skidding Alternative

- Less risk during move
- Challenge to construct everything during summer:
  - 68 temporary piles
  - 6 skid beams
  - New span
- I-5 Closure: 12 to 24 hours



Structural Design Alternative Evaluation

- **High Priority:** Time to Construct
  - Ability to complete during summer
  - Accelerate if necessary
- **Medium Priority:** Total Weight
  - Less than 915 tons = less risk during move and no remediation of existing substructure
- **Lower Priority:** Cost

Initial Design Alternatives

- Concrete Girders:
  - Conventional girders
  - Precast or CIP deck
- Steel Girders:
  - Twin girder systems (Inverset)™
  - Conventional girders
  - Precast or CIP decks
- Out of the Box:
  - Repair the truss
  - Permanent ACROW

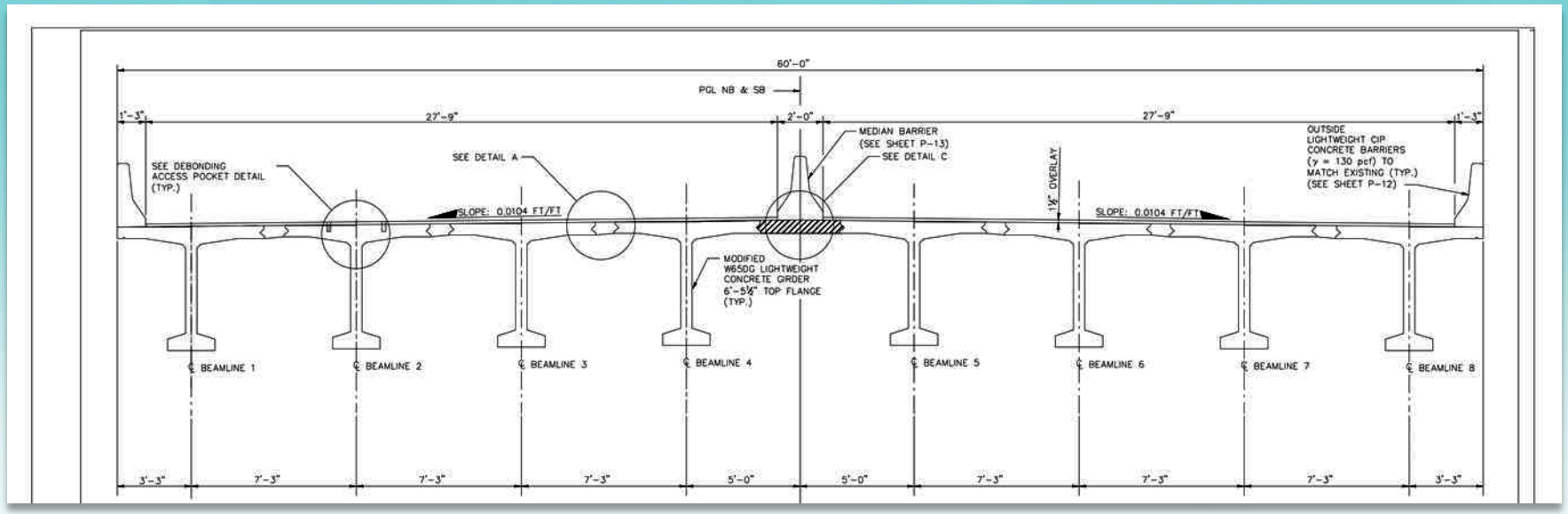
Concrete Girder Alternatives

Advantages:

- Shorter fabrication time
- Ability to control schedule
- Conventional construction

Disadvantages:

- Span weight
  - Is 915 tons possible?
- Girder weight
  - Shipping and erection



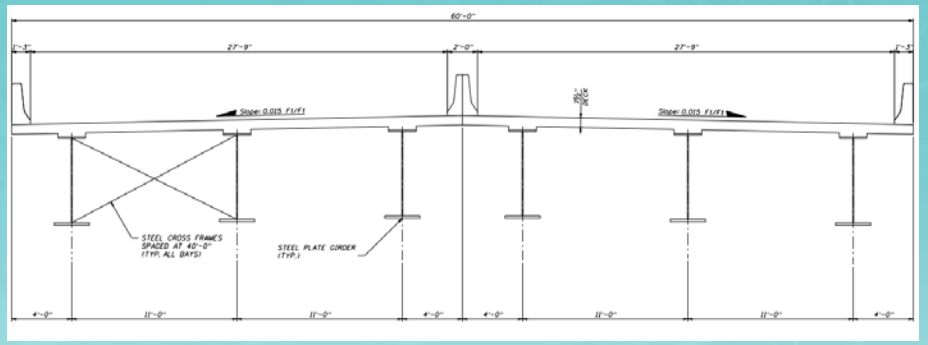
Steel Girder Alternatives

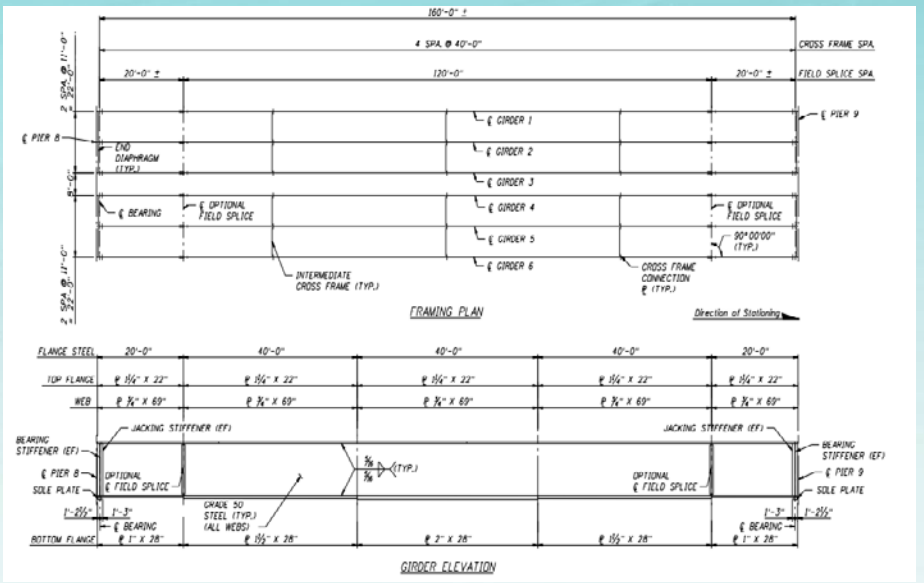
Advantages:

- Lower span weight
- Lower girder weight
- Fewer beam lines
- Conventional construction

Disadvantages:

- Fabrication time
  - Does anyone have the plate?
  - Ability to fabricate immediately?
- Schedule
  - Fabricator on critical path





Design Alternatives Evaluation

(2 week procurement)

Concrete Alternatives:

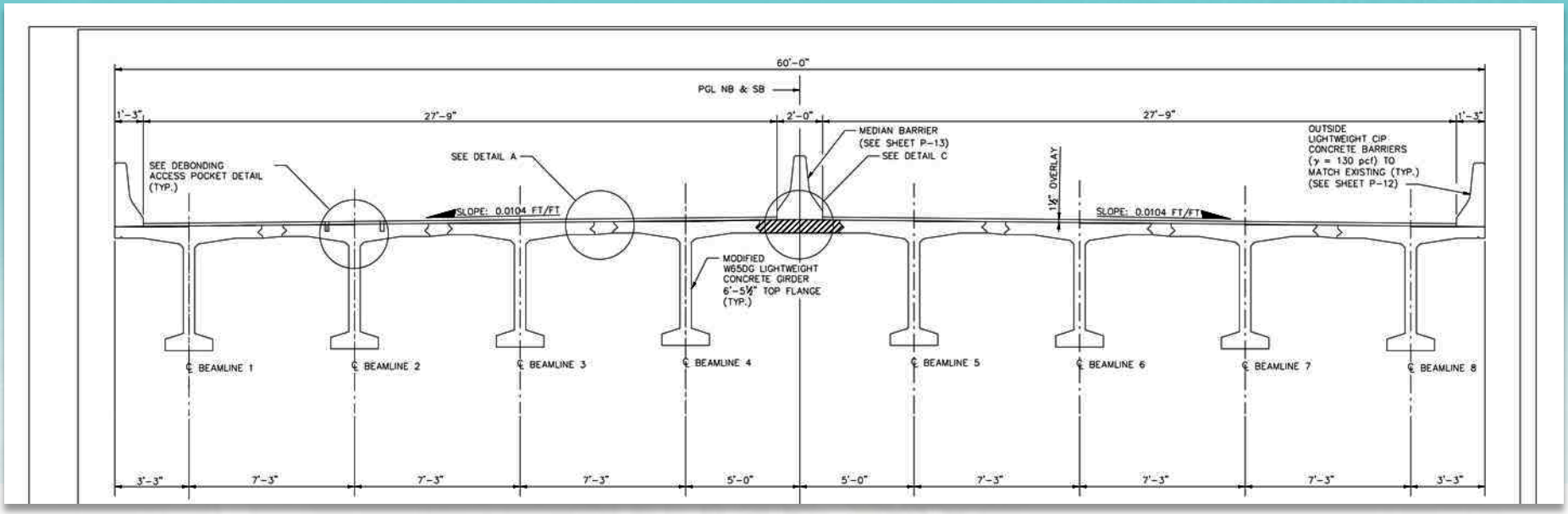
- **Week 1:**
  Four initial concepts
- **Week 2:**
  One concept refined

Steel Girder Alternatives:

- **Week 1:**
  Three initial concepts
- **Week 2**:
  One concept refined

CONCRETE ALTERNATIVE SELECTED

Concrete Alternative Features



Lightweight Deck Girder Superstructure

- 9,000 psi mix
- 122pcf Concrete Weight Unit
- 133pcf Girder Unit Weight

Designed for Skidding

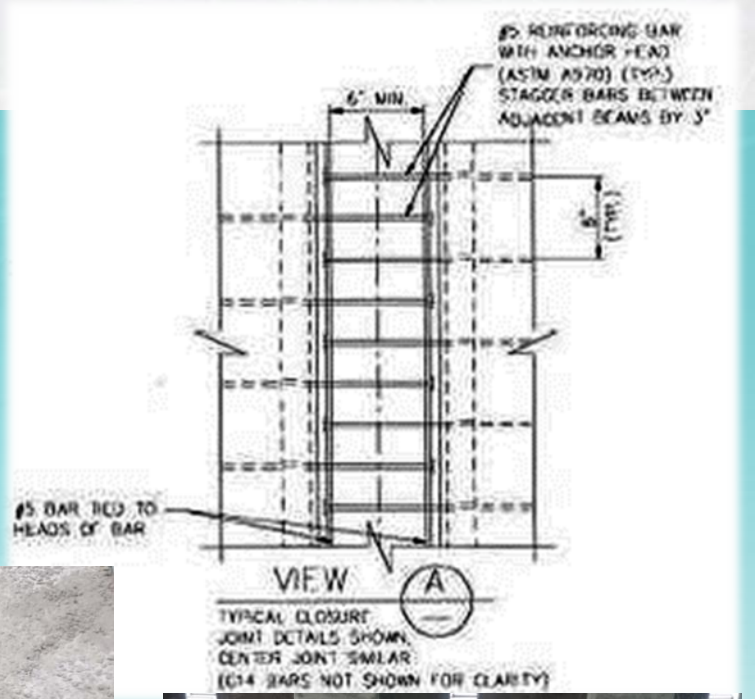
- Conventional bearing locations
- Temporary support at intermediate diaphragms

Other Unique Aspects

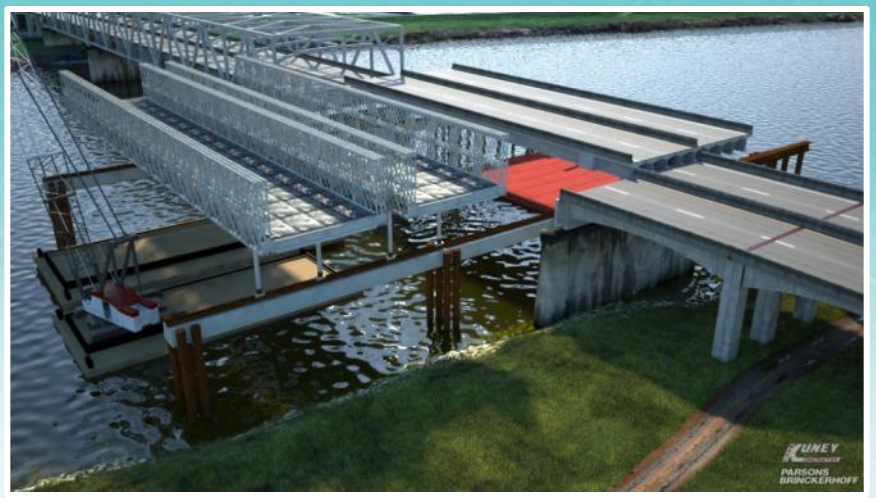
- Full moment girder connections
- Beam spacing accommodates ACROW pedestals
- Geometry control

Girder to Girder Connection

- Full flexural-shear transfer
- Eliminated girder line
- Reduced cracking potential



Skidding System Features (three design days)



Construct Girders in Permanent Bearing Locations

- Two temporary bents
- Twelve 24” ϕ pipe bents
- Approx. 50’ about mudline

Skid Track

- Located 20’ from each end
- Facilitates ACROW removal
- Avoids conflict between temporary piles and existing piers
- 56-24” ϕ pipe piles

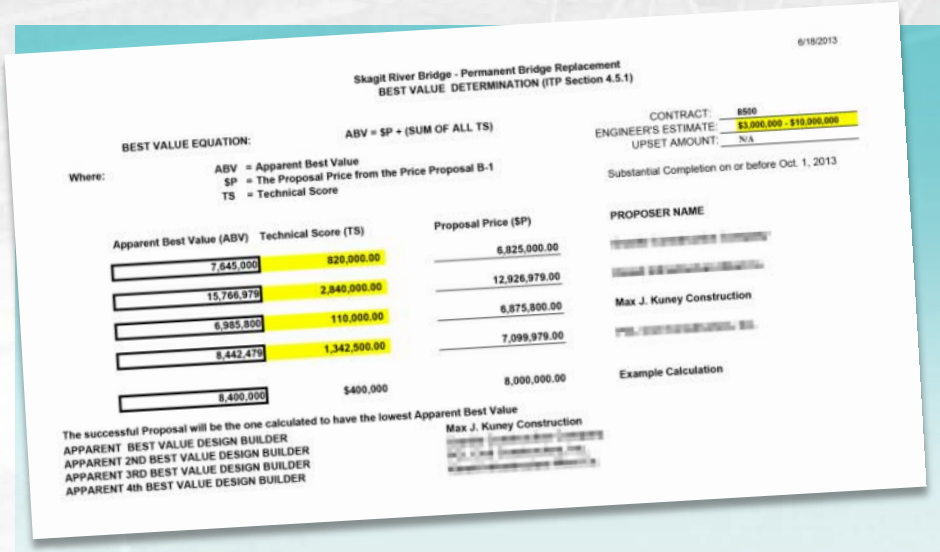
Heavy Trussed Beams

- Span 77’ under ACROW
- Transfer new span in
- Transfer ACROW out

Bid Results

Summary

- Three close bidders
  - Price within $200,000
- We won on technical score by $700,000



6/18/2013

Skagit River Bridge - Permanent Bridge Replacement
BEST VALUE DETERMINATION (ITP Section 4.5.1)

BEST VALUE EQUATION: ABV = $P + (SUM OF ALL TS)

Where:
ABV = Apparent Best Value
$P = The Proposal Price from the Price Proposal B-1
TS = Technical Score

CONTRACT: 8500
ENGINEER'S ESTIMATE: $3,000,000 - $10,000,000
UPSET AMOUNT: N/A

Substantial Completion on or before Oct. 1, 2013

Apparent Best Value (ABV)	Technical Score (TS)	Proposal Price ($P)	PROPOSER NAME
7,645,000	820,000.00	6,825,000.00	[redacted]
15,766,979	2,840,000.00	12,926,979.00	[redacted]
6,985,800	110,000.00	6,875,800.00	Max J. Kuney Construction
8,442,479	1,342,500.00	7,099,979.00	[redacted]
8,400,000	$400,000	8,000,000.00	Example Calculation

The successful Proposal will be the one calculated to have the lowest Apparent Best Value

APPARENT BEST VALUE DESIGN BUILDER — Max J. Kuney Construction
APPARENT 2ND BEST VALUE DESIGN BUILDER — [redacted]
APPARENT 3RD BEST VALUE DESIGN BUILDER
APPARENT 4th BEST VALUE DESIGN BUILDER

Project Kickoff – NTP (June 19, 2013)

Design Activities

- Replacement Span Firsts:
  - WSDOT lightweight girder
  - Full moment girder connection
  - Span designed to be lifted 20’ from ends
- Temporary Works:
  - Temporary bents
  - Skid beam bents
  - Elevation Control
  - Skid Beams

Design Delivery

- WSDOT over the shoulder reviews
- Shop drawings concurrent with design
- Design concurrent with construction

Temporary Works Design/Construction

Temporary Bents

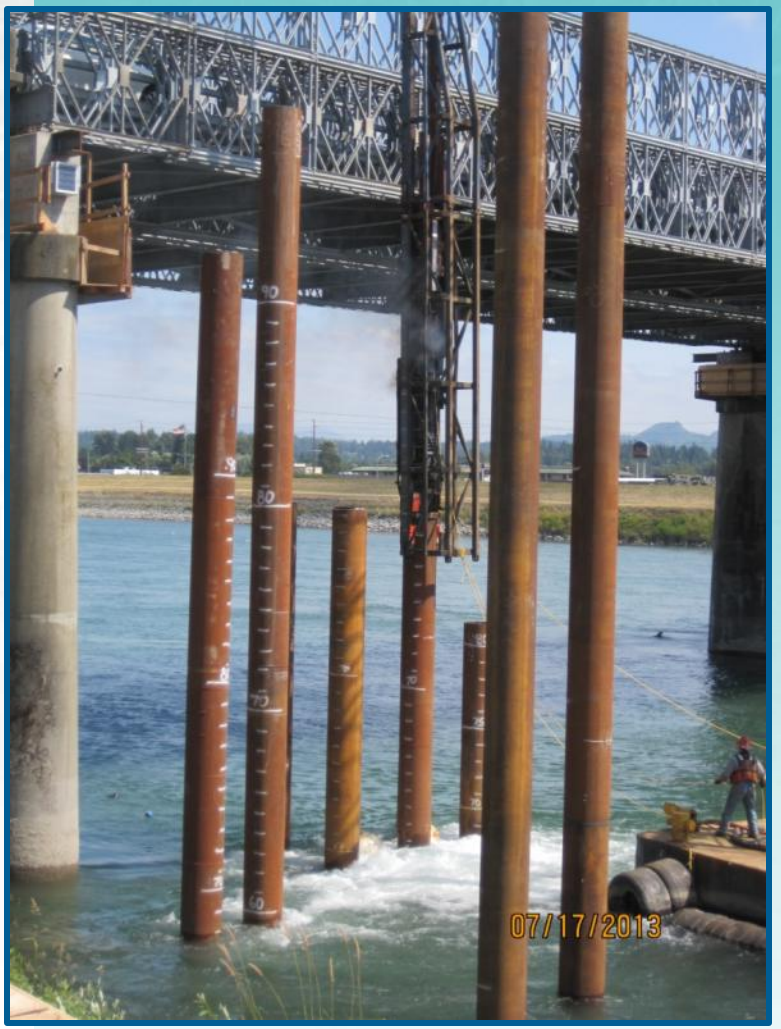
- Adjacent to existing bridge
- Cantilevered condition
- 50’ high above mudline

Skidding Bents

- Pile clusters to support main span
- Pile layout for other spans

Heavy Trussed Beams

- Span 77’ under ACROW
- Other beam details



Replacement Span Design/Construction

Lightweight Concrete Girders

- **Day 2:** Aggregate shipped
- **Day 5:** Final girder design and shop drawings commence simultaneously
- **Day 20:** Design RFC and shop drawings complete
- **Day 22:** First girder cast
- **Day 37:** Final girder cast

Project Timeline

Thursday, May 23: Bridge collapses

May 26: Governor's press conference

June 20 – August 18
Permanent span construction

Early September: Bridge move

May 31: Pre-bid

June 3: LOI due

June 17: Bids due

June 18: Bids open

June 19: NTP

June 23: Girder shop drawing production starts

July 2: Temporary works design begins

July 19: Flexi-floats assembled

August 1: Temporary works design complete

August 12: Trestle bent construction complete

August 18: Final pile driven

MAY | **JUNE** | **JULY** | **AUGUST** | **SEPT**

May 24: Emergency work begins

ACROW bridge construction

June 19: ACROW bridge opens

July 9: Girders RFC

July 9: Finalize pile layout

July 11: First girder cast

July 11: First temporary pile inground

July 26: Final girder cast

August 13–15: Permanent girders set

October 1: Contractual deadline

KUNEY CONSTRUCTION SINCE 1930 GENERAL CONTRACTORS

PARSONS BRINCKERHOFF

OMEGA MORGAN STRENGTH AND TRUST

Lifting Diaphragms

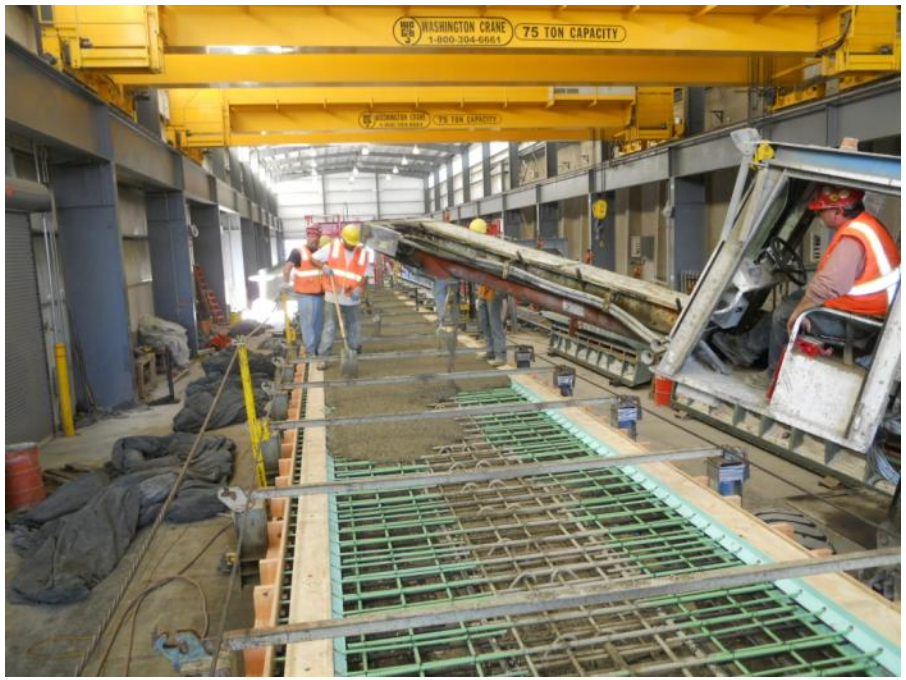
Skidding Support Condition

- Four point support
- Transition across skid beams

Design Details

- Weight an issue (915 tons)
- Reinforcement details

Precast Girder Construction

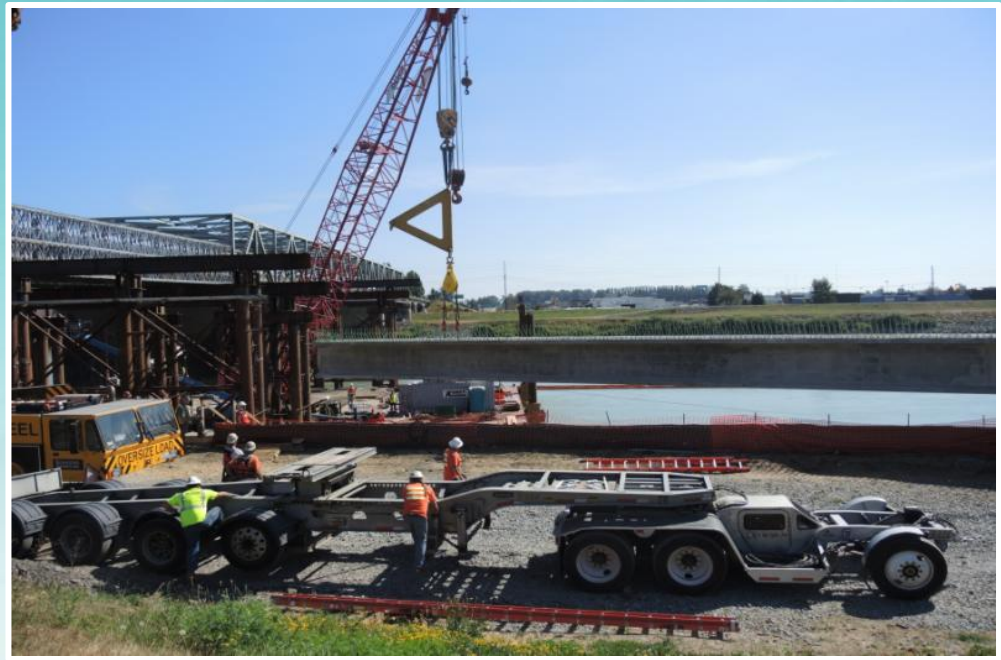


Temporary Pile Bents

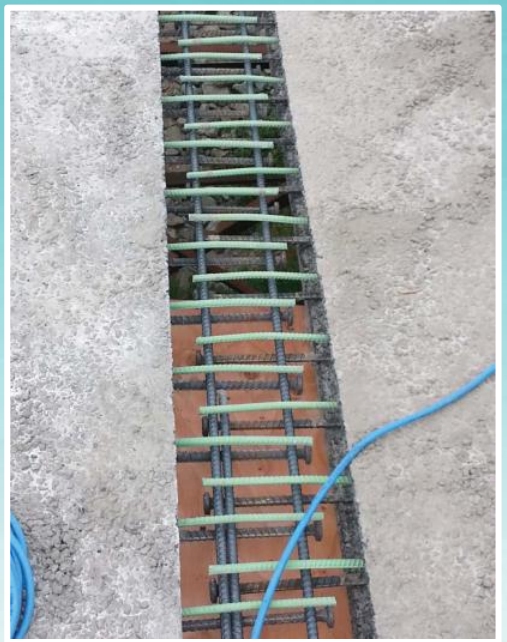
Skidding Bents

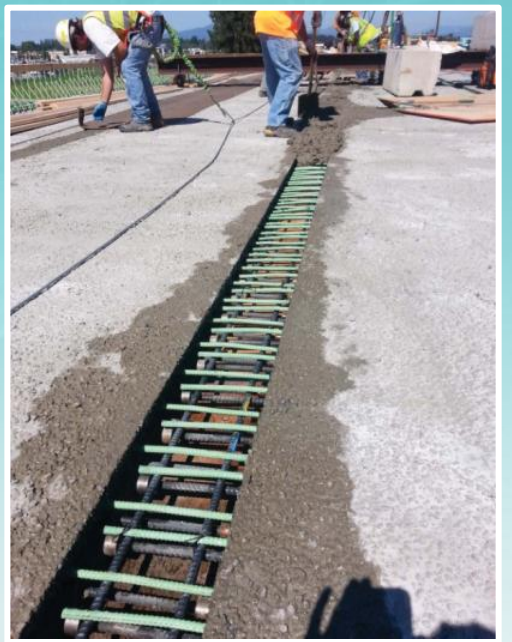
Truss Beam

Set Prestressed Concrete Girders



Girder Closure Pours





Intermediate Diaphragms

Pour Concrete Barriers and Overlay

Prepare to move bridges

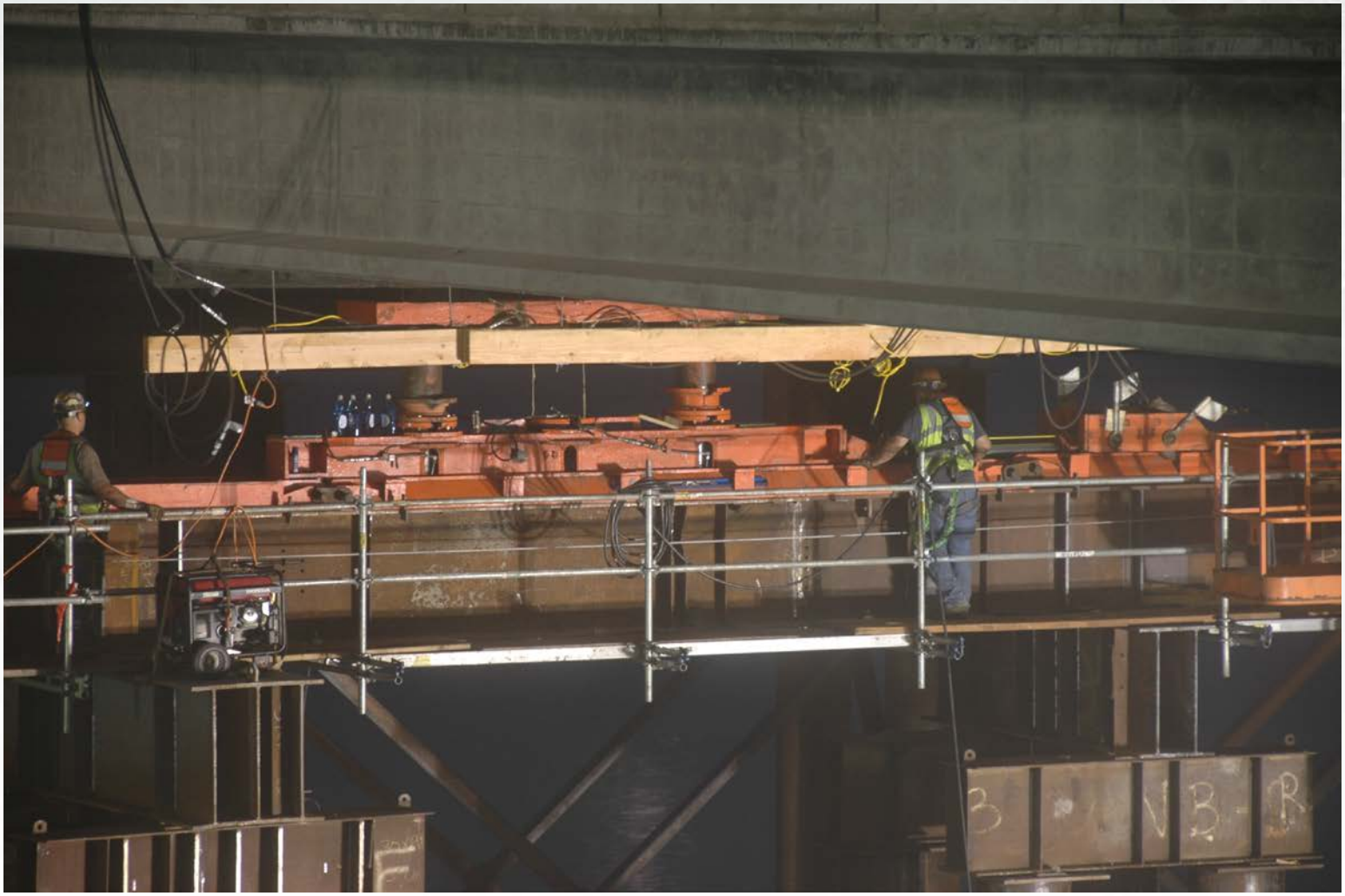
Move temporary ACROW bridges

Move temporary ACROW bridges

One down, one to go…

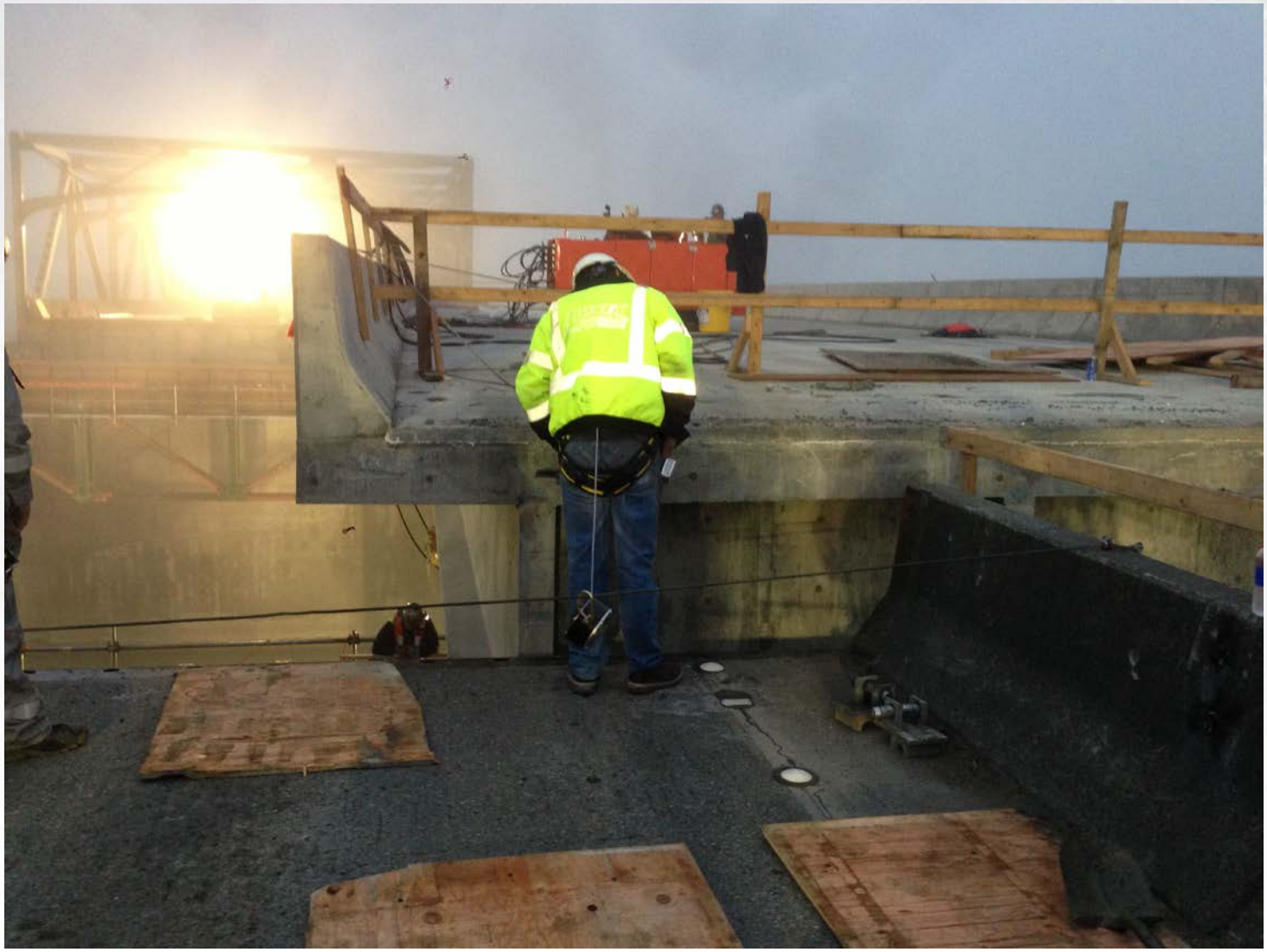
Ready to move new span

Skid new span into place

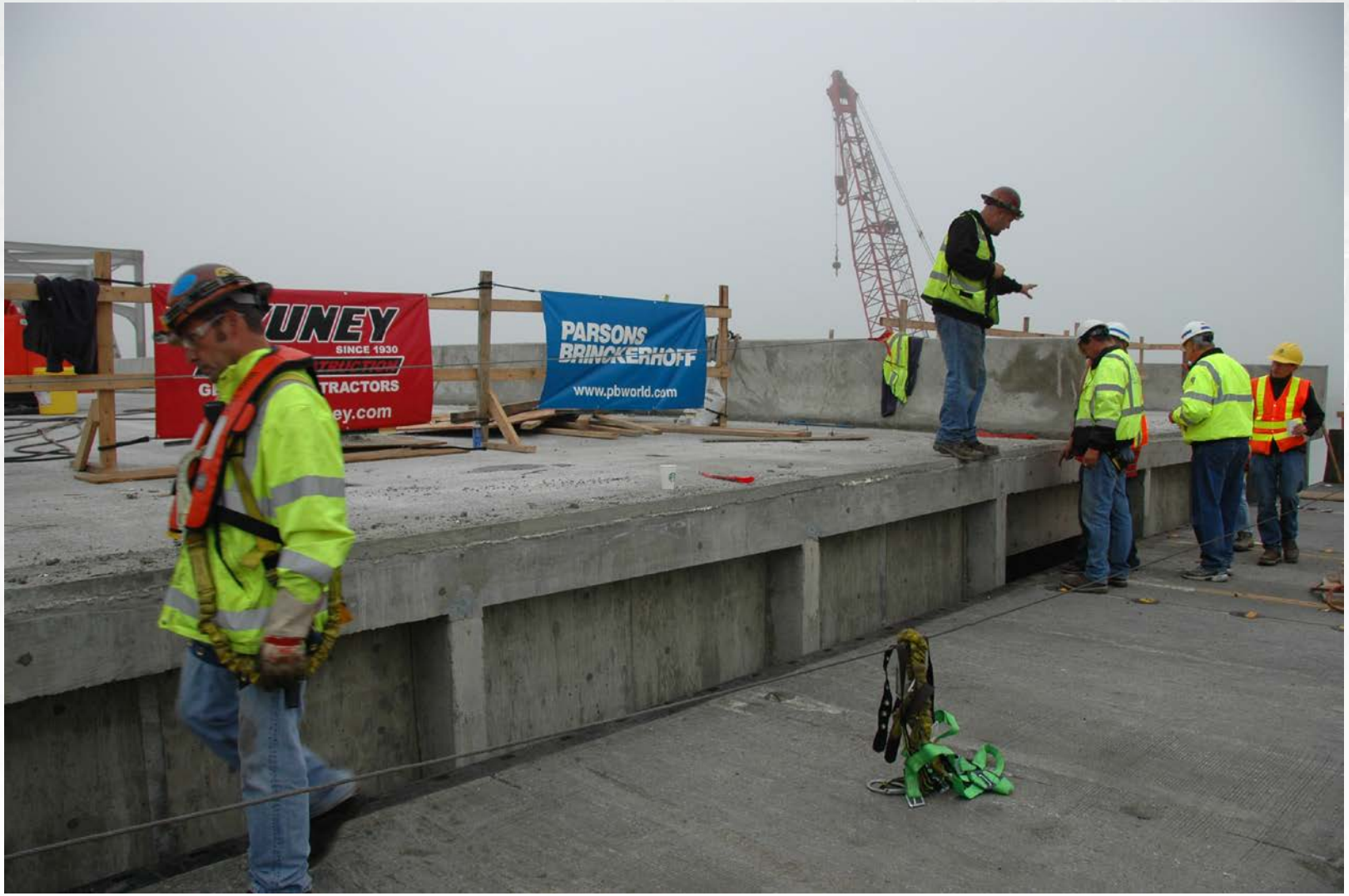


Skidding system

Moving the new span into place



Lowering the new span into place



Bridge in place

Add striping, clean up, and open

Bridge open to traffic

Lessons Learned

- Examine the existing site conditions carefully
- Utilize As-Builts of the existing structure to look for conflicts
- Ensure critical materials are available to meet the schedule
- Ensure the local labor force can meet the needs of the project
- Federally funded projects have additional requirements
- Examine the risk transfer, especially in Design-Build

Bridge Slide Video


Questions?

Q&A Panel

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Websites/Resources

- SIBC Webinar Training Project Website
  - www.slideinbridgeconstruction.com
  - 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
  - Many other resources, case studies, etc. also available

SIBC Modules

- Web-based Training
  - 3 Modules: SIBC Part 1, Part 2, and Part 3
  - Each goes “live” with the associated webinars above
  - Module 3 will be available Friday, Dec. 18 at http://slideinbridgeconstruction.com

FIU ABC Center Training

NEXT WEBINAR:

Thursday, December 17, 2015 (1:00 – 2:00 pm Eastern)

“Industry Perspective on Precast Element Details for Successful ABC Projects”

To register, visit: http://www.abc-utc.fiu.edu

(earn one hour of PDH)

Slide IT

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LATERAL MOVE
TECHNOLOGY

Accelerated Bridge Construction (ABC)

U.S. Department of Transportation
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THANK YOU FOR YOUR PARTICIPATION!

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

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