

Design-Build Research Summary

WSDOT Project Delivery Method Review Task Force

September 18, 2024

Keith Molenaar, Ph.D.

University of Colorado Boulder

Douglas Gransberg, Ph.D. PE

Gransberg and Associates

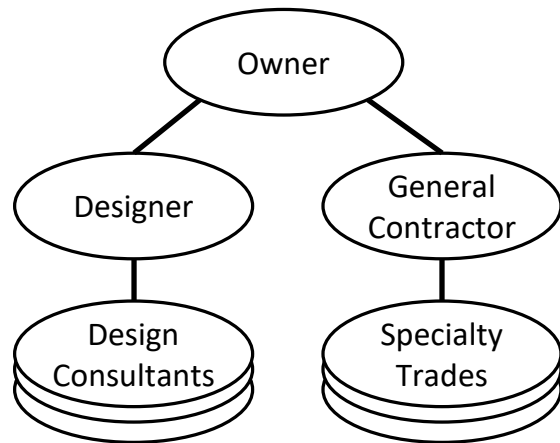
Presentation Outline

- Brief Design-Build Background
- Project Delivery Performance and Cost Certainty Comparison
- Equitable Design-Build Risk Allocation
- Next Steps and Open Discussion

Research Motivation

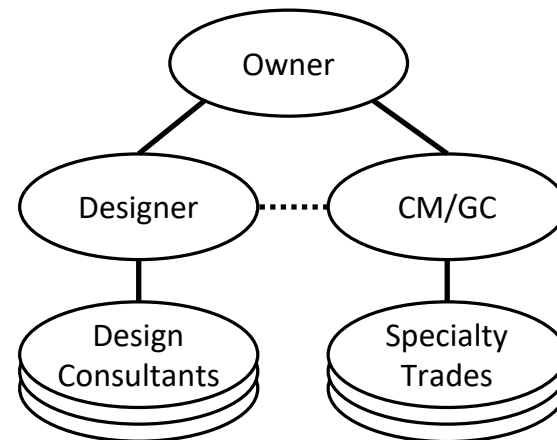
To improve owner decision-making by providing current benchmarks for *project delivery system* performance

Design-Bid-Build



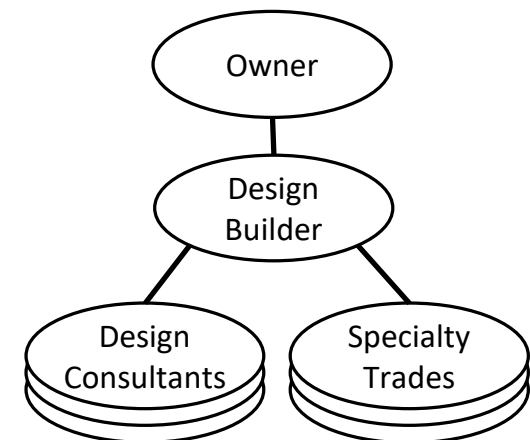
vs.

Construction Manager at Risk



vs.

Design-Build

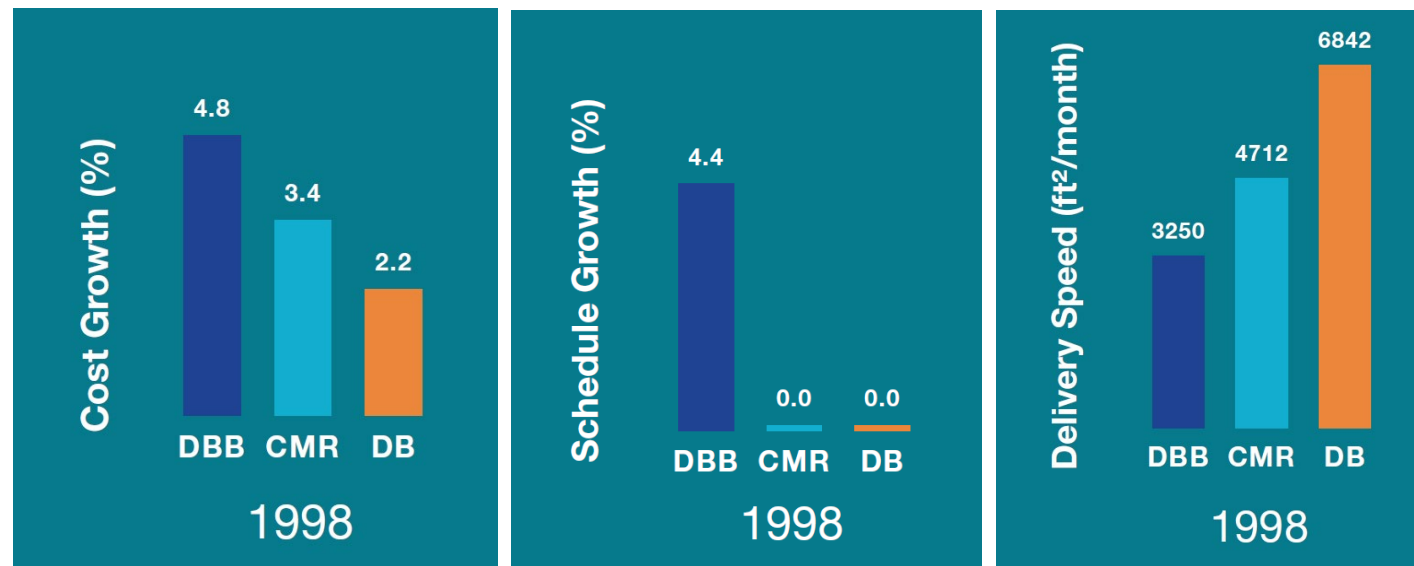


Project Delivery Research

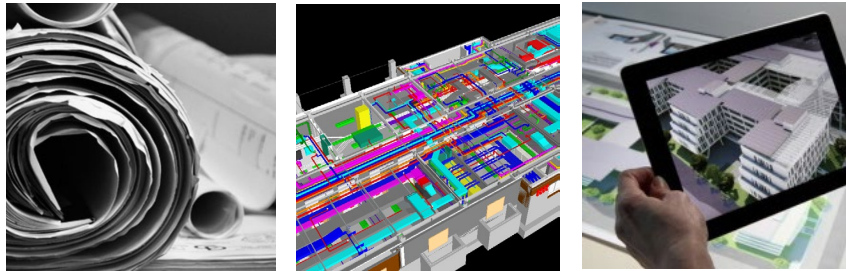
- Revisiting Project Delivery Performance
Pankow Foundation/Construction Industry Institute
<https://www.pankowfoundation.org/our-work/research-grants/project-delivery/integrated/02-18-revisiting-project-delivery-performance/>
- Alternative Contracting Method Performance in U.S. Highway Construction
Federal Highway Administration
<https://www.fhwa.dot.gov/publications/research/infrastructure/17100/17100.pdf>
- ACEC Research Institute Design-Build Study
ACEC Research Institute
<https://program.acec.org/2022-design-build-study>

1998 CII Benchmark

In 1998, the **Construction Industry Institute (CII)** released a report comparing the performance of DBB, CMR and DB project delivery systems based on data from 351 projects:



20 Years of Change



Technological change that enables more complex engineering, design and management

A focus on **sustainability** to improve the efficiency of buildings and reduce waste in the process



Organizational change that promotes collaboration across disciplines

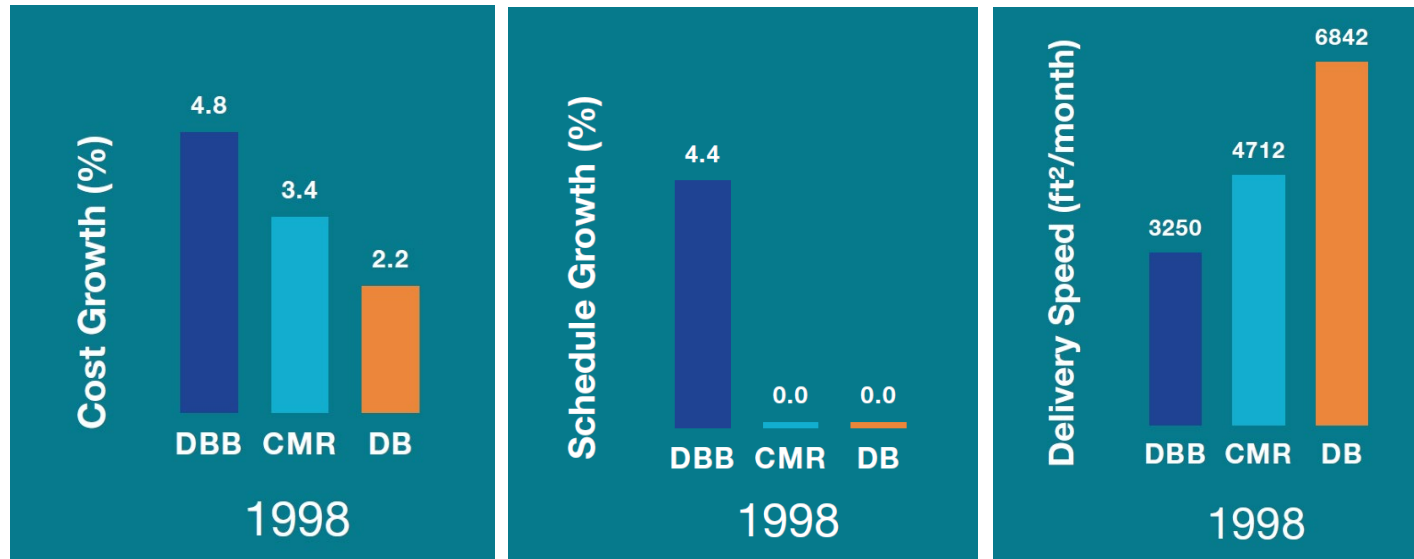
2018 CII/Pankow Benchmark

Now, the **CII** and **Charles Pankow Foundation** sponsored a study to repeat the same comparison with a set of contemporary projects and answer the question:

Does the Design-Build delivery system still outperform the alternatives?

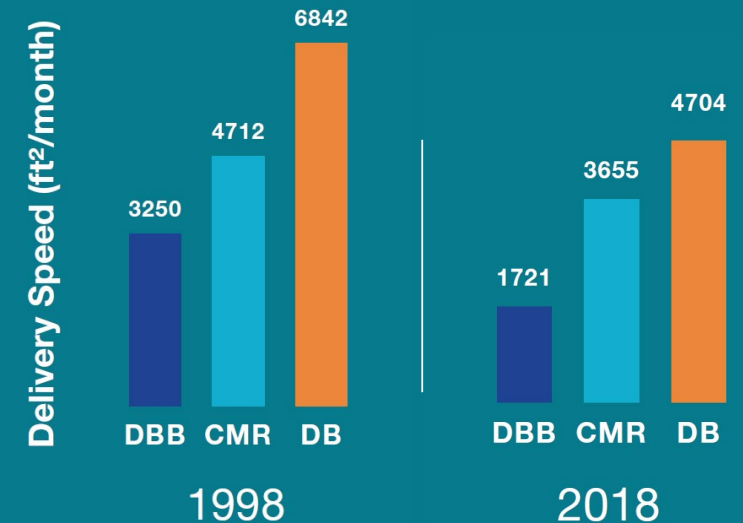
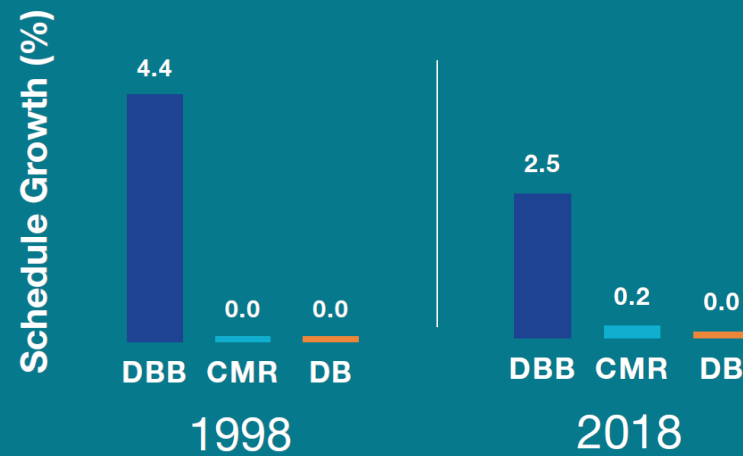
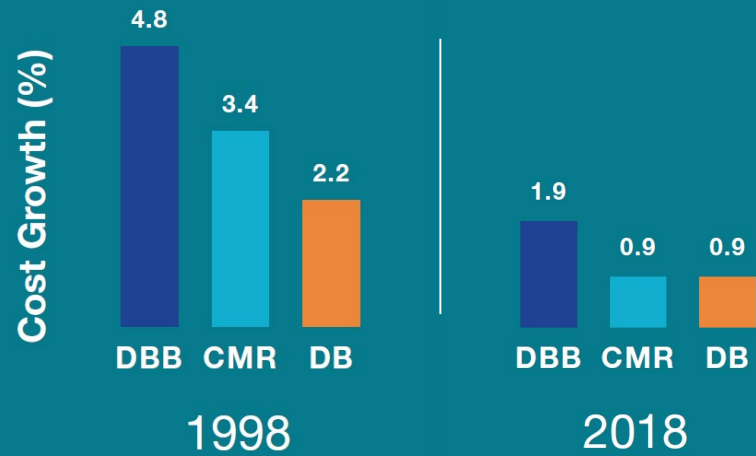
Summary of Findings

After 20 years...



Summary of Findings

After 20 years...

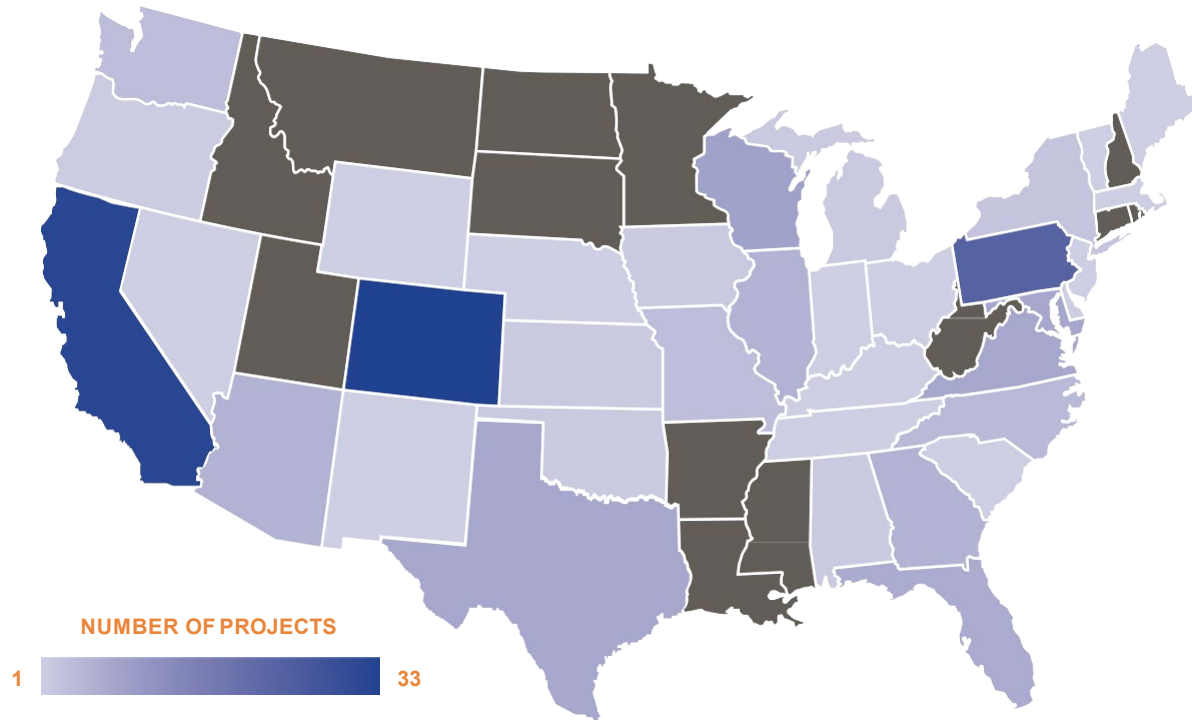


Summary of Findings

After 20 years...

- The **delivery speed** of Design-Build projects has increased, relative to DBB and CMR projects
- Design-Build projects are still more reliable than DBB and CMR projects, in terms of **cost and schedule growth**
- On a per **square-foot cost** basis, Design-Build projects are equivalent to or slightly less than DBB and CMR projects

Project Data Set

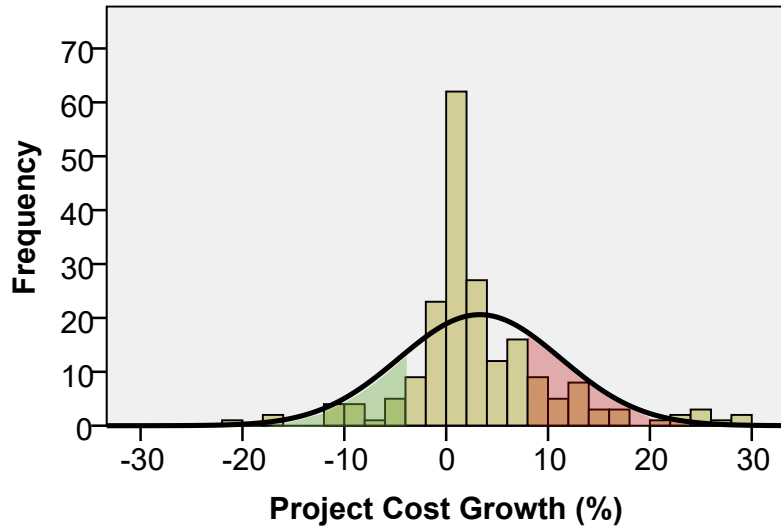


212
Projects
completed
(2008 - 2013)

53 Design-Bid-Build
79 CM at Risk
80 Design-Build

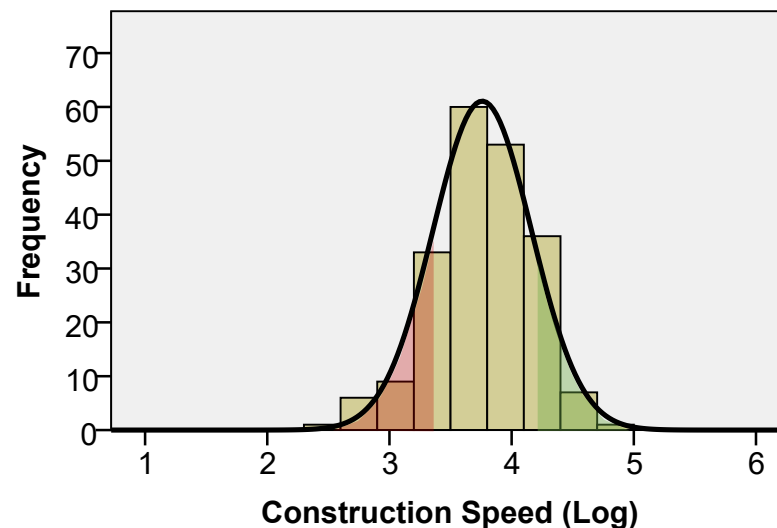
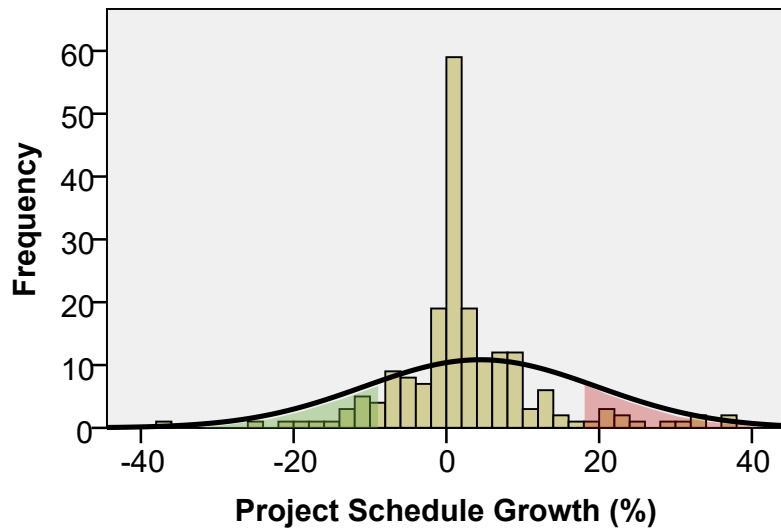
62% Publicly Funded / **38%** Privately Funded

Validation: Best and Worst Performers



24 Projects appeared in at least three of the best performing quartiles (**green** shaded areas)

38% agreed to a follow-on interview



16 Projects appeared in at least three of the worst performing quartiles (**red** shaded areas)

44% agreed to a follow-on interview

Results: Lessons Learned



The **best performing** projects differentiated themselves by:

- **Emphasizing a relational project culture:** Owners issued early expectations to the team to not tolerate arguments, unprofessionalism or unfairness
- **Repeated relationships:** Designer and/or builder often worked with the Owner on prior projects

Results: Lessons Learned



The **worst performing** projects were characterized by:

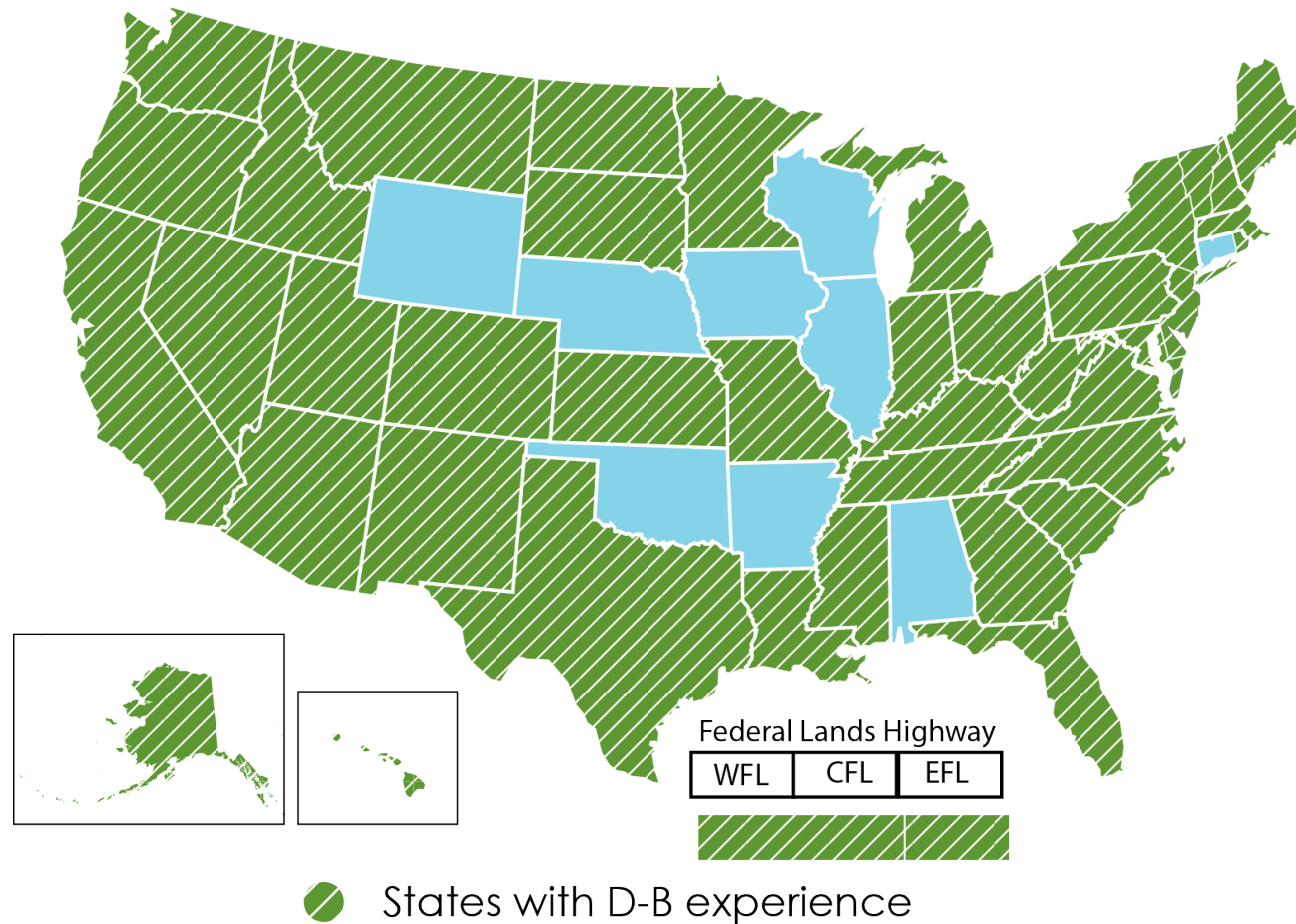
- **Lack of experience:** First-time project managers or the Owner's first time working with the project delivery method
- **Poor communication:** Breakdowns in communication leading to unrealistic expectations and delayed decision-making
- **Turnover in the team:** Understaffing creating high work loads, stress and errors

Project Delivery Research

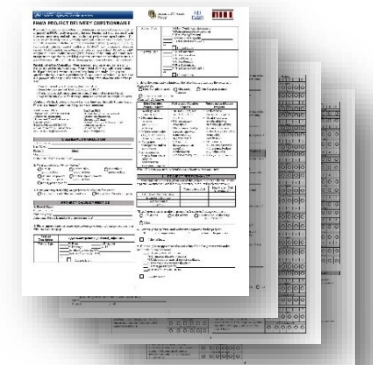
Alternative Contracting Method Performance in U.S. Highway Construction



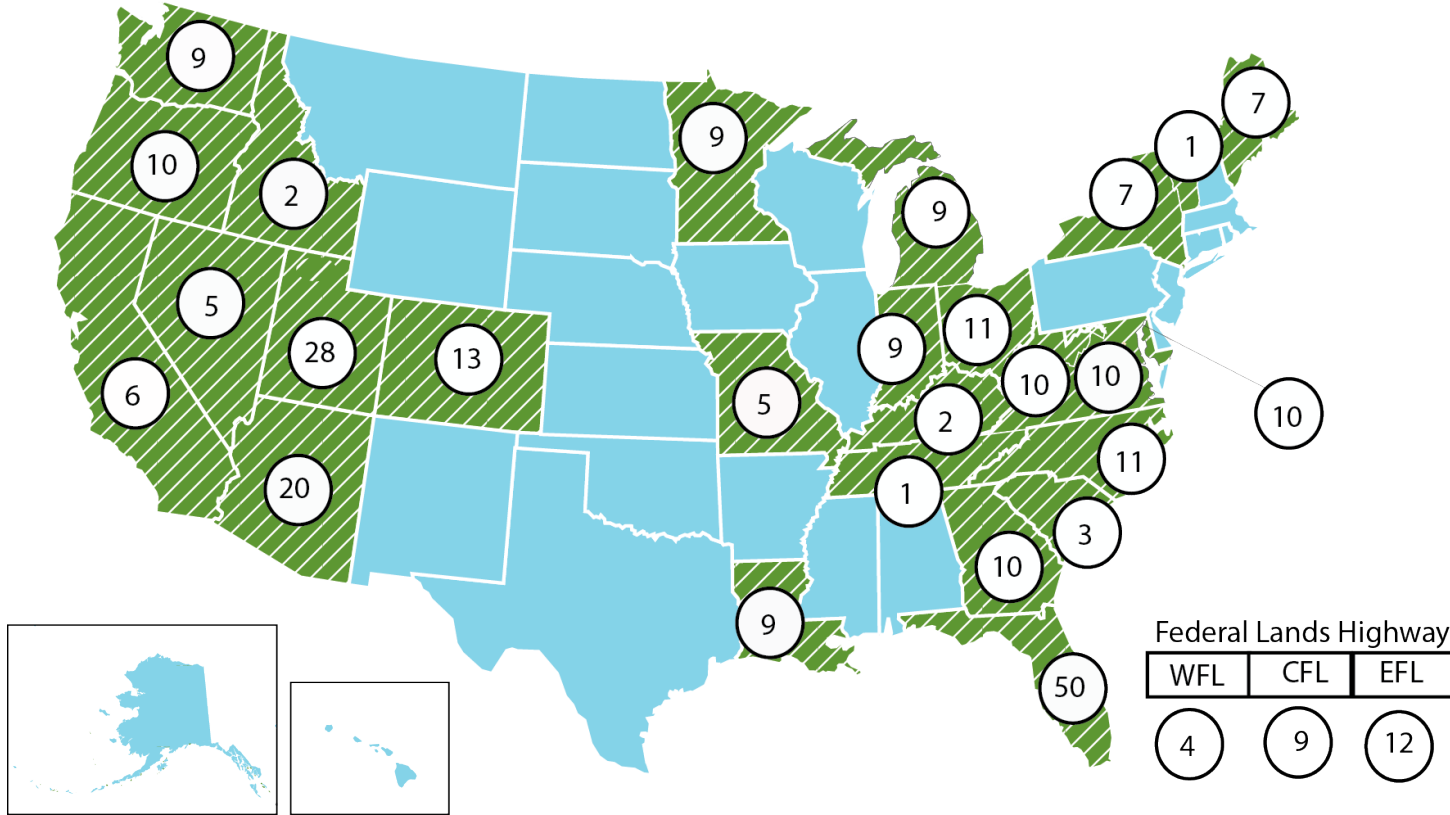
Tech Brief of Empirical ACM Performance



- Two-step data collection approach
 1. Contract cost and time from contracting databases
 2. Additional project characteristics from project managers
- Follow-up calls for data validation



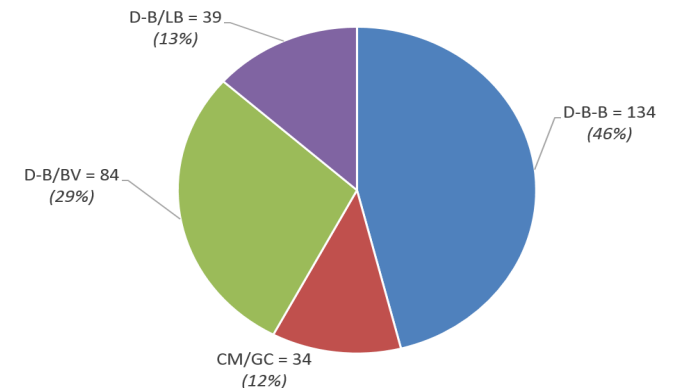
Tech Brief of Empirical ACM Performance



States That Contributed: D-B-B, CM/GC & D-B Projects

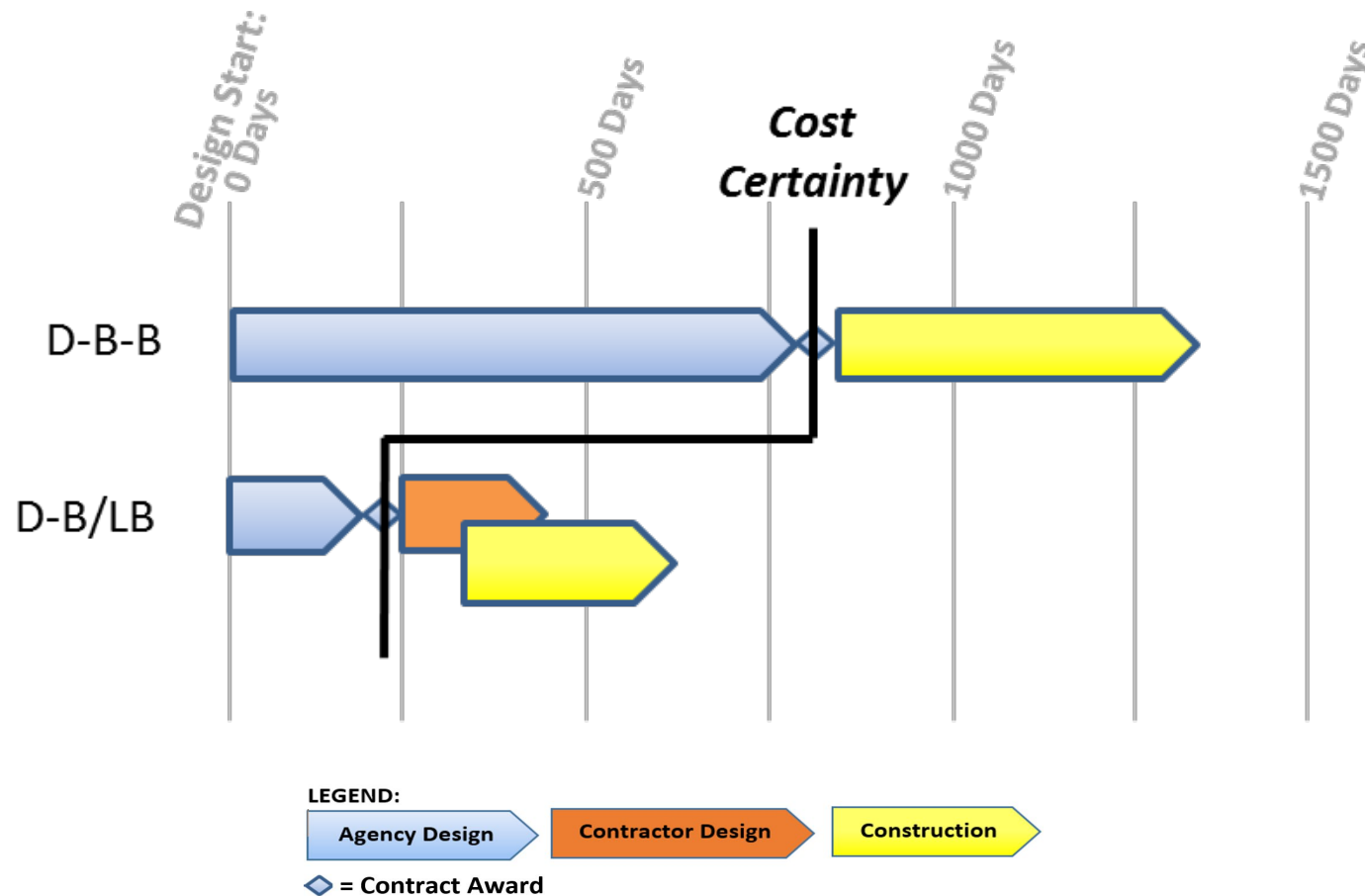
Research Data Collection

- 291 projects
 - 134 D-B-B projects
 - 34 CM/GC projects
 - 39 D-B/LB projects
 - 84 D-B/BV projects
- 28 agencies
- Completed 2004-2015



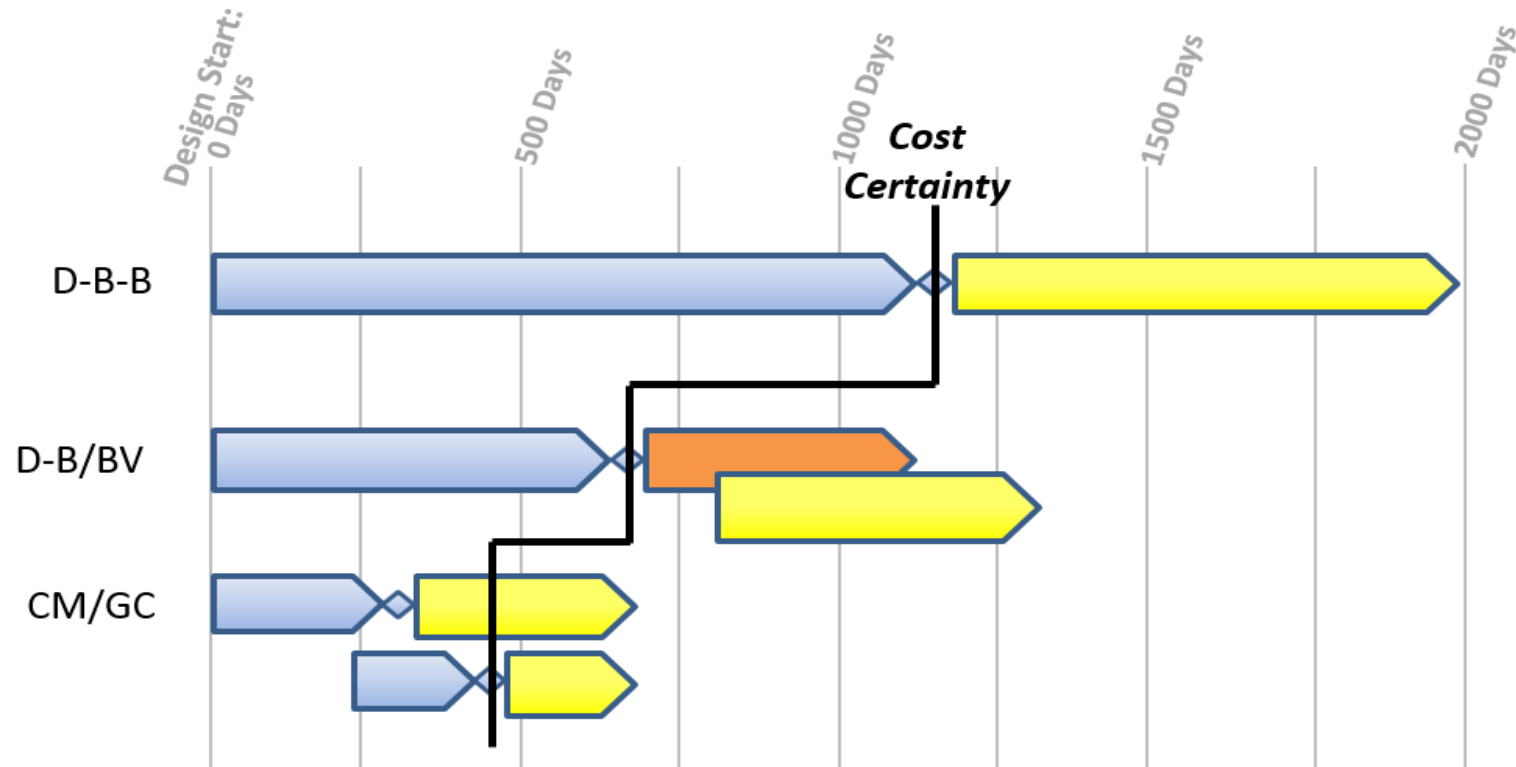
Tech Brief of Empirical ACM Performance

Timing of Award for D-B-B & D-B/LB projects between \$2M-10M

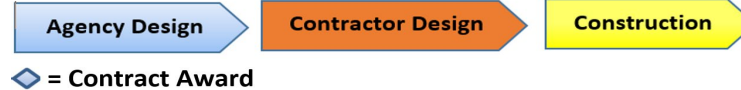


Tech Brief of Empirical ACM Performance

Timing of Award for D-B-B, CM/GC & D-B/LB Projects between \$10M-50M



LEGEND:



Relationship between ACMs and Change Orders

Average Impact (% of cost growth) of Change Order Categories

Change Orders	D-B-B (n = 65)	CM/GC (n = 19)	D-B/LB (n = 21)	D-B/BV (n = 57)
Agency Directed	1.2%	0.7%	1.6%	1.9%
Plan Quantity Changes	1.1%	0.3%	0.6%	0.2%
Unforeseen Conditions	2.4%	1.5%	1.8%	1.8%
Plan Errors and Omissions	0.9%	0.6%	0.1%	0.5%

Project Delivery Research

ACEC Research Institute Design-Build Study



Study Overview

Identify design-build firm challenges and make owner recommendations for successful project outcomes

OUR 3-STEP APPROACH

1

Firm-based data from 155 ACEC design firms of various sizes participating in DB projects across diverse US market sectors

2

Project performance data obtained from 105 completed DB projects of various sizes delivered in the US market

3

Interview findings from 16 case studies that were selected from best and worst performing projects

Why Now?

- 84% of ACEC firms experienced design-build growth in last five years
- Infrastructure Investment and Jobs Act (IIJA) will increase design-build megaprojects
- Project owners and design firms must address risk transfer and project harmony hurdles

MARKET SECTORS

1

INFRASTRUCTURE

includes transportation
and water/wastewater

2

BUILDINGS

includes all building types

3

HYBRID

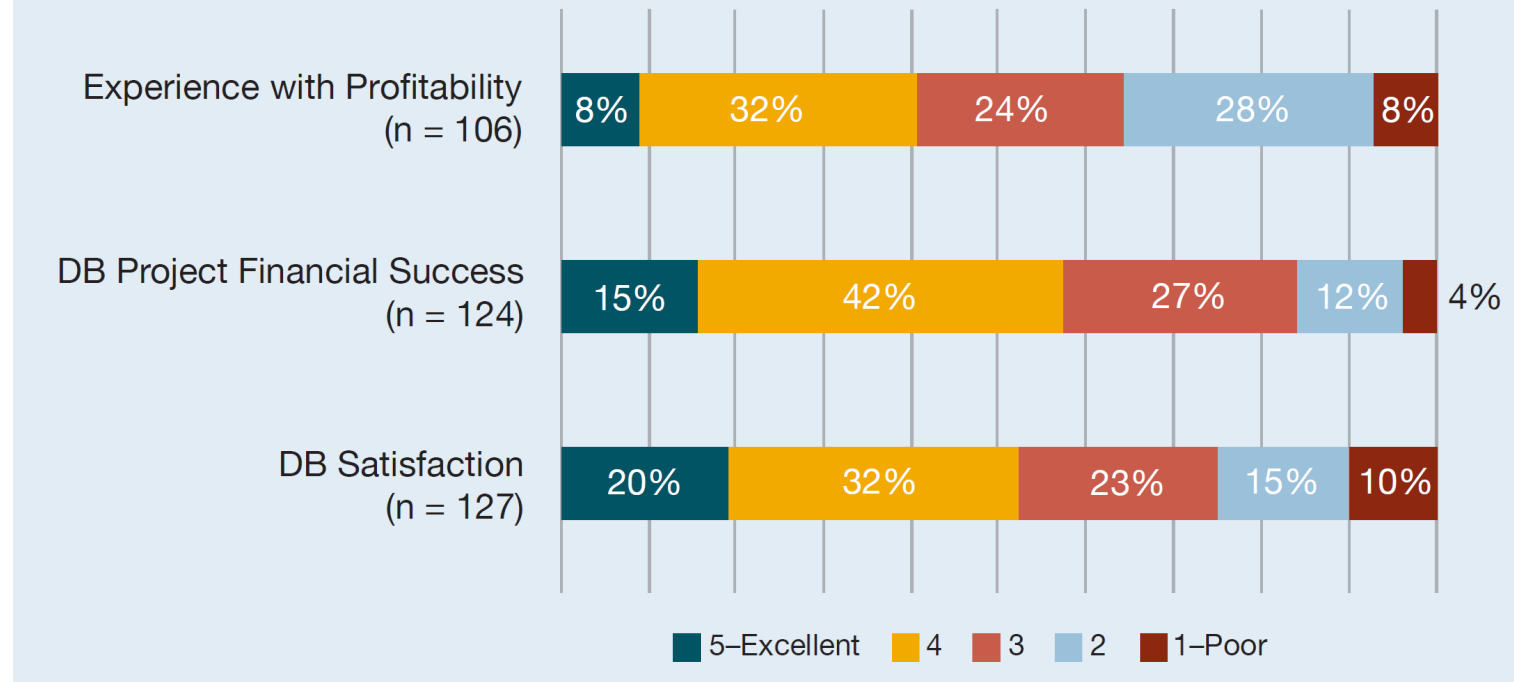
includes industrial
and technology

Key Takeaways

A Tale of Two Extremes

36% of ACEC firms experienced poor profitability on design-build projects in last five years

ACEC Firm Project Delivery Methods Preferences

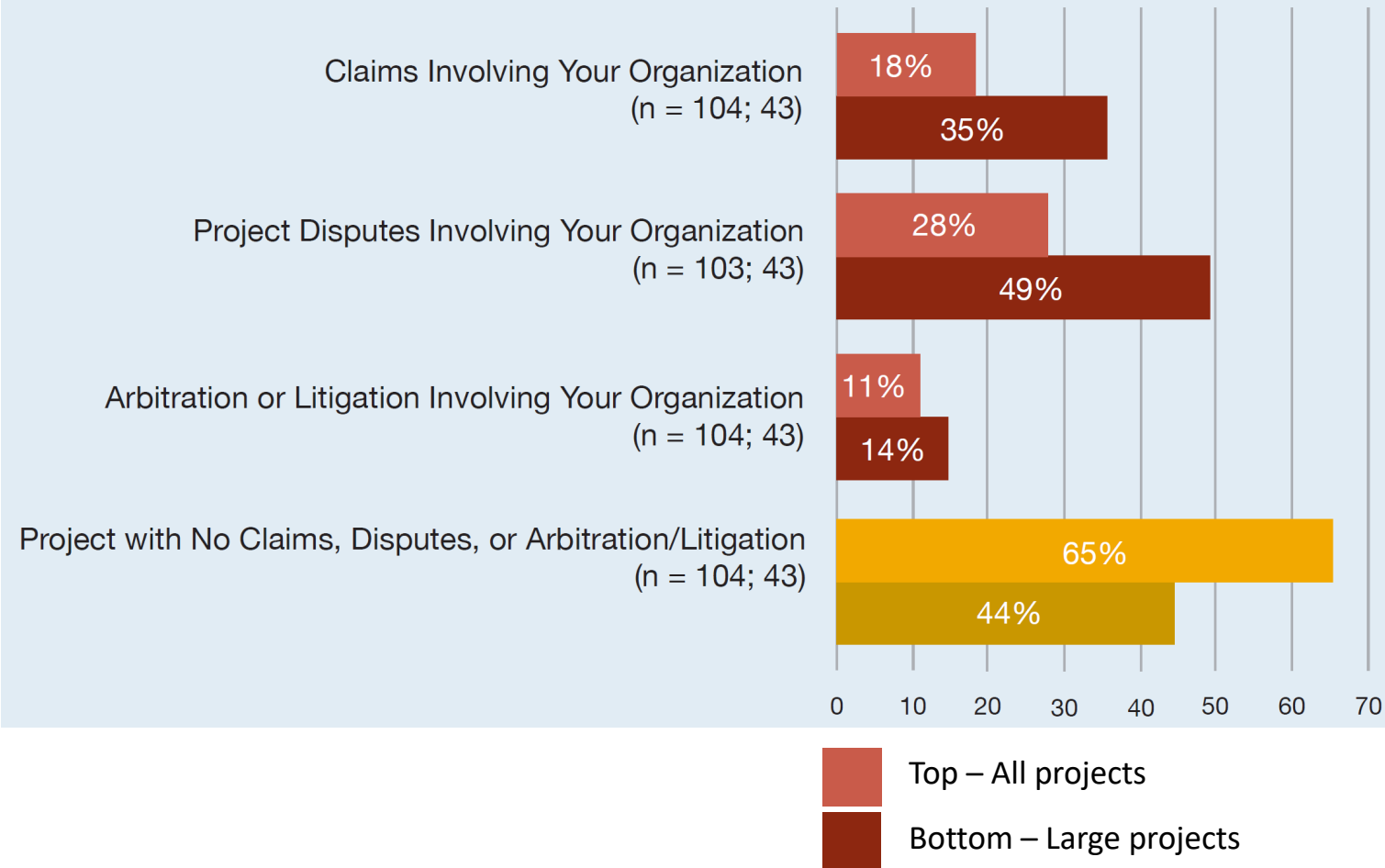


Key Takeaways

A Tale of Two Extremes

Rates of claims, disputes and arbitration/litigation are higher on large and infrastructure projects

Project Harmony State of the Practice



Key Takeaways

A Tale of Two Extremes

There are significant concerns with larger infrastructure projects which could impact the success of the IIJA investments

Smaller Projects

Balanced risk exposure



Larger Projects

Imbalance in risk transfer practices



Recommendations for Owners

Owners are encouraged to embrace contract language that fairly allocates risk and be active members of the DB team.

- Consider splitting up mega projects
- Create unique DB delivery programs
- Avoid transferring inequitable risks
- Engage in open forums around risk and insurance options
- Embrace the use qualifications in best-value procurement

Recommendations for DB Teams

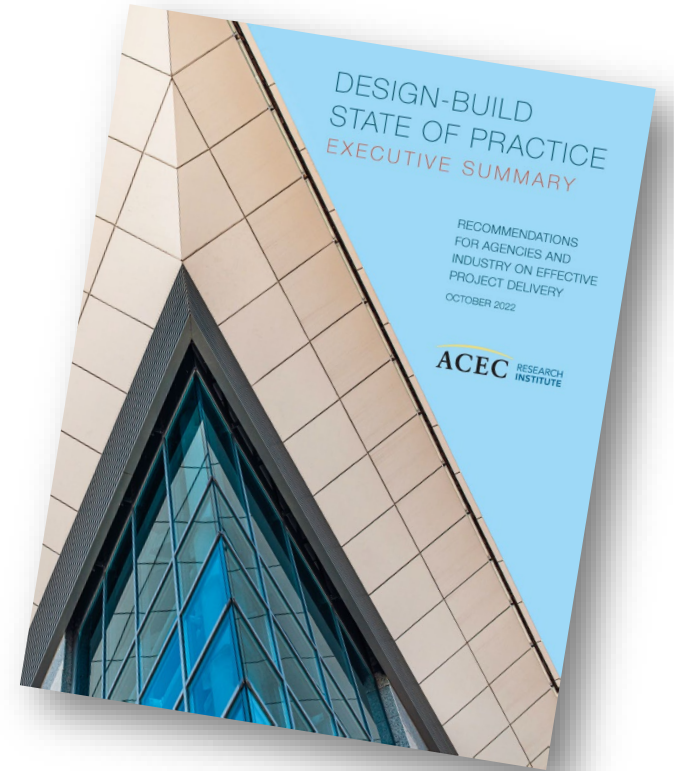
Firms are encouraged to build long-term relationships with constructors coupled with strong risk reviews.

- Create long-term DB partnerships
- Engage in rigorous contract risk reviews
- Engage with owners to set expectations and agree on fundamental design parameters
- Secure full insurance coverage for all aspects of the project

Next Steps

ACEC Research Institute Design-Build 2.0

- Evaluate alternative forms of DB
 - Qualifications-Based DB
 - Progressive DB
 - Integrated Project Delivery



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