



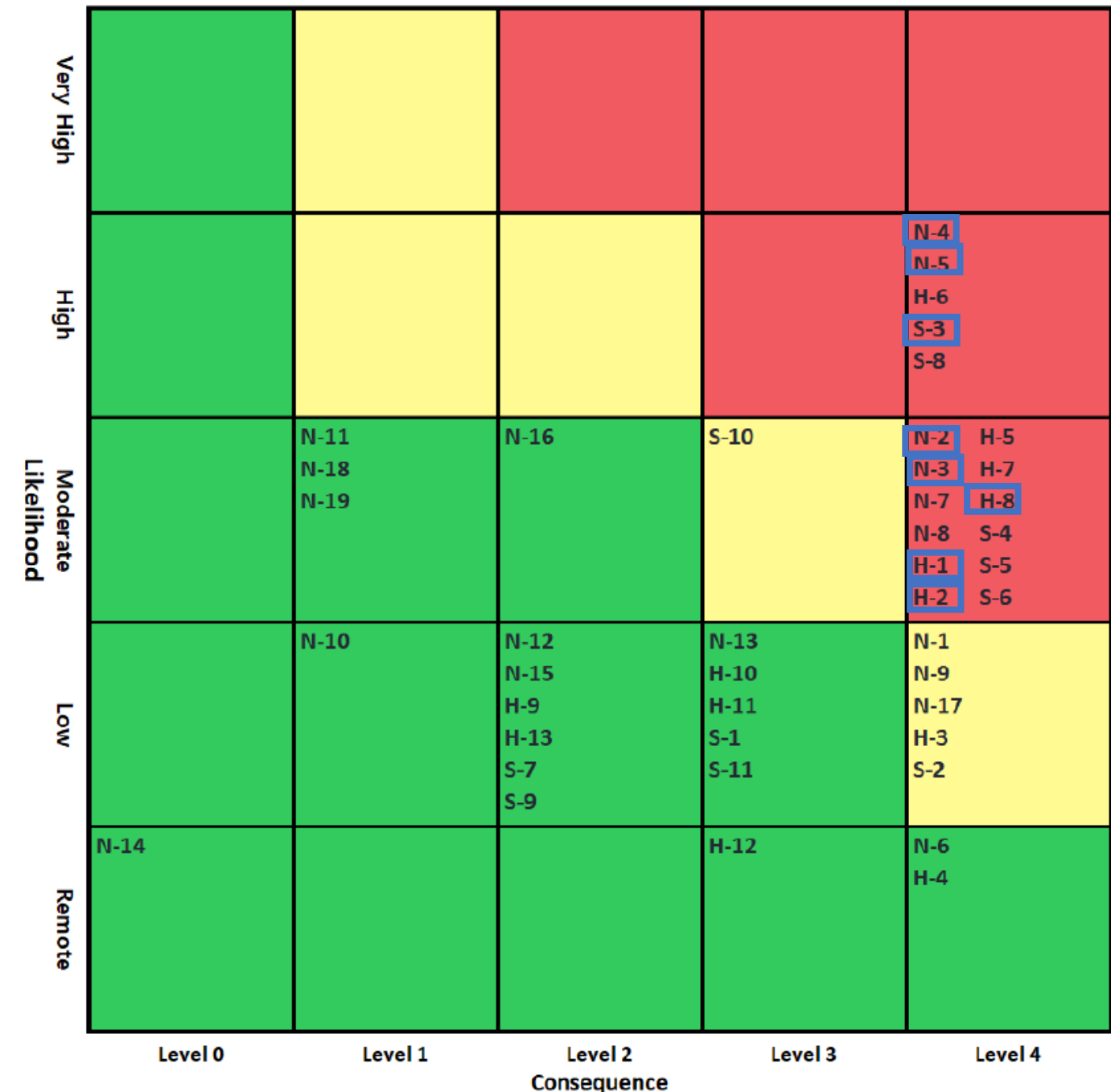
Concrete Assessment and Service Life Extension (CAASLE AMENDMENT No. 2)

***Presented by
Mike McClendon
Upper Basin Regional Manager***



Table 1-3: Summary of Higher-Risk Potential Failure Modes Identified in 2019 SQRA

PFM Number	PFM Title	Likelihood	Consequence	Confidence
N-2	Bulkhead Deck Slab Failure due to Structural Concrete Deterioration during Normal Operations	Moderate	Level 4	Medium
N-3	Spillway Deck Slab Failure due to Structural Concrete Deterioration during Normal Operations	Moderate	Level 4	Medium
N-4	Upstream Bulkhead Corbel Failure due to Structural Concrete Deterioration during Normal Operations	High	Level 4	Poor
N-5	Upstream Spillway Corbel Failure due to Structural Concrete Deterioration during Normal Operations	High	Level 4	Poor
H-1	Upstream Deck Slab Failure due to Structural Inadequacy during Hydrologic Event	Moderate	Level 4	Medium
H-2	Upstream Corbel Failure due to Structural Inadequacy during Hydrologic Event	Moderate	Level 4	Poor
H-8	Downstream Spillway Slab Failure due to Structural Concrete Deterioration during Hydrologic Event	Moderate	Level 4	Medium
S-3	Corbel Failure due to Structural Inadequacy caused by Seismic Event	High	Level 4	Poor





CAASLE Amendment No. 2

Morris Sheppard Dam CAASLE
Phase III Long-Term Structural Concrete Testing & Repair Program

May 12, 2023

MORRIS SHEPPARD DAM

CONCRETE ASSESSMENT AND SERVICE LIFE EXTENSION (CAASLE)

Phase III Long-Term Structural Concrete Testing & Repair Program

Palo Pinto County, Texas

May 12, 2023

GF Job No.: 068993 | BRA RFP No.: 15-09-898

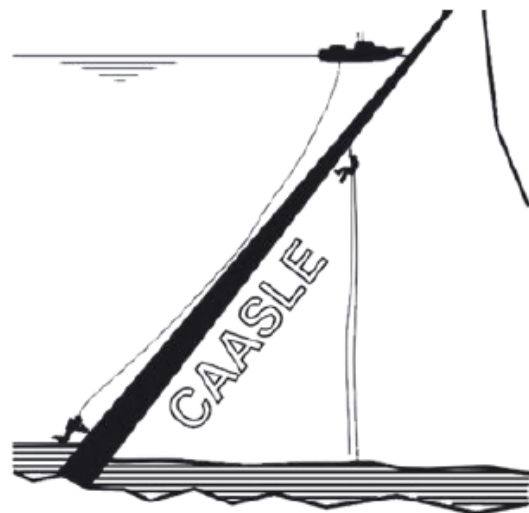


Table 2-1: Priority Levels of Structural Features

Feature	Priority Level
Upstream Slabs	High
Upstream Corbels	High
Crest Slabs	Medium
Crest Slab Corbels	Medium
Buttresses	Medium
Apron Slabs	Low
Cross-Canyon Stiffener Beams	Low
Downstream Corbel	Low





CAASLE Amendment No. 2

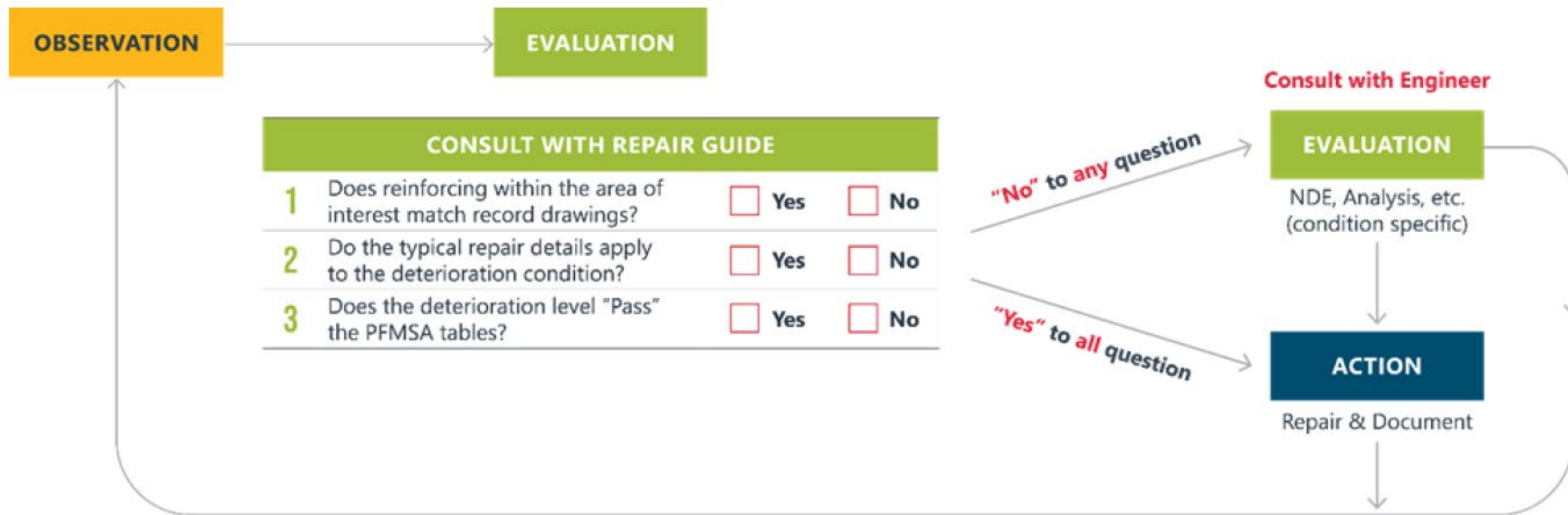


Figure 3-1: Investigation and Repair Guide Flowchart



Amendment Number 2

Existing Phase III PSA NTE:	\$765,178
Amend. No. 1:	\$60,000
Proposed Amend. No. 2:	<u>\$300,000</u>
Amended PSA Total:	\$1,125,178



Photo 3-2: Example of Destructive Investigation of Bay 31 Slab 6, March 2022; Concrete Backfilled



Example of Concrete Repairs





“BE IT RESOLVED that the Board of Directors of the Brazos River Authority hereby authorizes the General Manager/CEO to execute Amendment Number 2 to the professional services contract with Gannett Fleming Inc. for Phase III of the Concrete Assessment and Service Life Extension project increasing the total not to exceed amount by \$300,000.”



Brazos River Authority



Brazos

— ★ —
RIVER AUTHORITY



Pier Plate Wall Repairs

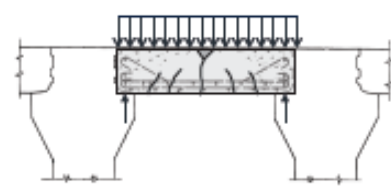




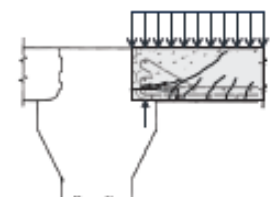
CAASLE Amendment No. 2

OBSERVATION

SLABS



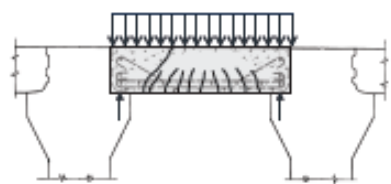
A. Flexural Failure



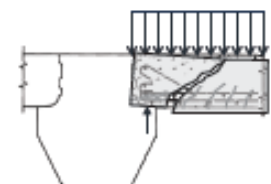
C. Shear - Tension Failure



Flexural Cracking Example



B. Diagonal Tension Failure

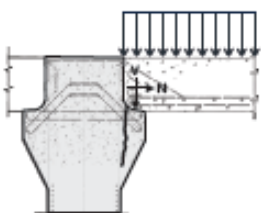


D. Shear - Compression Failure

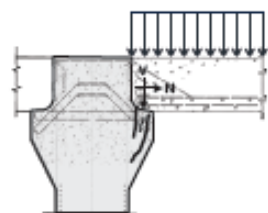


Shear/Tension Cracking Example

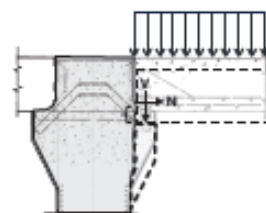
CORBELS



A. Flexural Failure



B. Diagonal Tension Failure



C. Direct Shear Failure



Cracking Example

EVALUATION

1 Does reinforcing within the area of interest match record drawings?

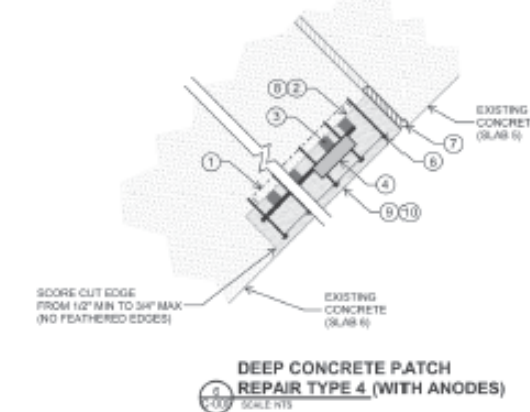
Reference: APPENDIX E

Typical Upstream (Deck) Slab Record Drawing Reinforcement (Flexural)

Panel Info	Record Drawing Deck Panel Rebar Information					
	Number	Upper Elevation	Lower Elevation	Rebar Size	Rebar Spacing (in.)	Number of Layers
NON-OVERFLOW	1	1015	1005	8	5.00	1
	2	1005	993	10	5.25	1
	3	993	981	10	4.50	1
	4	981	969	10	4.00	1
	5	969	957	10	3.75	1
	6	957	945	10	7.00	2
	7	945	933	10	6.75	2
	8	933	921	10	6.50	2
	9	921	909	10	6.25	2
	10	909	897	10	6.00	2
	11	897	885	10	5.50	2
SPILLWAY	1	989	957	10	7.00	2
	2	957	945	10	7.25	2
	3	945	933	10	6.75	2
	4	933	921	10	6.25	2
	5	921	909	10	6.00	2
	6	909	897	10	5.75	2

2 Do the typical repair details apply to the deterioration condition?

Reference: APPENDIX E



3 Does the deterioration level "Pass" the PFMSA tables?

Reference: Failure Mode Progression Structural Analyses, August 2022

Bulkhead Slabs - PMF Loading Conditions - Flexural DCRs

Slab Number	Elevation (ft) Center of Slab	Percentage of Reinforcement Remaining ¹									
		10%	20%	30%	40%	50%	60%	70%	80%	90%	100%
2	1010	2.41	1.21	0.81	0.61	0.49	0.41	0.36	0.32	0.28	0.26
3	999	3.24	1.63	1.09	0.83	0.67	0.56	0.48	0.42	0.38	0.34
4	987	3.54	1.78	1.19	0.90	0.72	0.61	0.52	0.46	0.41	0.37
5	975	3.65	1.83	1.23	0.93	0.75	0.63	0.54	0.47	0.42	0.38
6	963	3.77	1.89	1.27	0.96	0.77	0.65	0.56	0.49	0.44	0.40
7	951	4.00	2.01	1.35	1.02	0.82	0.69	0.59	0.52	0.47	0.42
8	939	3.79	1.91	1.28	0.96	0.78	0.65	0.56	0.49	0.44	0.40
9	927	3.84	1.95	1.29	0.98	0.79	0.66	0.57	0.50	0.45	0.40
10	915	4.02	2.02	1.35	1.02	0.82	0.69	0.59	0.52	0.47	0.42
11	903	4.31	2.17	1.45	1.10	0.88	0.74	0.64	0.56	0.50	0.45
12	891	4.32	2.17	1.45	1.10	0.89	0.74	0.64	0.56	0.50	0.46
13	879	4.47	2.25	1.51	1.14	0.92	0.77	0.66	0.58	0.52	0.47
14	867 ²	4.79	2.41	1.61	1.22	0.98	0.82	0.71	0.62	0.56	0.50
15	855 ²	4.84	2.43	1.63	1.23	0.99	0.83	0.72	0.63	0.56	0.51
16	843 ²	4.87	2.45	1.64	1.24	1.00	0.84	0.72	0.63	0.57	0.51
17	831 ²	5.12	2.58	1.73	1.30	1.05	0.88	0.76	0.67	0.60	0.54