



Prioritization Efforts for ABC in Texas

FIU ABC-UTC Monthly Webinar Series

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July 20, 2023



- Owners get excited about breaking ground.
- The public gets way more excited about cutting ribbons!
- How do we avoid, or at least minimize, the dreaded orange barrels?
- Accelerated Bridge Construction has gained a great deal of momentum around the country.
- However, there is still a need for wider adoption, especially on more standard projects.



THANKS

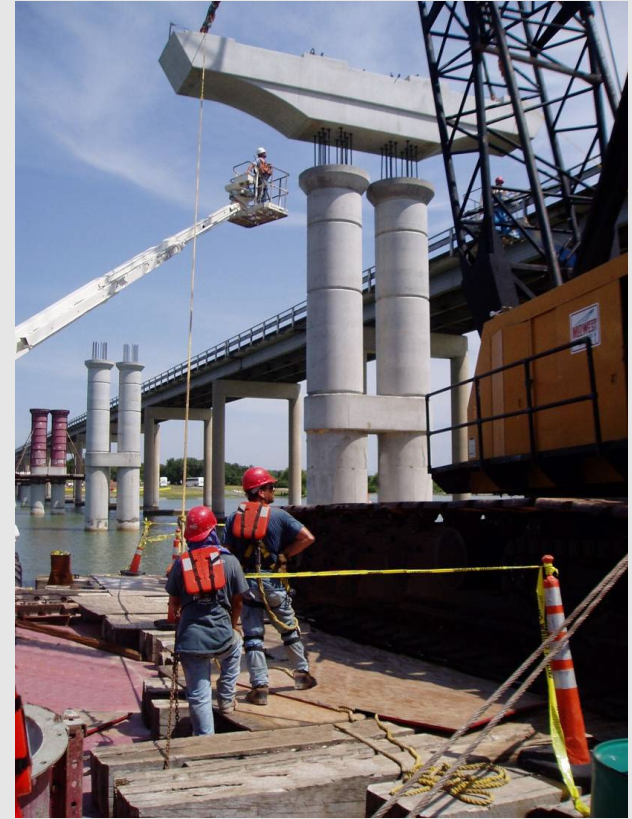


- **Speed** (obviously).
- **Quality.** TxDOT relies heavily on prefabricated elements produced in plant environments with exceptional oversight and quality control.
- **Safety.** I think we should be talking about the safety aspect of ABC far more often.



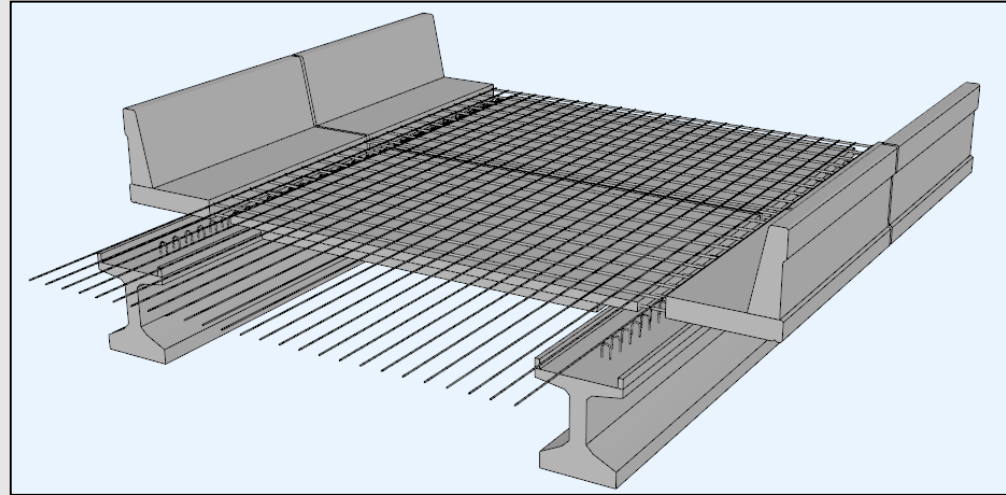


- ABC does not have to just be about high-profile projects with complex approaches aimed at super rapid turnaround times.
- Lots of opportunities to accelerate projects that are more standard.
- Terrific progress has been made on developing standards for prefabricated elements. Bridges can now be designed and constructed practically from the ground up using Lego pieces.





- Prime Contractors in Texas have been very clear with us.
- Keep it simple!
- Even for accelerated construction, TxDOT utilizes as many standard details and techniques as possible.
- We also look for opportunities to include multiple options (equal alternates) in plans.





- Largely a misnomer that ABC is way more expensive than standard construction. With astronomical construction costs, particularly for traffic control, we are finding that ABC is frequently comparable or less expensive.
- Many planners remain steadfast in their belief that at least one lane of traffic must be maintained at any cost.
- Interesting in many cases to see the public more on board with ABC than owners and planners. Public outreach is critical!
- At TxDOT we are working hard to change that mindset, including making ABC the preferred option over phased or detoured approaches.



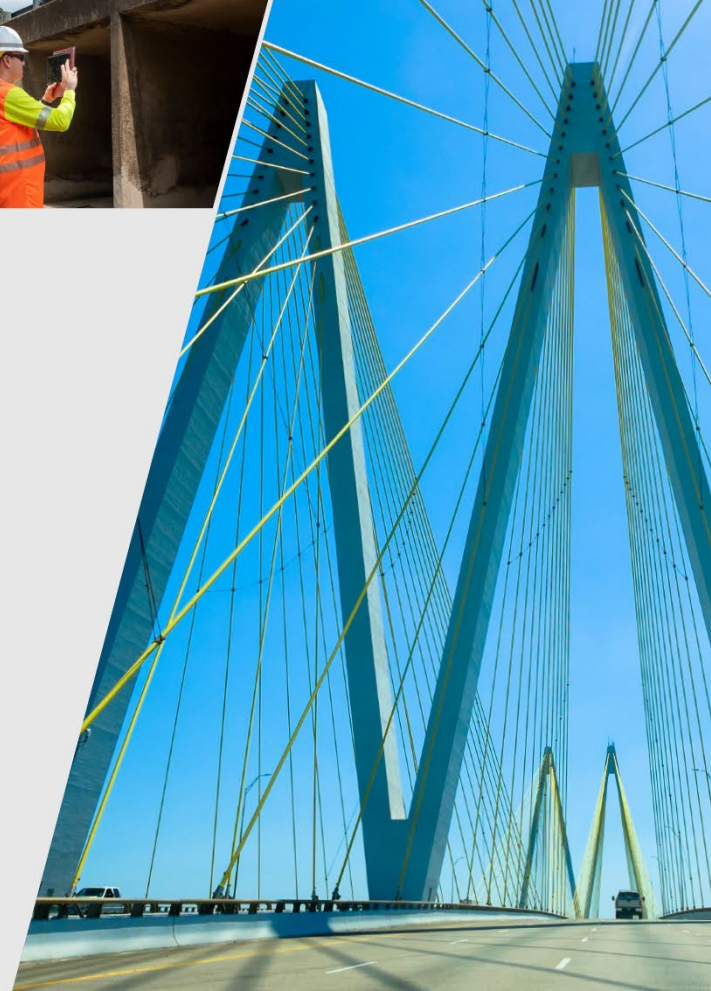


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Bernie Carrasco, P.E.

TxDOT Bridge Management Section Director



July 20, 2023



- A Year Ago

Using Accelerated Bridge Construction Instead of Bridge Phasing and Detours





- Yes, but maybe...

Using Accelerated Bridge
Construction ~~Instead of~~
Bridge Phasing **To Minimize**
and Detours



Temporary Detours and Phased Construction



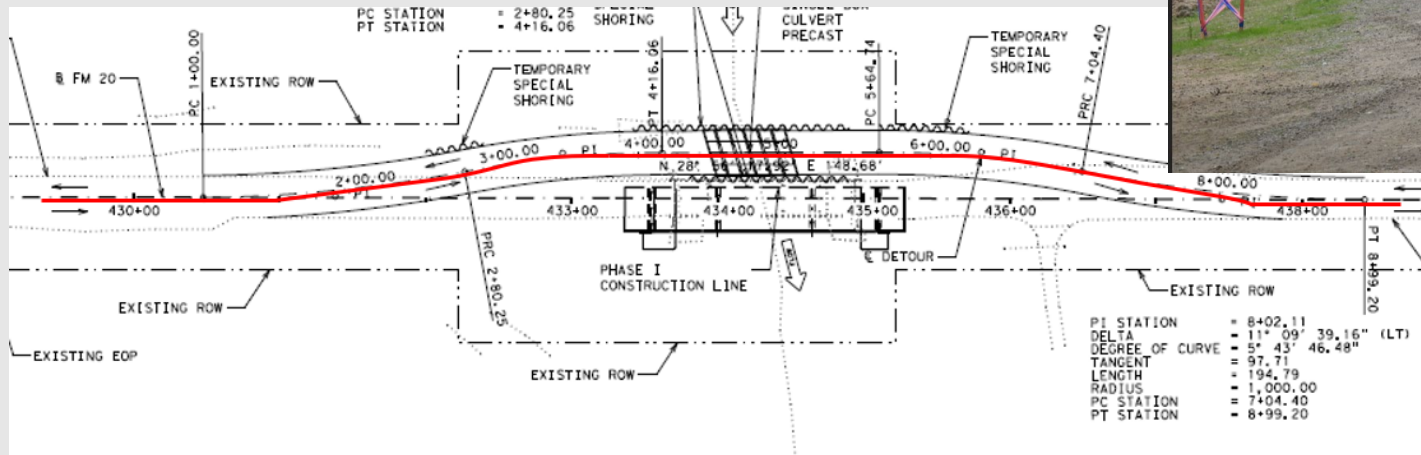
- Temporary Detours VERY expensive
- 2 Bridges (or almost bridges and roadway elements)



Temporary Detours and Phased Construction



- Horizontal curve – safety concern
- Possible additional ROW costs





Phased Bridge Construction

- Bigger footprint
- Traffic control expense
- 2 or more bridge structures, longer schedules



Temporary Detours and Phased Construction



- Ride quality, construction joints
- Narrow lanes during construction
- Additional ROW, more utility relocations



Then what?



- Enter ABC right?

Then what?



Yes, but what does that look like?



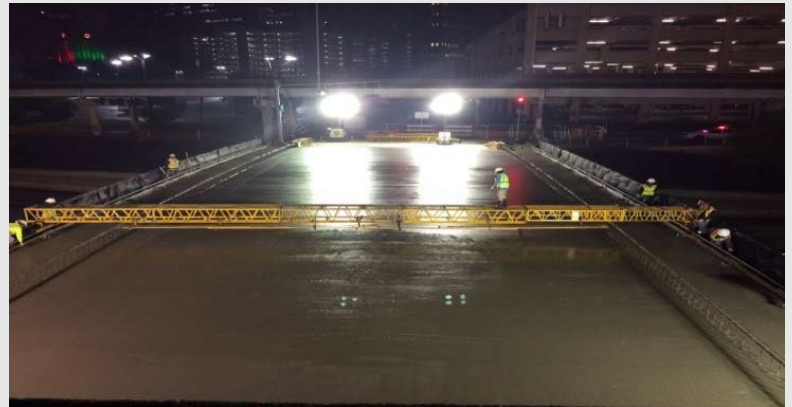
Fort Worth 7th Street Bridge - 2013

Self Propelled Modular Transporters (SPMT)

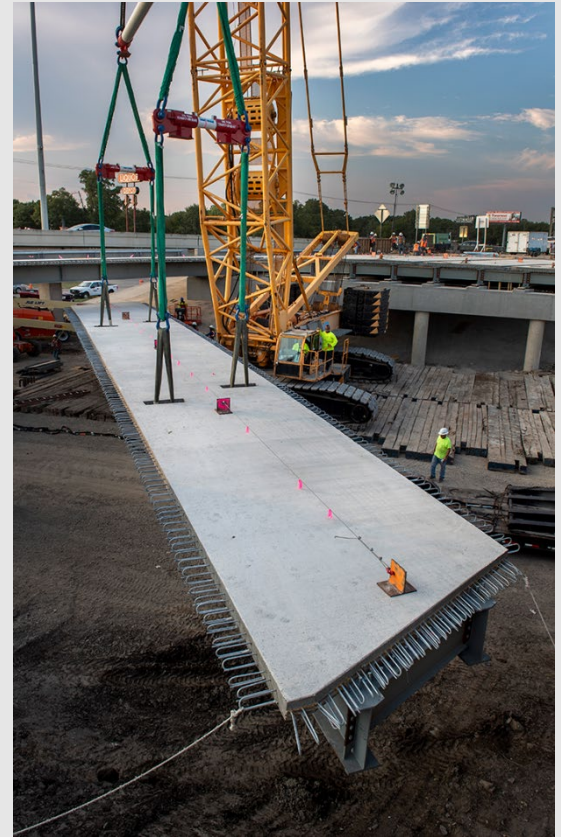


Photos Courtesy of Heavy Equipment Guide

West Dallas St. in Houston - 2016



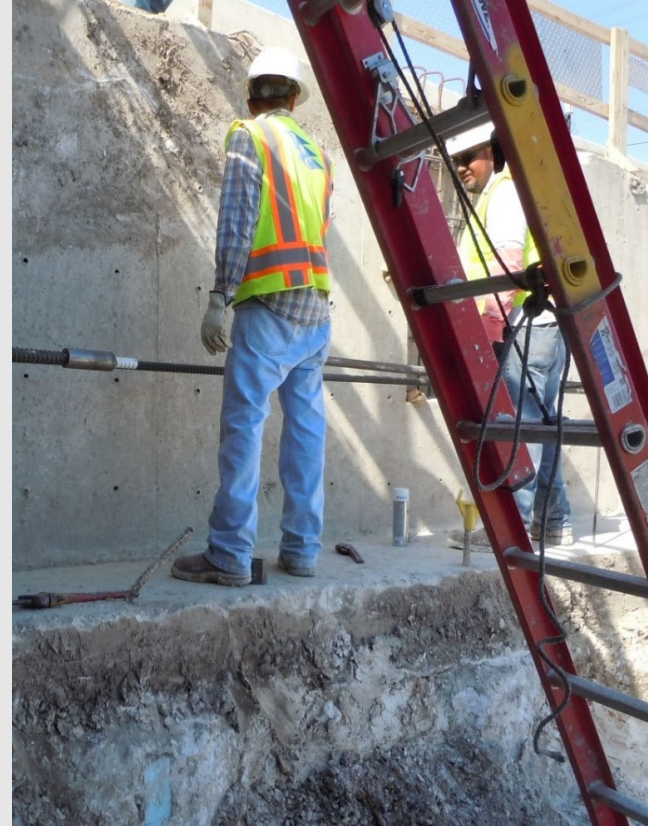
IH 635 @ Seagoville Road Weekend Replacement - 2018





- Construction time
 - 20 months down to 2 weekend closures
- Cost
 - +\$11M down to \$6M
 - Less phasing (traffic control)
 - No temporary retaining walls.
 - Cut scope a little.

Lateral Slide-in – LP 345 (San Antonio - 2013)



How can we accelerate?



- Weekend or weeks long closures are great, but not as common in Texas.





- Prioritize Accelerated Bridge Construction
 - any cost-effective method
- Upcoming policy:
 - Each project – submit written plan to TxDOT Bridge Division: Compare time and cost of full closure vs phased construction vs temporary detours.
 - All must be considered at time of Preliminary Bridge Layout.
 - Full closure with ABC techniques to be first consideration.



- Prioritize Accelerated Bridge Construction
– any cost-effective method

How can we accelerate?



- Precast as many elements as possible to speed construction up



How can we accelerate?



- In other words...
LEGOs!





- TxDOT has a very mature and wide-breadth set of bridge standards
- Standardization = well understood details and knowns for contractors
- Example Standard Toolbox Standards:
 - Precast Concrete Deck Panels (PCP's)
 - TxDOT uses partial depth panels as default





- Example Standard Toolbox Standards:
 - Precast Concrete Deck Panels (PCP's)
 - Prestressed Beams





- Example Standard Toolbox Standards:
 - Decked Slab Beams (no CIP deck construction)
 - Caveat for on-system environment
 - Not with truck traffic
 - Landlocked bridge

Precast Abutment

Decked Slab Beams

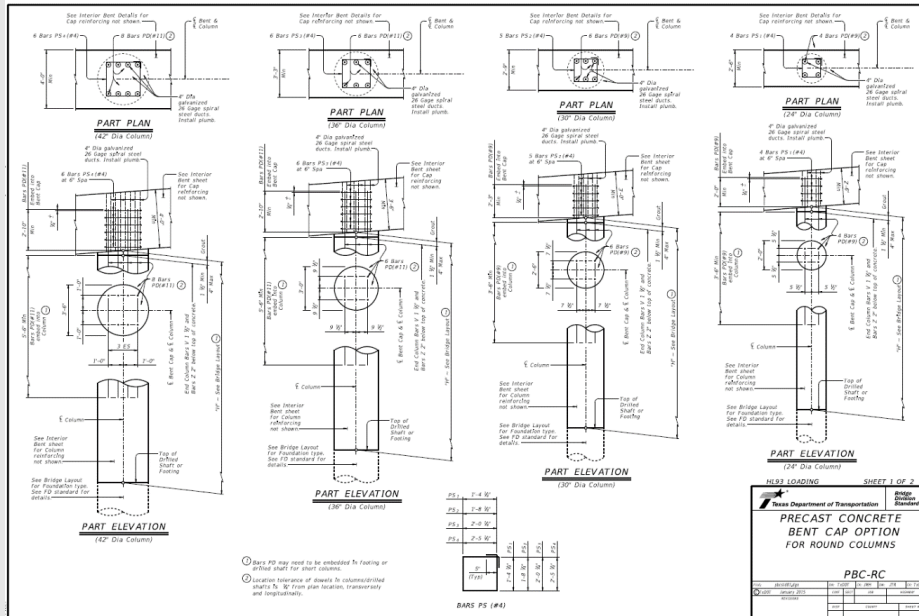
Precast Bent Cap

Steel Piling





- Precast Bent Caps (Piers)
 - Standard** (conc columns and steel piling)



- Standard in most (almost all) projects



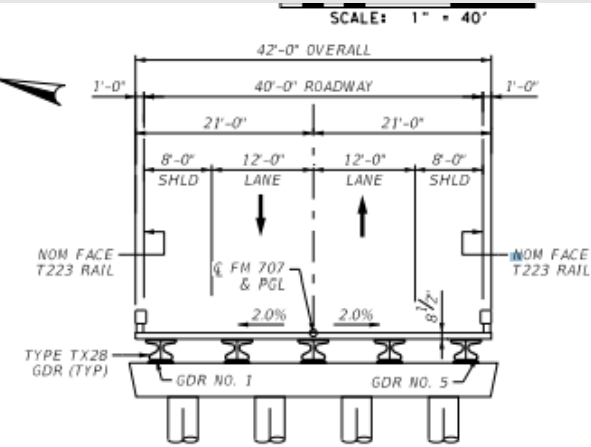
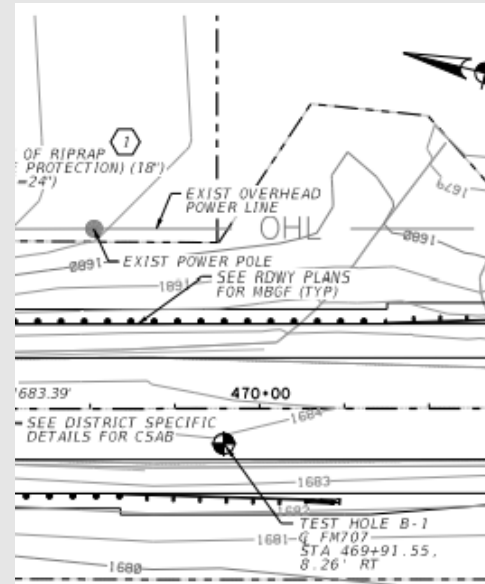
- Precast Abutment details (not standard)





- Communicate full closures to contractors
 - Reduce phasing
 - Reduce temporary detour constructed

BRIDGE CLOSED DURING CONSTRUCTION. SEE TRAFFIC CONTROL PLANS FOR ADDITIONAL DETAILS



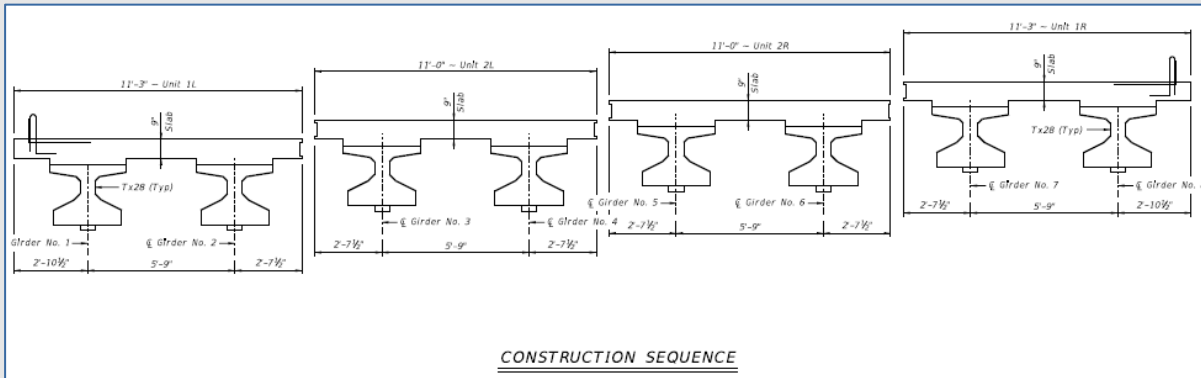
TYPICAL SECTION
SPANS 1 - 3
(NOT TO SCALE)

- GENERAL NOTES:**
1. BRIDGE DESIGNED IN ACCORDANCE WITH AASHTO LRFD BRIDGE DESIGN SPECIFICATIONS, 8TH EDITION (2017), FOR HL93 LOADING.
 2. BRIDGE CLOSED DURING CONSTRUCTION. SEE TRAFFIC CONTROL PLANS FOR ADDITIONAL DETAILS
 3. THE "H" VALUES SHOWN ARE ESTIMATED COLUMN HEIGHTS. THE CONTRACTORS IS RESPONSIBLE FOR CALCULATING THE ACTUAL COLUMN HEIGHTS BASED ON FIELD CONDITIONS. COLUMNS SHALL BE EMBEDDED 2' MINIMUM BELOW THE EXISTING GROUND.

4. SEE EXISTING UTILITY LAYOUTS FOR IDENTIFICATION OF EXISTING UTILITIES.
5. SEE BRIDGE QUANTITY SUMMARY SHEET FOR BRIDGE ESTIMATED QUANTITIES, BEARING SEAT ELEVATIONS, AND MATERIAL NOTES FOR BRIDGE VARIOUS ELEMENTS.
6. SEE HYDRAULIC DATA SHEETS FOR ADDITIONAL INFORMATION.
7. SAW CUT GROOVING OF THE BRIDGE DECK AND APPROACH SLAB IS REQUIRED.
8. D DENOTES BENTS WITH DOWEL BARS FOR EXTERIOR BEAMS WITH SLOTTED HOLES



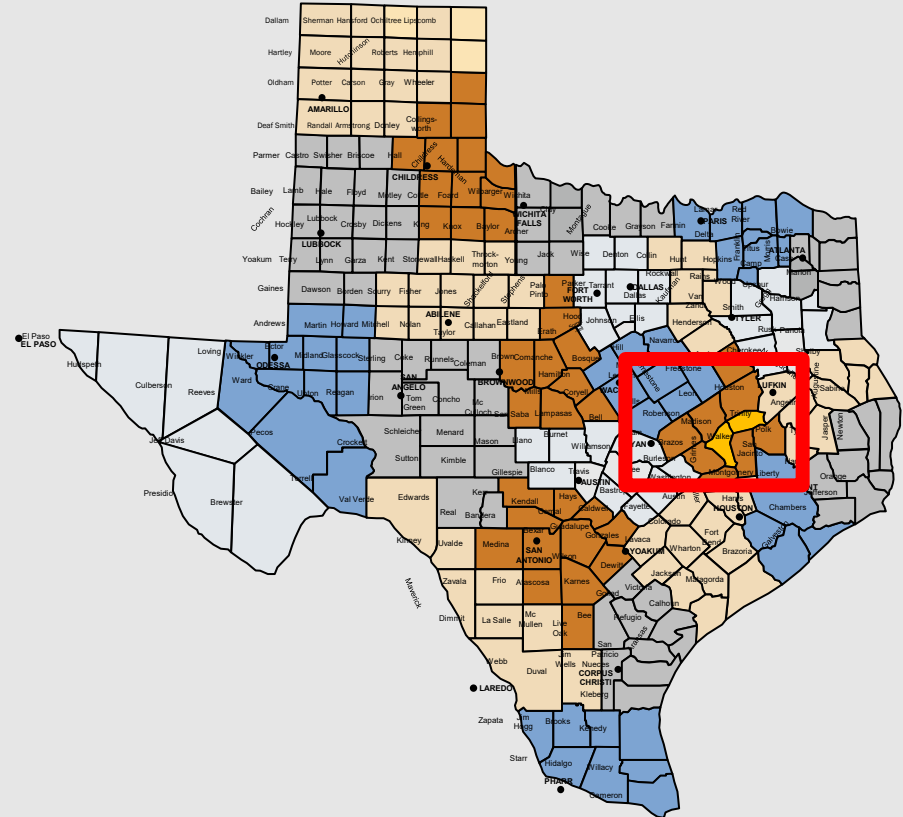
- What else?
 - Innovation Committee
 - Pre-topped girders





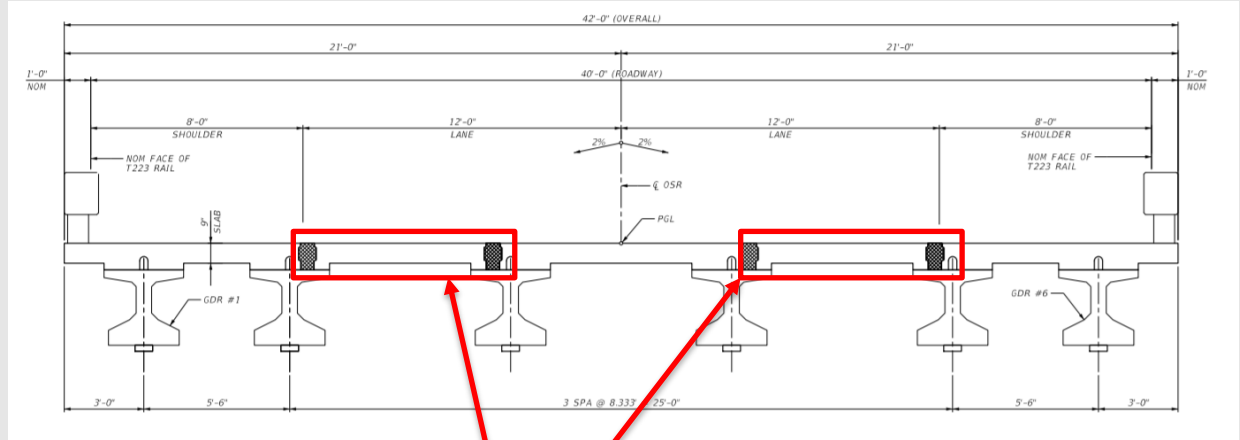
Bryan District Project (2019)

- 3 Bridge Replacements
- Rural highway (OSR) with long detours
- Cast Deck with Tx-Girders off site





- Pick 2 girders w/ deck at a time
- Place drop-in panels
- Cast closure pour with Rapid Setting Fiber Reinforced Concrete (RSFRC)
- Cast rail with exterior sections



Drop-in Panel



- Pick 2 girders w/ deck at a time
- Place drop-in panels
- Cast closure pour with Rapid Setting Fiber Reinforced Concrete (RSFRC)
- Cast rail with exterior sections





- Pick 2 girders w/ deck at a time
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■ UHPC vs RSFRC

	Proprietary UHPC	RSFRC
Material Cost	~\$5000/cyd	
Compressive Strength (28 day)	>17000+ psi*	-
Compressive Strength (7 day)	-	~6000 psi
Compressive Strength (4 day)	~14000 psi	-
Compressive Strength (4 hours)	-	~3000 psi
48 hour Pull-Out Strength (% of yield)	100 @ 4 days (or 14ksi compressive strength)	75
Familiarity	Limited	

*Minimum defined by ASTM C1856 for UHPC classification

UHPC TxDOT SS 4119

<http://ftp.dot.state.tx.us/pub/txdot-info/cmd/cserve/specs/2014/spec/ss4119.pdf>

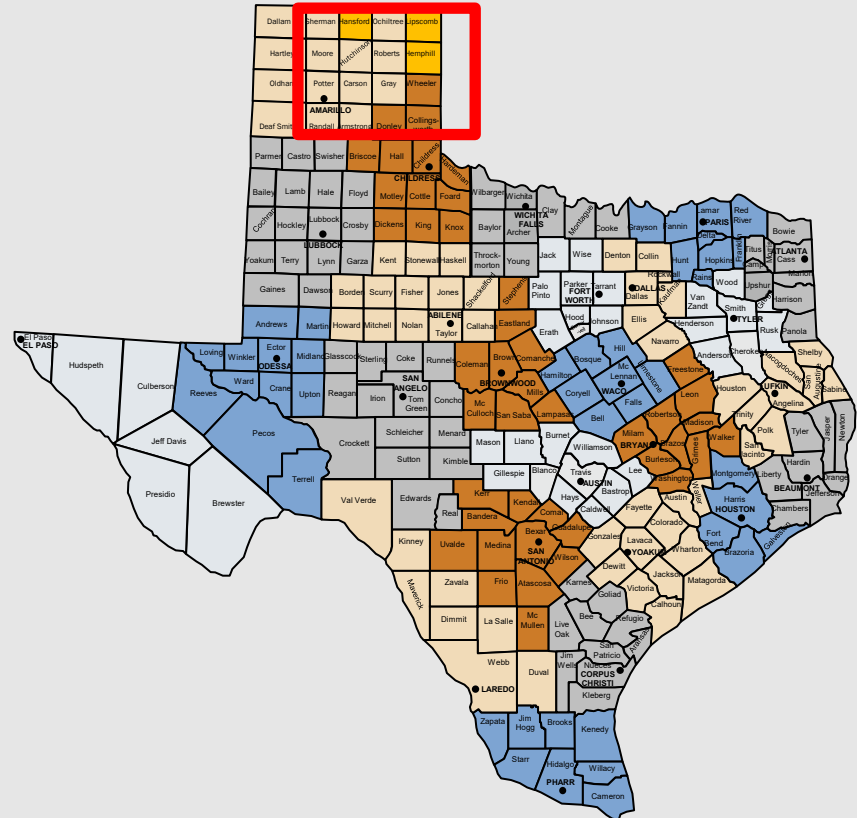
RSFRC TxDOT SS 4144

<ftp://ftp.dot.state.tx.us/pub/txdot-info/cmd/cserve/specs/2014/spec/ss4144.pdf>



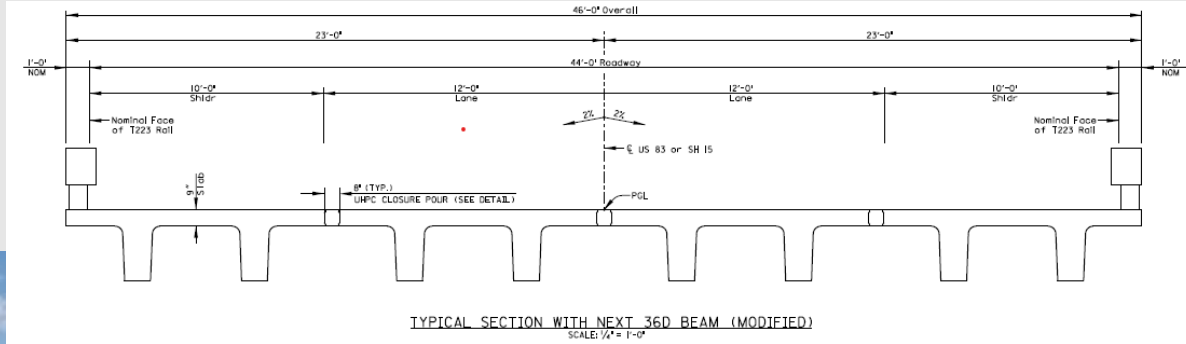
Amarillo Project (2020)

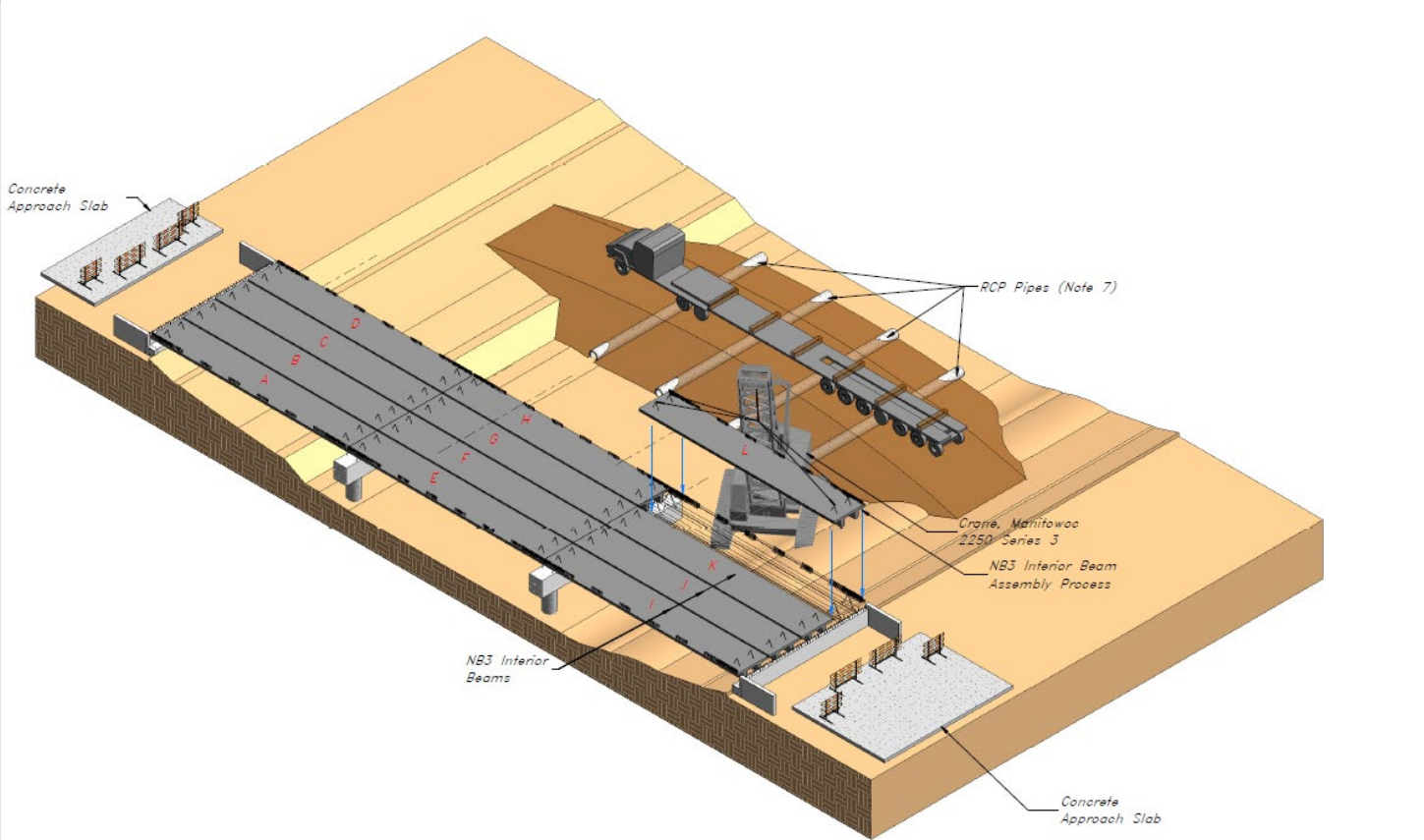
- 5 Bridge Replacements
- Rural highways with long detours (SH15 and US83)
- 10 calendar day closure time per bridge
- Sought contractor input on foundation options, superstructure concept, and access/timeframe issues





■ NEXT Beams





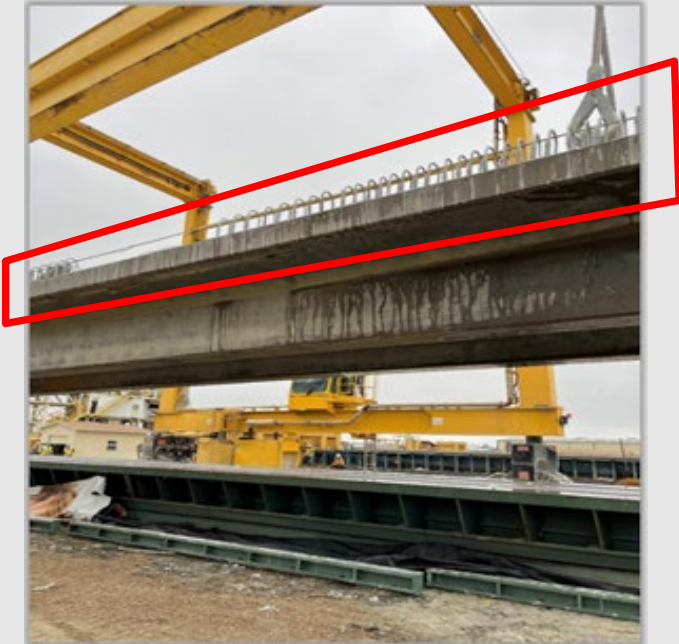


- UHPC Closure





- Look closely – precast rail





- Pros
 - Quicker delivery of final project
 - Overall lower impact to traveling public
 - Better control of materials in precast plants

- Cons
 - Usually involves a full closure
 - Contractor inexperience
 - Not suitable for every bridge
 - Schedule pressures



- **Speed** – work with all partners
- **Quality.** Prefabricated elements - with exceptional oversight and quality control.
- **Safety.** – should be part of conversation more often.



- 2018 - IH 635 @ Seagoville Road



Questions?

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