Data Driven Asset Management Decisions

Andrew Bush

Texas Department of Transportation

April 25, 2025

Technology and making our lives easier

- Communication
- Information Access
- Navigation
- Online Shopping
- Healthcare
- Financial Management
- Productivity

Making sense of TXDOT dollars

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Project Name	Category	Automatic	Cost	Utility	Utility Change	Benefit/Cost ($k)	Cost ($k) / Benefit	Year	Frozen	Status
142460098601007(Culvert Replacement)	Replacement	Yes	$ 701,134.00	100	100	0.000142626	7011.34	2024	No	Proposed
062380000401017(Culvert Replacement)	Replacement	Yes	$ 323,475.00	100	100	0.000309142	3234.75	2024	No	Proposed
150150002502213(On-System Bridge Replacement)	Replacement	Yes	$ 1,689,297.00	100	33.33	0.00001973	50684.0024	2024	No	Proposed
150150007308124(On-System Bridge Replacement)	Replacement	Yes	$ 1,645,372.00	100	33.33	0.000020256	49366.1146	2024	No	Proposed
011170000913096(On-System Bridge Replacement)	Replacement	Yes	$ 2,114,252.00	100	33.33	0.000015764	63433.9033	2024	No	Proposed
120200252302011(On-System Bridge Replacement)	Replacement	Yes	$ 10,377,675.00	100	33.33	0.000003211	311361.3861	2024	No	Proposed
082170010604043(On-System Bridge Replacement)	Replacement	Yes	$ 12,170,304.00	100	33.33	0.000002738	365145.6345	2024	No	Proposed
251730010504052(On-System Bridge Replacement)	Replacement	Yes	$ 3,114,246.00	100	33.33	0.000010702	93436.7296	2024	No	Proposed
150150007212073(Culvert Replacement)	Replacement	Yes	$ 15,682,575.00	100	100	0.000006376	156825.75	2024	No	Proposed
171540011704023(Culvert Replacement)	Replacement	Yes	$ 644,774.00	100	100	0.000155093	6447.74	2024	No	Proposed
021120008004039(On-System Bridge Replacement)	Replacement	Yes	$ 1,321,280.00	100	33.33	0.000025225	39642.3642	2024	No	Proposed
102120016501017(On-System Bridge Replacement)	Replacement	Yes	$ 1,859,504.00	100	33.33	0.000017924	55790.699	2024	No	Proposed
010600013604059(On-System Bridge Replacement)	Replacement	Yes	$ 1,618,901.00	100	33.33	0.000020588	48571.8871	2024	No	Proposed
082090103105005(On-System Bridge Replacement)	Replacement	Yes	$ 853,929.00	100	33.33	0.000039031	25620.432	2024	No	Proposed
010750027904013(Culvert Replacement)	Replacement	Yes	$ 512,584.00	100	100	0.000195089	5125.84	2024	No	Proposed
181990000912132(On-System Bridge Replacement)	Replacement	Yes	$ 901,300.00	100	66.67	0.00007397	13518.827	2024	No	Proposed
250970105301006(On-System Bridge Replacement)	Replacement	Yes	$ 594,094.00	100	33.33	0.000056102	17824.6024	2024	No	Proposed
180710004804047(On-System Bridge Replacement)	Replacement	Yes	$ 1,394,162.00	100	33.33	0.000023906	41829.0429	2024	No	Proposed
121700033804058(On-System Bridge Replacement)	Replacement	Yes	$ 1,443,312.00	100	33.33	0.000023092	43303.6903	2024	No	Proposed
032440004306069(On-System Bridge Replacement)	Replacement	Yes	$ 4,501,429.00	100	33.33	0.000007404	135056.3936	2024	No	Proposed
011170057902002(On-System Bridge Replacement)	Replacement	Yes	$ 261,165.00	100	66.67	0.000255279	3917.2791	2024	No	Proposed
062380000402064(On-System Bridge Replacement)	Replacement	Yes	$ 2,188,811.00	100	33.33	0.000015227	65670.921	2024	No	Proposed
011130000909182(On-System Bridge Replacement)	Replacement	Yes	$ 1,535,149.00	100	33.33	0.000021711	46059.0759	2024	No	Proposed
102340049503092(On-System Bridge Replacement)	Replacement	Yes	$ 1,586,494.00	100	33.33	0.000021008	47599.5799	2024	No	Proposed
060690000501014(Culvert Replacement)	Replacement	Yes	$ 1,780,400.00	100	100	0.000056167	17804	2024	No	Proposed
170820061201013(On-System Bridge Replacement)	Replacement	Yes	$ 168,958.00	100	33.33	0.000197267	5069.2469	2024	No	Proposed

Making sense of TXDOT dollars

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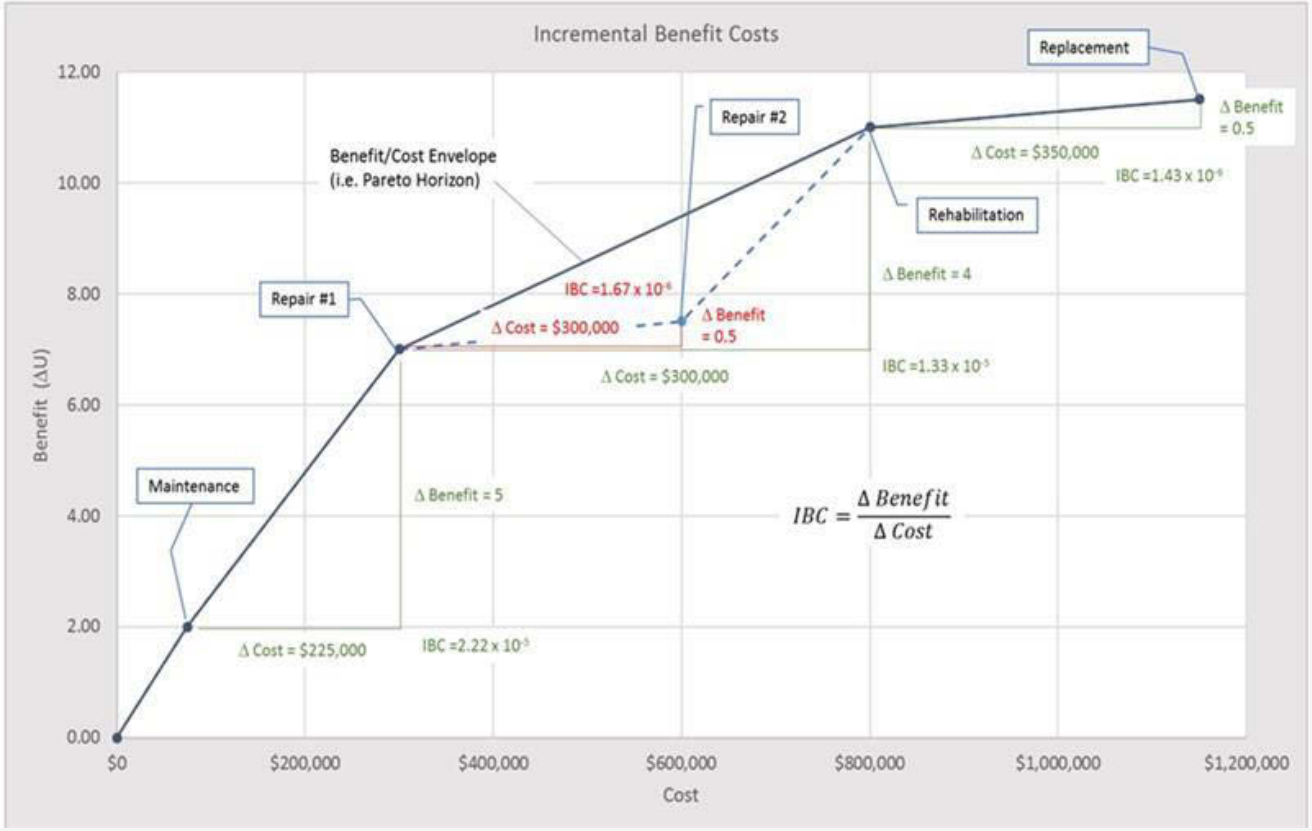

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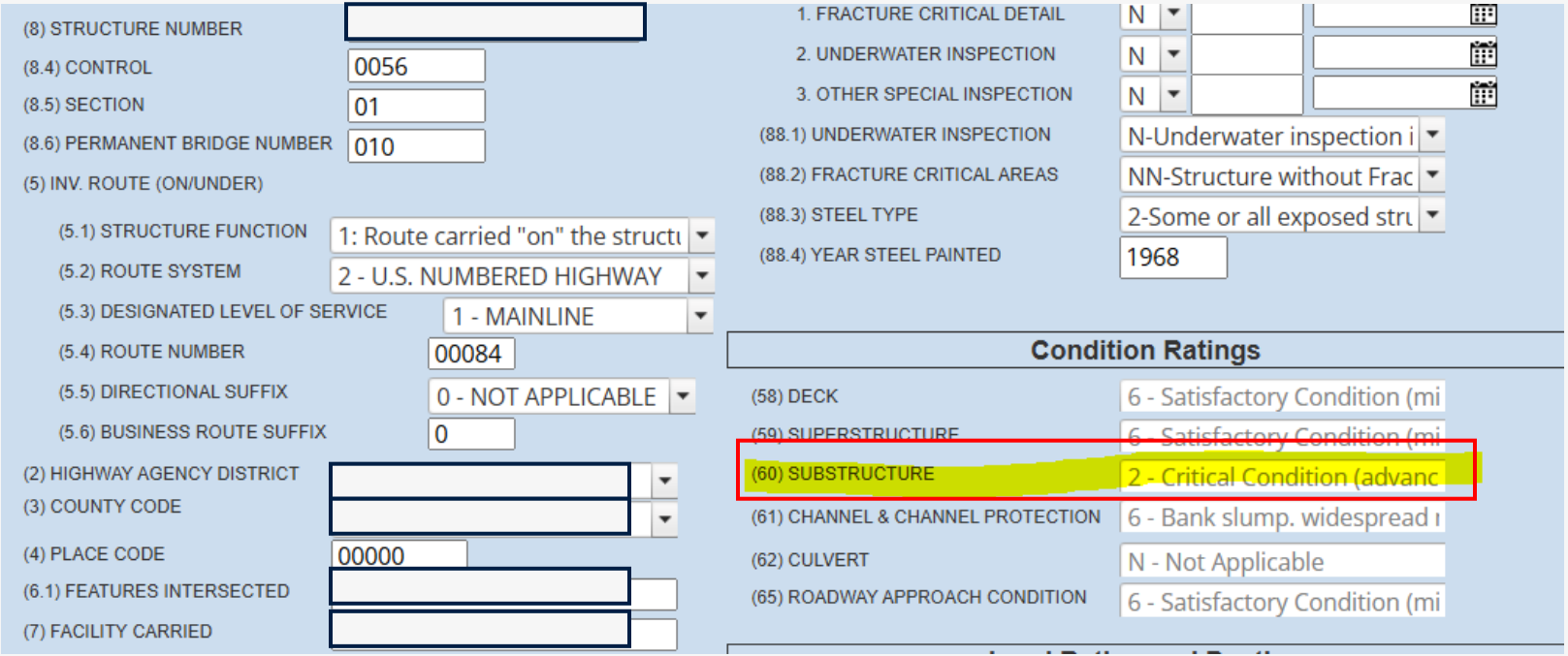
The Data and the Narrative

Condition Ratings	
(58) DECK	6 - Satisfactory Condition (mi
(59) SUPERSTRUCTURE	4 - Poor Condition (advanced
(60) SUBSTRUCTURE	7 - Good Condition (some mi

Name	Env.	Total Quantity	Units	State 1	State 2	State 3	State 4	Details
16 - Reinforced Concrete Top Flange	3 - Mod.	6034	sq. ft.	6034	0	0	0	View
510 - Wearing Surfaces		5624	sq. ft.	5624	0	0	0	View
205 - Reinforced Concrete Column	3 - Mod.	12	each	12	0	0	0	View
215 - Reinforced Concrete Abutment	3 - Mod.	80	ft.	80	0	0	0	View
234 - Reinforced Concrete Pier Cap	3 - Mod.	160	ft.	160	0	0	0	View
110 - Reinforced Concrete Open Girder/Beam	3 - Mod.	2120	ft.	2008	100	12	0	View
1080 - Delamination/Spall/Patched Area		2		0	0	2	0	View
1130 - Cracking (RC and Other)		110		0	100	10	0	View

Elem.	Str. Unit.	Env.	Element Description	Tot. Qty.	Units	Pct1	Pct2	Pct3	Pct4
16	0	Mod. (3)	Re Conc Top Flange	6034	sq.ft	100.000%	0.000	0.000	0.000
110	0	Mod. (3)	Re Conc Opn Girder/Beam	2120	ft	94.717%	4.717	0.566	0.000

The Data and the Narrative



Bent 3 & 4 steel piles have minor to moderate local scour

2 CRITICAL CONDITION — advanced deterioration of primary structural elements. Fatigue cracks in steel or shear cracks in concrete may be present or scour may have removed substructure support. Unless closely monitored it may be necessary to close the bridge until corrective action is taken.

BELOW GROUND OR FOUNDATION: 2

COMMENTS: Bent 3 & 4 steel piles have minor to moderate local scour (See photo). Concrete encasements have been added to the exterior piles at Bent 4 and the North exterior pile of Bent 3. No significant change in channel measurements since previous inspections.

COLLISION PROTECTION SYSTEM:

Defects	Condition States 1 GOOD	2 FAIR	3 POOR	4 SEVERE
Corrosion (1000)	None.	Freckled rust. Corrosion of the steel has initiated.	Section loss is evident or pack rust is present but does not warrant structural review.	The condition warrants a structural review to determine the effect on strength or serviceability of the element or bridge; OR a structural review has been completed and the defects impact strength or serviceability of the element or bridge.
Cracking (1010)	None.	Crack that has self-arrested or has been arrested with effective arrest holes, doubling plates, or similar.	Identified crack that is not arrested but does not warrant structural review.	
Connection (1020)	Connection is in place and functioning as intended.	Loose fasteners or pack rust without distortion is present but the connection is in place and functioning as intended.	Missing bolts, rivets, or fasteners; broken welds; or pack rust with distortion but does not warrant a structural review.	
Distortion (1900)	None.	Distortion not requiring mitigation or mitigated distortion.	Distortion that requires mitigation that has not been addressed but does not warrant structural review.	
Settlement (4000)	None.	Exists within tolerable limits or arrested with no observed structural distress.	Exceeds tolerable limits but does not warrant structural review.	
Scour (6000)	None.	Exists within tolerable limits or has been arrested with effective countermeasures.	Exceeds tolerable limits but is less than the critical limits determined by scour evaluation and does not warrant structural review.	

The Data and the Narrative

Elem.	Str. Unit.	Env.	Element Description	Tot. Qty.	Units	Qty1	Qty2	Qty3	Qty4
215	0	Mod. (3)	Re Conc Abutment	90	ft	88.000	2	0	0
225	0	Mod. (3)	Steel Pile	8	each	0.000	0	8	0
234	0	Mod. (3)	Re Conc Pier Cap	180	ft	177.000	3	0	0
301	0	Mod. (3)	Pourable Joint Seal	172	ft	172.000	0	0	0
331	0	Mod. (3)	Re Conc Bridge Railing	285	ft	284.000	1	0	0
8166	0	Mod. (3)	Secondary Members/Reinforced Con	70	each	69.000	1	0	0
8270	0	Mod. (3)	Wing Wall/Reinforced Concrete	4	each	4.000	0	0	0
8340	0	Mod. (3)	Approach Rail/Metal	450	ft	449.000	1	0	0
8603	0	Mod. (3)	Conventionally Formed	5	each	5.000	0	0	0
8631	0	Mod. (3)	T and Double T Beams	1140	ft	1,131.000	9	0	0
8671	0	Mod. (3)	Column or Pile Extension/Reinfor	34	each	24.000	10	0	0

The Data and the Narrative

BELOW GROUND OR FOUNDATION: 2

COMMENTS: Bent 3 & 4 steel piles have minor to moderate local scour (See photo). Concrete encasements have been added to the exterior piles at Bent 4 and the North exterior pile of Bent 3. No significant change in channel measurements since previous inspections.

COLLISION PROTECTION SYSTEM:

Pile	8	each	0.000	0	8	0

Defects	Condition States 1 GOOD	2 FAIR	3 POOR	4 SEVERE
Corrosion (1000)	None.	Freckled rust. Corrosion of the steel has initiated.	Section loss is evident or pack rust is present but does not warrant structural review.	The condition warrants a structural review to determine the effect on strength or serviceability of the element or bridge; OR a structural review has been completed and the defects impact strength or serviceability of the element or bridge.
Cracking (1010)	None.	Crack that has self-arrested or has been arrested with effective arrest holes, doubling plates, or similar.	Identified crack that is not arrested but does not warrant structural review.	
Connection (1020)	Connection is in place and functioning as intended.	Loose fasteners or pack rust without distortion is present but the connection is in place and functioning as intended.	Missing bolts, rivets, or fasteners; broken welds; or pack rust with distortion but does not warrant a structural review.	
Distortion (1900)	None.	Distortion not requiring mitigation or mitigated distortion.	Distortion that requires mitigation that has not been addressed but does not warrant structural review.	
Settlement (4000)	None.	Exists within tolerable limits or arrested with no observed structural distress.	Exceeds tolerable limits but does not warrant structural review.	
Scour (6000)	None.	Exists within tolerable limits or has been arrested with effective countermeasures.	Exceeds tolerable limits but is less than the critical limits determined by scour evaluation and does not warrant structural review.	

2 CRITICAL CONDITION - advanced deterioration of primary structural elements. Fatigue cracks in steel or shear cracks in concrete may be present or scour may have removed substructure support. Unless closely monitored it may be necessary to close the bridge until corrective action is taken.

The other situation

Elem.	Str. Unit.	Env.	Element Description	Tot. Qty.	Units	Pct1	Pct2	Pct3	Pct4
241	0	Mod. (3)	Re Conc Culvert	424	ft	0.000%	47.170	52.830	0.000

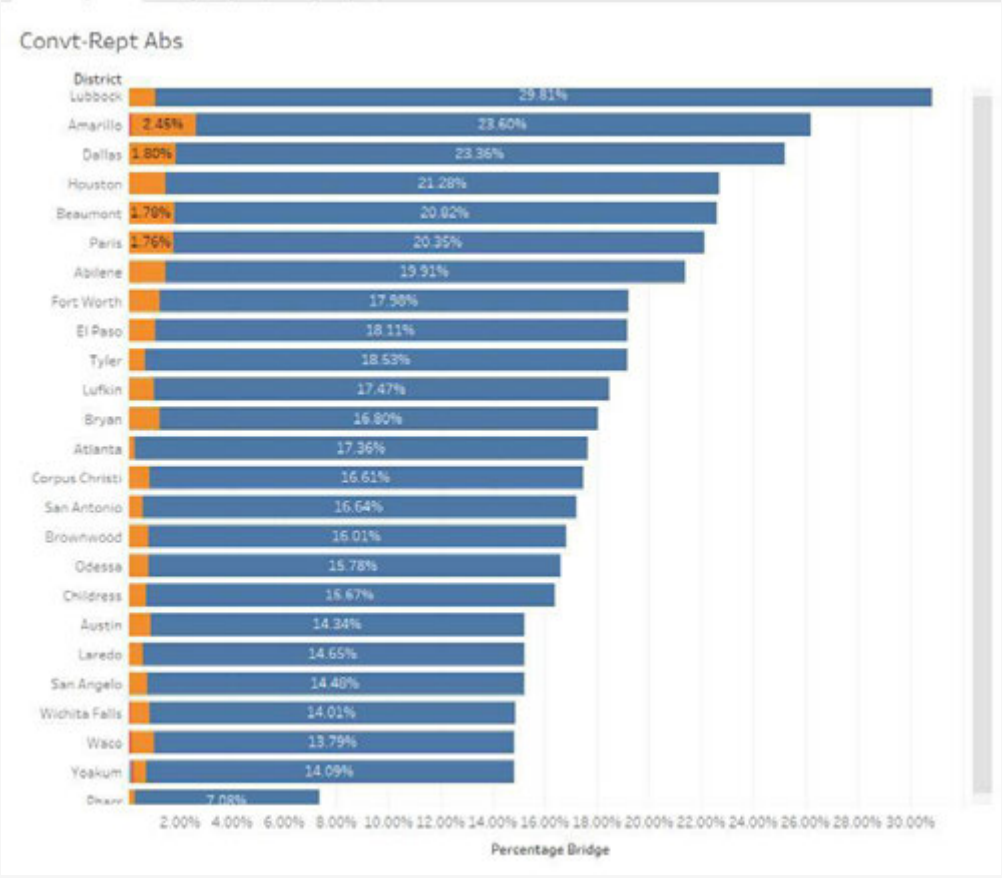
Culvert walls exhibit isolated hairline vertical cracks.

(62) CULVERT | 7 - Shrinkage cracks, light sca

3
POOR
Spall greater than 1 in. deep or greater than 6 in. diameter. Patched area that is unsound or showing distress. Does not warrant structural review.
Present with measurable section loss but does not warrant structural review.
Heavy build-up with rust staining.
~~Width greater than 0.05 in. or spacing of less than 1 ft.~~ Wide cracks or heavy pattern (map) cracking.
Coarse aggregate is loose or has popped out of the concrete matrix due to abrasion or wear.
Distortion that requires mitigation that has not been addressed but does not warrant structural review.
Exceeds tolerable limits but does not warrant structural review.

3
POOR
Exceeds tolerable limits but is less than the critical limits determined by scour evaluation and does not warrant structural review.
The element has impact damage. The specific damage caused by the impact has been captured in Condition State 3 under the appropriate material defect entry.

Data Moves at the Speed of Trust



Right time for a Rehab

Transition Times

* NBI Rating 9:	3	Years
* NBI Rating 8:	17	Years
* NBI Rating 7:	23	Years
* NBI Rating 6:	18	Years
* NBI Rating 5:	13	Years
* NBI Rating 4:	9	Years
* NBI Rating 3:	4	Years
* NBI Rating 2:	2	Years
* NBI Rating 1:	1	Years

Bridge Built in 2000
Rehab between 2020-2061

Good BrM Example

Work Suggested	Category	Cost
(Deck Preservation, Substructure Preservation)	Preservation	$ 310,113.00

Initial Project Estimate	FOP estimate nearest 100K
$859,515.00	$360,000

Condition Ratings

	Inspector Ratings:	NBI Converted Rating:
Deck (058)	7 Good	7
Superstructure (059)	7 Good	7
Substructure (060)	6 Satisfactory	6

Rehab Estimate from good Element Data

- TXDOTConnect Estimate
- $405,530

- BrM Estimate
- $434,600

Why was this bridge not picked

Condition Ratings	
(58) DECK	6 - Satisfactory Condition (mi
(59) SUPERSTRUCTURE	5 - Fair Condition (minor sect
(60) SUBSTRUCTURE	5 - Fair Condition (minor sect

Elem.	Str. Unit.	Env.	Element Description	Tot. Qty.	Units	Qty1	Qty2	Qty3	Qty4
12	0	Mod. (3)	Re Concrete Deck	270216	sq.ft	270,183.000	33	0	0
109	0	Mod. (3)	Pre Opn Conc Girder/Beam	38880	ft	38,856.000	22	2	0
205	0	Mod. (3)	Re Conc Column	240	each	0.000	240	0	0
215	0	Mod. (3)	Re Conc Abutment	84	ft	77.000	7	0	0
234	0	Mod. (3)	Re Conc Pier Cap	3200	ft	3,181.000	19	0	0
301	0	Mod. (3)	Pourable Joint Seal	3200	ft	3,161.000	39	0	0
304	0	Mod. (3)	Open Expansion Joint	84	ft	84.000	0	0	0
310	0	Mod. (3)	Elastomeric Bearing	972	each	968.000	4	0	0
321	0	Mod. (3)	Re Conc Approach Slab	1600	sq.ft	1,580.000	20	0	0
331	0	Mod. (3)	Re Conc Bridge Railing	12960	ft	12,951.000	9	0	0

Why was this bridge not picked

Substructure **(060)**: 5 Fair 7

Elem.	Str. Unit.	Env.	Element Description	Tot. Qty.	Units	Qty1	Qty2	Qty3	Qty4
205	0	Mod. (3)	Re Conc Column	135	each	132.000	3	0	0
215	0	Mod. (3)	Re Conc Abutment	82	ft	76.000	6	0	0
234	0	Mod. (3)	Re Conc Pier Cap	1809	ft	1,758.000	51	0	0

Why was this bridge not picked

Hydro demo and redecking

Initial Project Estimate
$249,958.42

Condition Ratings

Inspector Ratings: NBI Converted Rating:

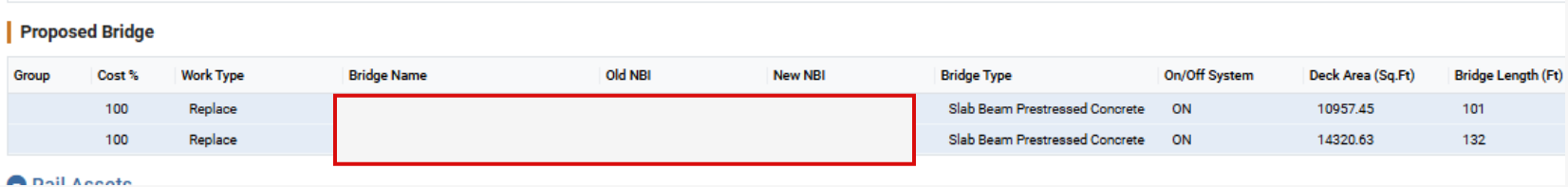
Deck (058): 5 Fair 8

Elem.	Str. Unit.	Env.	Element Description	Tot. Qty.	Units	Qty1	Qty2	Qty3	Qty4
15	0	Mod. (3)	Pre Concrete Top Flange	6800	sq.ft	6,800.000	0	0	0

Why was this bridge not picked

it’s already programmed in FY26

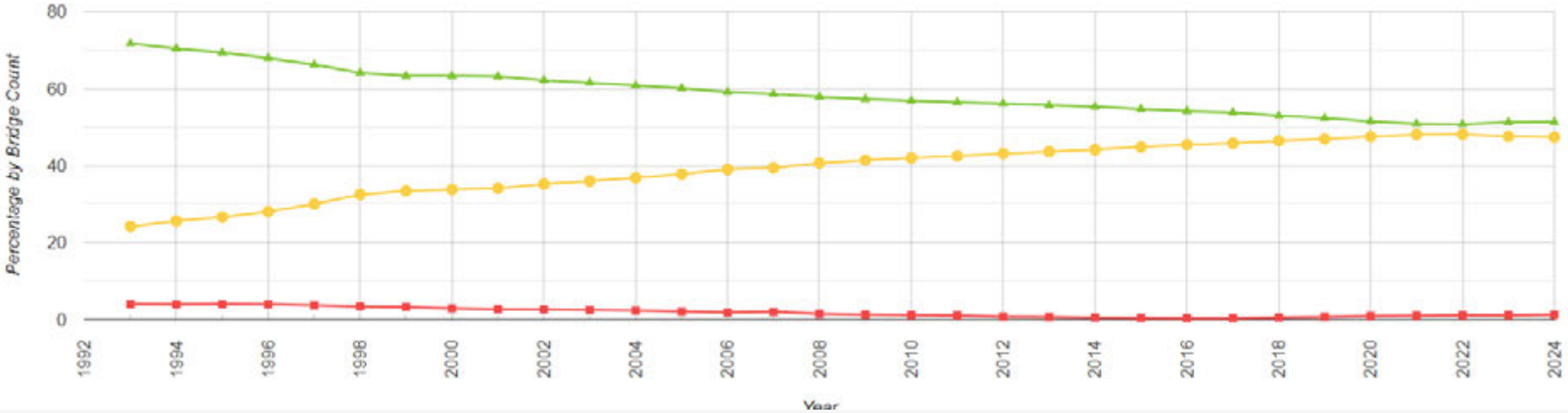
Why was this bridge not picked



*Estimated Let Date:

06/05/2024

Texas



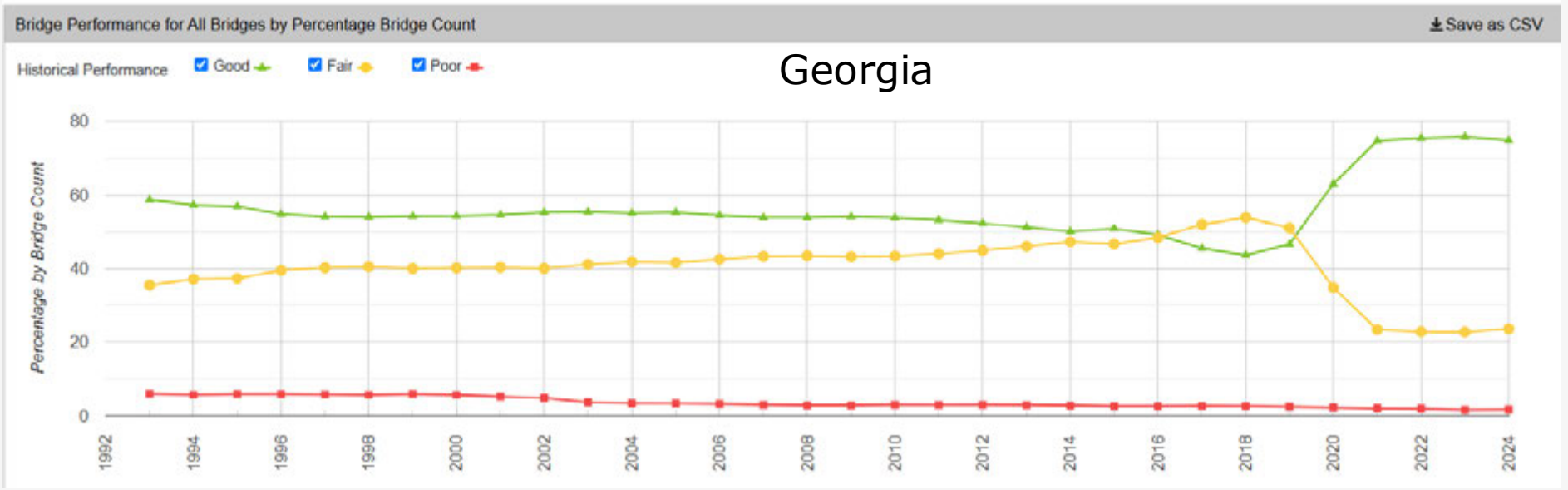
CAT 6 UTP

BCS= 89.1->88.4
$4.6 Billion

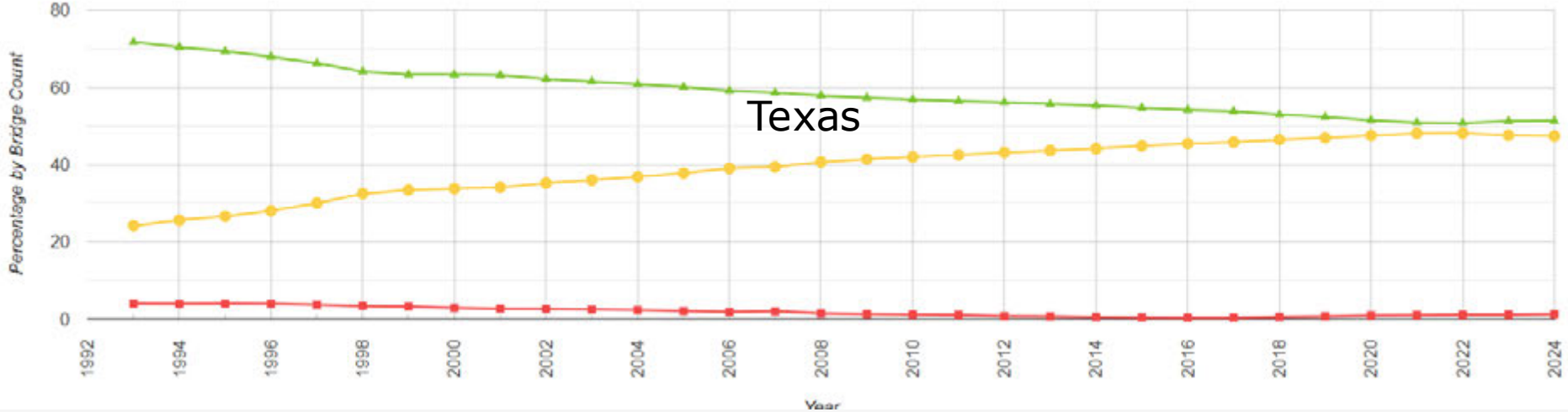
BCS= 89.1
$10.4 Billion

BCS= 90
$18 Billion

Other States percentages



Texas



Doing the same thing over and over again and expecting different results

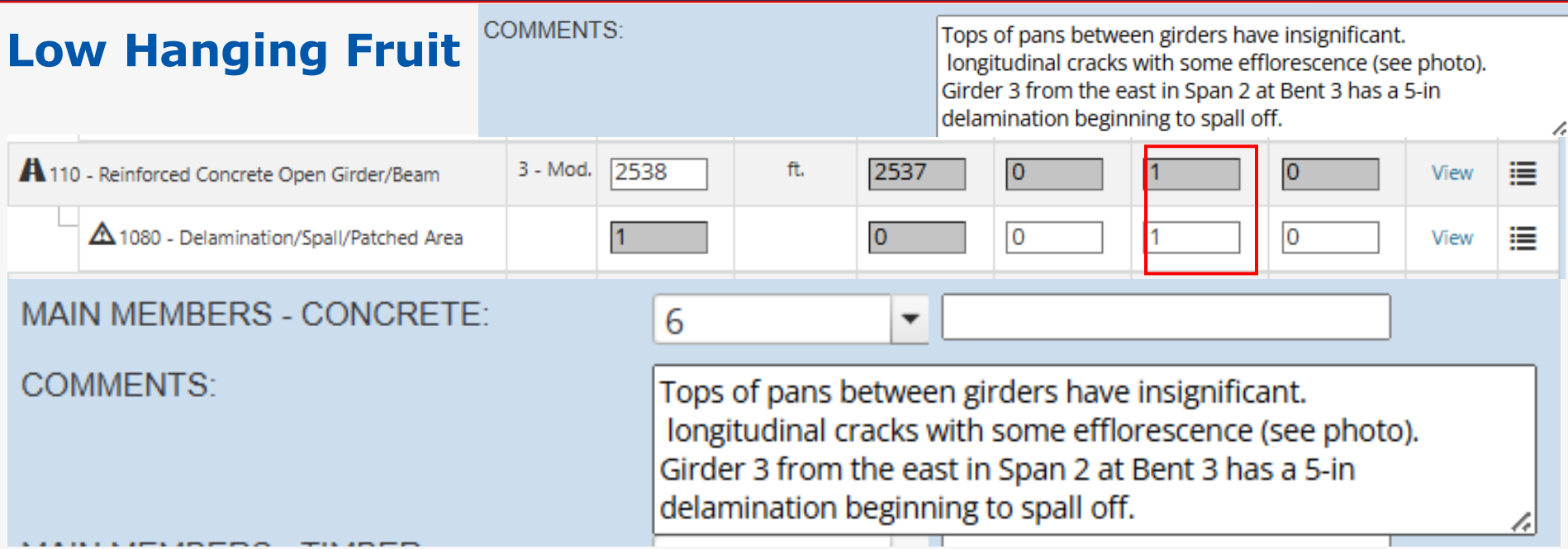
Using your Bridge Crews to Raise your Bridge Condition Score

Good Condition Data

Condition ratings are used to describe the existing, in-place bridge as compared to the as-built condition. Evaluation is for the materials related, physical condition of the deck, superstructure, and substructure components of a bridge. The condition evaluation of channels and channel protection and of culverts is also included. Condition codes are *properly used* when they provide an overall *characterization* of the general condition of the *entire component* being rated. Conversely, they are *improperly used* if they attempt to describe *localized* or nominally occurring instances of deterioration or disrepair. Correct assignment of a condition code must, therefore, consider both the severity of the deterioration or disrepair and the extent to which it is widespread throughout the component being rated.

7	GOOD CONDITION — some minor problems.
6	SATISFACTORY CONDITION — structural elements show some minor deterioration.

Low Hanging Fruit



1 LF or SQ.FT

1289 Bridges

10 LF or SQ.FT

7917 Bridges

Data Mismatch

Condition Ratings

(58) DECK	6 - Satisfactory Condition (mi
(59) SUPERSTRUCTURE	6 - Satisfactory Condition (mi
(60) SUBSTRUCTURE	6 - Satisfactory Condition (mi

MAIN MEMBERS - CONCRETE: 6

COMMENTS: 1. Beams have minor to moderate cracks, delaminations and spalls with exposed and rusty strands (mostly in bottom flanges) at ends over abutments and at Bents 4 and 7 from the South (see photos). East beam in the South span has a patched spall over Bent 2.

MAIN MEMBERS - TIMBER:

ABUTMENT CAPS: 7

COMMENTS: 1. Abutment caps have minor vertical and horizontal cracks.

CAPS - CONCRETE: 6

COMMENTS: 3. Bent caps have hairline flexural cracks between columns. Caps at Bents 4 and 7 from south have minor to moderate horizontal cracks and delaminations (see photo). Cap at Bent 2 has a minor spall below beam 4 from West (no exposed rebar).

COMMENTS:	1. Underside of deck has widespread minor transverse and diagonal cracks with efflorescence. Underside of deck overhangs have a few minor delaminations and spalls with exposed rebar, mostly at the North end of the bridge.
WEARING - SURFACE:	7 — 3" of Asphalt
COMMENTS:	2. Asphalt overlay has minor wear and flushing. Asphalt edges along joints has ravelled.
Surfacing Thickness:	3 inches
Fill Height:	inches
JOINTS, EXPANSION, OPEN:	N
COMMENTS:	
JOINTS, EXPANSION, SEALED:	6
COMMENTS:	3. Joint armor has heavy rust and deterioration. Expansion joint seals are filled with dirt and debris and other incompressible material. Joint seals at Bents 4 and 7 from the South have widespread tearing and joints have opened up as wide as 4" wide (see photos).
JOINTS, OTHER:	N
COMMENTS:	
DRAINAGE SYSTEM:	7
COMMENTS:	4. Drain holes are partially clogged with dirt and debris.
CURBS, SIDEWALKS & PARAPETS:	N
COMMENTS:	
MEDIAN BARRIER:	N
COMMENTS:	
RAILINGS:	7
COMMENTS:	5. Bridge rails have minor vertical cracks and a few minor spalls.

Data Mismatch

Element Inspection

View Federal Element Summary

Actions

Name	Env.	Total Quantity	Units	State 1	State 2	State 3	State 4	Details
12 - Reinforced Concrete Deck	3 - Mod.	53055	sq. ft.	53055	0	0	0	View
109 - Prestressed Concrete Open Girder/Beam	3 - Mod.	6882	ft.	6882	0	0	0	View
205 - Reinforced Concrete Column	3 - Mod.	24	each	24	0	0	0	View
215 - Reinforced Concrete Abutment	3 - Mod.	108	ft.	108	0	0	0	View
234 - Reinforced Concrete Pier Cap	3 - Mod.	496	ft.	496	0	0	0	View
310 - Elastomeric Bearing	3 - Mod.	126	each	126	0	0	0	View
331 - Reinforced Concrete Bridge Railing	3 - Mod.	1965	ft.	1965	0	0	0	View

Data Match

Elem.	Str. Unit.	Env.	Element Description	Tot. Qty.	Units	Qty1	Qty2	Qty3	Qty4
12	0	Mod. (3)	Re Concrete Deck	13843	sq.ft	2,970.000	4382	6491	0
109	0	Mod. (3)	Pre Opn Conc Girder/Beam	1960	ft	1,030.000	360	480	90
205	0	Mod. (3)	Re Conc Column	12	each	0.000	0	12	0
215	0	Mod. (3)	Re Conc Abutment	60	ft	13.000	10	22	15
234	0	Mod. (3)	Re Conc Pier Cap	159	ft	0.000	37	122	0
300	0	Mod. (3)	Strip Seal Exp Joint	235	ft	0.000	0	0	235
310	0	Mod. (3)	Elastomeric Bearing	56	each	28.000	16	11	1
321	0	Mod. (3)	Re Conc Approach Slab	1130	sq.ft	226.000	678	226	0

Accurate Condition and Element Data

Condition Ratings	
(58) DECK	7 - Good Condition (some mi
(59) SUPERSTRUCTURE	6 - Satisfactory Condition (mi
(60) SUBSTRUCTURE	7 - Good Condition (some mi

MAIN MEMBERS - CONCRETE: 6

COMMENTS: West span beam 3 (from north) has moderate spall ~9' with 2 exposed strands in bottom flange and small areas of delamination in top flange

Name	Env.	Total Quantity	Units	State 1	State 2	State 3	State 4
12 - Reinforced Concrete Deck	3 - Mod.	61675	sq. ft.	61675	0	0	0
109 - Prestressed Concrete Open Girder/Beam	3 - Mod.	9511	ft.	9502	0	9	0
1080 - Delamination/Spall/Patched Area		9		0	0	9	0

Accurate Condition and Element Data

Good Condition Data

Condition Ratings	
(58) DECK	6 - Satisfactory Condition (mi
(59) SUPERSTRUCTURE	6 - Satisfactory Condition (mi
(60) SUBSTRUCTURE	6 - Satisfactory Condition (mi

38 - Reinforced Concrete Slab	3 - Mod.	1598	sq. ft.	1565	31	2	0	View	
1080 - Delamination/Spall/Patched Area		2		0	1	1	0	View	
1090 - Exposed Rebar		1		0	0	1	0	View	
215 - Reinforced Concrete Abutment	3 - Mod.	50	ft.	41	9	0	0	View	
1080 - Delamination/Spall/Patched Area		1		0	1	0	0	View	
234 - Reinforced Concrete Pier Cap	3 - Mod.	50	ft.	30	20	0	0	View	
1080 - Delamination/Spall/Patched Area		20		0	20	0	0	View	

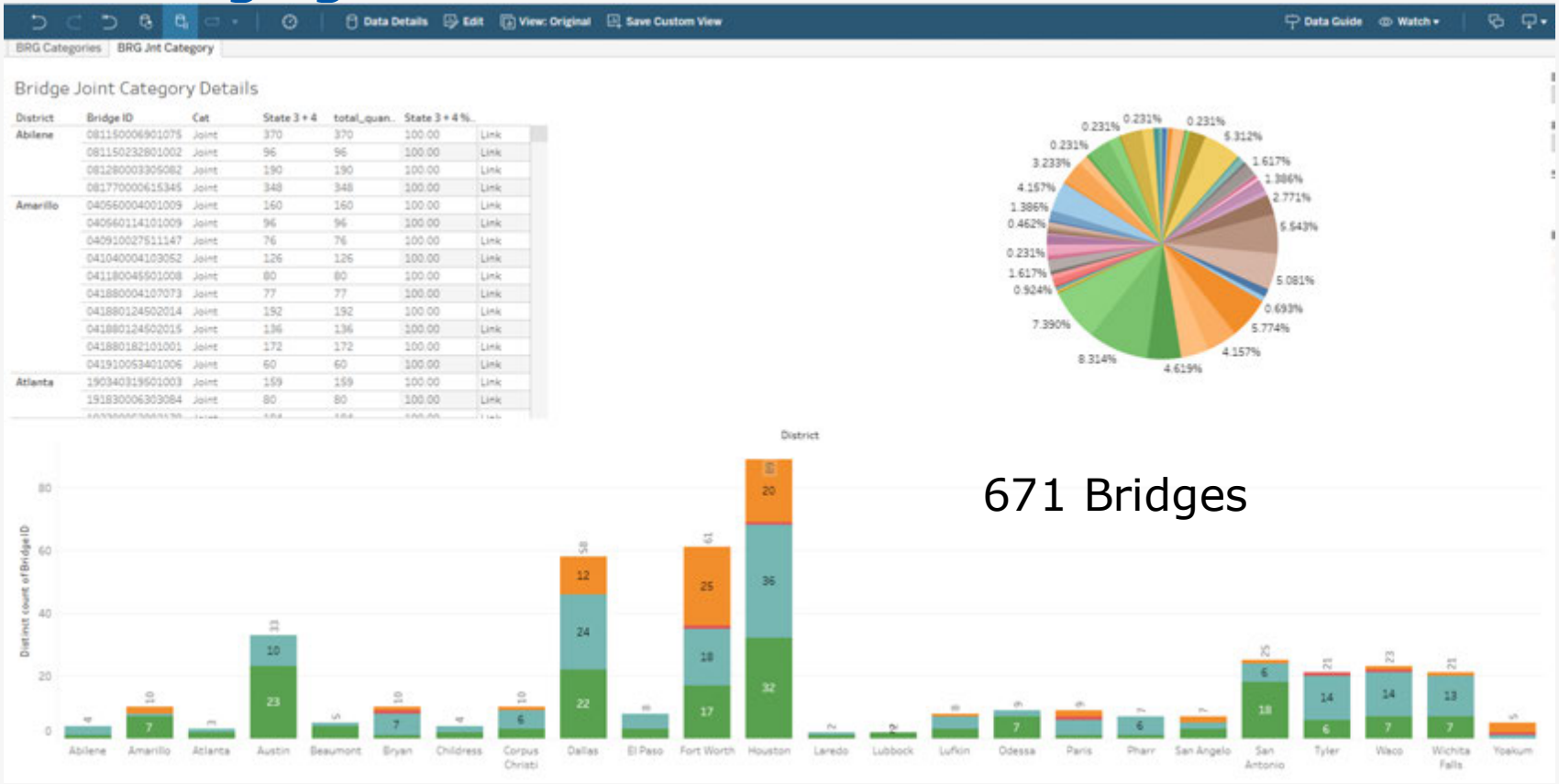
Status	Project Category
Programmed	Replacement

*Estimated Let Date:
09/01/2028

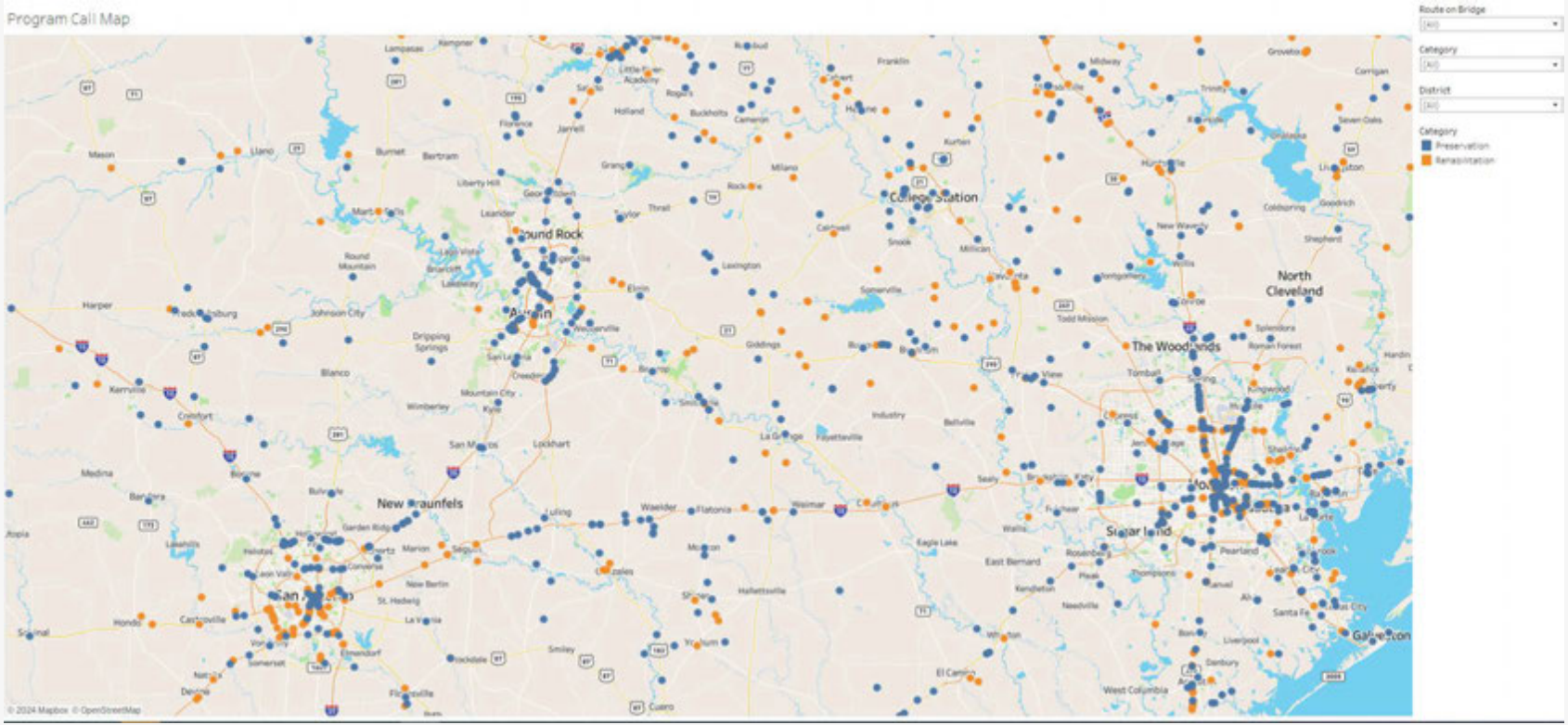
Good Element Data

110 - Reinforced Concrete Open Girder/Beam	3 - Mod.	4368	ft.	4344	0	0	24	View
7000 - Damage		24		0	0	0	24	View

Low Hanging Fruit

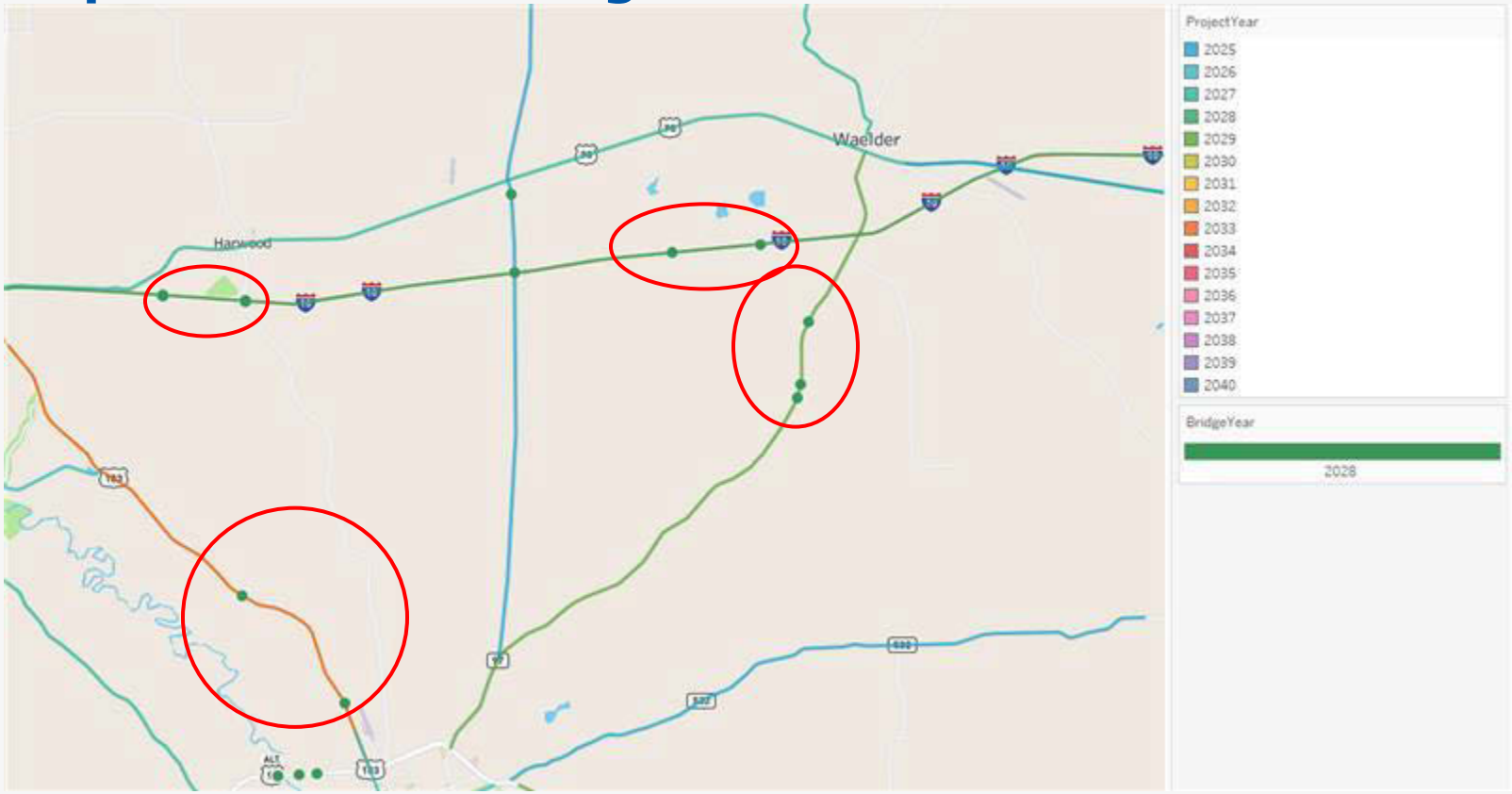


Geospatial Data



Geospatial Data

Geospatial Data for Program Call



But why

- **Enhanced Efficiency**
- **Cost Savings**
- **Improved Decision Making**
- **Increased Asset Lifespan**
- **Strategic Planning**

Technology and making our lives easier

The Goal of the BrM Optimizer is to pick projects that the Engineer would pick.

Questions?