Slide-In Bridge Construction (SIBC)

FHWA SIBC Cost Estimation Tool
Western Bridge Engineers Seminar

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Michael Baker International

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U.S. Department of Transportation
Federal Highway Administration

Michael Baker INTERNATIONAL

leidos

Every Day Counts (innovation, ingenuity, invention, imagination)

Project Team

- Leidos and Michael Baker International
  - AJ Yates – Lead Investigator
  - Eric Perry – Program Manager
- Federal Highway Administration
  - Laura Lawndy – Contracting Officer Representative
  - Romeo Garcia – Technical Representative

Project Team

- Technical Working Group
  - James Nelson – Iowa DOT
  - Tony Lesch – Minnesota DOT
  - Albert Nako – Oregon DOT
  - Becky Nix – Utah DOT
  - James Luebke – Wisconsin DOT

Project Scope

- Develop a cost estimation tool to facilitate the preparation of construction cost estimate for SIBC Projects

Deliverables

- Spreadsheet (xlsx)
- Guidelines (pdf)

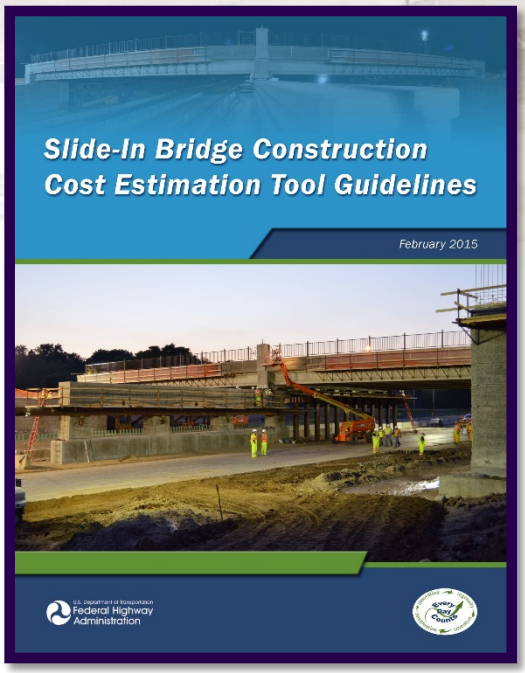
FHWA SIBC Cost Estimation Tool

- Guidelines

  http://www.fhwa.dot.gov/construction/sibc/pubs/costest/sibc_costest.pdf

- Spreadsheet

  http://www.fhwa.dot.gov/construction/sibc/pubs/costest/sibc_costest.xlsx



Slide-In Bridge Construction Overview

Slide-In Bridge Construction Overview

- Benefits
  - Enhanced safety to both construction crews and traveling public
  - Shortened on-site construction time
  - Reduced mobility impacts
  - Improved quality
  - Improved constructability

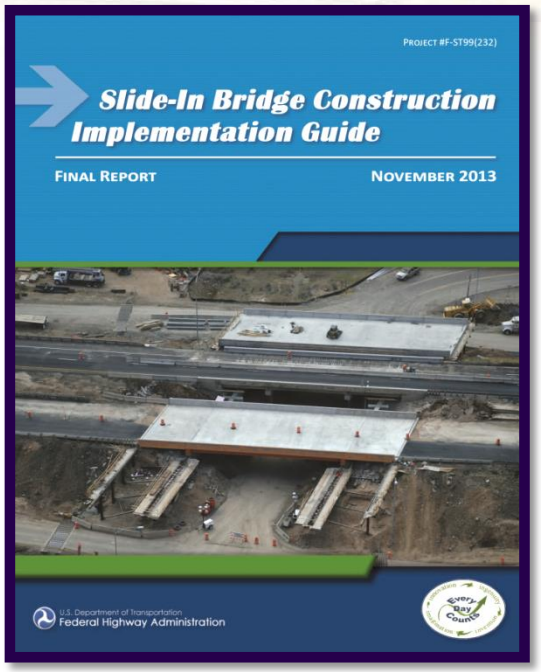
Slide-In Bridge Construction Overview

- Limitations
  - Limited right-of-way (ROW) for staging
  - Geometric constraints
  - Lack of SIBC experience
  - Profile changes
  - Utility impacts

FHWA SIBC Implementation Guide

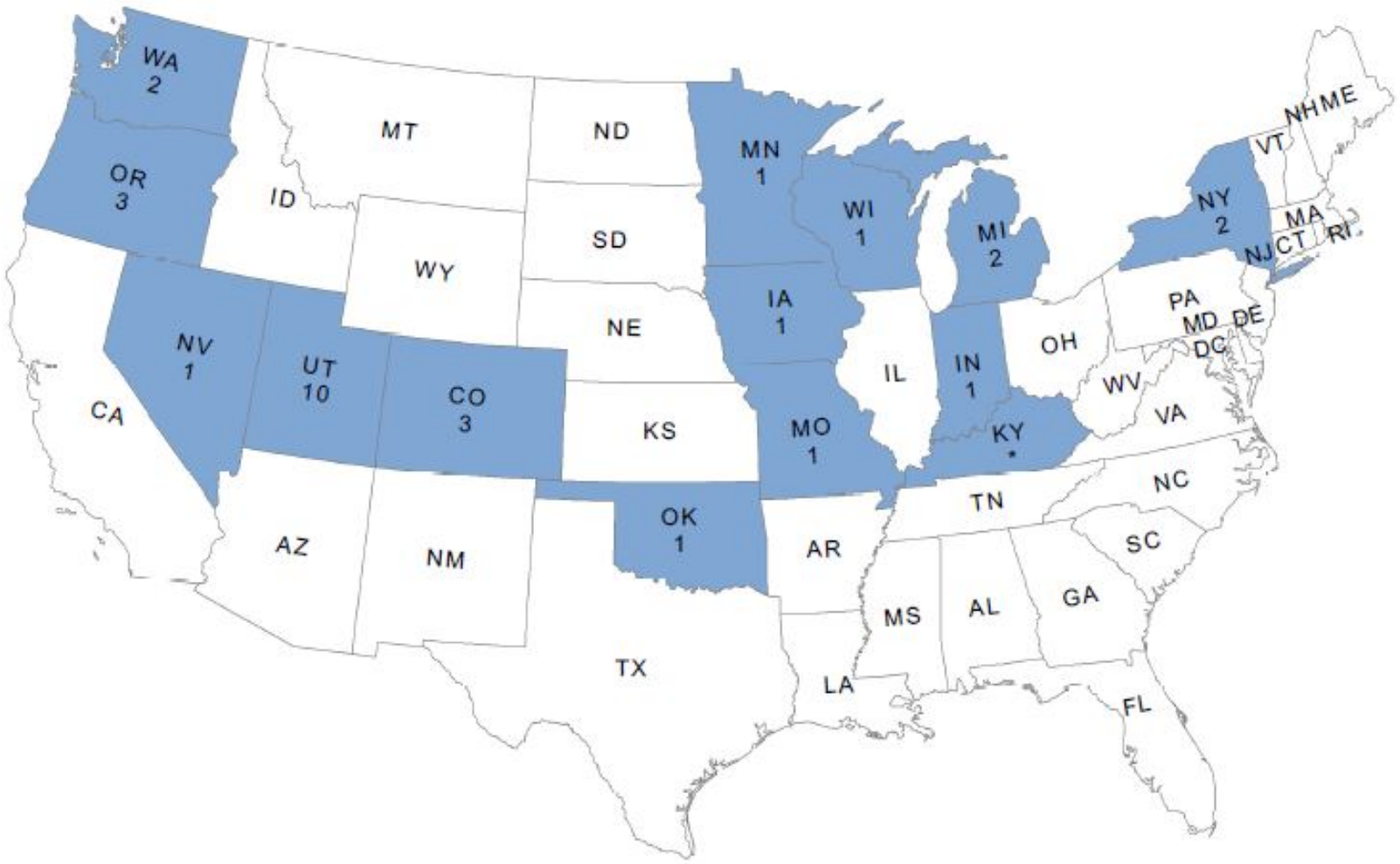
http://www.fhwa.dot.gov/construction/sibc/pubs/sibc_guide.pdf

- Development Team
  - Utah Department of Transportation
  - Michael Baker International
  - H. Boyle Engineering
  - Ralph L. Wadsworth



Data Collection

- Identified 29 completed SIBC projects nationwide
  - 22 D-B-B, 7 D-B
  - Project Cost Forms
- Data Reliability



*Milton-Madison Bridge Shares a Border With Kentucky

No SIBC Projects in Alaska or Hawaii

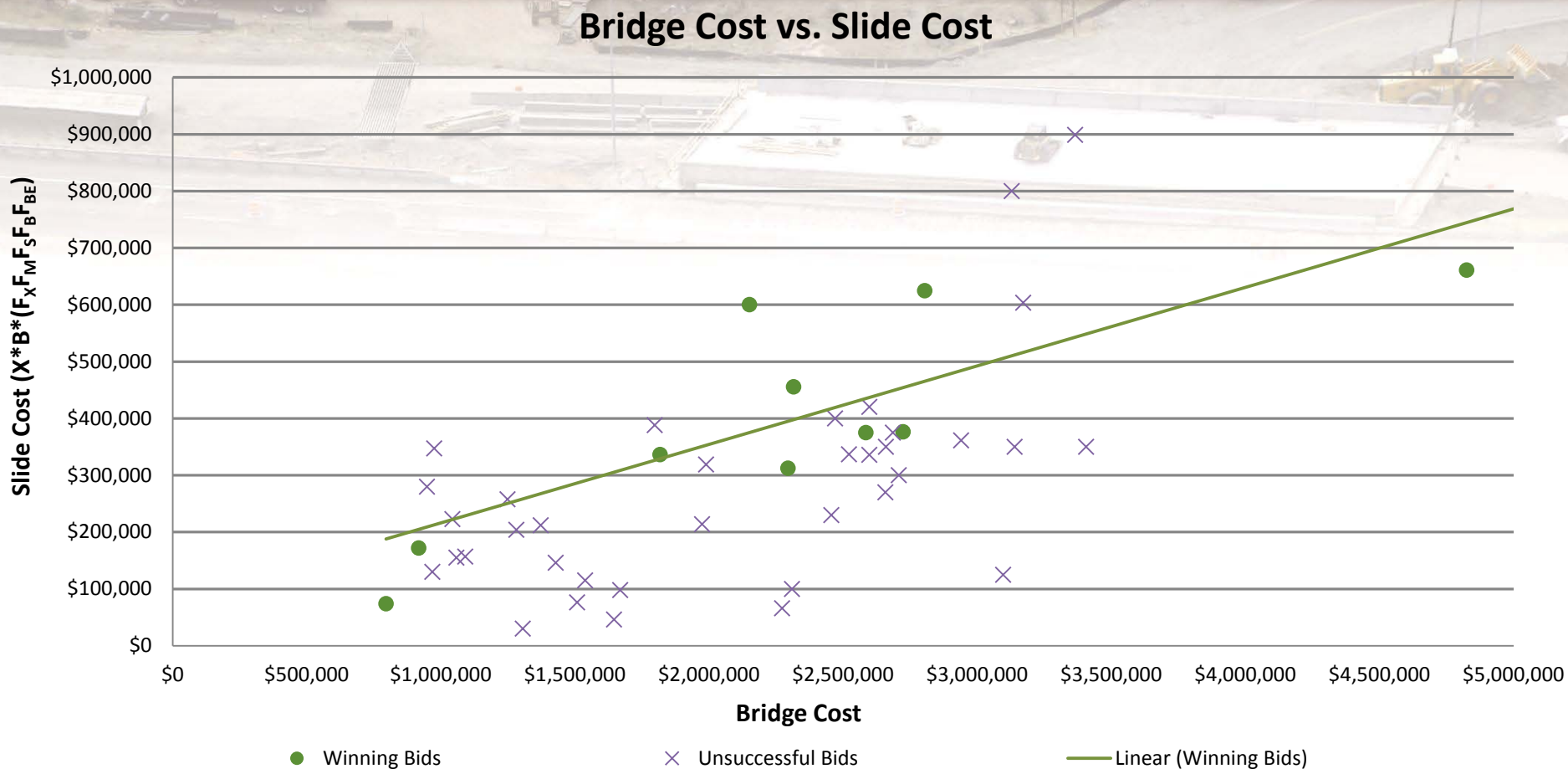
Data Collection

Criterion	Range of Values	Average
Year Constructed	2009 to 2014	N/A
Project Duration (months)	2 to 19	9
Closure Duration (hours)	14 to 1,128	178
Estimated Bridge Cost without SIBC ($)	$795k to $25M	$4.8M
Slide Cost ($)	$74k to $2.7M	$475k
Ratio of Slide Cost to Estimated Bridge Cost without SIBC (%)	1.2% to 28.4%	15.6%
Schedule Reduction (Days)	36 to 365	151

Estimation Approaches

- Statistical Modeling
  - $ax + by + cz \ldots = E$
- Summation of Costs
  - $\sum(x + y + z \ldots) = E$
- Factored Bridge Cost
  - $XB(f_1 f_2 f_3 \ldots f_n) = E$

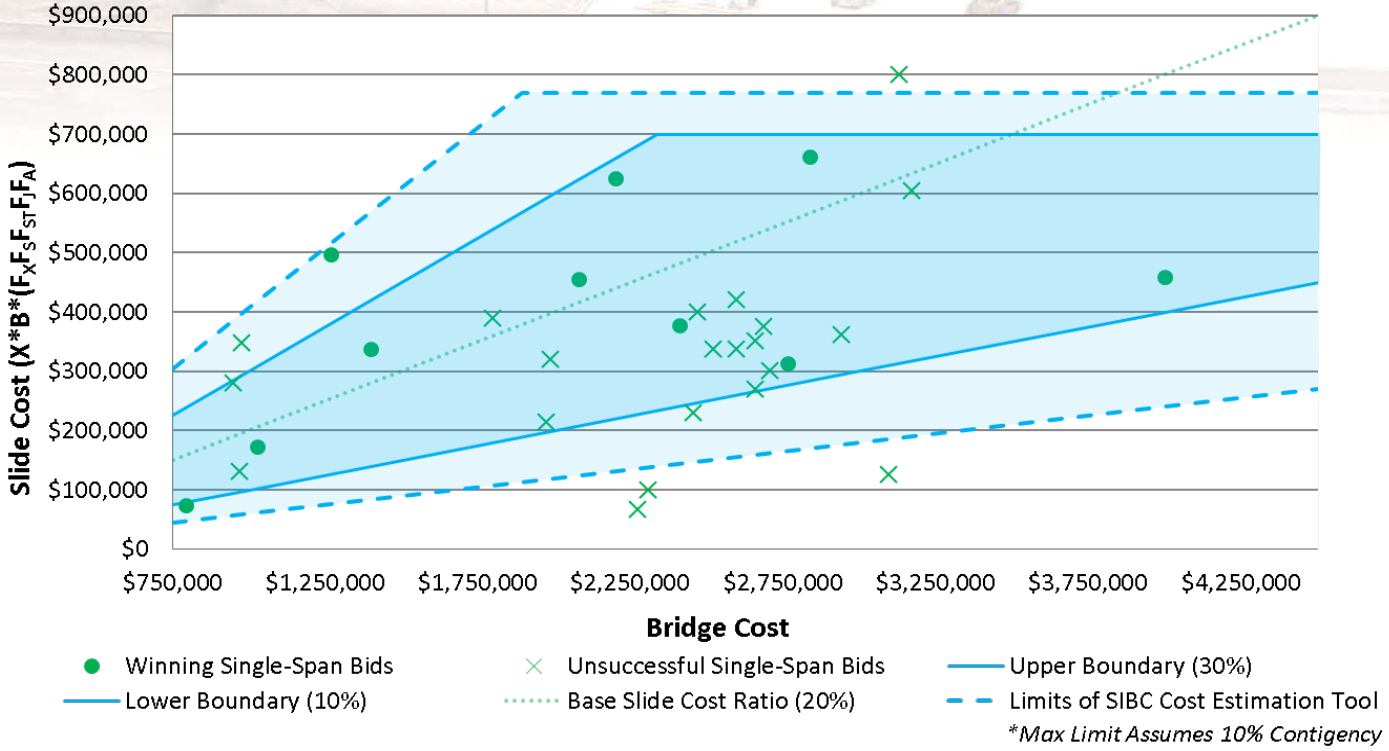
Data Collection



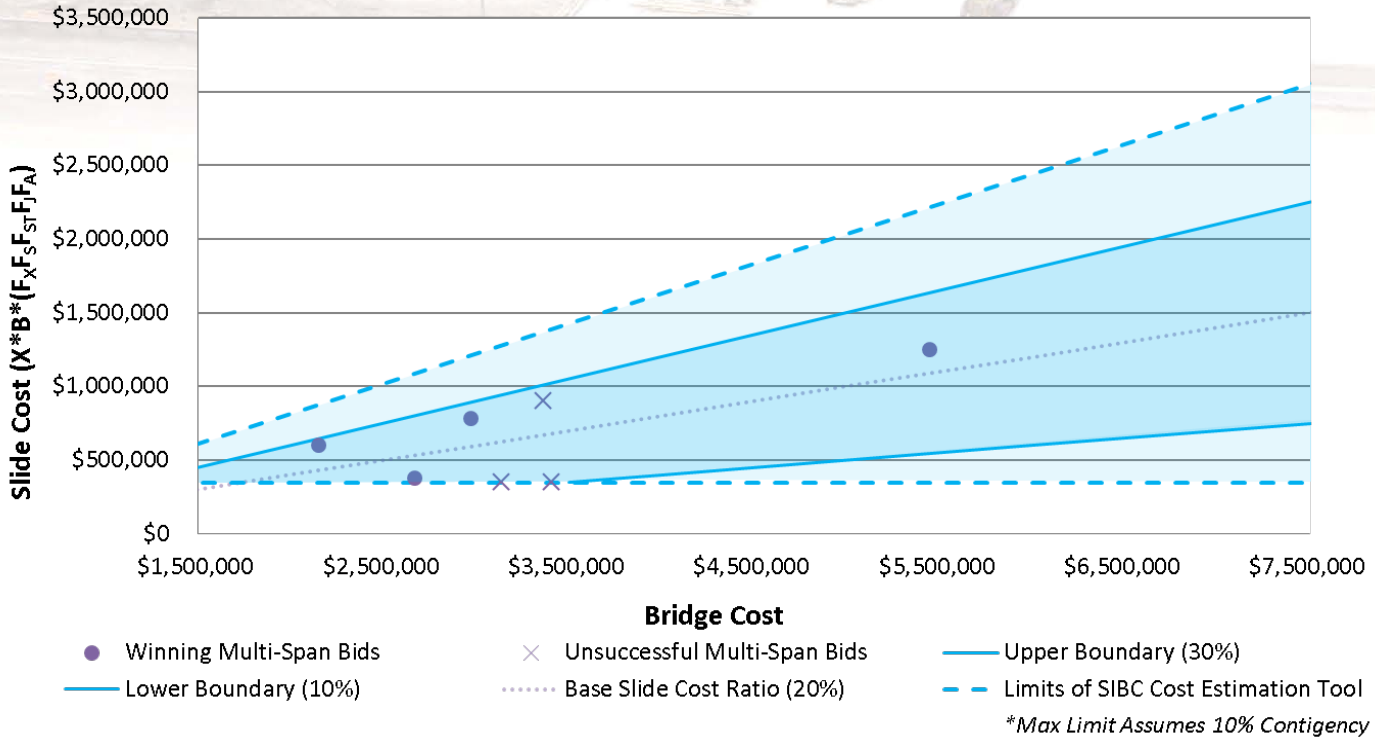
Methodology

Estimated Slide Cost		Additional Construction Cost Inputs		Additional Project Cost Inputs		Total Estimated SIBC Cost
$(1 + C) * X * B * (F_X F_M F_S F_B F_{BE})$	+	$S + D$	+	$A + I$	=	E
C = Construction Contingency (%) **X** = Estimated Bridge Cost Without SIBC ($) **B** = Base Slide Cost Factor **F** = Cost Adjustment Factor Based on Slide Characteristics		**S** = Additional Site Costs Required for SIBC ($) **D** = Additional Bridge Construction Costs Required for SIBC ($)		**A** = Additional Administrative Costs Required for SIBC ($) **I** = Incentives/ Disincentives ($)		**E** = Estimated Cost of SIBC ($)

Single Span Bridges



Multi-Span Bridges



Cost Adjustment Factors

- Agency Experience
- Materials
- Site Complexity
- Bridge Complexity
- Bidding Environment

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Sample Calculations