







COST OF DELAYED ACTION -BRIDGE REPAIR VS. REHAB VS. REPLACEMENT

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Outline

1	Bridge Inventory
2	Bridge Preservation Funding Options
3	Bridge Preservation Examples
4	Bridge Replacement Examples
5	Recent Trends & Lessons Learned
6	Path Forward

- Texas Bridge Inventory
 - 36,000 bridges on the state system
 - 19,000 bridges off the state system



Bridge Replacements - Structure Costs

State F	Y 201	7 Low B	id Av	erage for	New	and Reg	blaced	Bridges	with	DCIS Esti	mate	•		Total	
Length, LF	2	20-50	5	1-100	10)1-200	20	1-400	40	1-1000	>	1000	average	Number	
Туре	#	\$/SF	#	\$/SF	#	\$/SF	#	\$/SF	#	\$/SF	#	\$/SF	\$/SF	#	
CLV	32	62.5	7	56.2									60.8	39	
GP-BX			16	110.5	3	107.8	12	83.1					90.4	31	
GPDSB	1	118.7	3	117.7	1	88.7							100.6	5	
GPITX	1	122.8	18	94.0	38	61.9	105	58.5	39	65.0	21	63.9	62.5	220	
GP-U			1	63.1			3	57.5	2	48.8	12	65.2	64.4	18	
GPXBX			3	120.4	1	88.7	1	86.7					85.4	5	
GS-I					2	148.1	1	137.2	5	151.2	1	124.9	146.3	9	
GS-I RR					4	562.6							562.6	4	
GS-TR					1	142.4	2	184.8	5	196.3	2	165.3	177.8	10	
PCSB	18	130.5	13	116.7	22	84.5	4	47.6					86.8	57	
Legend: CLV - Bridge Class Culvert GPXBX - Girder Prestressed "X Box"															
GP-BX -	Girder Prestressed "Box" Beam						GS-I - Girder Steel "I" Bea					am			
GPDSB -	SB - Girder Prestressed Decked Slab Beam						GS-I RR - Girder Steel "I" Be				el "I" Bea	am carrying F	₹R		
GPITX -	Girder Prestressed "I" Texas Shape							GS-TR	Girder Steel Trapezoidal						
GP-U -	Girder Prestressed "U" Beam							PCSB	-	Prestressed Concrete Slab Beam					

Bridge Preservation Funding Options

- \$15M Bridge Preventive Maintenance Program Established in 1987
- \$50M Bridge Maintenance Improvement Program Established in 2015
- Other District Discretionary Funding



Bridge Maintenance & Improvement Program

- Use to extend bridge life an additional 25 years
- Focus on improving structural condition of bridges
- Use for large scale preservation projects
- Requires site visit for evaluation
- Preparation of cost estimate with consideration of bridge replacement option (life cycle planning).



- Maintaining a project list
 - Scope of work
 - Cost of project
 - Tracking performance of preservation activities
- Revisit BMIP project selection and program objectives



Culvert Preservation - Project 1: Minor Rehabilitation

- Year Constructed 1953/1968
- Scope of work: concrete repairs and concrete lining to deteriorated cell
- Total Construction Cost (Bid): \$54,568
 - \$47/SF of bridge deck area







Culvert Preservation - Project 2: Major Rehabilitation

- Year Constructed 1940/1985
- Scope of work: rail improvements and reconstruction of top slab and wing
- <u>Total</u> Construction Cost (Bid): \$1.0M
 \$194/SF of bridge deck area





Bridge Rehabilitation: SH 149 Over Sabine River

- Year Constructed 1943/1961
 - 32 35' concrete T beam and P/S concrete approach spans
 - 1 230' steel unit
- Scope of work: remove excess overlay, clean and seal joints, rail upgrade, strengthen with shear studs, various concrete repairs, repair beam ends, clean steel unit
- <u>Total</u> Construction Cost (Bid): \$ 2M
 - \$24/SF of bridge deck area





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Bridge Rehabilitation: IH 27 Bridges in Lubbock

- Year Constructed: 4 in 1967, 4 in 1987
- P/S concrete
- Scope of work: Remove and replace bridge deck overlays, concrete repairs to substructure and superstructure, bearing pad replacements. Substructure strengthening.
- <u>Total</u> Construction Cost (Bid): \$7.6M
 - \$61/SF of bridge deck area



Bridge Replacements - Structure Costs

State FY 2017 Lo Length, LF 20-50 Type # \$/ CLV 32 6 GP-BX	w Bid Average 51-10 6F # \$, 2.5 7 5 16 11	ge for Ne .00	ew and Rep 101-200 \$/SF	20: #	Bridges 1-400 \$/SF	with 40: #	DCIS Esti	mate >	1000	average	Total Number	
Length, LF 20-50 Type # \$/ CLV 32 60 GP-BX	51-10 5F # \$, 2.5 7 5 16 11	00 2 5/SF # 56.2 110.5 3	101-200 \$/SF	20: #	1-400 \$/SF	40: #	1-1000	>	1000	average	Number	
Type # \$/ CLV 32 6 GP-BX	SF # \$/ 2.5 7 5 16 11	5/SF # 56.2 110.5 3	\$/SF	#	\$/SF	#	¢ /cr					
CLV 32 6	2.5 7 5 16 11	56.2 10.5 3					\$/SF	#	\$/SF	\$/SF	#	
GP-BX		10.5 3								60.8	39	
			3 107.8	12	83.1					90.4	31	
GPDSB 1 11	8.7 3 11	117.7 1	l 88.7							100.6	5	
GPITX 1 12	2.8 18 9	94.0 38	3 <u>61.9</u>	105	58.5	39	65.0	21	63.9	62.5	220	
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Legend:												
CLV - Bridge C	ass Culvert	GPXBX - Girder Prestressed					"X Box"					
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GPITX - Girder Pr	estressed "I"	GS-TR	GS-TR - Girder Steel Trapezoidal									
GP-U - Girder Pr	estressed "U'	PCSB	-	Prestressed Concrete Slab Beam								

Bridge Replacement: FM 981 Over Bear Creek

- Year Constructed 1951
 - 5 simple spans concrete slab
- Scope of work: Replace bridge with P/S concrete beam simple spans with full closure.
- Total Construction Cost: \$ 1.0M
 - \$359/SF of bridge deck area replaced
 - \$150/SF of new deck area



Bridge Replacement: FM 1945 Over Chiltipin Creek

- Year Constructed 1953
 - 2 simple spans concrete slab
- Scope of work: Replace deteriorated bridge with P/S concrete box beam simple span with full closure.
- Total Construction Cost: \$ 0.5M
 - \$461/SF of bridge deck area replaced
 - \$240/SF of new deck area



Bridge Replacement: Bell Street & Bell Street Turnaround Over IH 40

- Year Constructed 1969
 - 4 span P/S concrete spans
- Scope of work: Replace two deteriorated bridges with single structure
- Total Construction Cost: \$ 7.5M
 - \$320/SF of bridge deck area replaced
 - \$312/SF of new deck area
- Anticipated Life: +75 yrs
 - Joint seals +/- 10 yrs
 - Deck replacement +/-40 yrs





Bridge Replacement: IH 20 Over SH 351

- Year Constructed 1961
 - Twin structures 4 span continuous steel I-bm repainted in 1989
- Scope of work: Replace two deteriorated bridges with P/S concrete simple span bridges. Improve vertical clearance.
- Total Construction Cost: \$ 14.9M
 - \$810/SF of bridge deck area replaced
 - \$487/SF of new deck area
- Anticipated Life: +75 yrs
 - Joint seals +/- 10 yrs
 - Deck replacement +/-40 yrs





Recent Cost

- 2016 & 2017 Project Costs (Bids)
- Replacement Total cost/original deck area
 - FM 981 \$359
 - FM 1945 \$461
 - Bell Street \$320
 - IH 20 Over SH 351 \$810
- Life Cycle Planning must be performed





Key Points

- Traffic control and phasing can significantly increase the price of a project. Costs for bridge improvements have been higher than final cost estimates and much higher than initial estimates.
- Scope of rehabilitation work changes as plans develop





- Culvert replacements encouraged over major rehabilitation
- Tracking performance of overlay projects including participating in Bridge Deck Database.
- Tracking performance of steel painting projects
- Continue to advance preservation efforts including promoting Concrete Repair Manual and documenting Bridge Preservation Preferences/Practices.
- To maximize use of limited funds, encourage detours rather than several phases of work.
- Revisit requirement to satisfy condition rating of 7 for deck, superstructure, and substructure for all bridges funded through BMIP

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