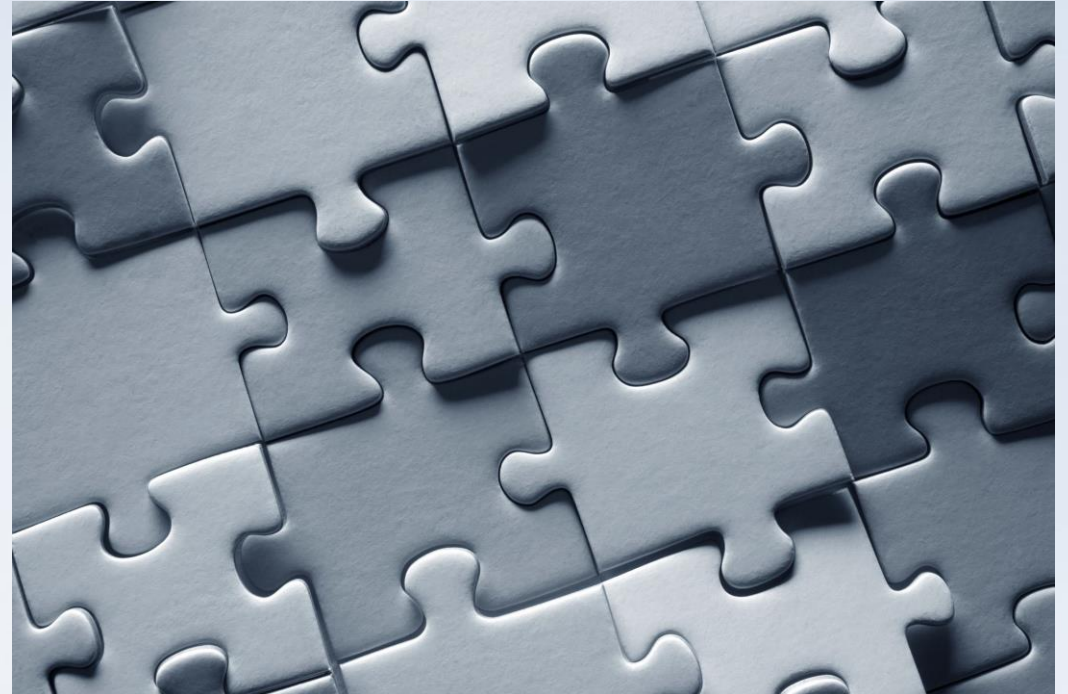


TxDOT's Bridge Deck Preservation Practices

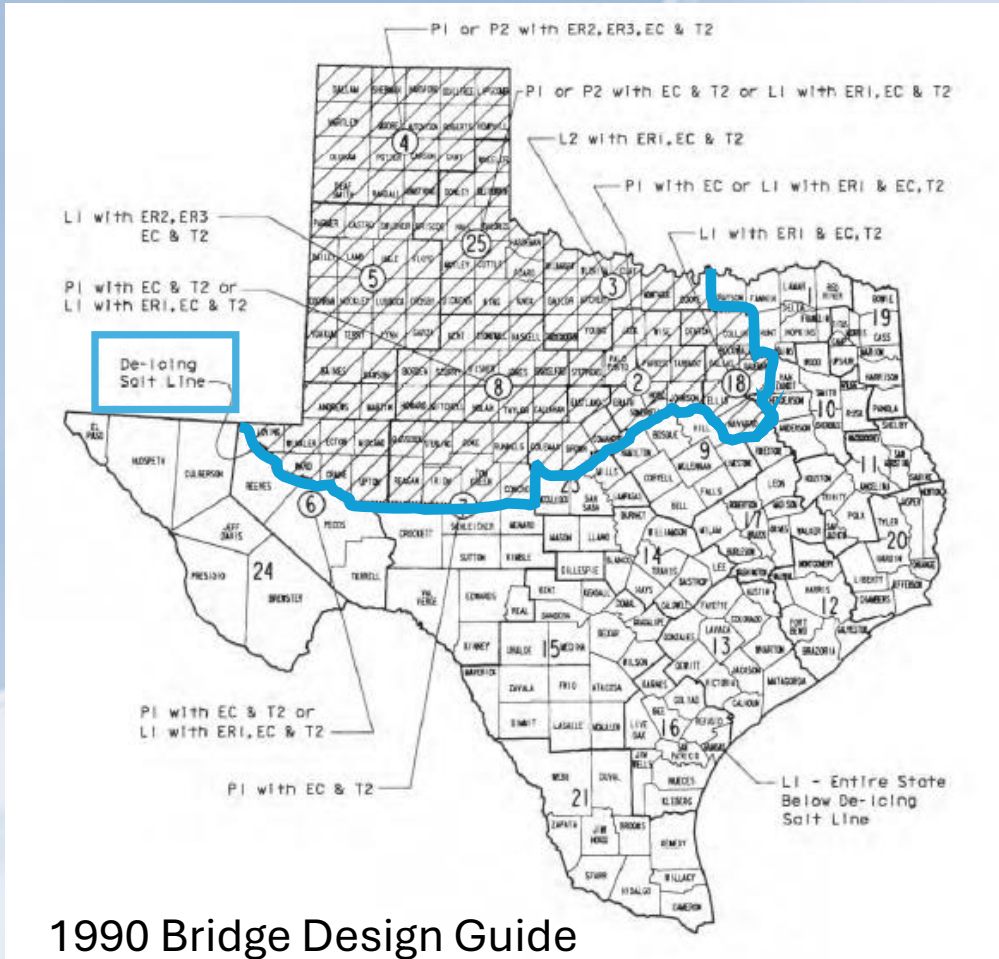
Steven Austin, TxDOT

Bridge Deck Preservation

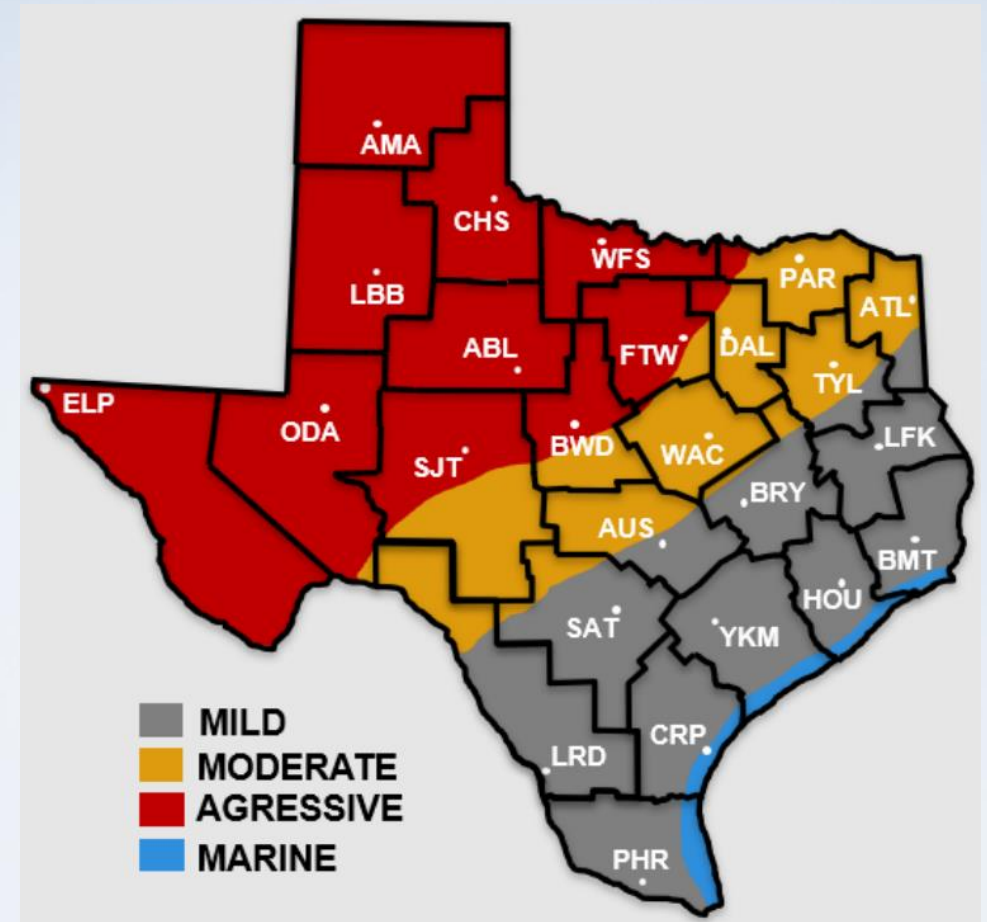
- New Construction
- Maintenance Operations Manual
- Bridge Preservation Guide
- Construction Inspection Resources and Training



Bridge Deck Preservation

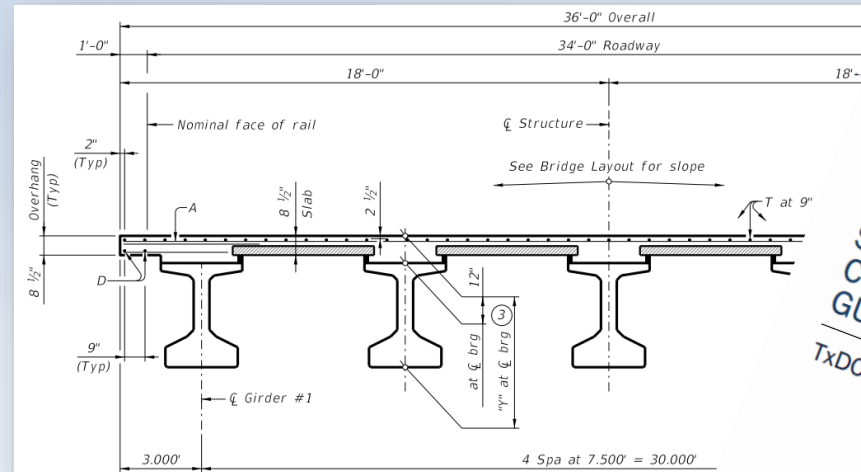


1990 Bridge Design Guide



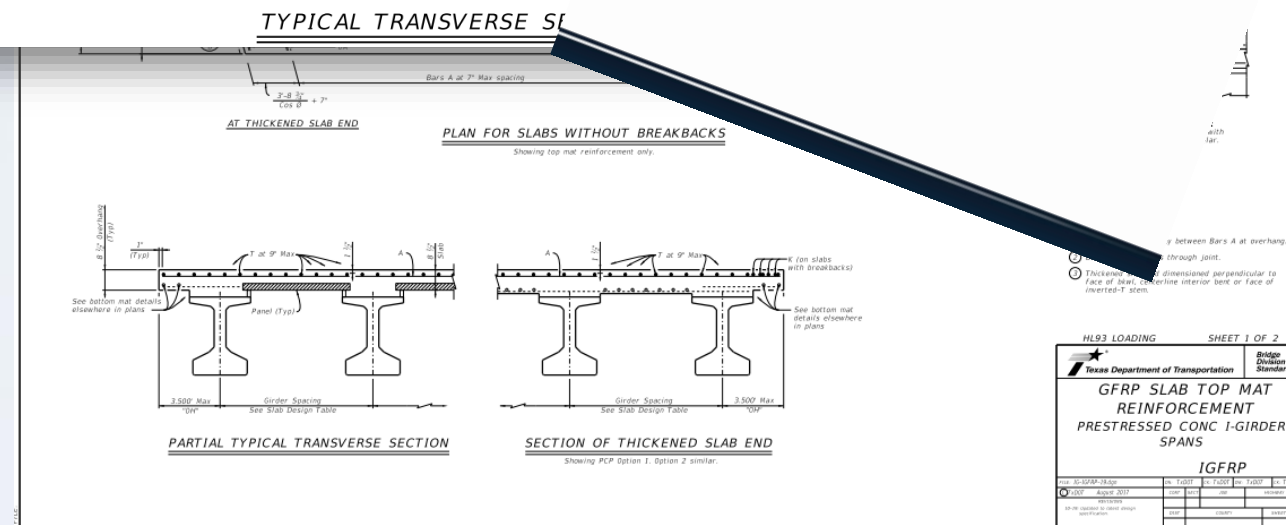
New Construction

- 2.5” Cover
- Corrosion resistant reinforcement
 - ECR, GFRP, Galvanized (HDG, CGR)
- Microfibers and macrofibers
- Shrinkage reducing admixtures
- HPC concrete



STRUCTURE DESIGN - CORROSION PROTECTION GUIDE

 TxDOT Bridge Division



New Construction

- Construction inspection support and training
 - Importance of saturated surface dry condition on panels
 - Importance of curing
- Crack repair
- Addressing deficient cover
- Working to advance internal curing practice in Texas

RELIABLE
CONCRETE ACCESSORIES

ReliableCure SOG®

Cyclic Maintenance

Maintenance Operations Manual



Revised March 2024

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Penetrating Concrete Surface Treatment

Applying penetrating concrete treatment (silane or other penetrating sealers) to concrete surfaces is beneficial to reduce deicing salts from penetrating the concrete. When salt reaches the reinforcing steel, it will corrode and result in spalling concrete. The most effective means of ensuring performance from silane is proper concrete surface preparation prior to application. Shot blasting the surface is believed to be the best surface preparation treatment, then abrasive blasting. Lastly water blasting is also allowed, but intensity of water must be sufficient to prepare the surface to absorb the sealer plus the concrete must be allowed to dry out sufficiently to accept the material which makes this the least desirable surface treatment. When traffic control is set up across a bridge for roadway work, it is a good practice to address the concrete bridge deck while mobilized. Maximum recommended reapplication interval is ten years.

Washing Bridge Decks

Sweeping and power washing bridge decks without overlays is recommended after the winter season concludes if salts were applied during the winter season.

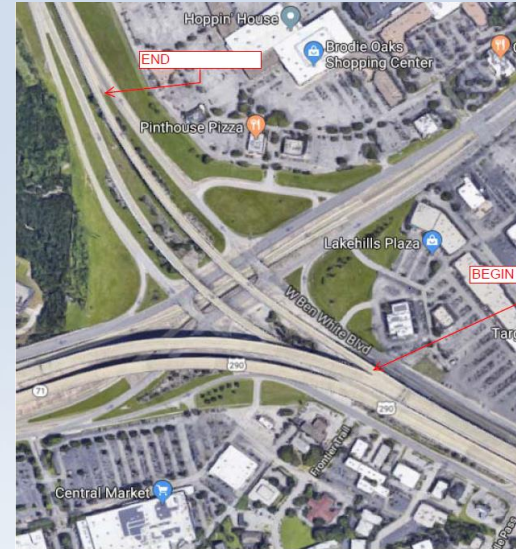
Penetrating Sealer



- 2024 projects in Abilene, Amarillo, and Odessa
- Does not include +1M SY of treatment in Austin between 2018 and 2019

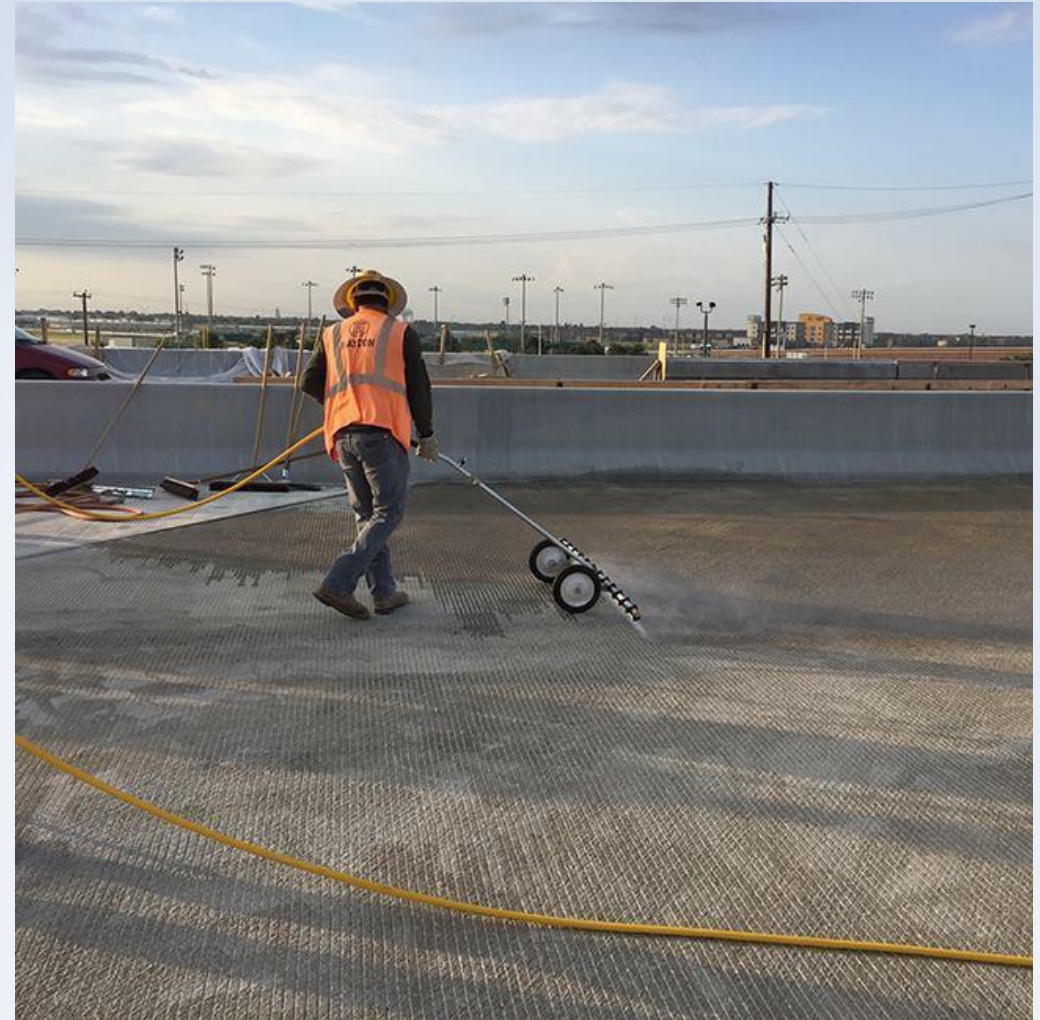
Penetrating Sealer

- 1M SY of treatment in Austin between 2018 and 2019
- TxDOT Maintenance Supervisor observations
 - Sealed direct connects were open
 - Treatments were more effective on sealed bridges
 - Bridges without sealing required continuous treatments.



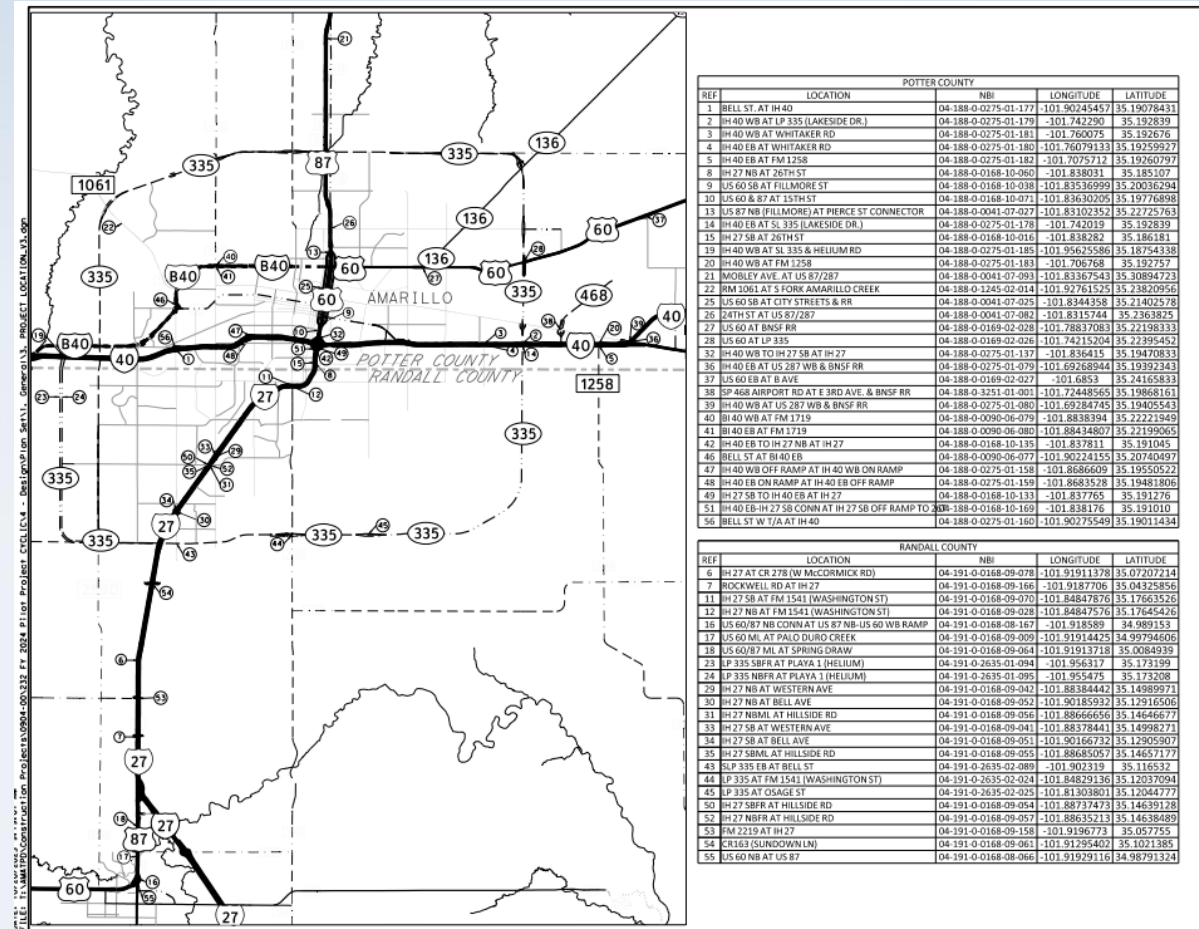
Cyclic Maintenance

- Pilot projects in Abilene, Amarillo, and Odessa



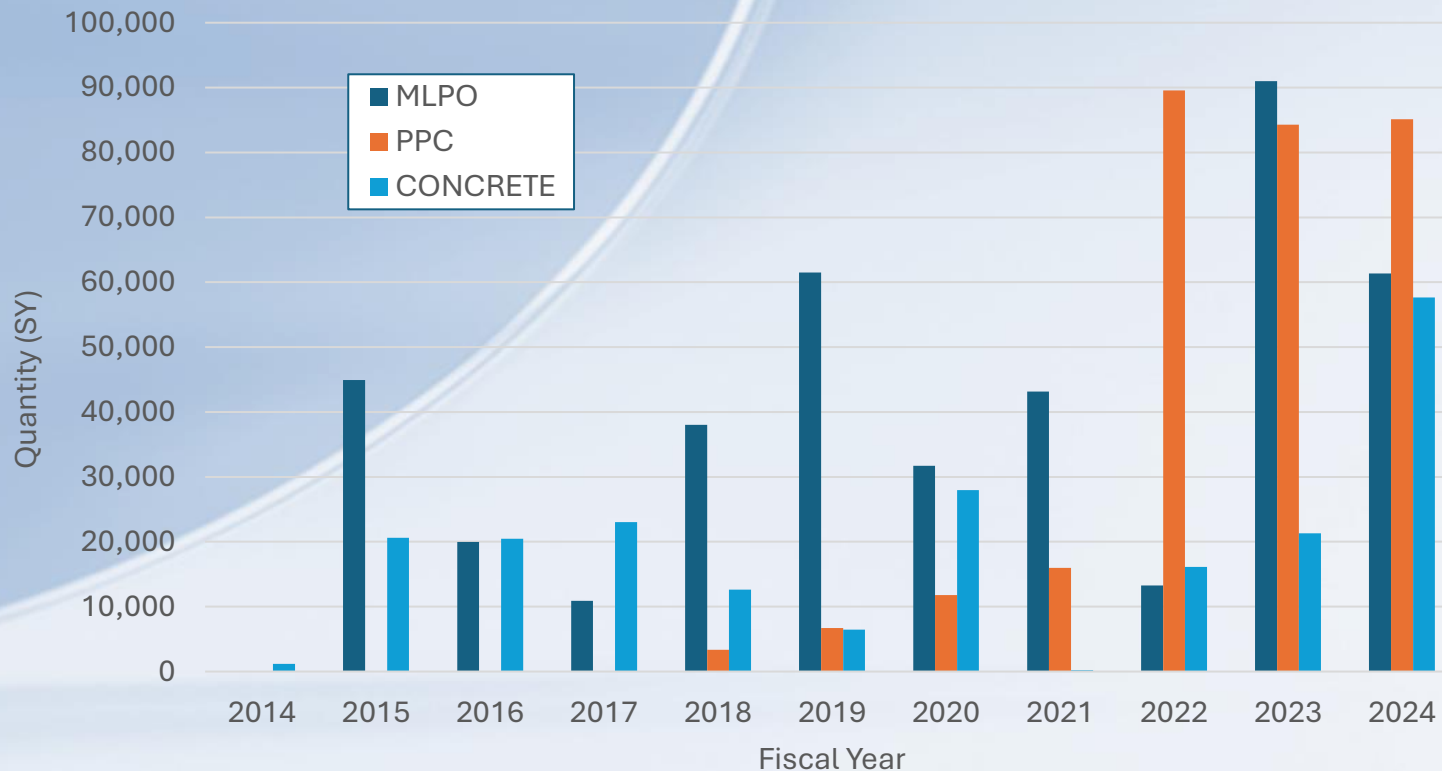
Cyclic Maintenance in Amarillo

- 56 bridges for \$1.7M
 - Joint cleaning and sealing
 - Drain cleaning
 - Substructure cleaning
 - Penetrating sealer on bare decks (\$50k per bridge)



Bridge Deck Overlays

OVERLAYS

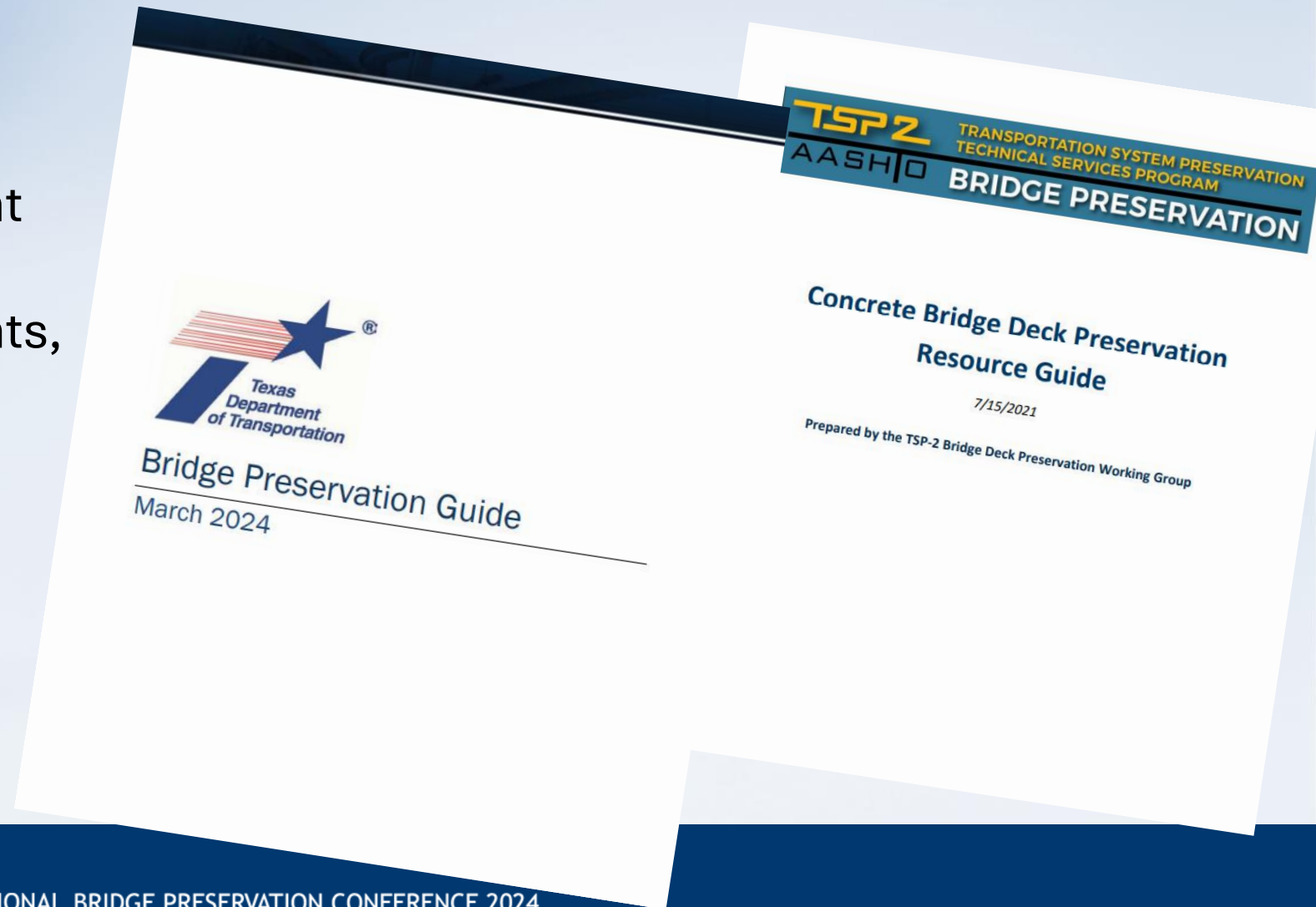


2014 - 2024

- Multi-layer Polymer (MLPO)
415,000 SY
- Polyester Polymer (PPC)
297,000 SY
- Concrete (CO & LMC)
207,000 SY

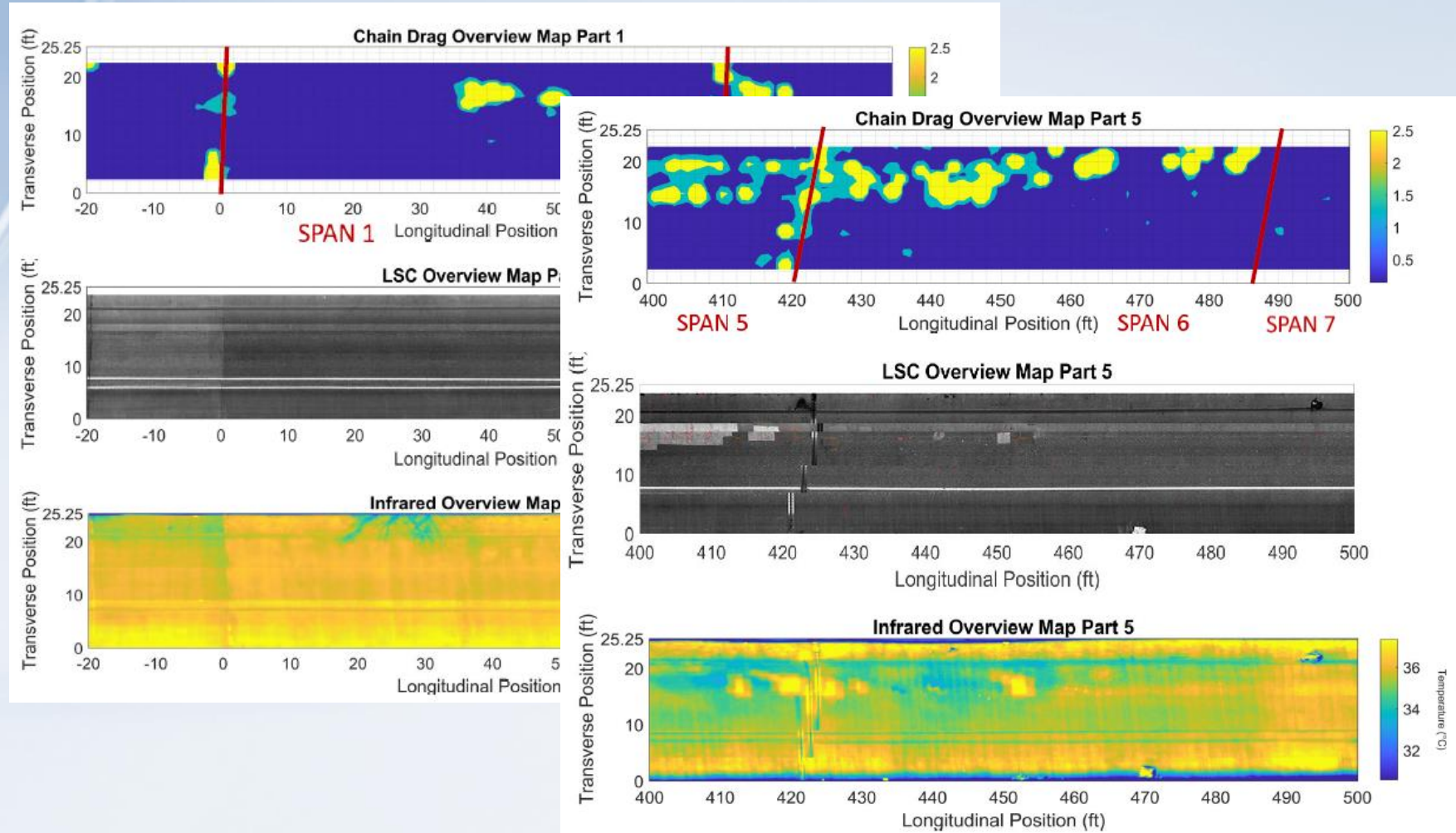
Selecting Overlay Type

- Documented guidance
 - Bridge deck assessment
 - Overlay options, preparation requirements, & applicability



Nondestructive Evaluation

- Sounding
- High-resolution imaging
- Infrared
- GPR



MLPO

- SH 31



PPC

- 30 projects (2018 and 2024)



Concrete Overlays

- Decades of success
- Steel fibers
- Prone to cracking
 - saturating deck for 12 hrs helps to substantially reduce cracking



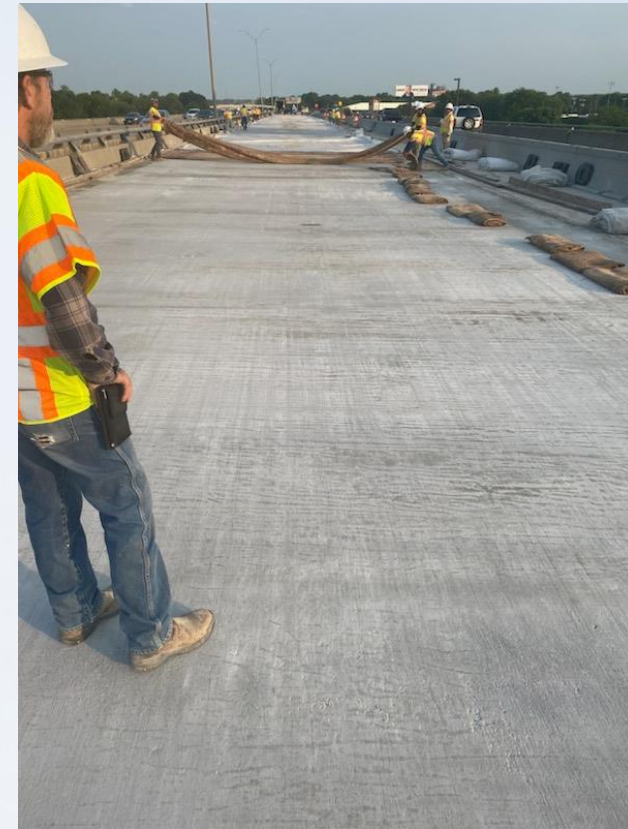
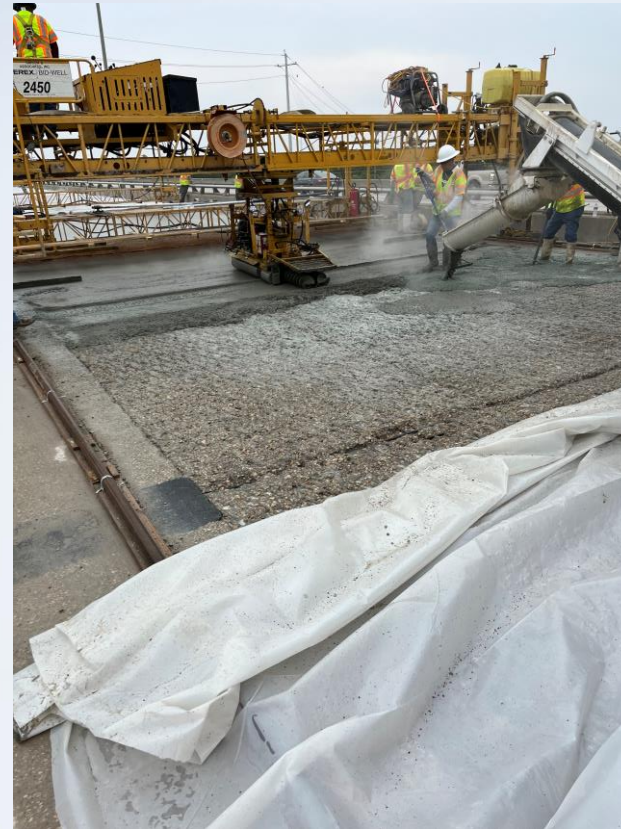
LMC Overlays

- Major Projects 2015 (Interstate) & 2016 (State Highway)



LMC Overlays (Early Strength Mix)

- IH 45 – Weekend work (1800-2000 SY with 2 hydromill crews)



Preserving Bridge Decks



Construction Resources

- Construction tips for overlays.
Topics include:
 - What to inspect during installation
 - Handling and storing of materials
 - Surface preparation
 - Mixing
 - Placing
 - Aggregate broadcasting
 - Curing
 - Texturing
- Video Training



[Divisions](#) / [Bridge Division \(BRG\)](#) / [Sections](#) / [Field Operations section](#)

Bridge construction tips

- [PDF Tip 1A - Prestressed Beams - Placement](#)
- [PDF Tip 1B - Prestressed Beams - Bracing](#)
- [PDF Tip 1C - Prestressed Beams - Bearing Pads](#)
- [PDF Tip 2A - Precast Concrete Panels \(PCP\) - Foam Bedding Strips](#)
- [PDF Tip 2B - Precast Concrete Panels \(PCP\) - Defects](#)
- [PDF Tip 2C - Precast Concrete Panels \(PCP\) - Setting Panels](#)
- [PDF Tip 2D - Precast Concrete Panels \(PCP\) - Generic Overview of Grading](#)
- [PDF Tip 3 - Drilled Shafts for HMIP and Other Ancillary Structures](#)
- [PDF Tip 4 - Adhesive Anchors](#)
- [PDF Tip 5 - Polymer Nosing \(Header\) Joint Design and Repair](#)
- [PDF Tip 6A - Multi-Layer Polymer Overlay \(MLPO\) Installation](#)
- [PDF Tip 6B - Polyester Polymer Concrete \(PPC\) Overlay Installation](#)

Bridge Construction Resources

BRIDGE TIPS

Texas Department of Transportation | Bridge Division

Jun 3, 2021 at 7:29:06 AM
172° S
County Road 329
Colorado

Exposed coarse aggregate after shot blasting

Jun 9, 2022 at 12:49:33 AM
236° SW
W Parmer Ln
Trawls County

Mixing material with electric drill

Contact the Bridge Construction & Maintenance Branch for more information. Contact information is available at: <https://crossroads.dot.state.tx.us/BRG/Documents/Site%20Documents/Field%20Operations/CM%20Branch%20Coverage.pdf>

Left lane overlay completed

Application of the high molecular weight

Contact the Bridge Construction & Maintenance Branch for more information. Contact information is available at: <https://crossroads.dot.state.tx.us/BRG/Documents/Site%20Documents/Field%20Operations/CM%20Branch%20Coverage.pdf>

Multi-Layer Polymer Overlay (MLPO) Installation December 2022 7 | Page

BRIDGE TIPS

Texas Department of Transportation | Bridge Division

Application of the high molecular weight

PPC overlay placement

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Overlay Performance Tracking

- Information tracked
 - Overlay type, product, and details
 - Surface preparation method
 - Deck condition before overlay installation
 - Time lag between surface prep and overlay installation (very important)
 - Contractor's name performed surface preparation and overlay
 - Any problems or inconsistencies during any installation steps

Structure ID	District	County	Facility carried/Features Intersected	Overlay System	Overlay Contractor	Overlay Product	Steel Fiber Detail	surface prep method	Time lag between surface prep and overlay (day)	Date of Overlay
18-057-0-2374-03-563	DALLAS	DALLAS	US 175 WB CONN A/IH 20	CONCRETE OVERLAY (2 IN)	SILVER CREEK CONSTRUCTION, INC.	CO mix design (4600 psi)	SikaFiber Novocon CS-1000, Type II, 40lb/CY	Hydro-Demolition (1")	7	11/3/2020

Overlay Performance Tracking

- Future use of the database
 - Store and summarize specific applicable project information in a single place
 - Track performance over time
 - Study causes of failures
 - Process improvement and lessons learned
 - Support and reinforce successful district practices

In-House Repair Capability

- Decks
- Concrete substructure
- Structural steel



In-House Repair Capability

- Partnering with industry for training



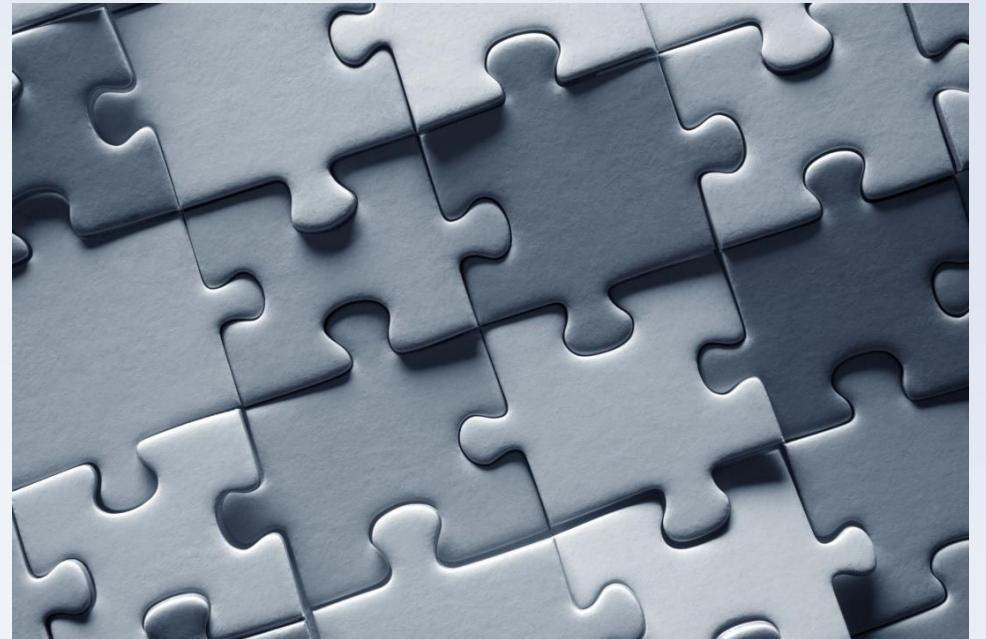
Construction Inspection Support

- Centralized staff provide statewide construction inspection support
- Serve as technical resources
- Project familiarity helps to better understand change orders and overruns



Putting all the pieces together

- Execution / Construction Quality is critical.
- Increasing awareness and familiarity with the specifications has been fruitful.
- Some preservation actions will not move the needle but can be performed to keep it from dropping.



Thank You

Steven Austin, TxDOT