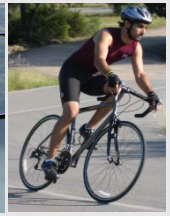
TEXAS DEPARTMENT OF TRANSPORTATION





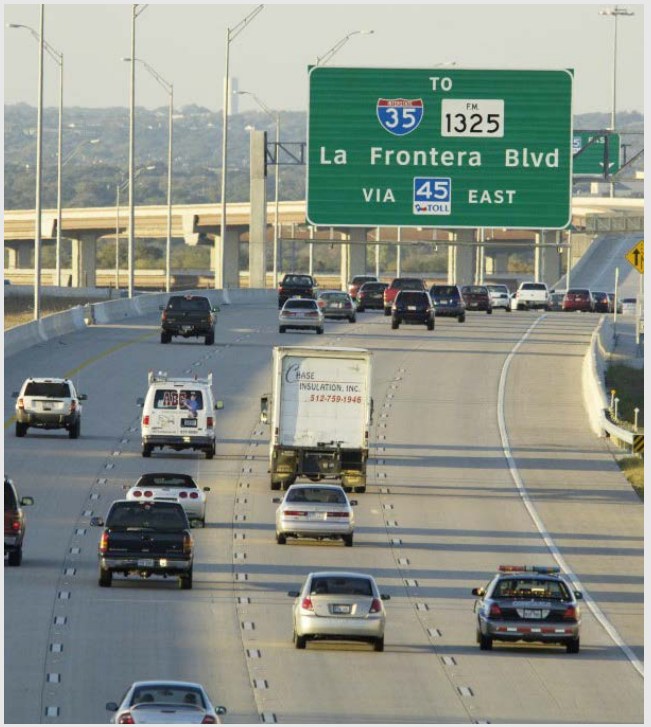


PRECAST, PRETENSIONED, BENT CAPS

Christopher Miller, EIT, MSE

John Holt, PE

Victoria McCammon, PE



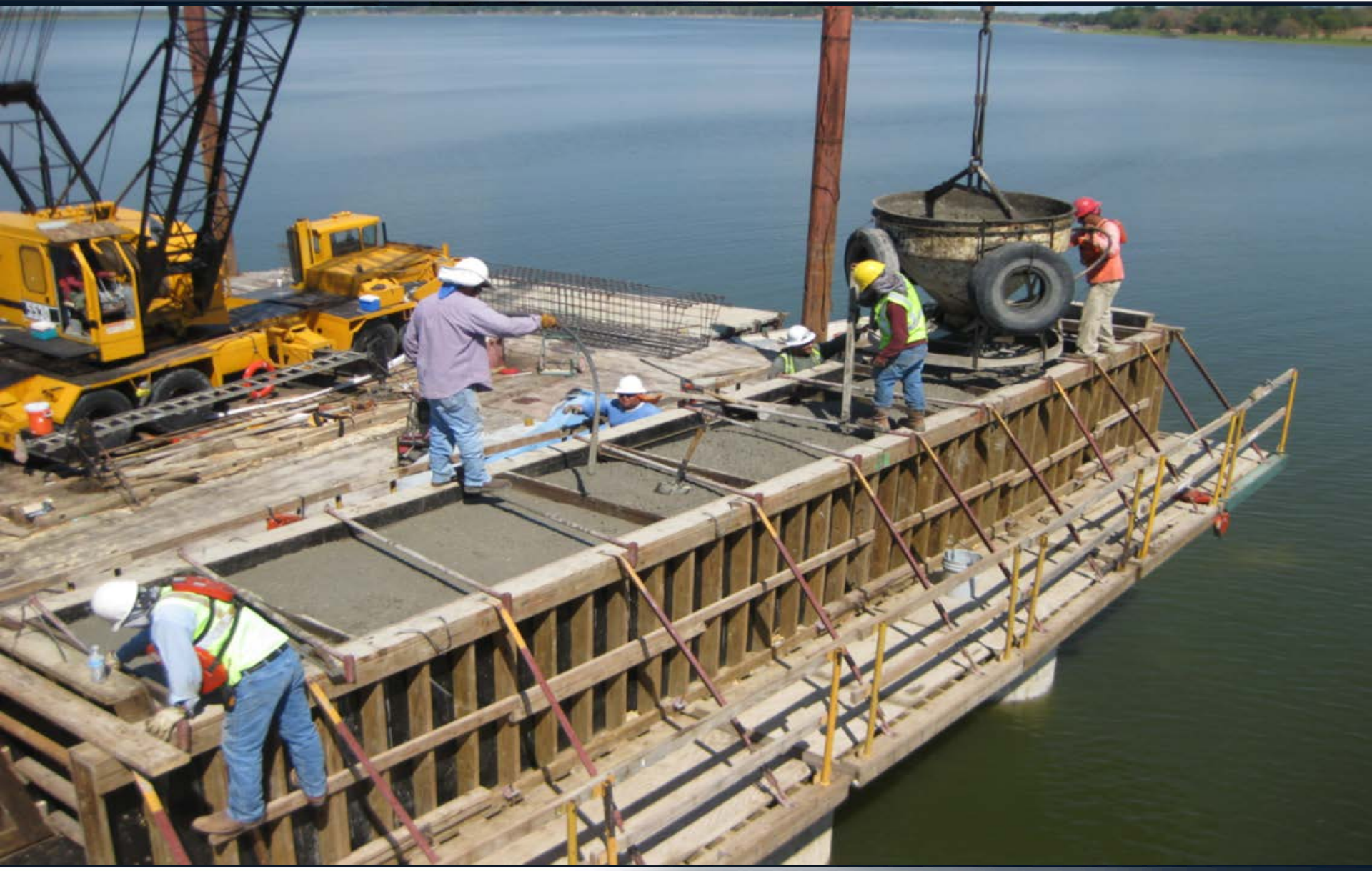
Overview

1. Cast-In-Place Bent Caps
2. First Generation Precast Bent Caps
3. Second Generation Precast Pretensioned Bent Caps
4. Current Projects

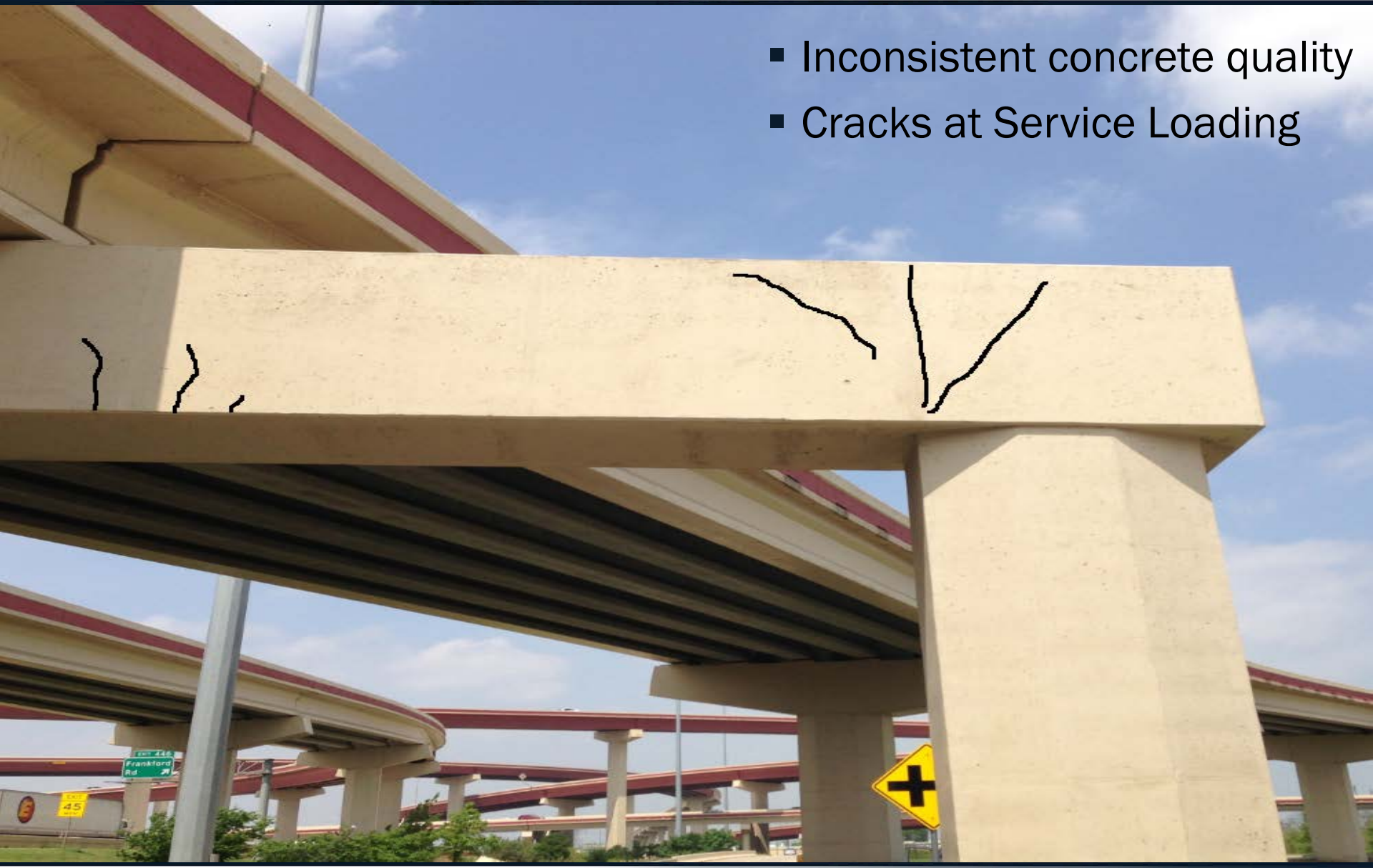
Cast-in-Place Construction



Cast-in-Place Safety



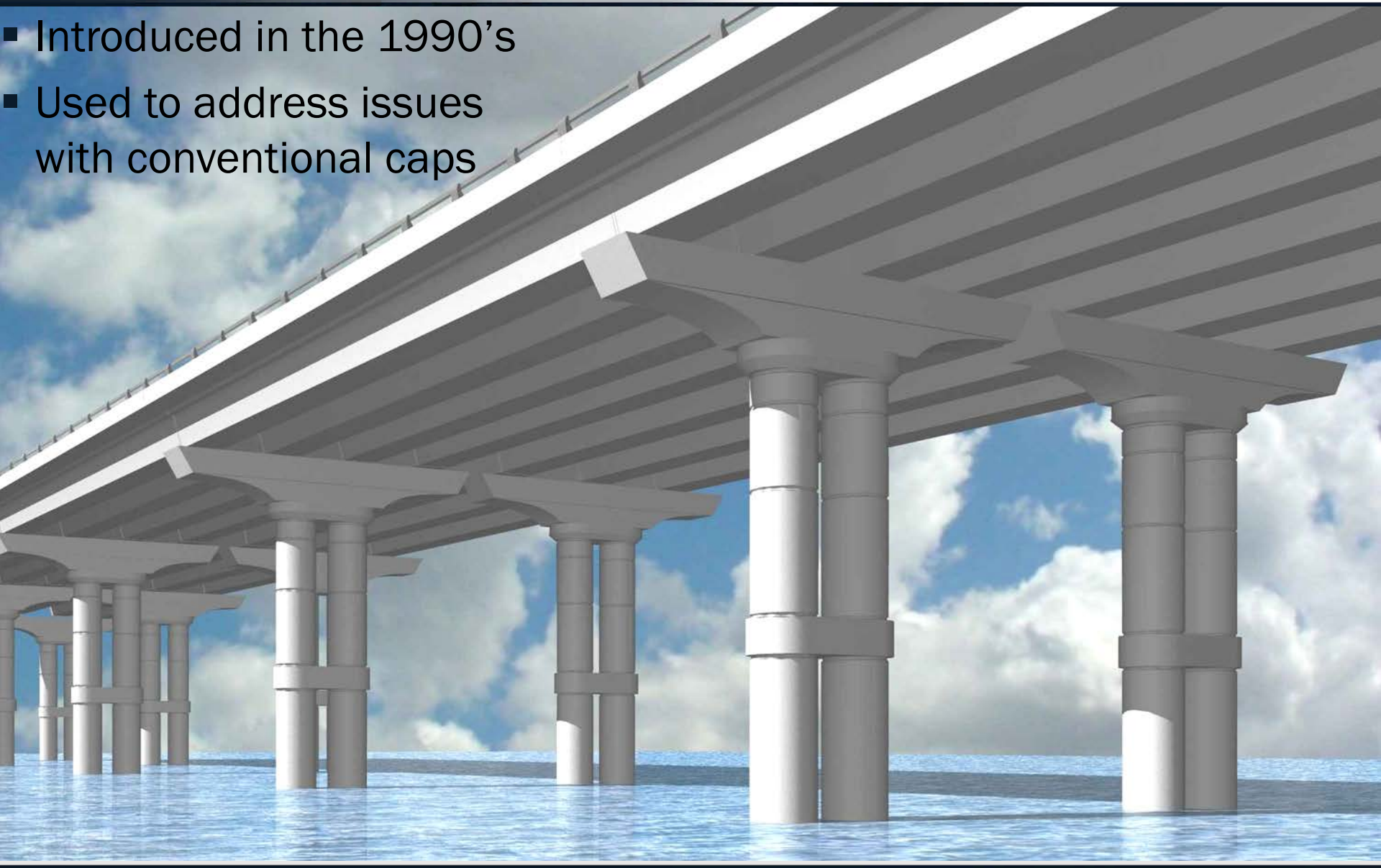
Cast-in-Place Quality



- Inconsistent concrete quality
- Cracks at Service Loading

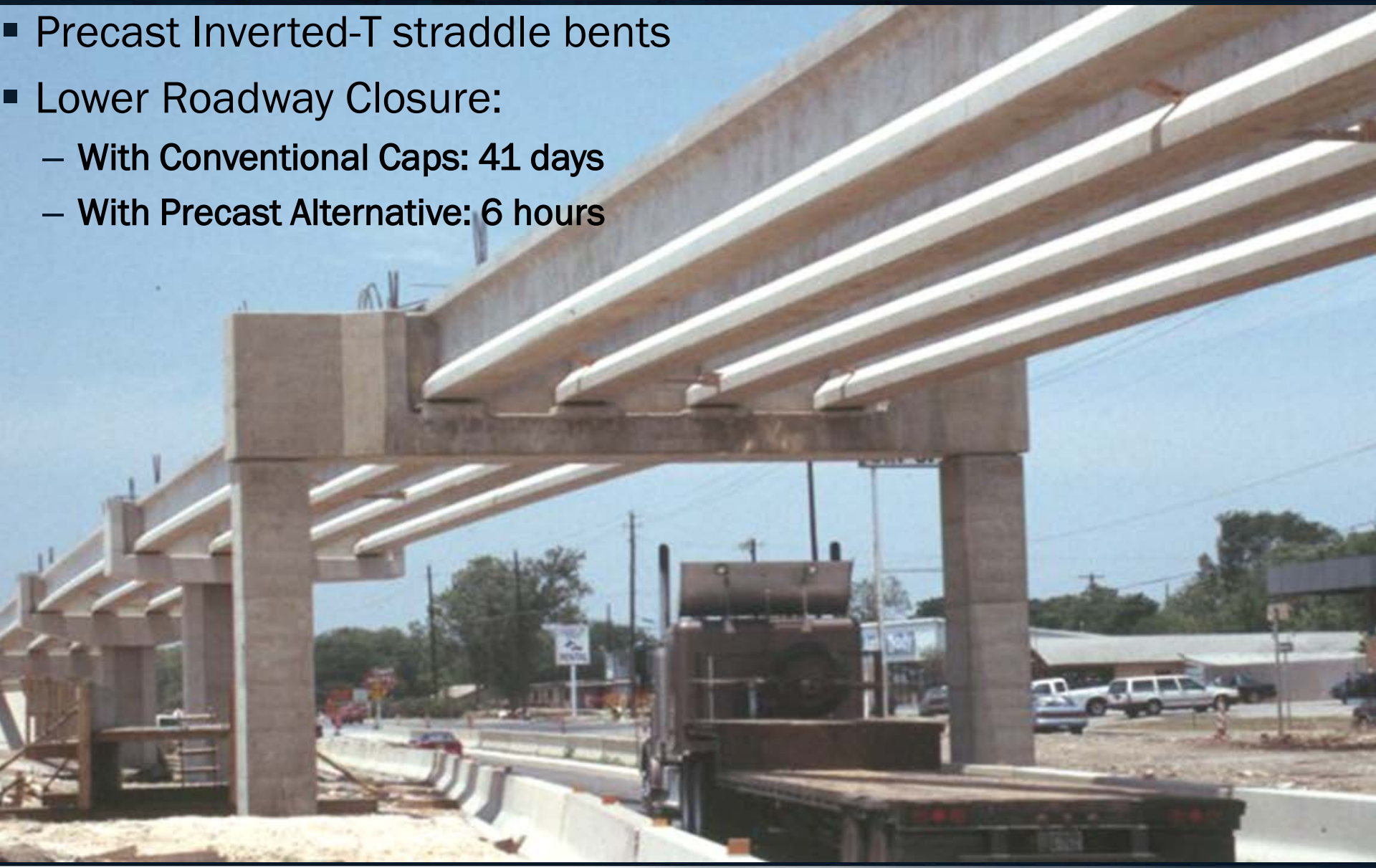
First Generation Precast Cap

- Introduced in the 1990's
- Used to address issues with conventional caps



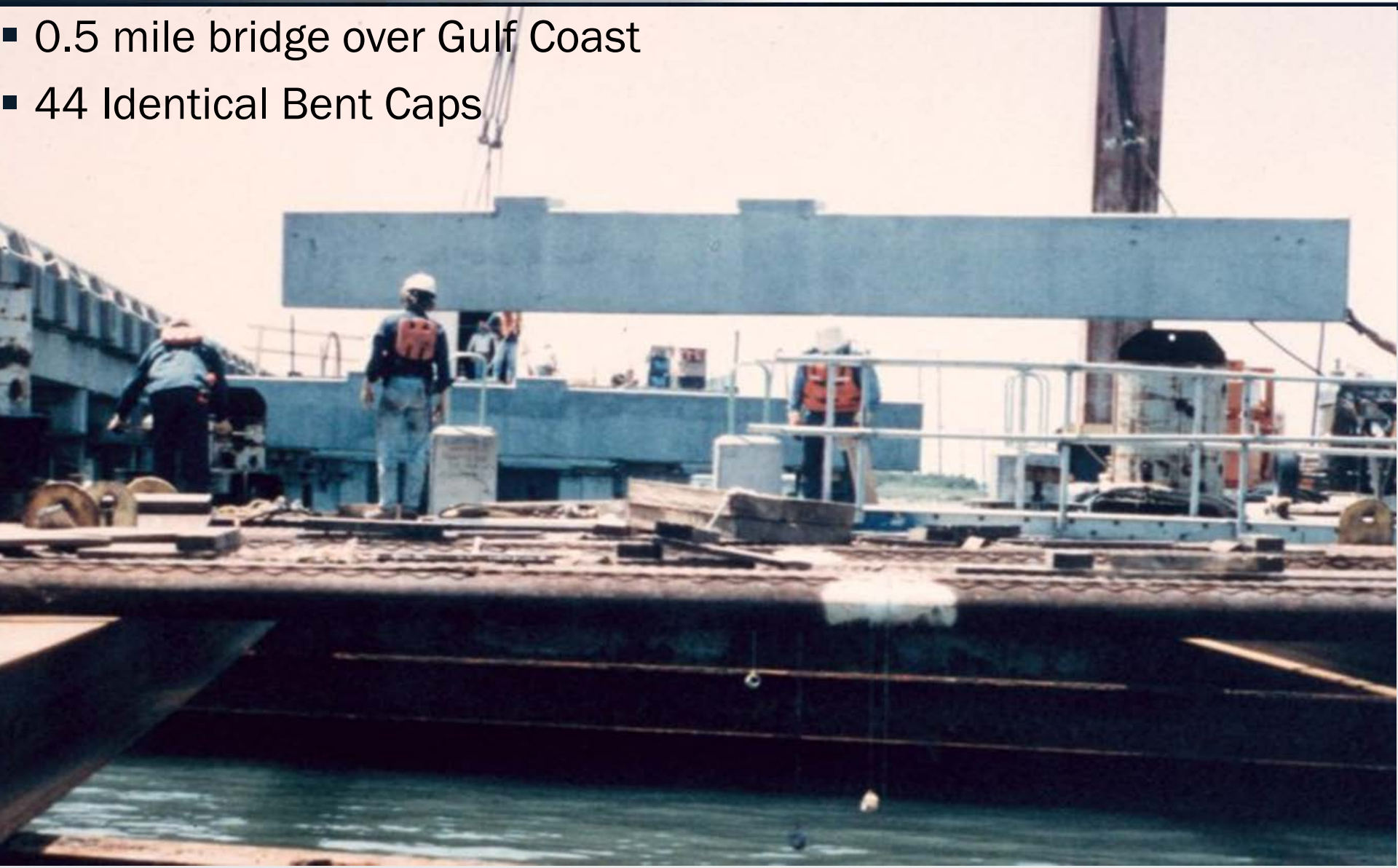
US 290 Ramp G

- Precast Inverted-T straddle bents
- Lower Roadway Closure:
  - With Conventional Caps: 41 days
  - With Precast Alternative: 6 hours



Redfish Bay

- 0.5 mile bridge over Gulf Coast
- 44 Identical Bent Caps

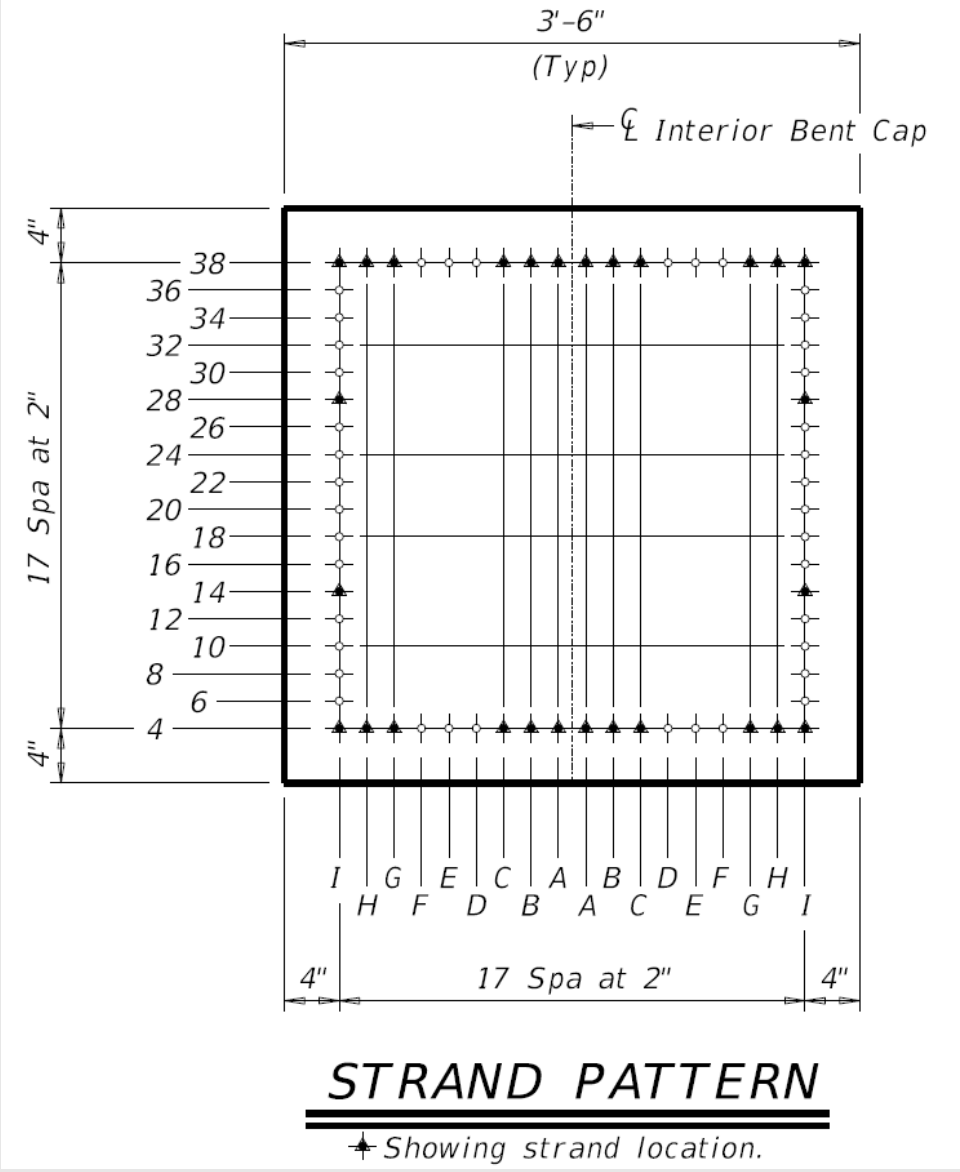


Second Generation Pretensioned, Precast Cap



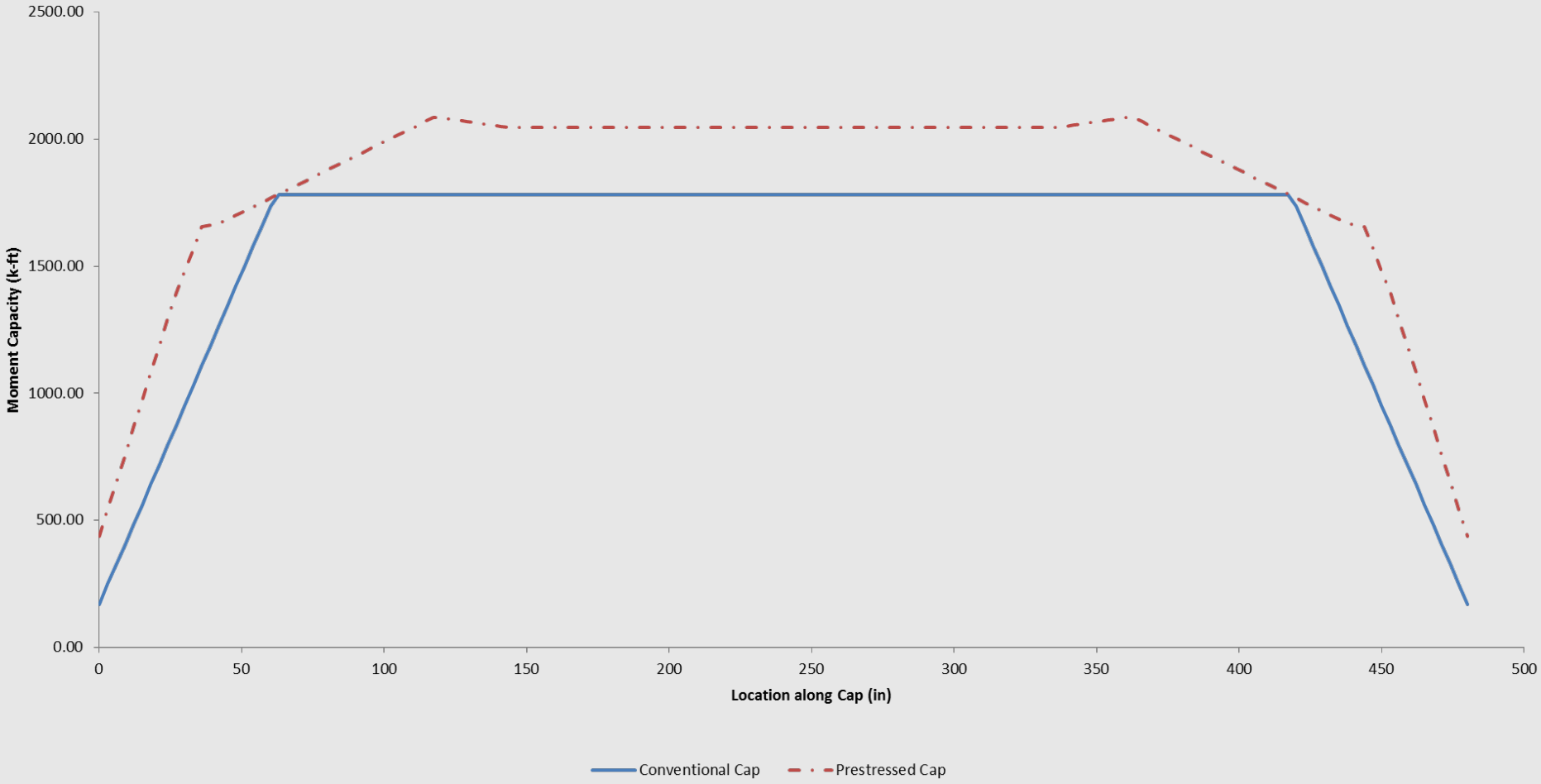
Design Concept

- Symmetric Strand Pattern
- Mimic TxGirder grid system



Strength & Service Design

- $\Phi M_{n,prestressed} \geq \Phi M_{n,conventional}$
- Match Shear Reinforcing
- Initial Stress for Storage/Lifting
- Service Limit Stress



Fabrication and Transportation



Installation

1 Team of 5 workers can:

Construct 3 CIP caps in 8 days

Install 12 PC caps in 1 day



Cap-to-Support connection



Applicability/Limitations

- Assess practicality of Precast vs Conventional
- Current Design only for Rectangular Bent Caps
- Check Development and Confinement
- Ensure Adequacy of Cap to Support Connection

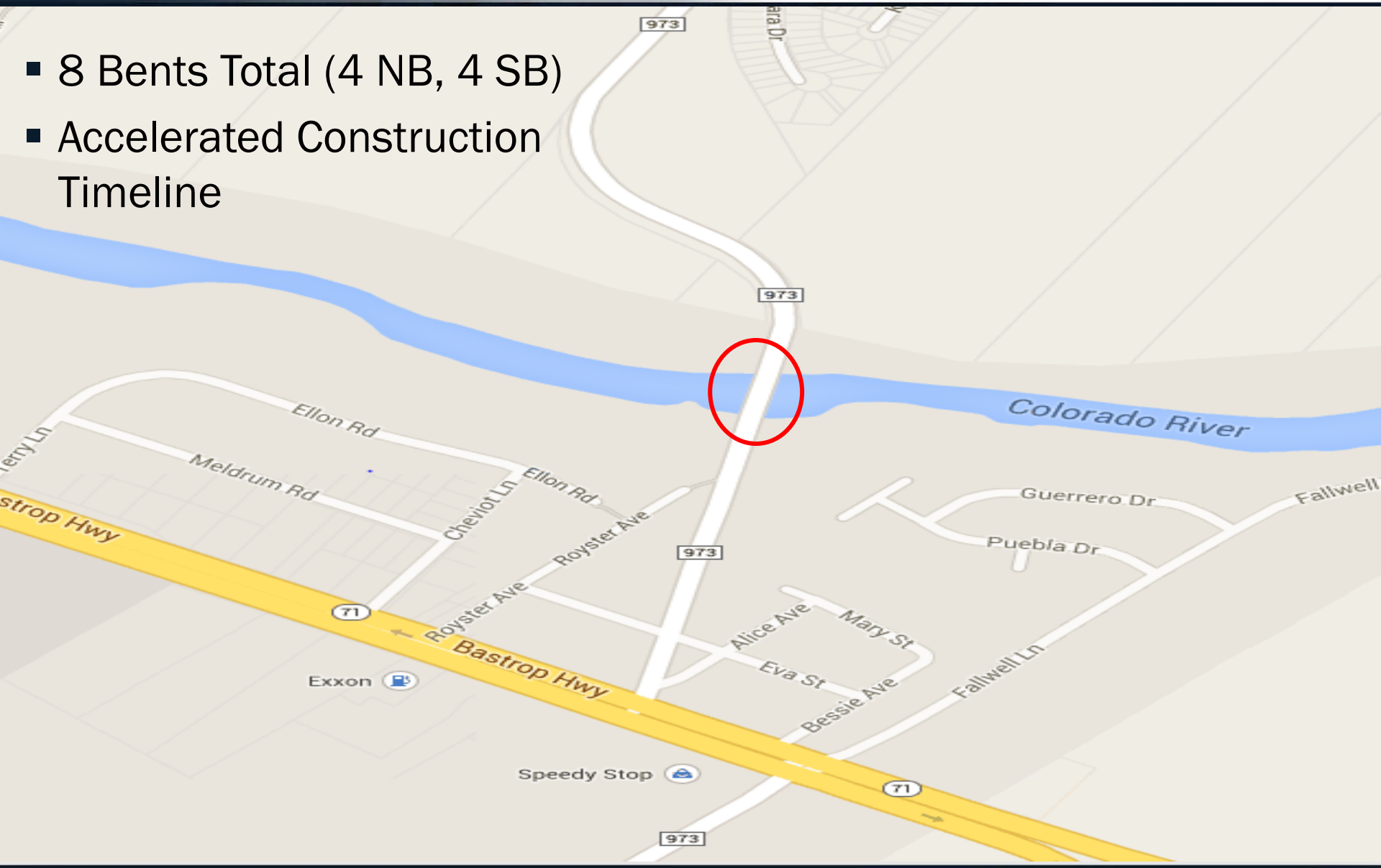
LP 1604 Bexar County, San Antonio, TX

- 36 Bents Total (18 NB, 18 SB)
- Identical Length and Column Spacing



FM 973 over Colorado River, Austin, TX

- 8 Bents Total (4 NB, 4 SB)
- Accelerated Construction Timeline



Conclusions

- Reduced Construction Time
- Increased Safety
- Improved Structural Performance

Acknowledgements

- Fabricator:
  - Bexar Concrete Works
- Contractor:
  - Texas Sterling Construction Co.
  - Lane Construction

Any Questions?

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Bridge Division

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