## DRAFT ENGINEERING APPENDIX A APPENDIX 3 PLATES

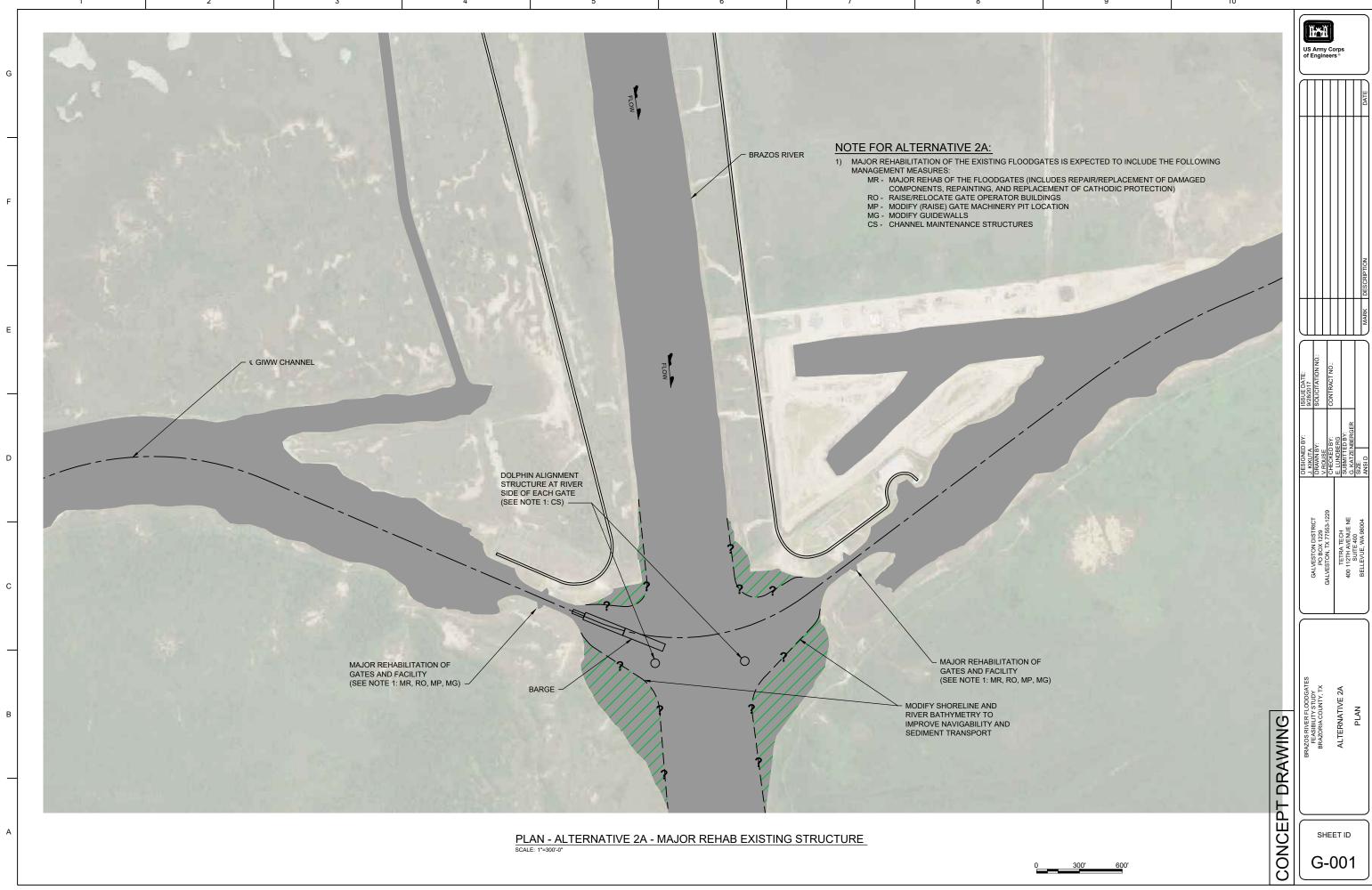
## BRAZOR RIVER FLOODGATES-COLORADO RIVER LOCKS FEASIBILITY STUDY – ALTERNATIVE PLATES APPENDIX

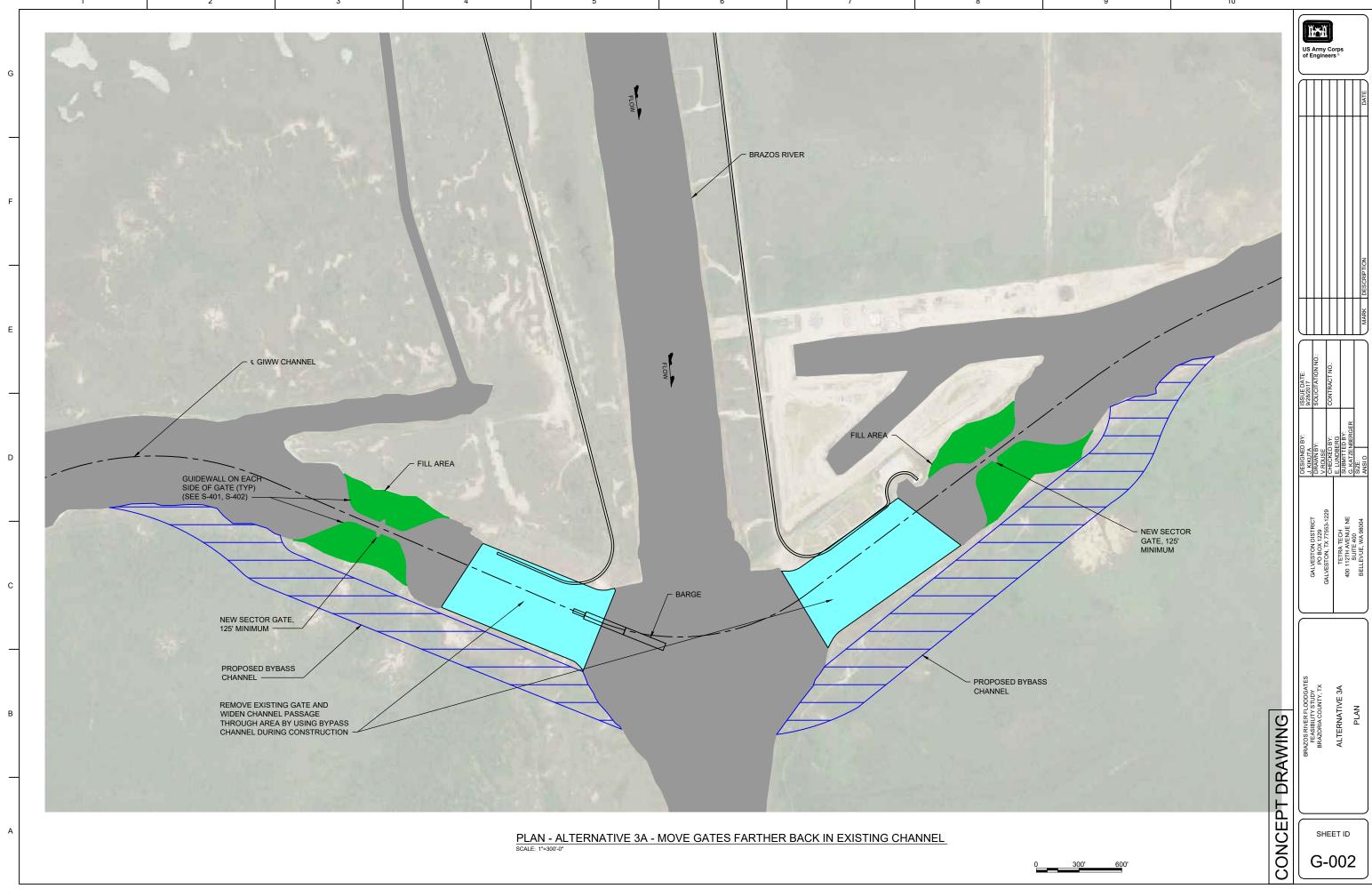
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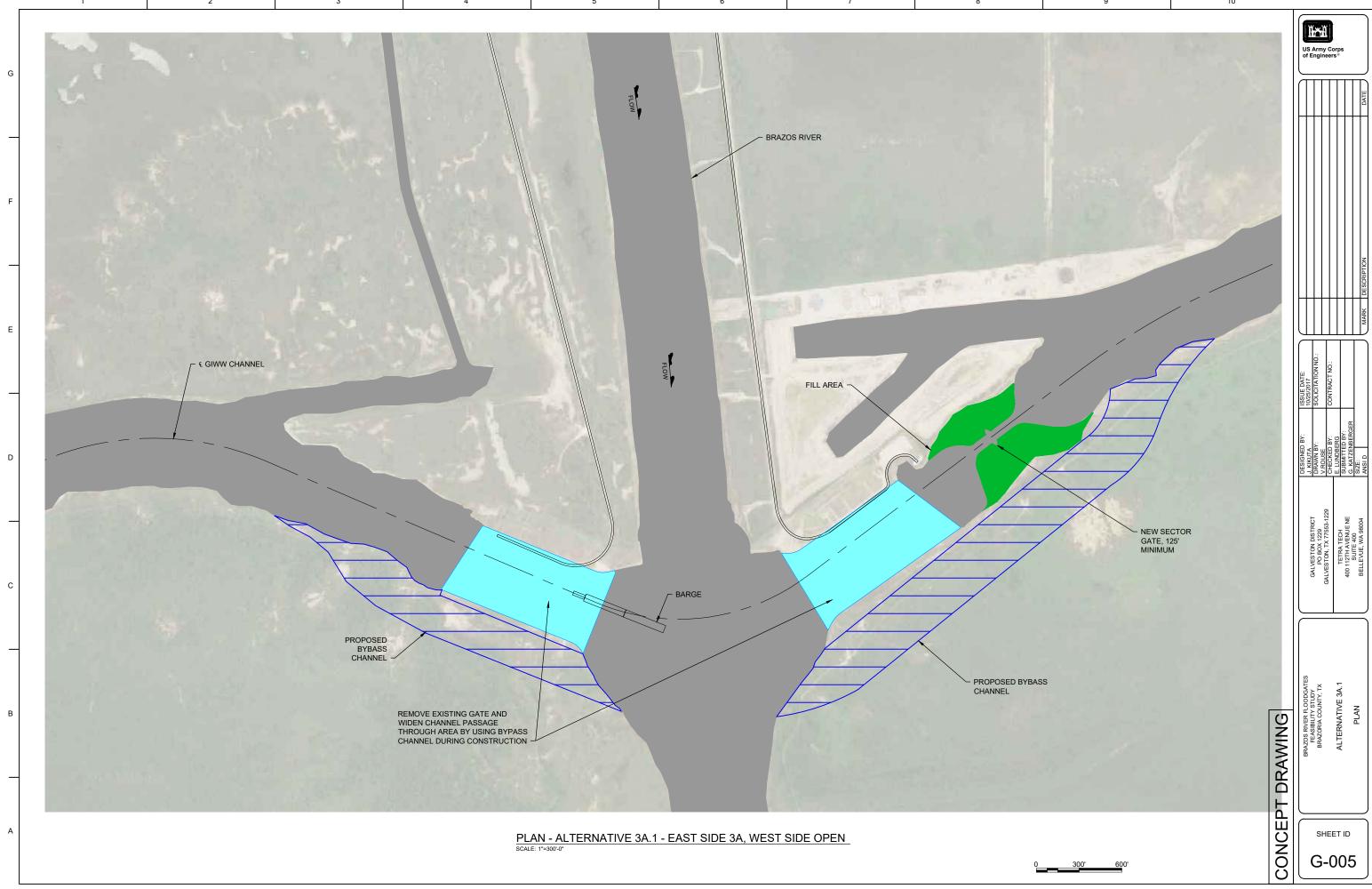
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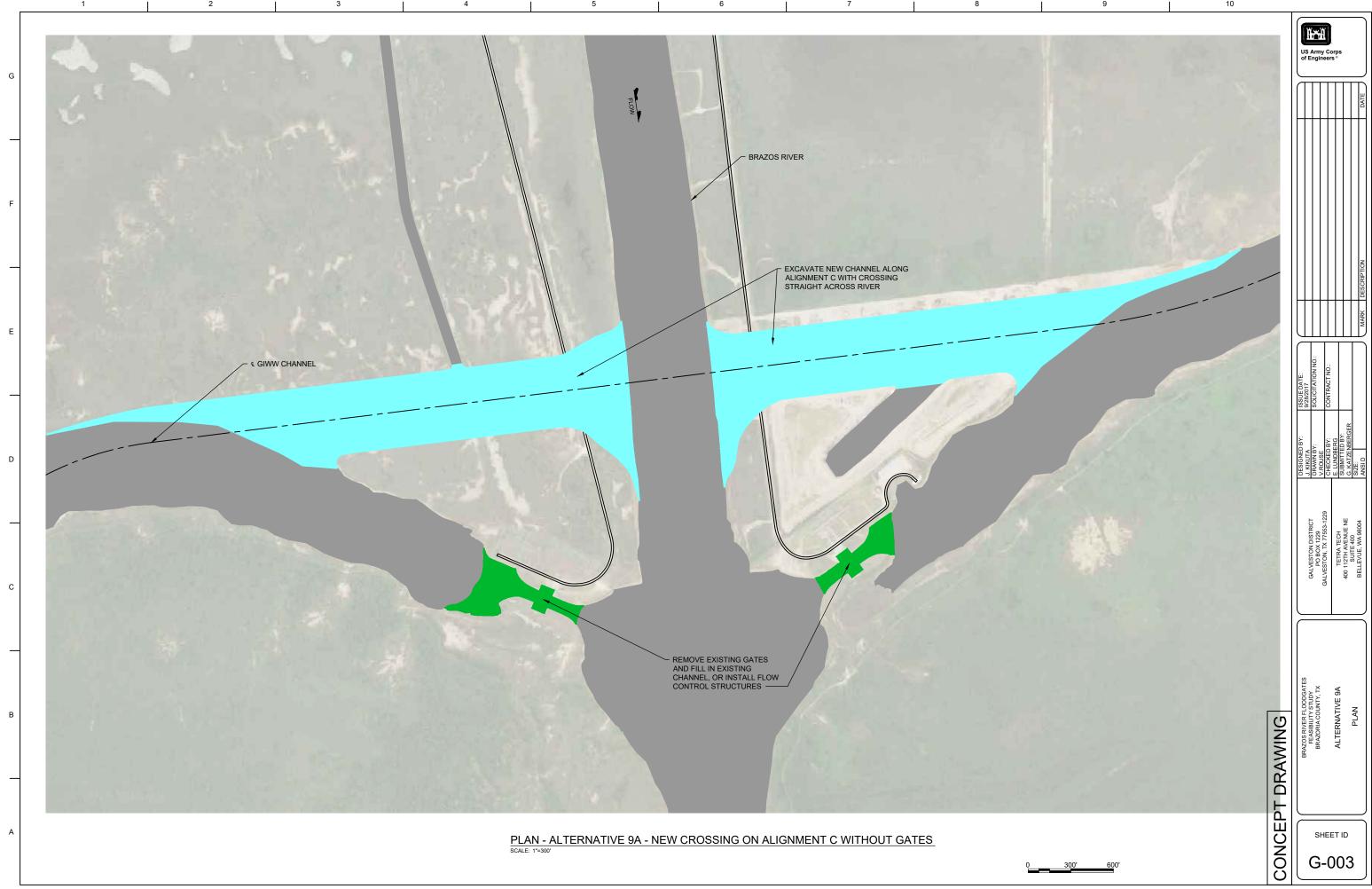
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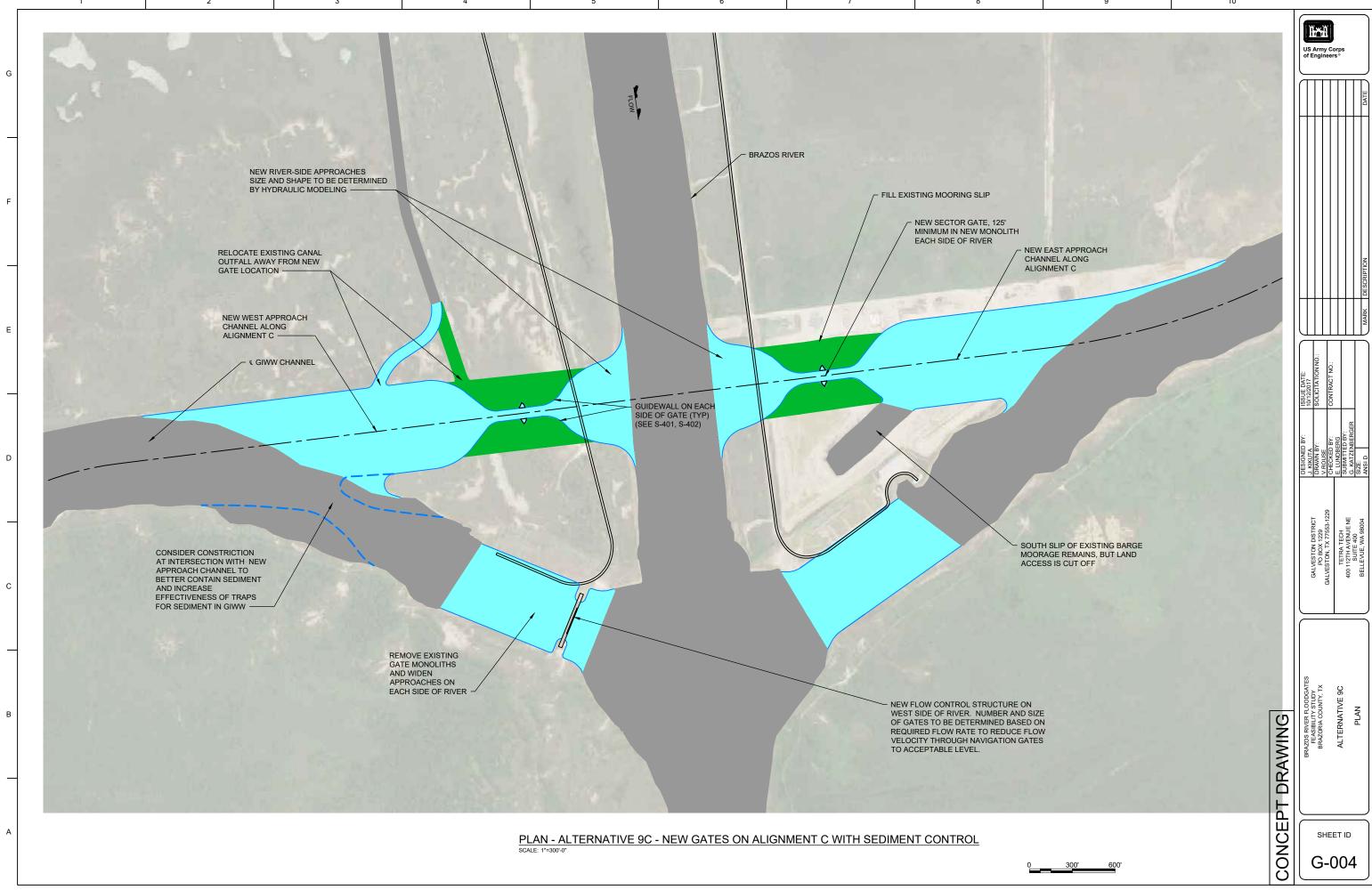
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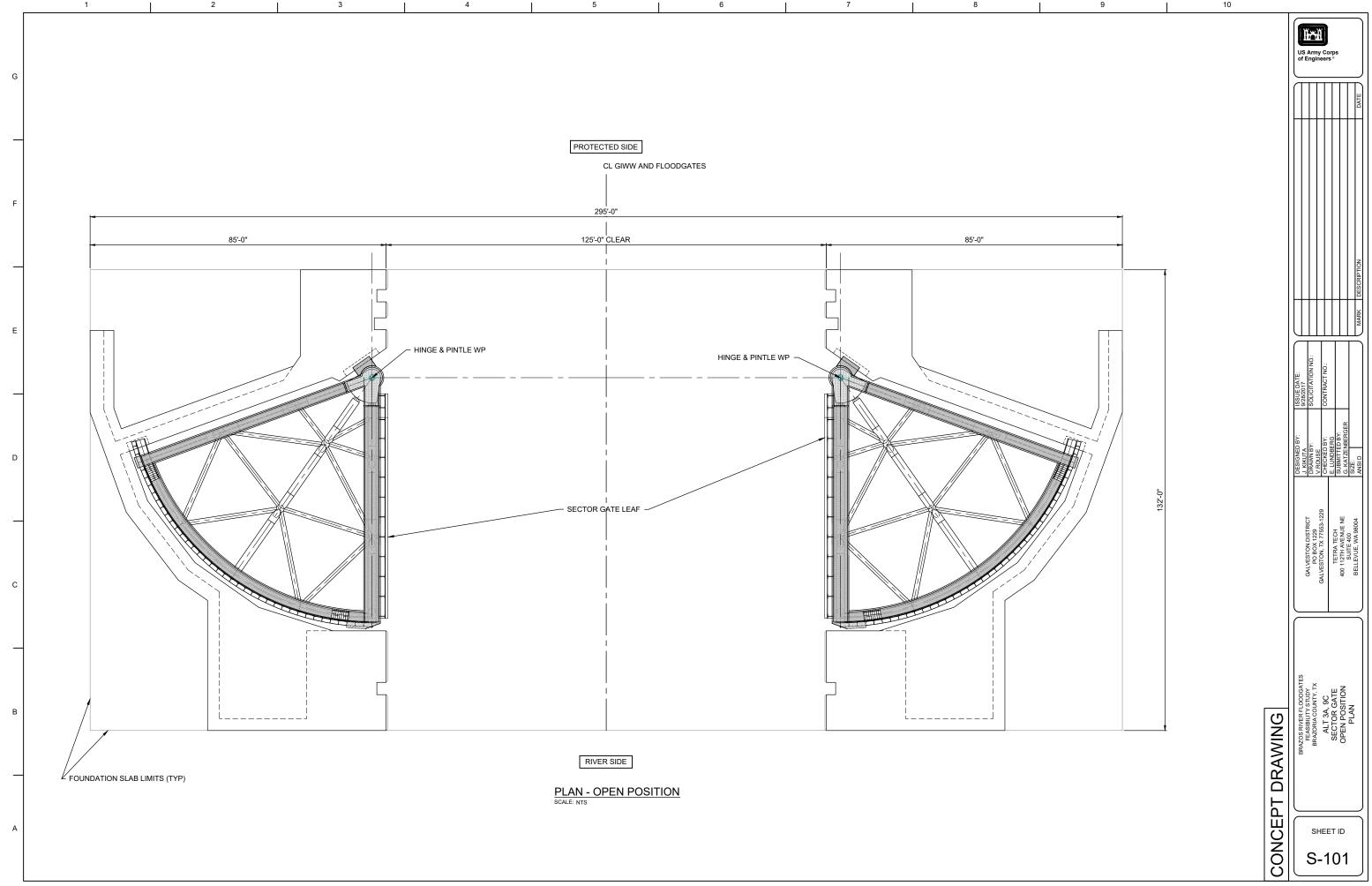


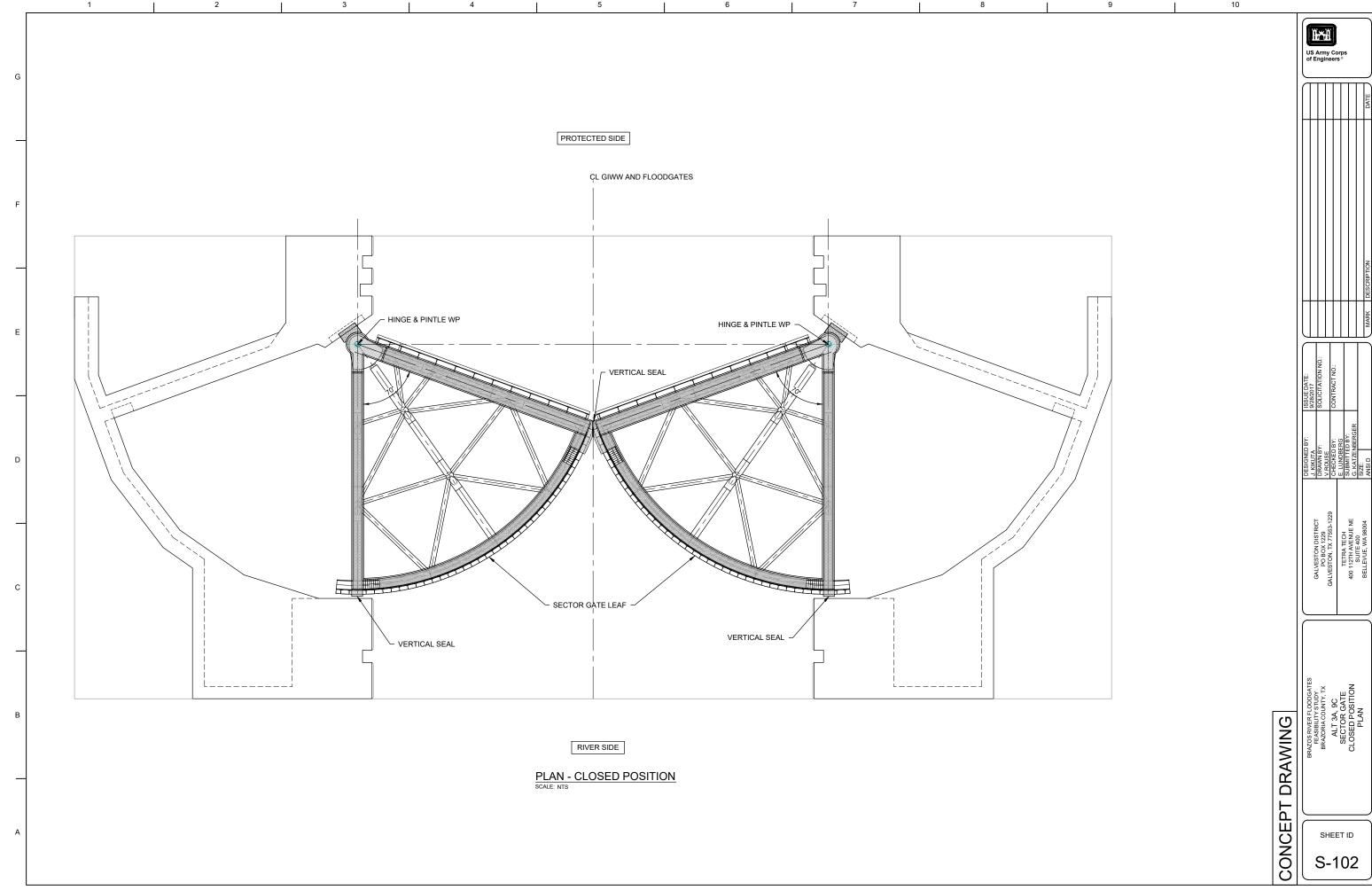


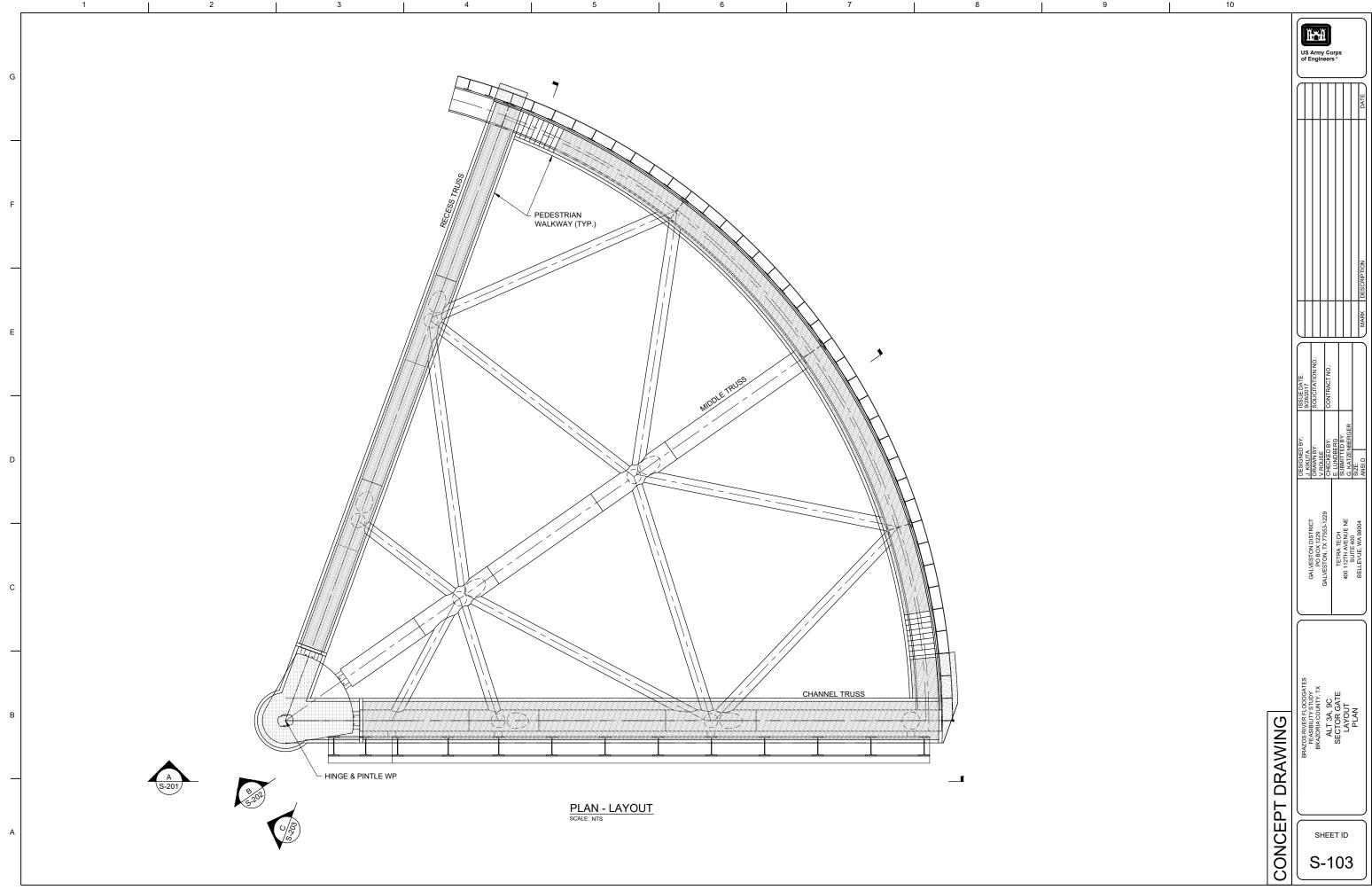


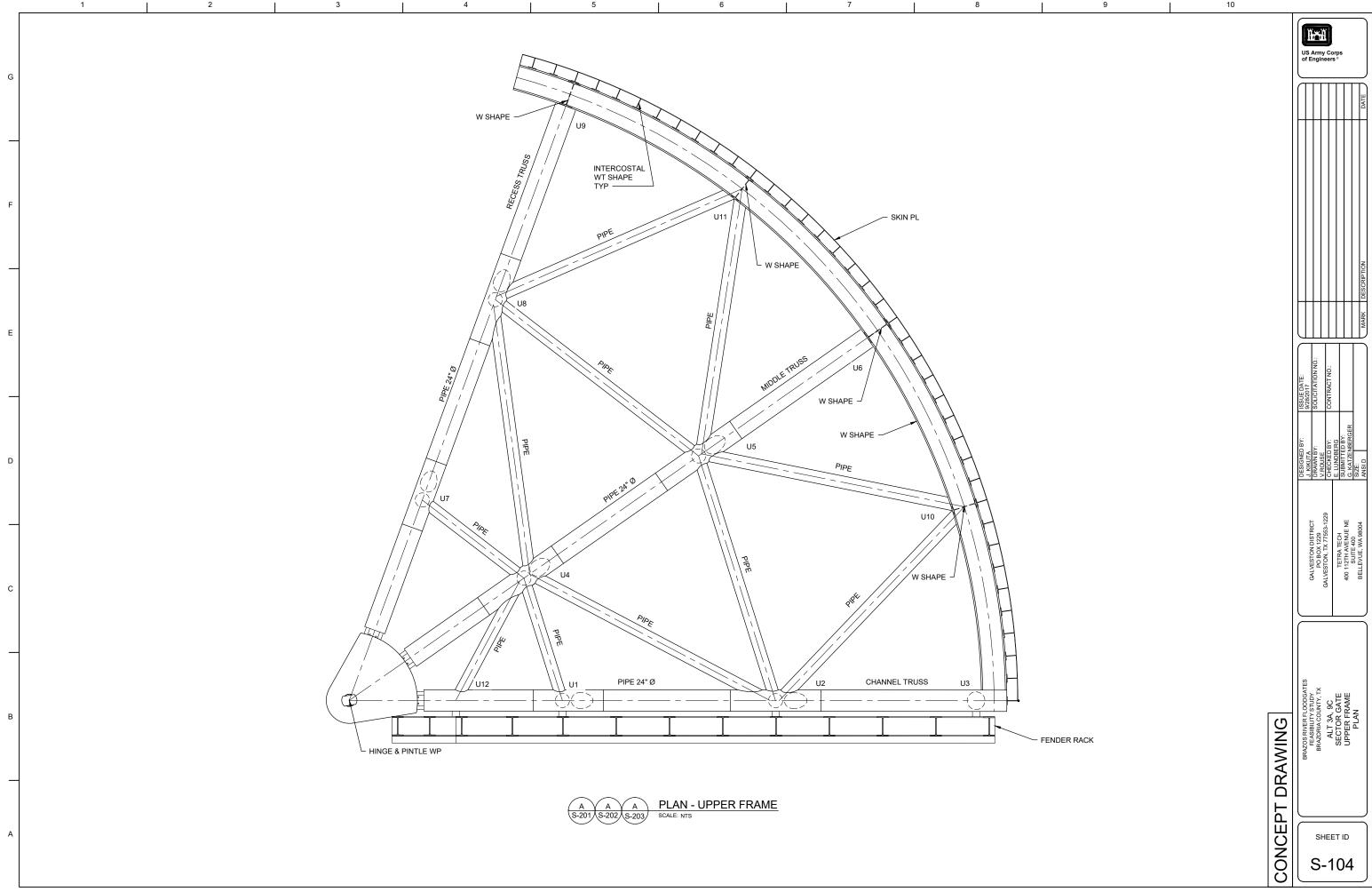


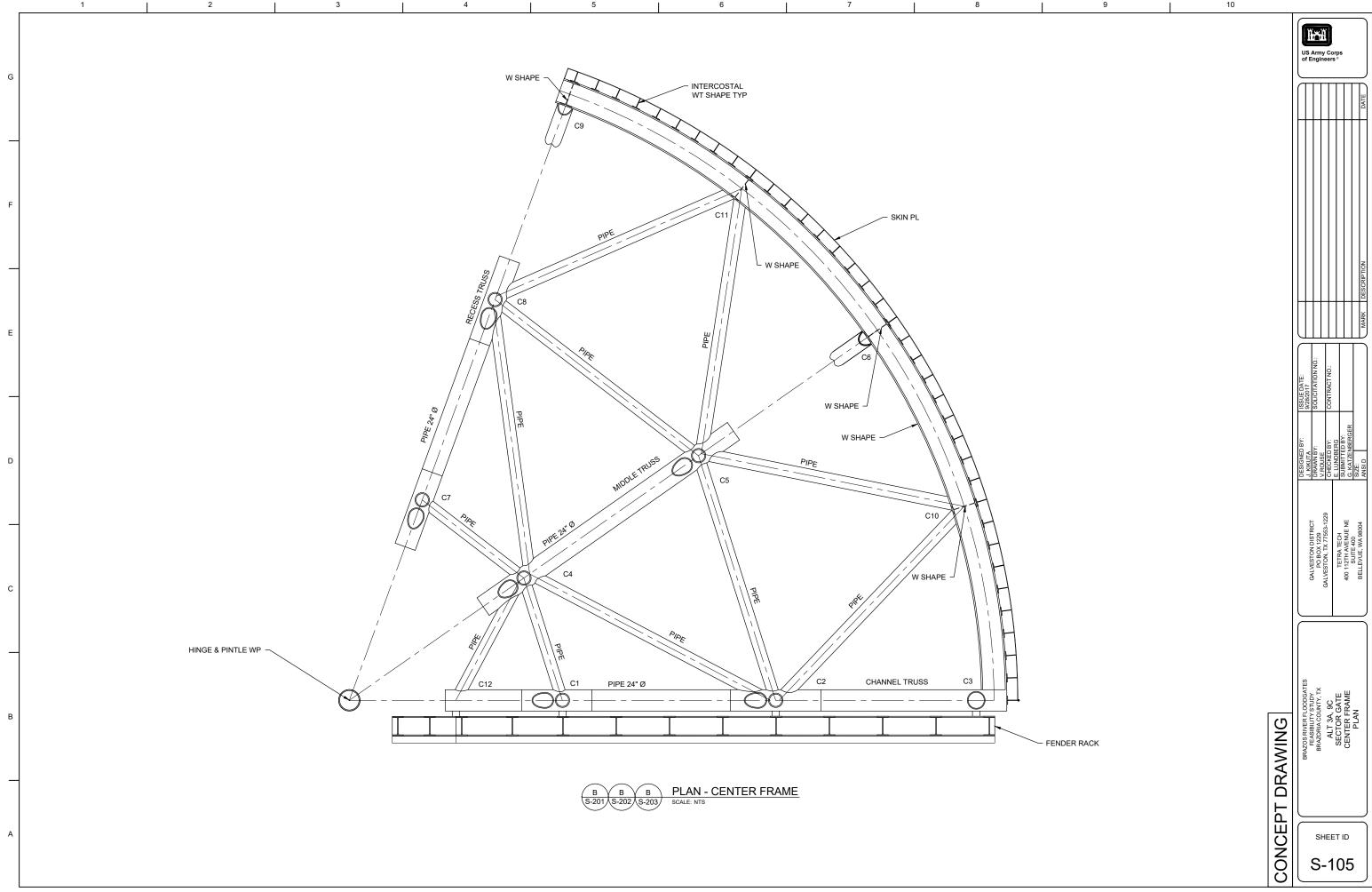


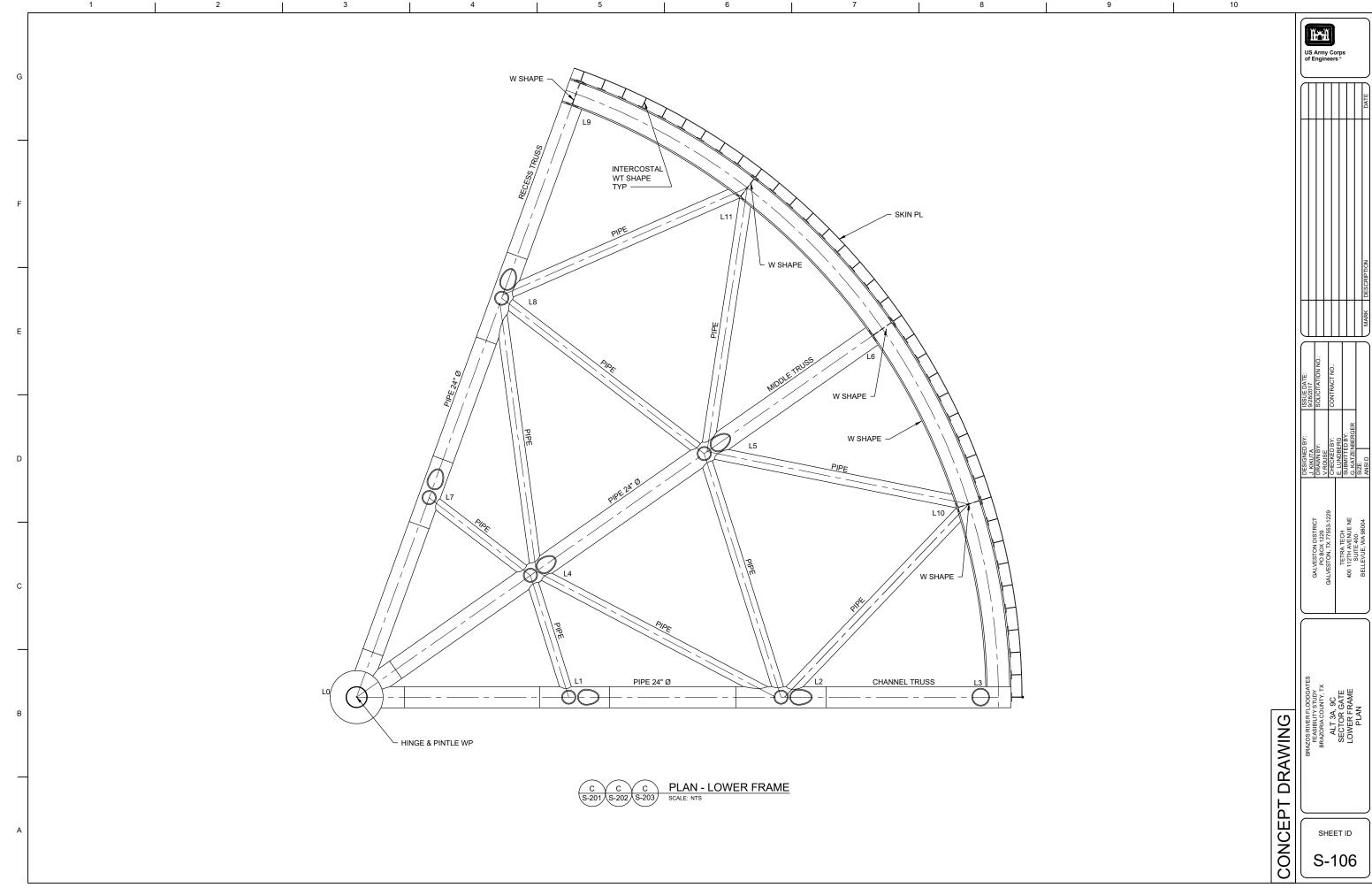


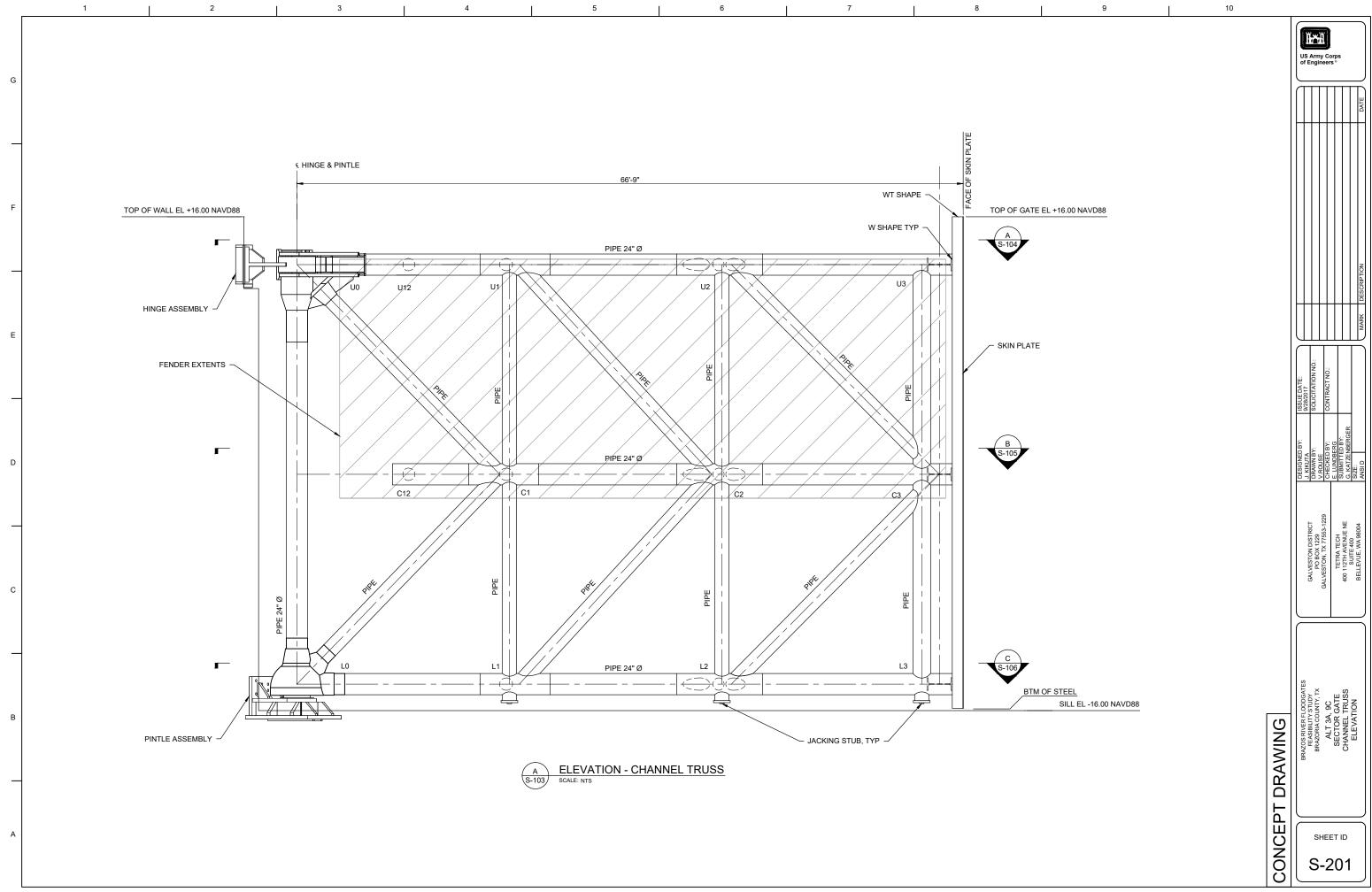


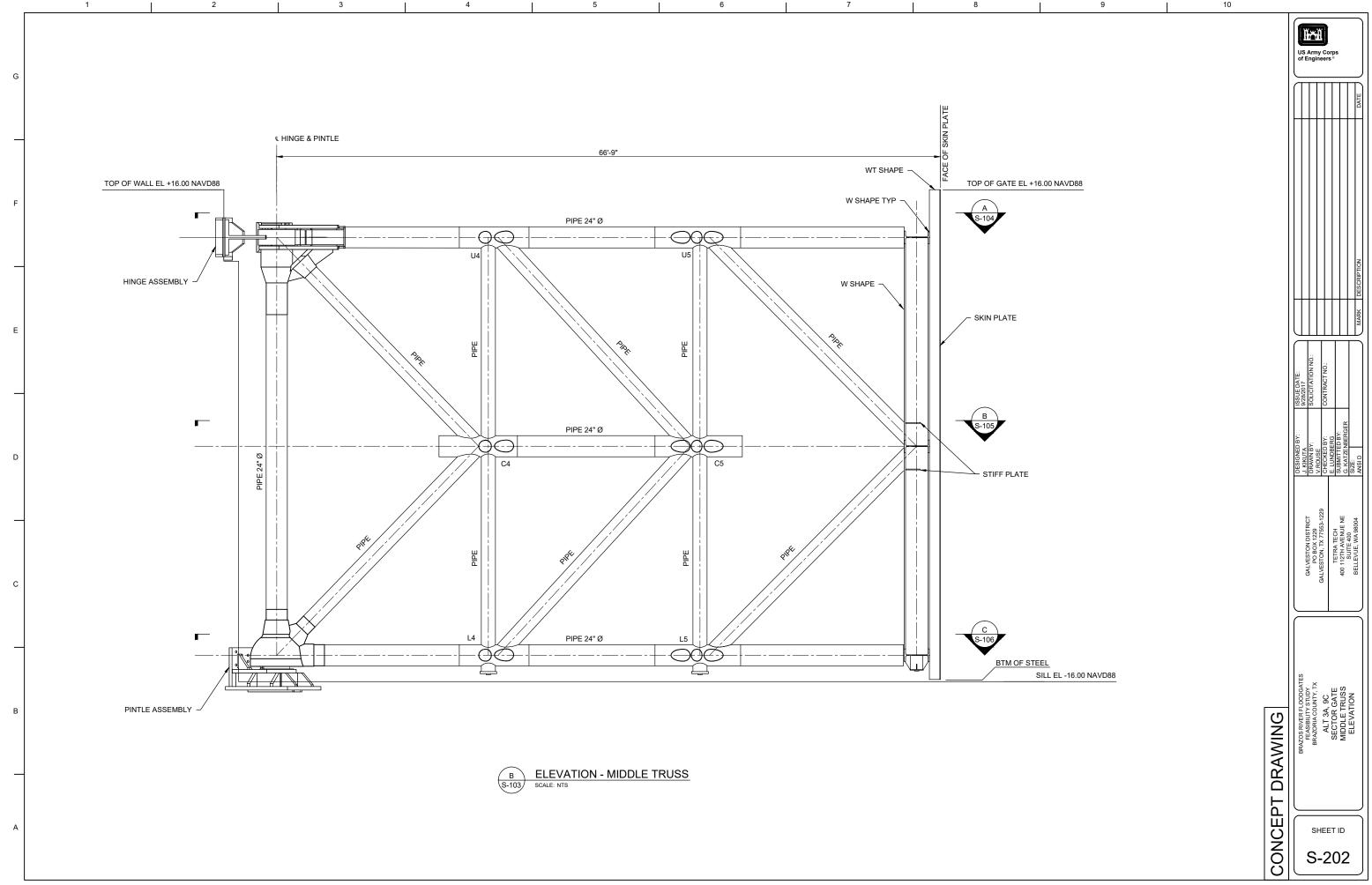


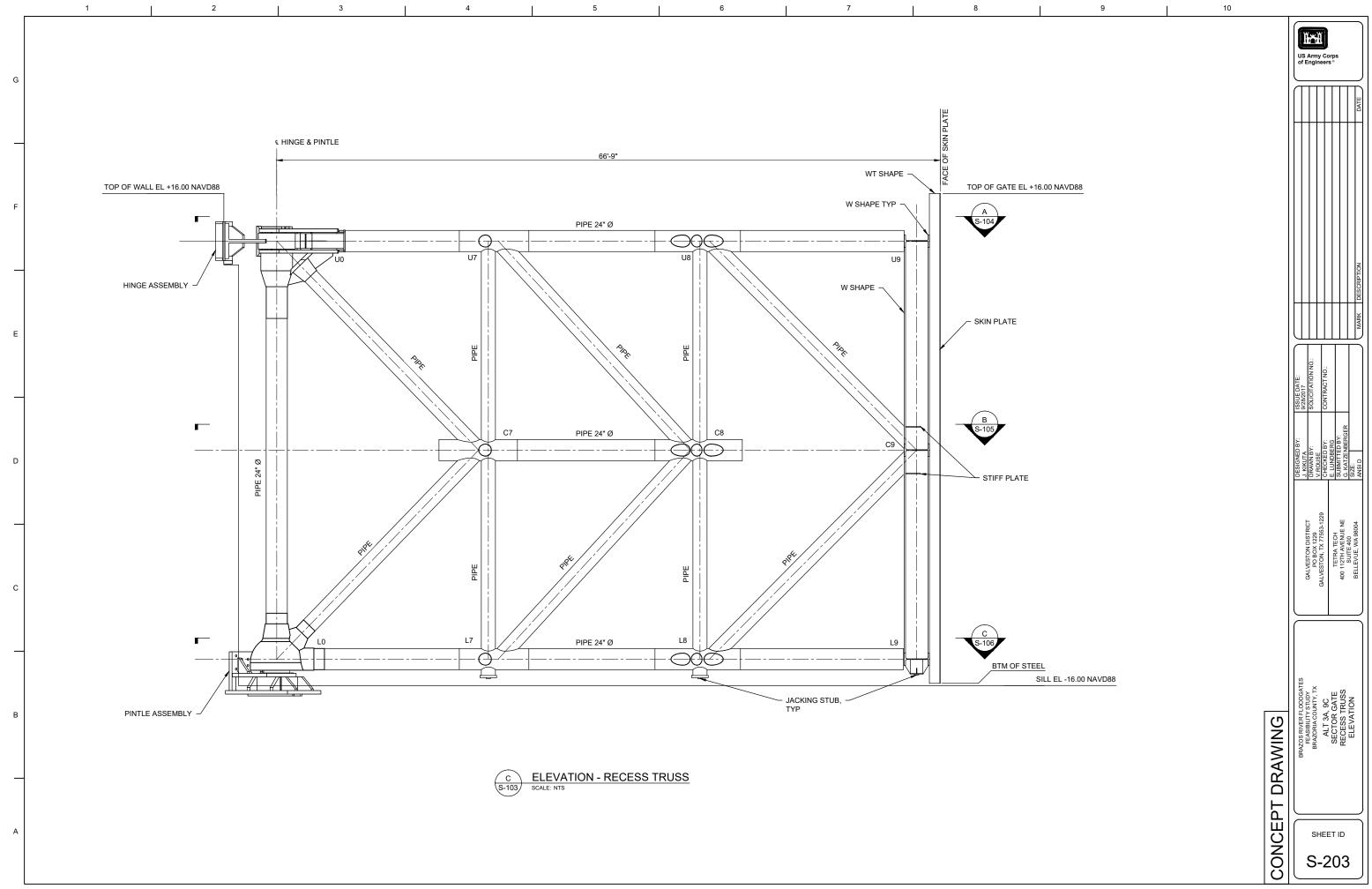


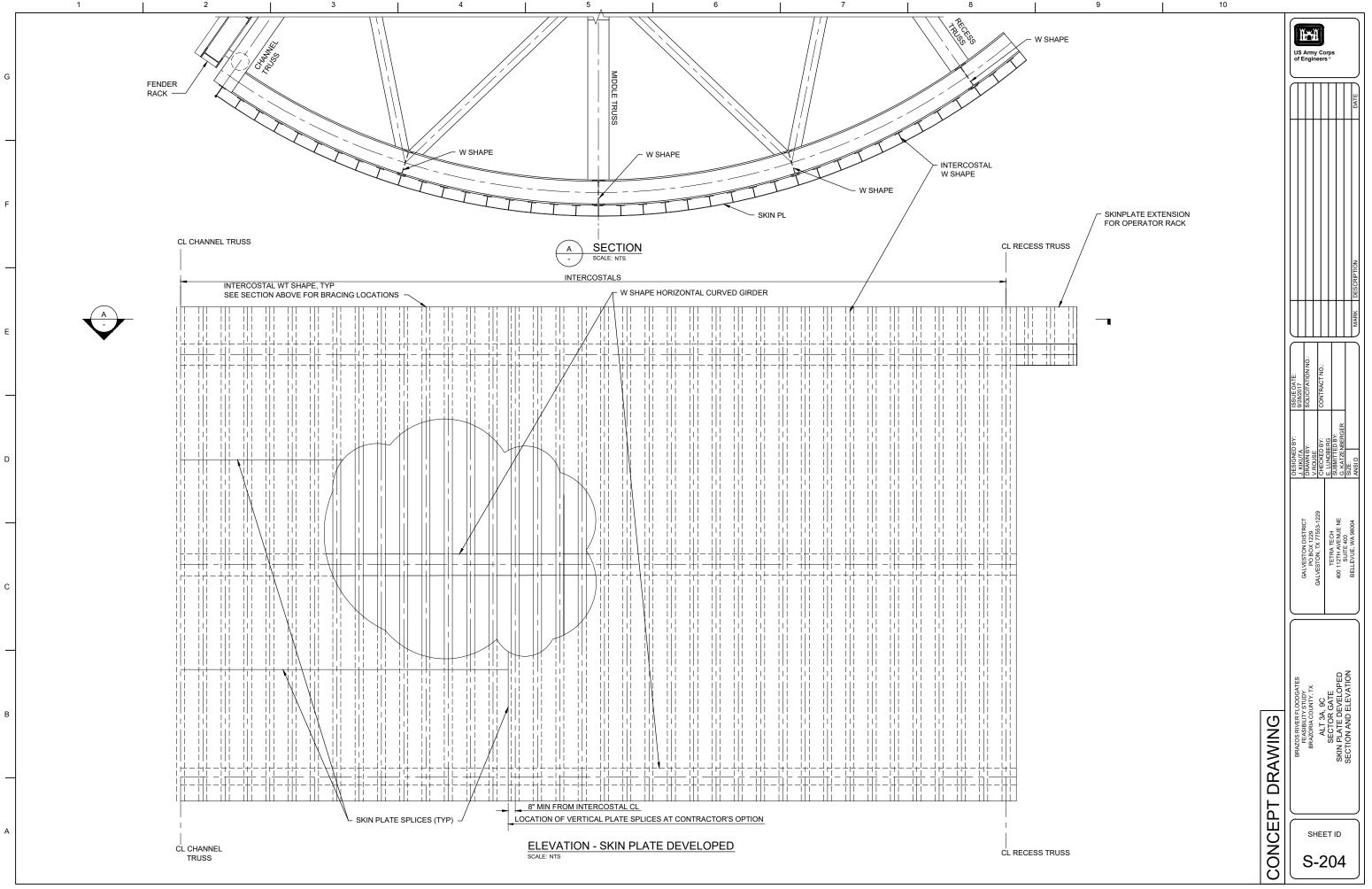


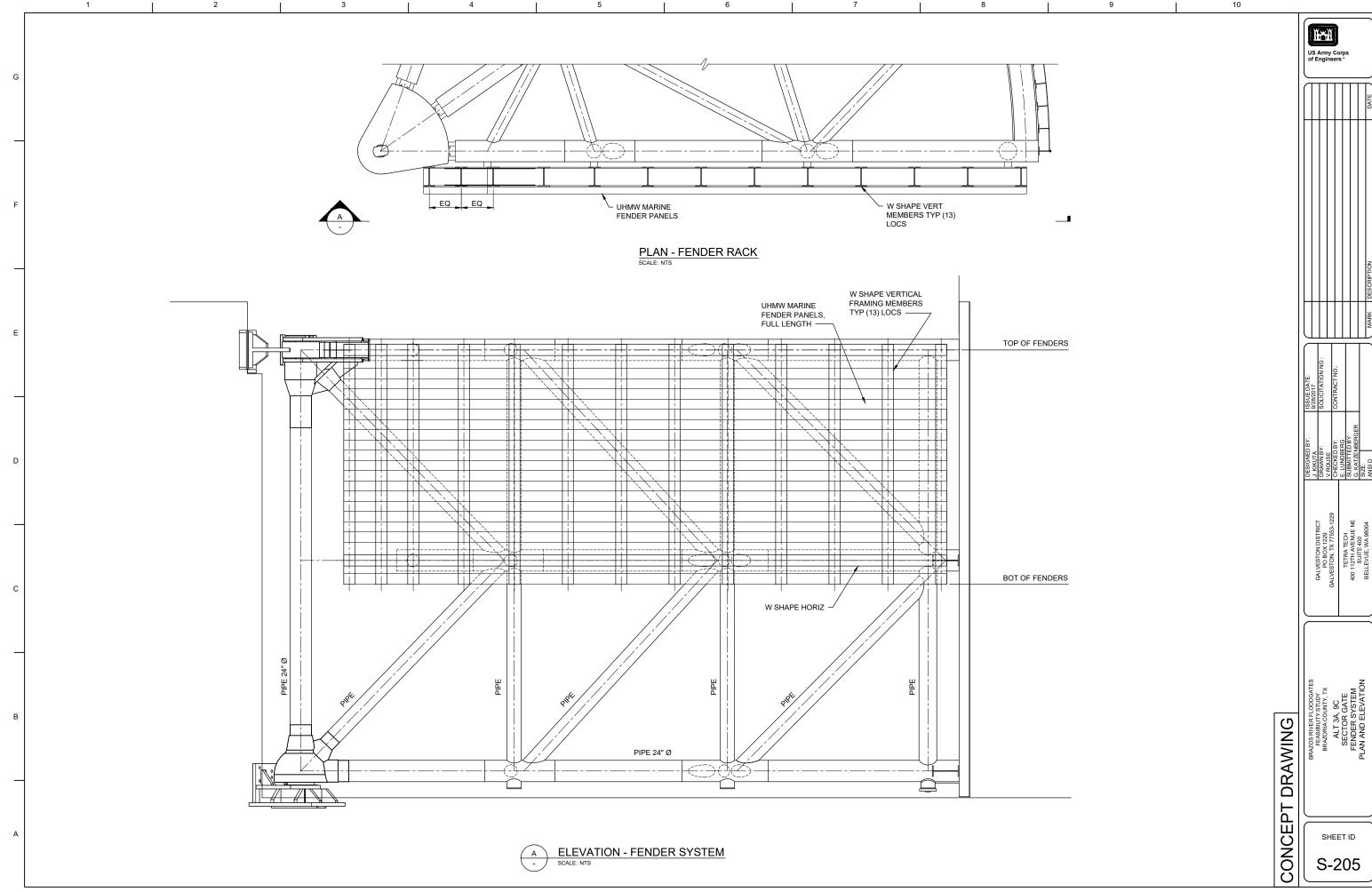


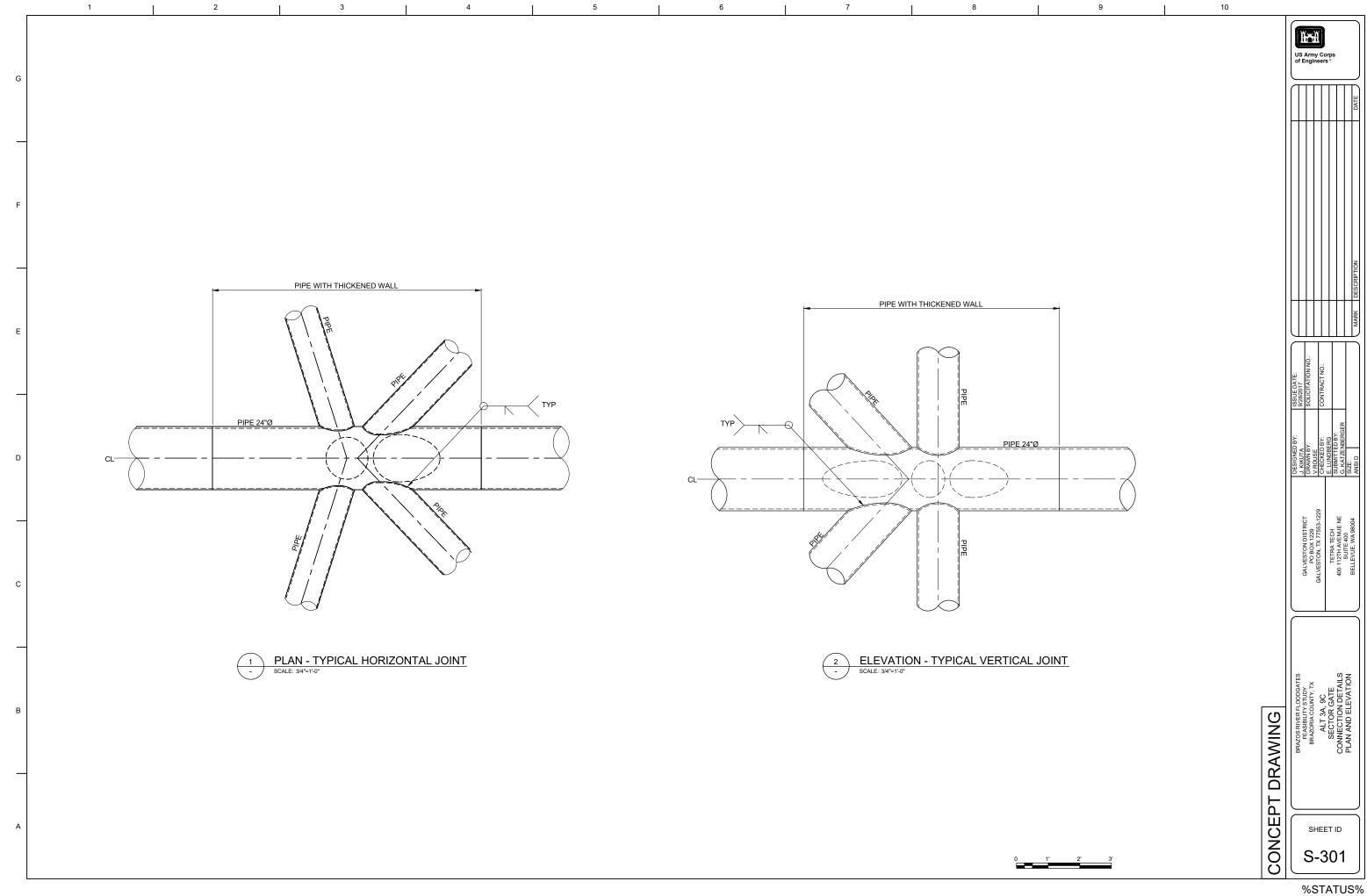


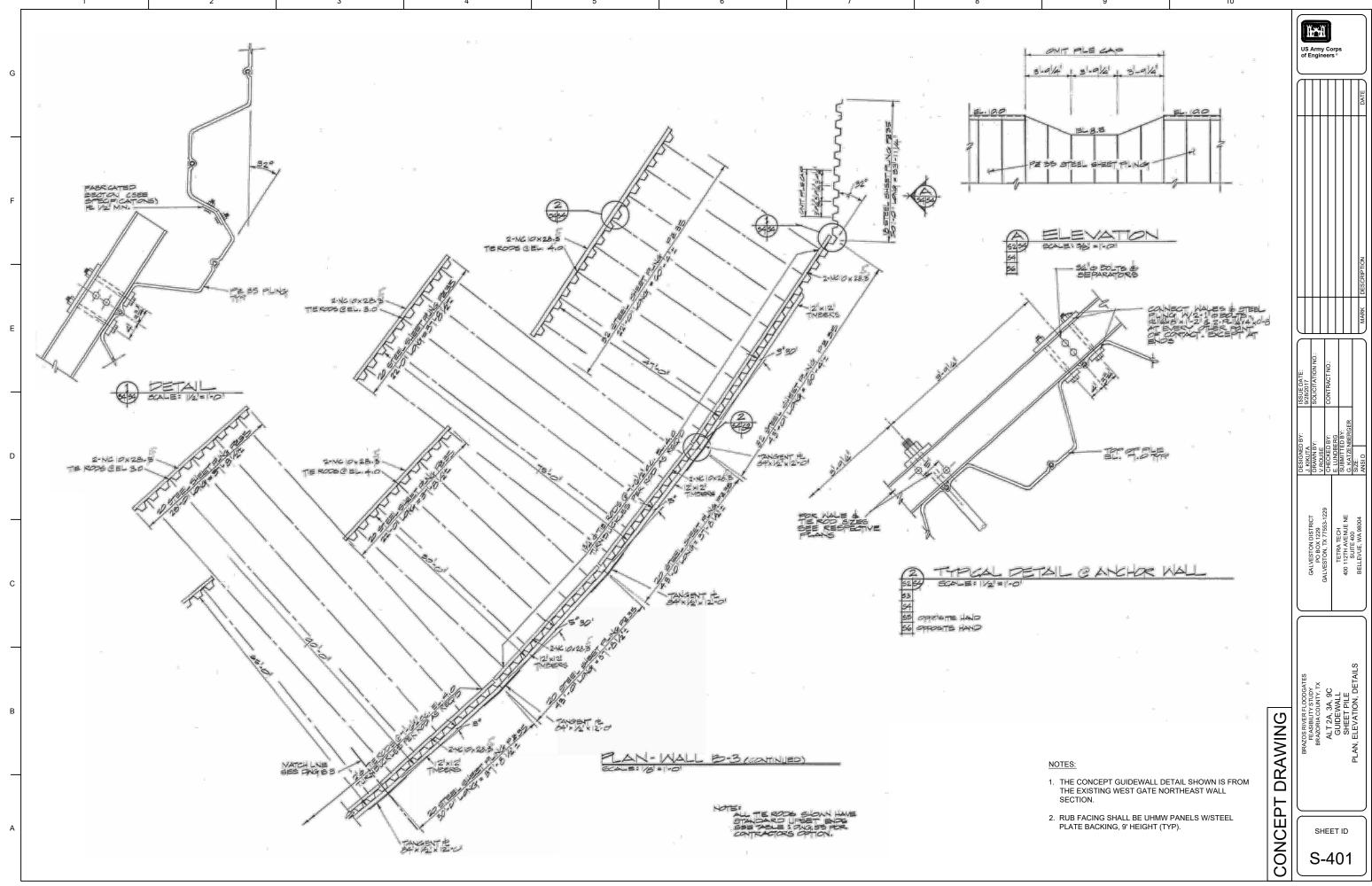


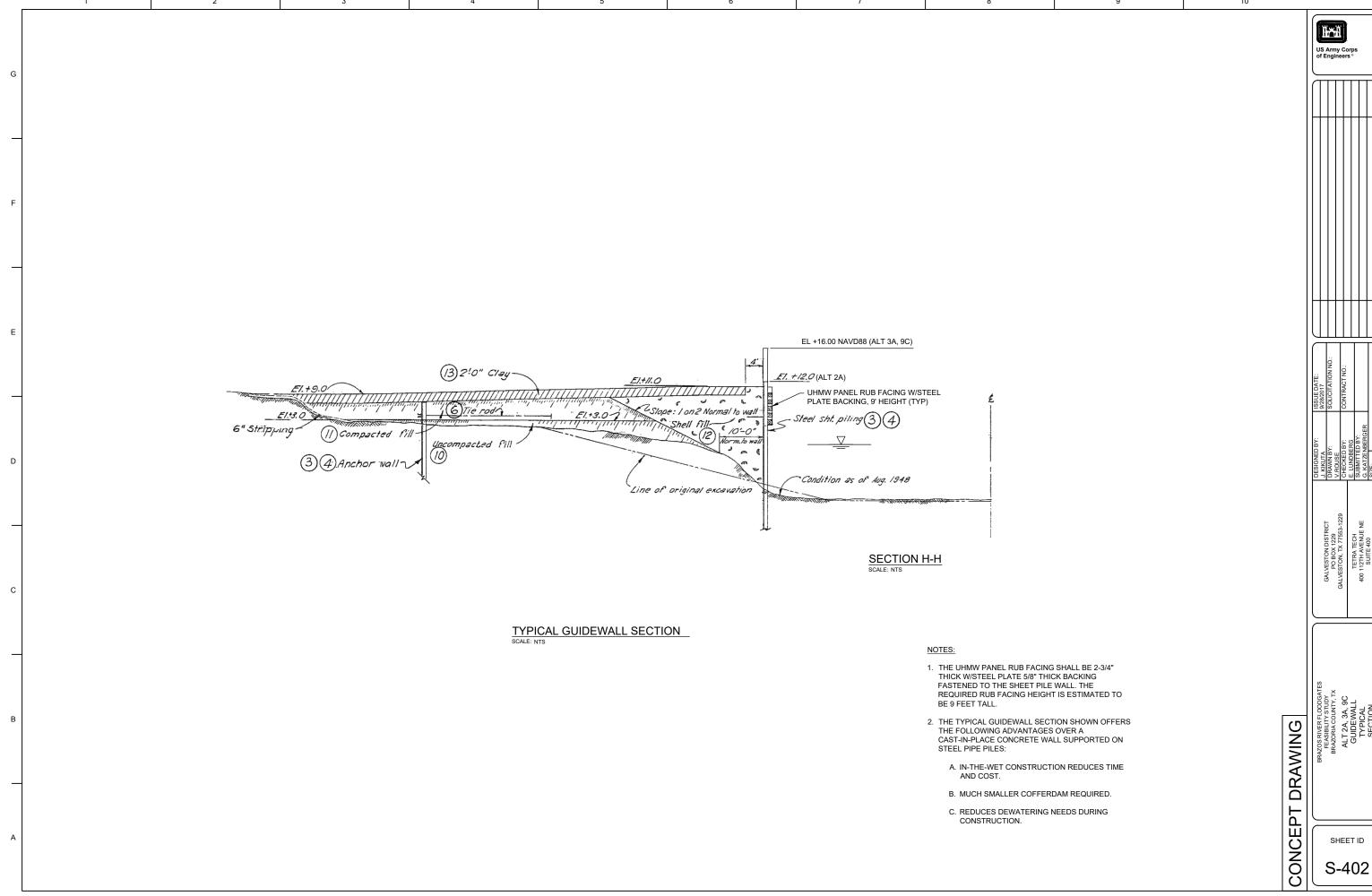


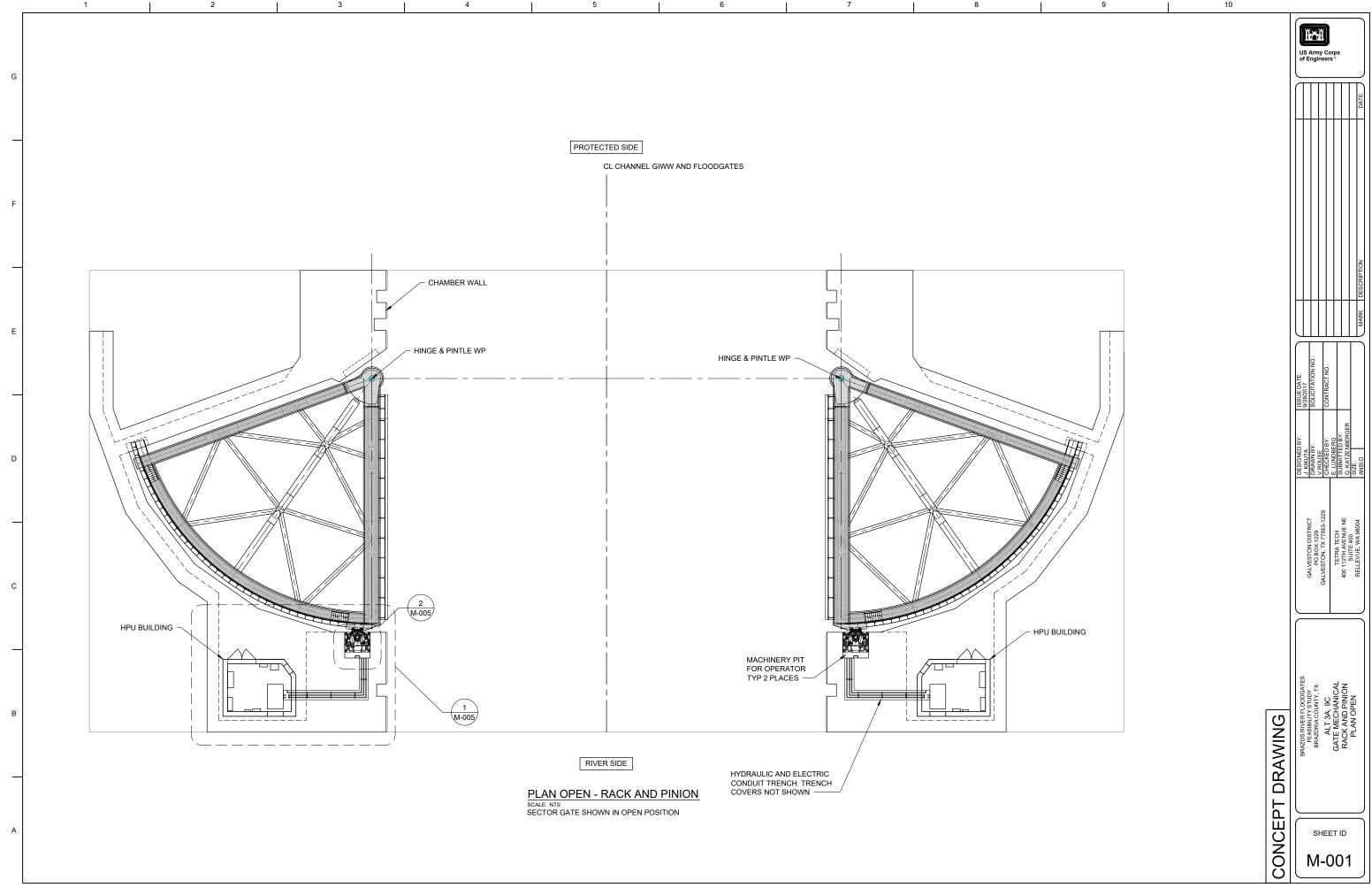


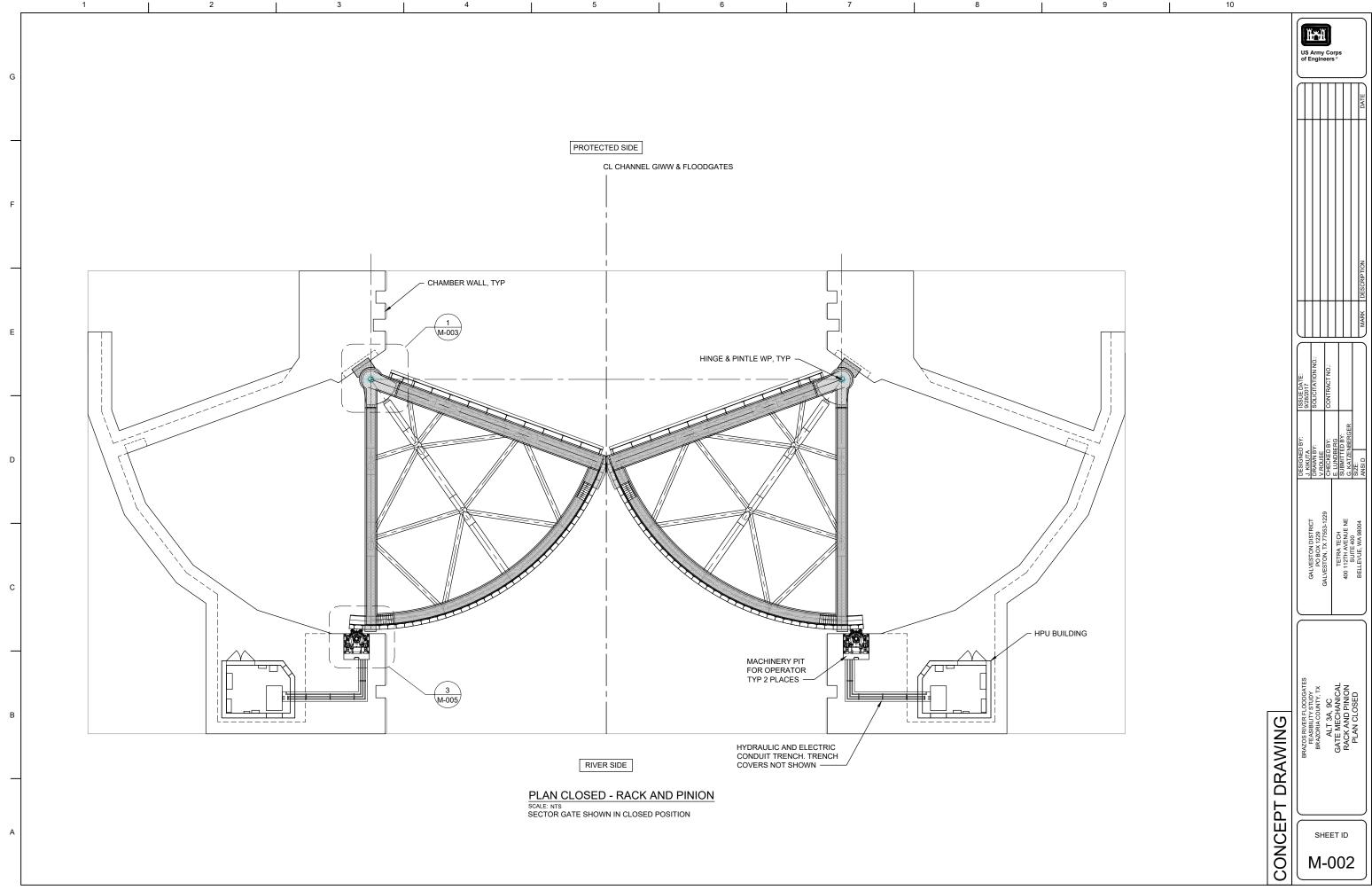


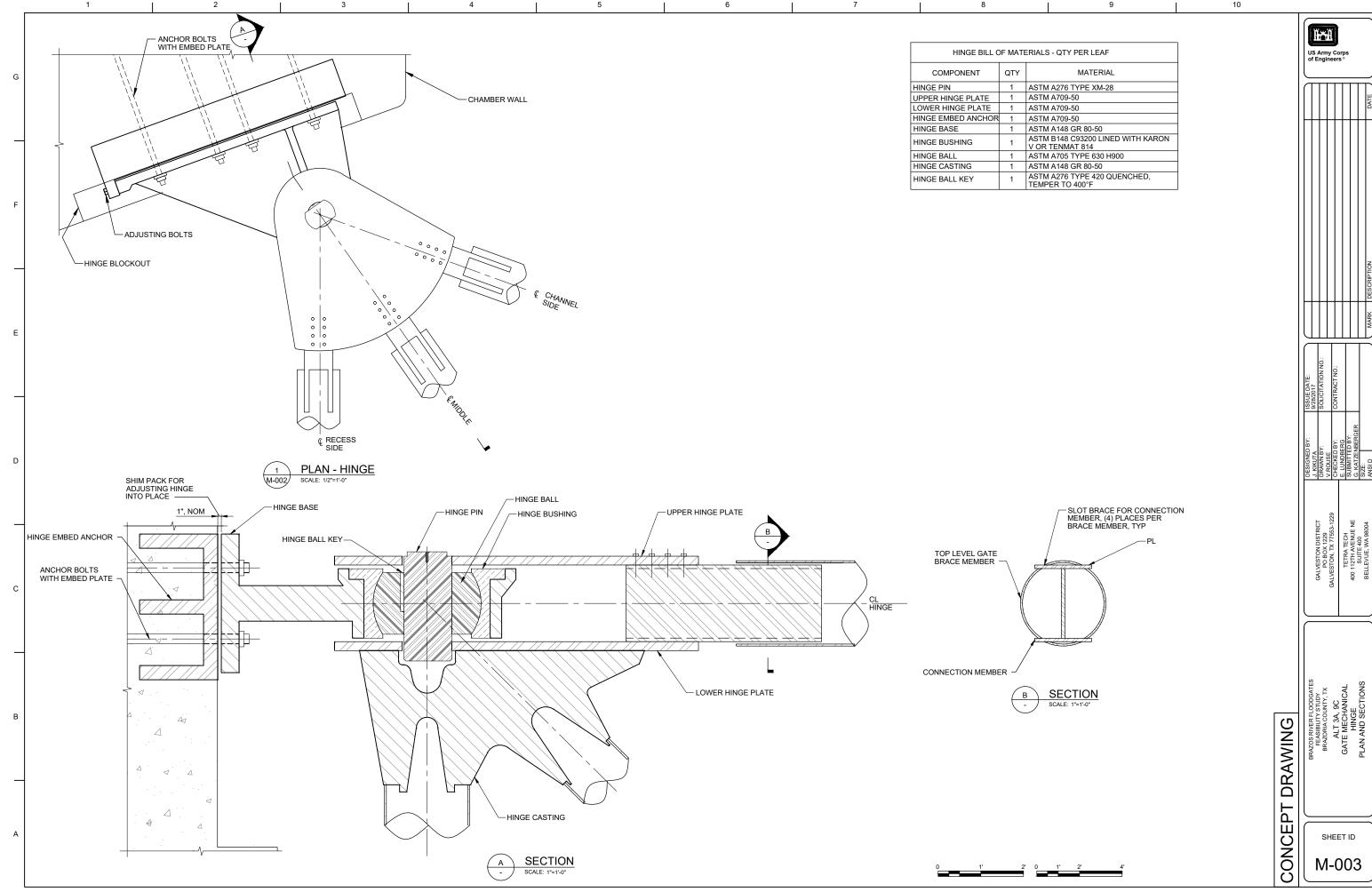


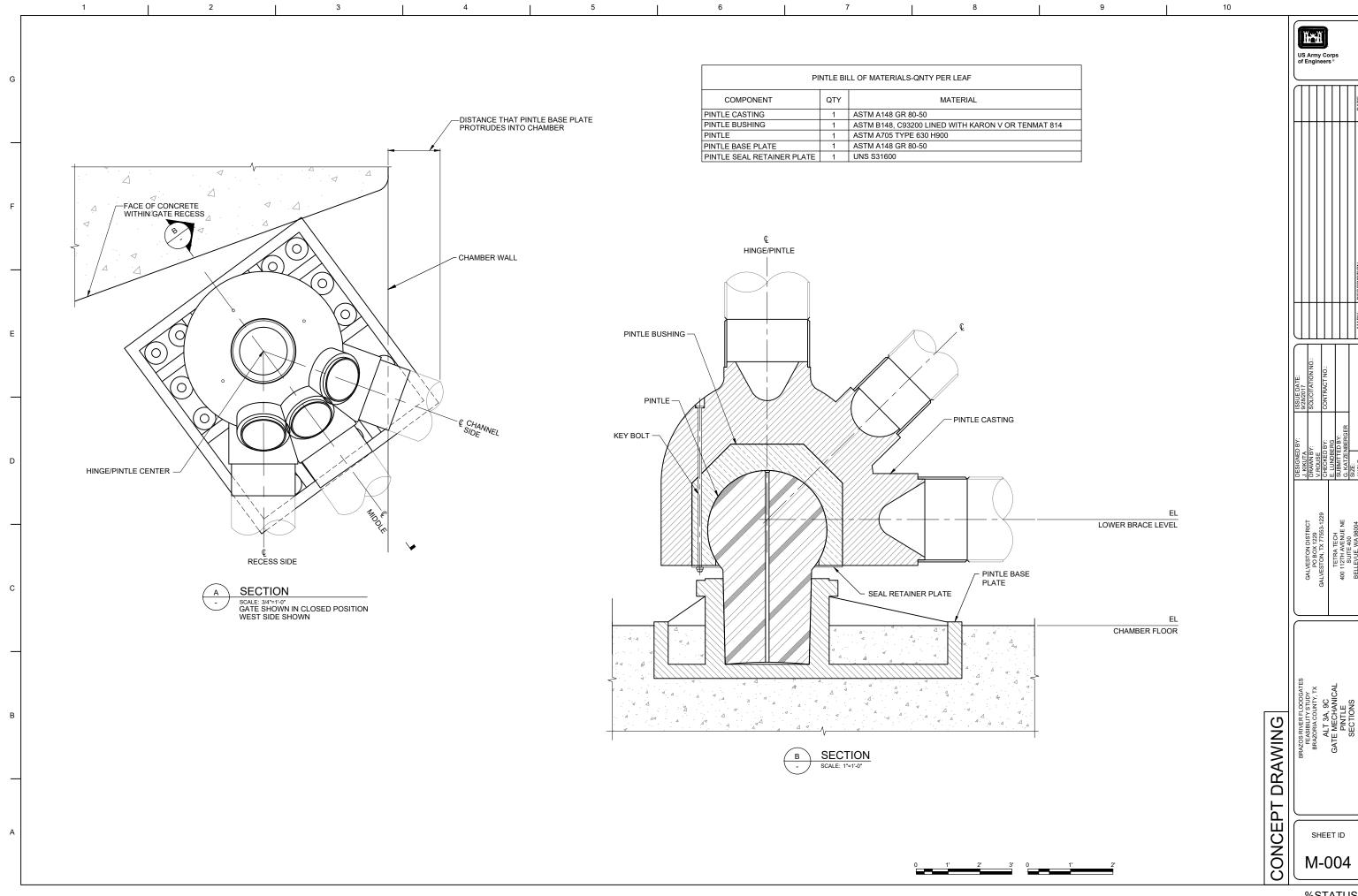


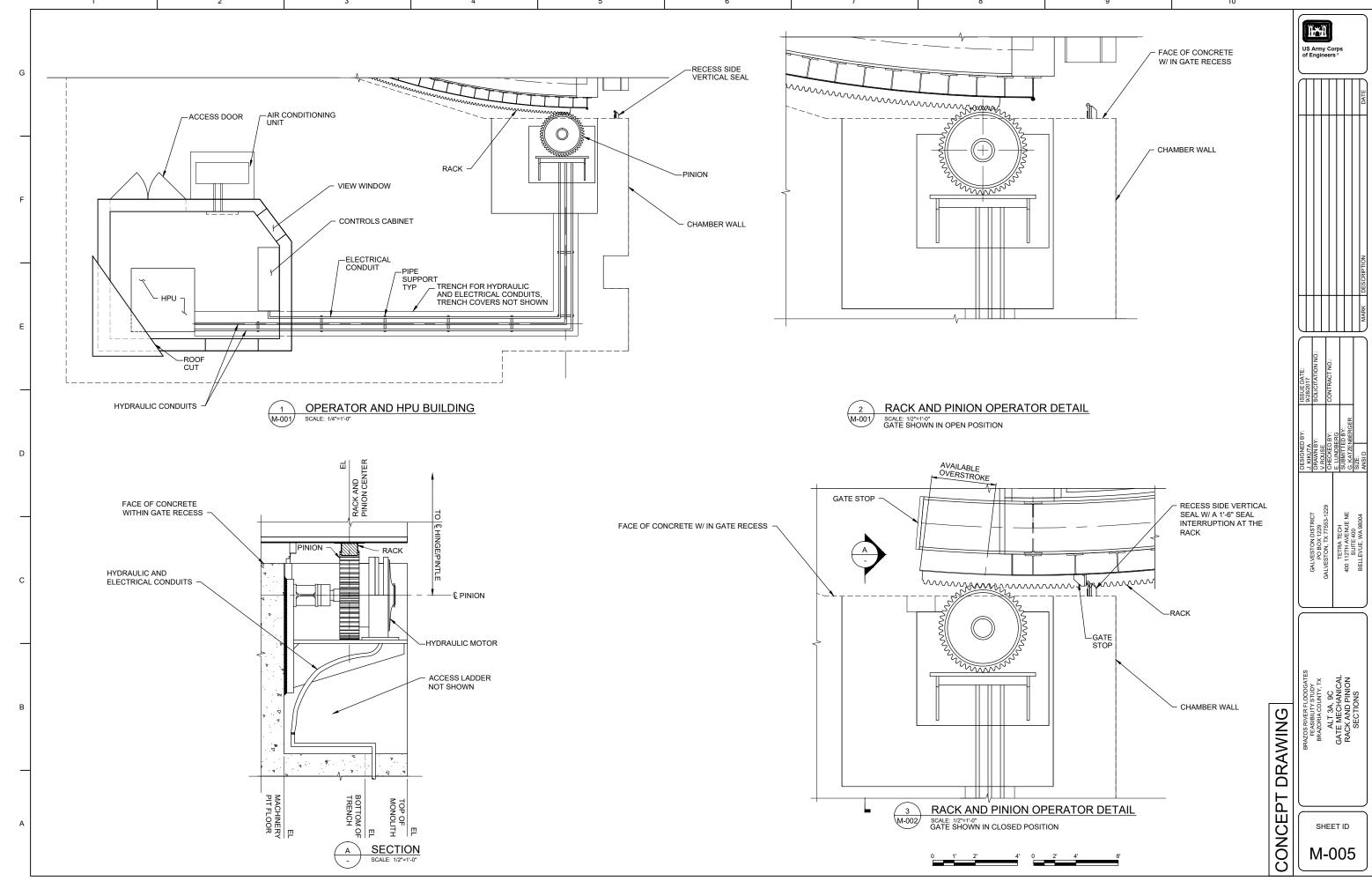




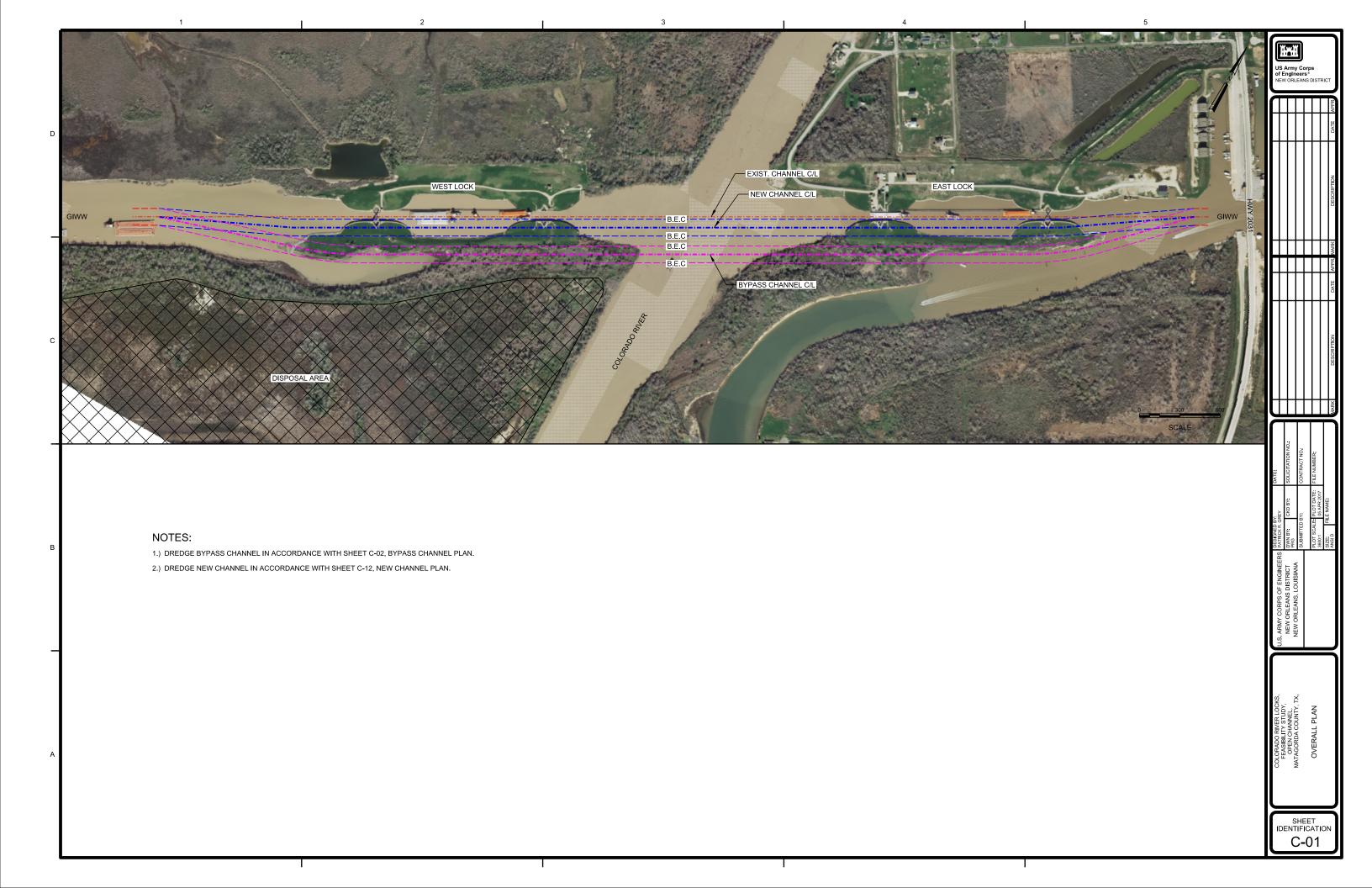


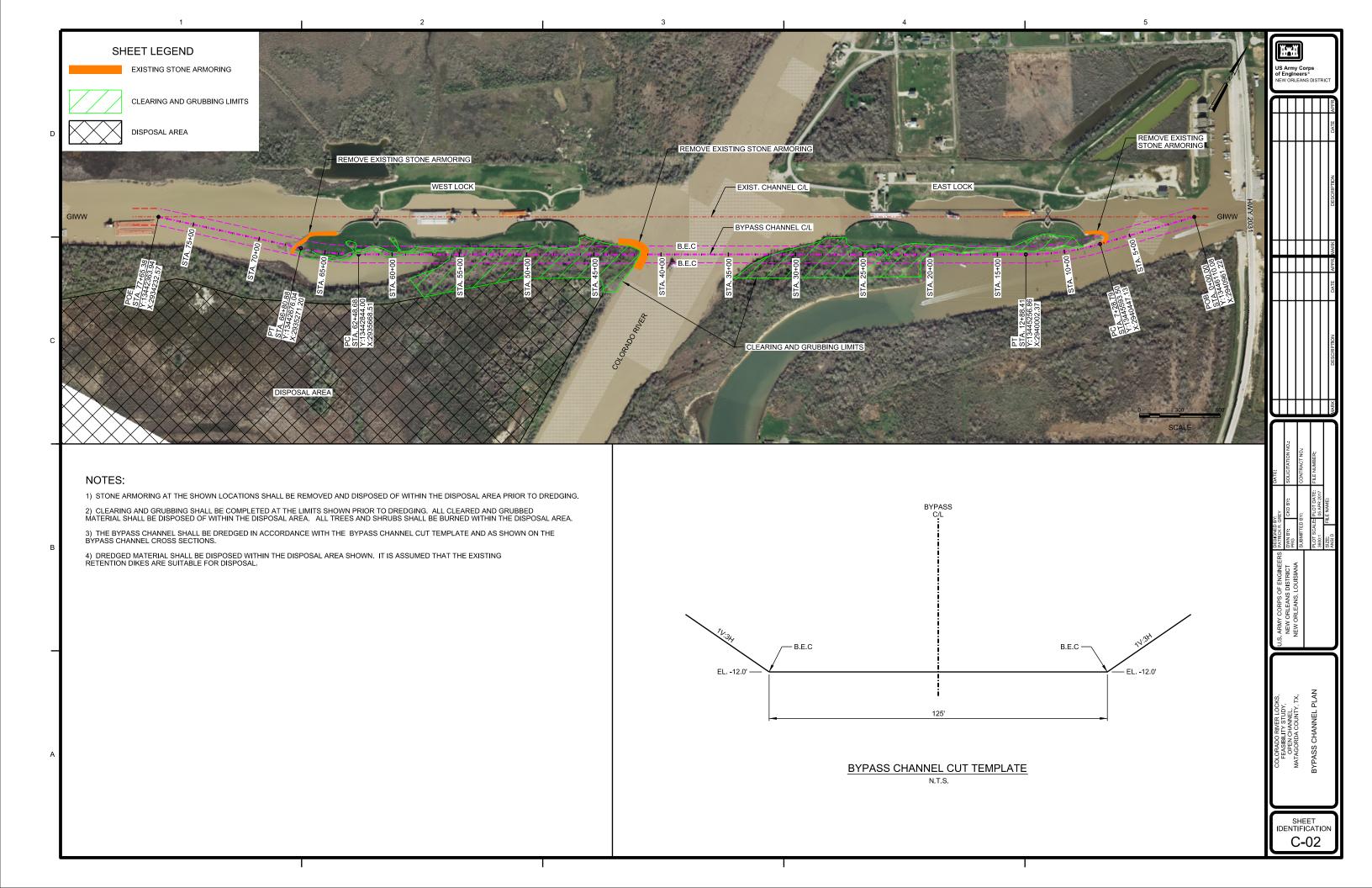


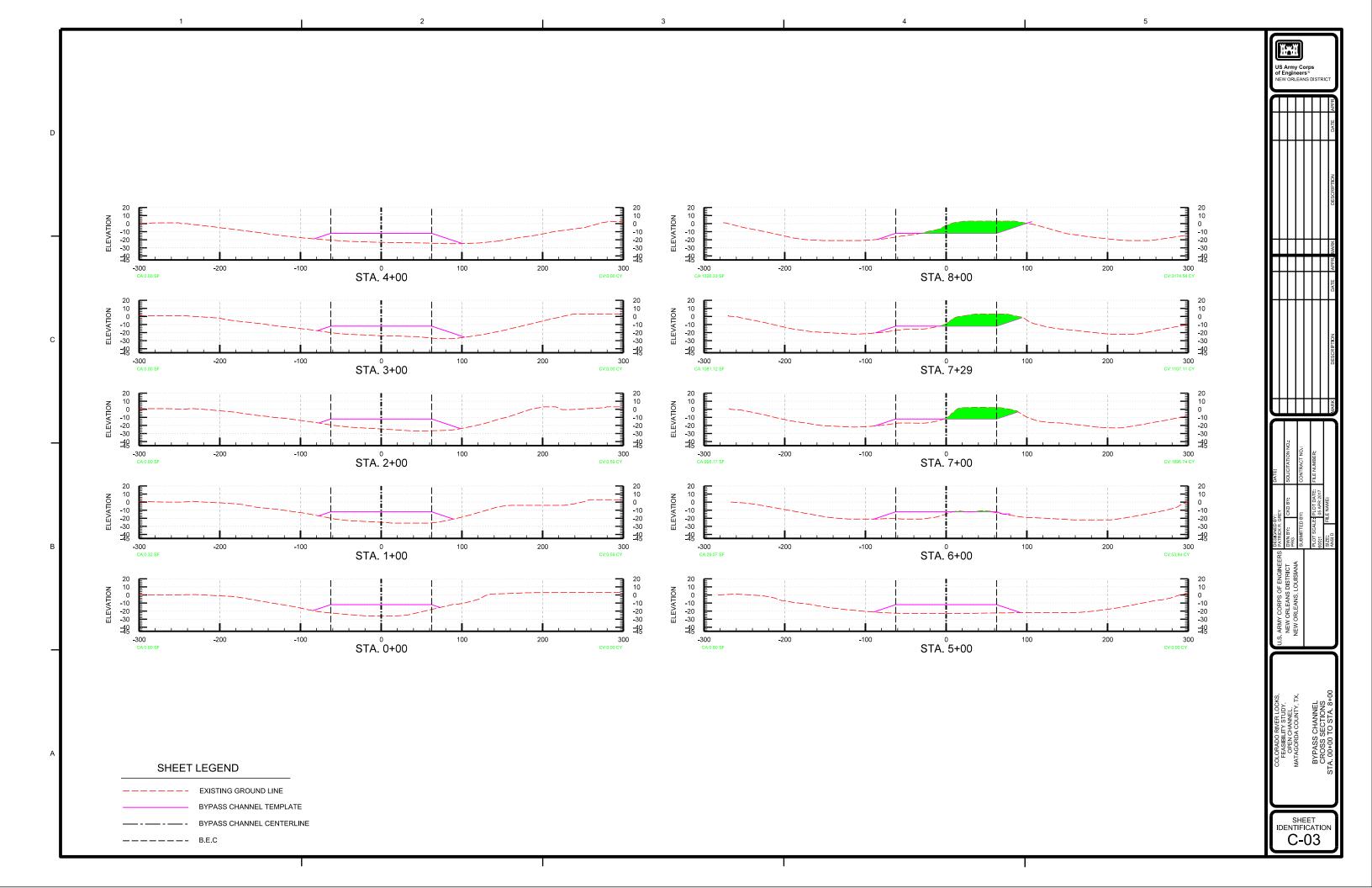


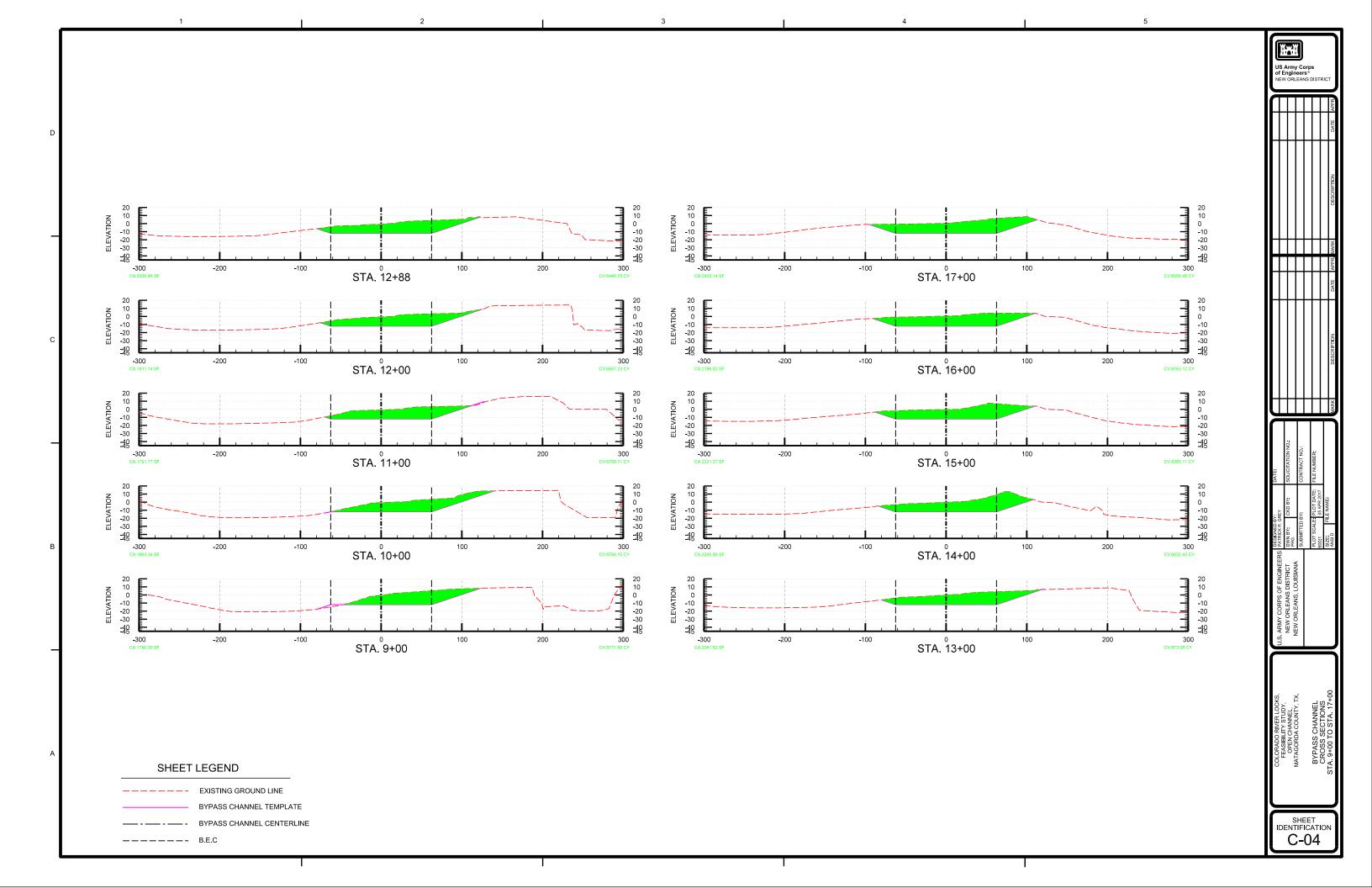


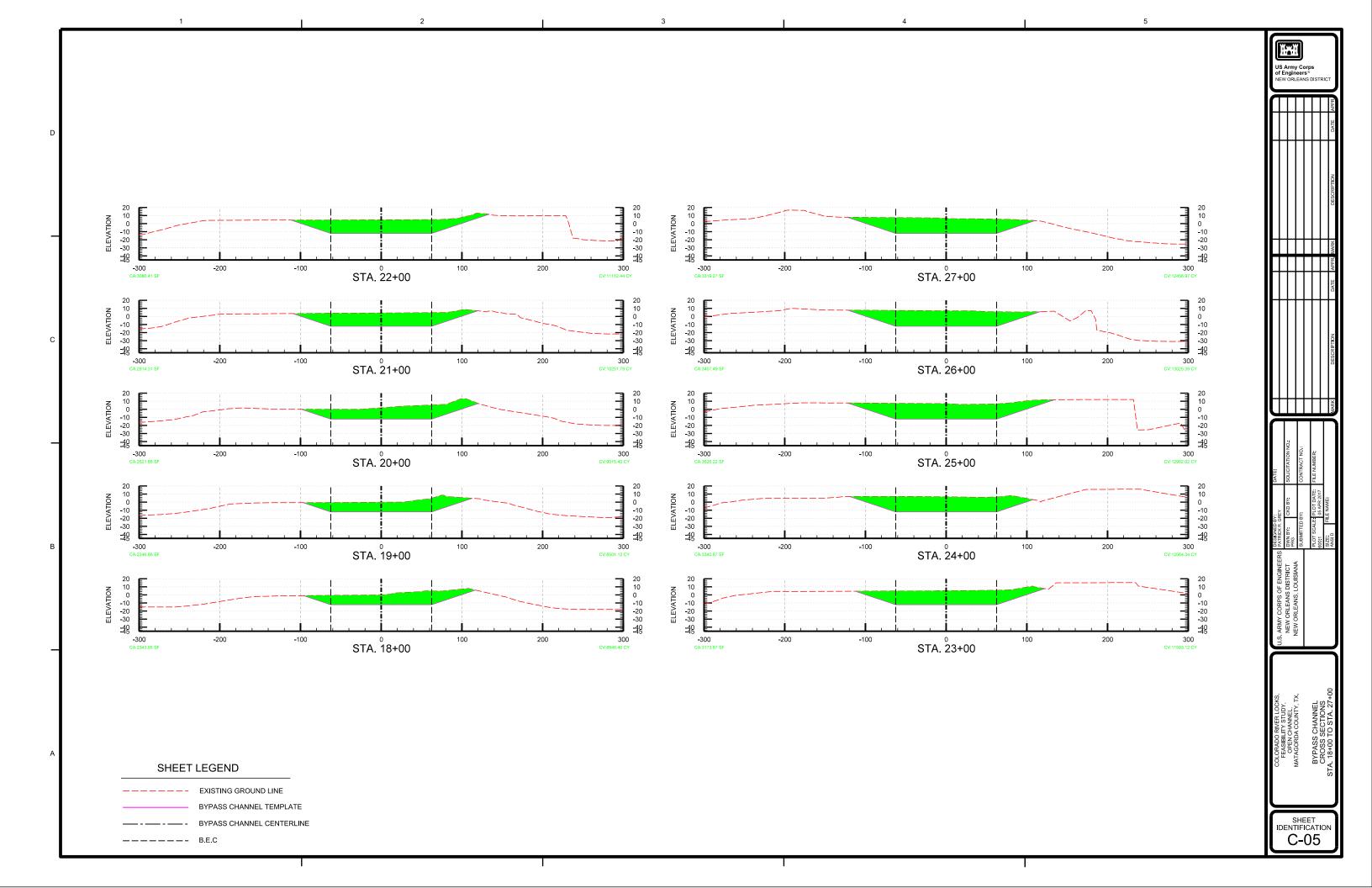


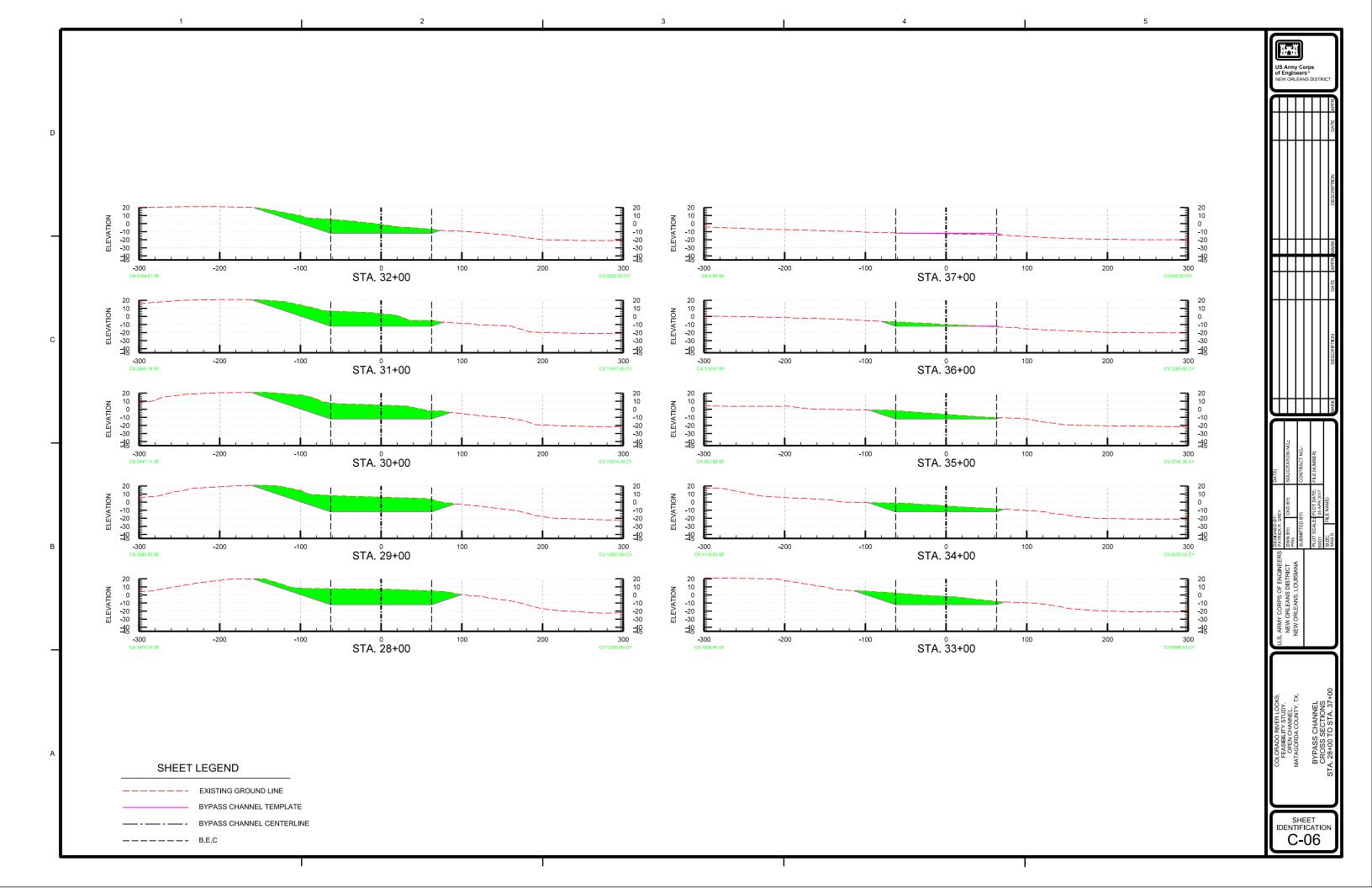


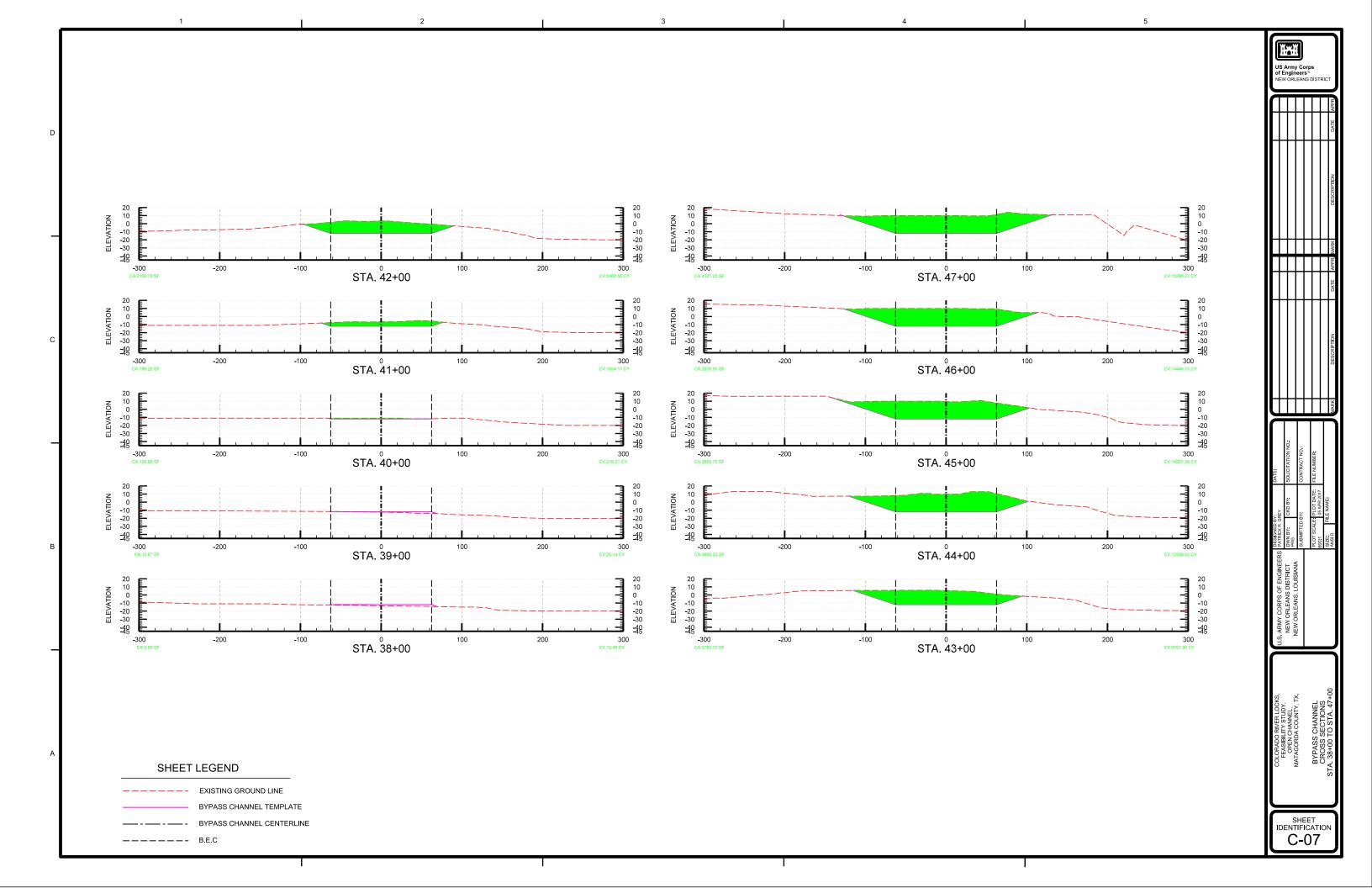


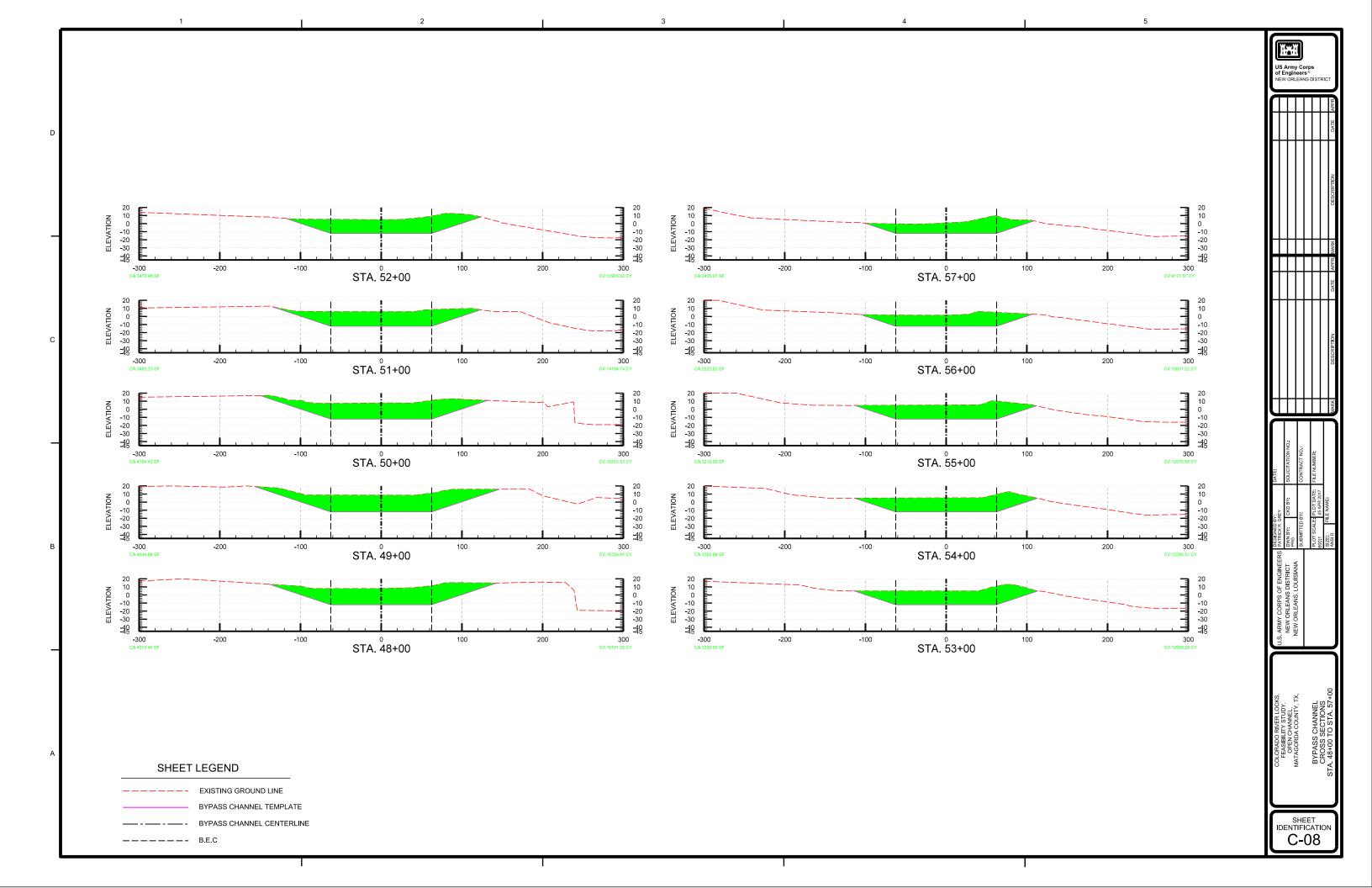


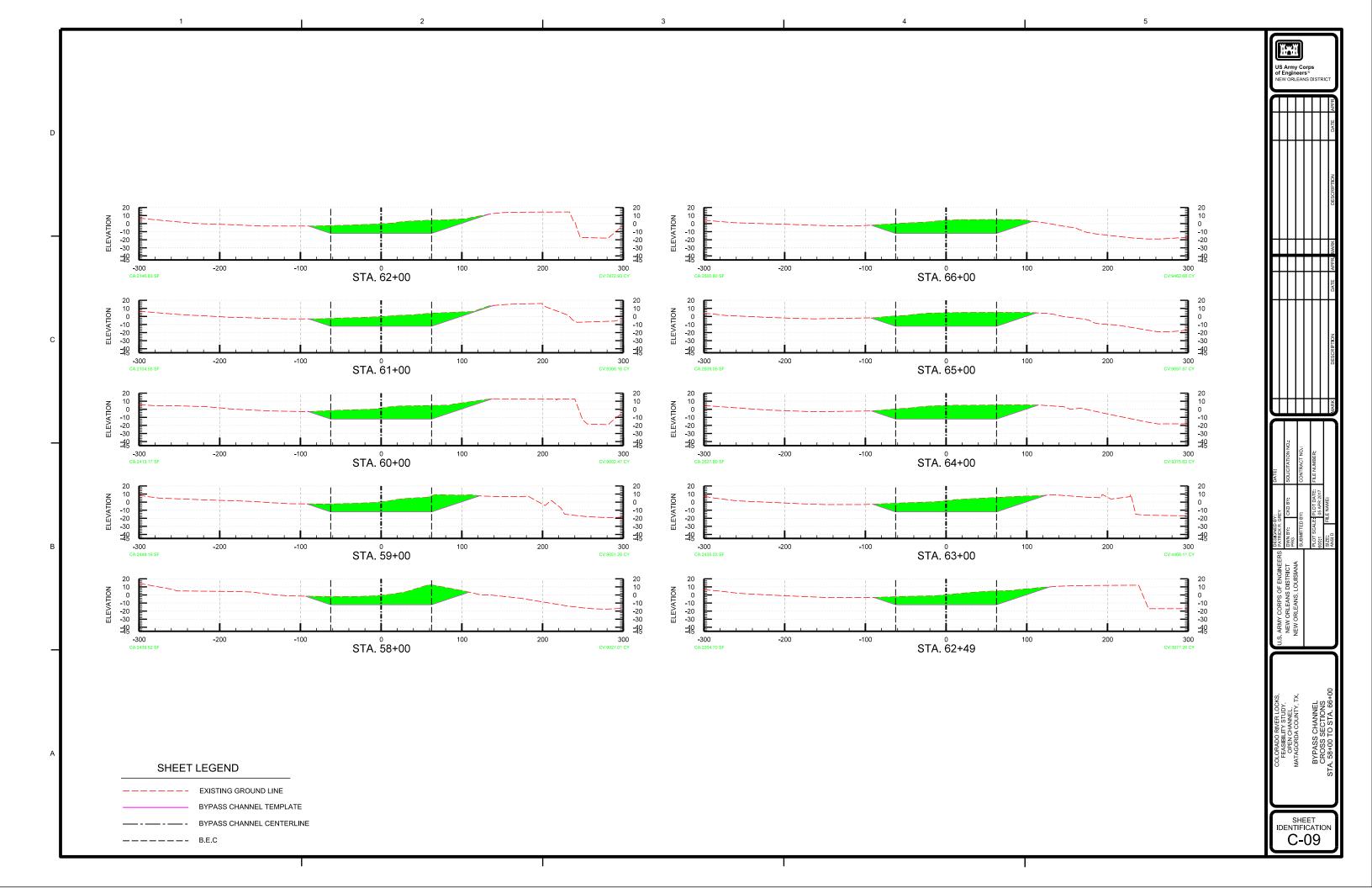


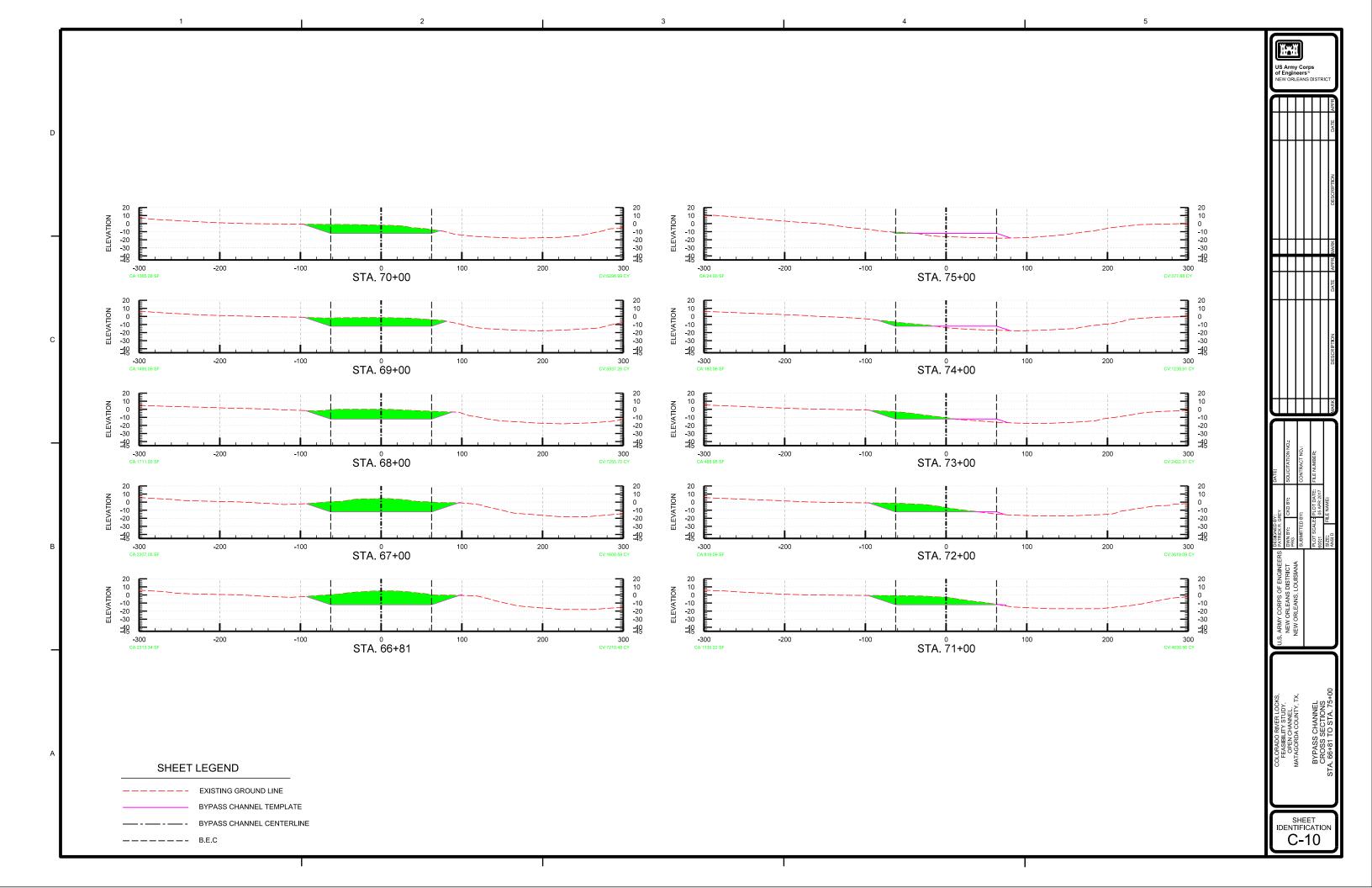


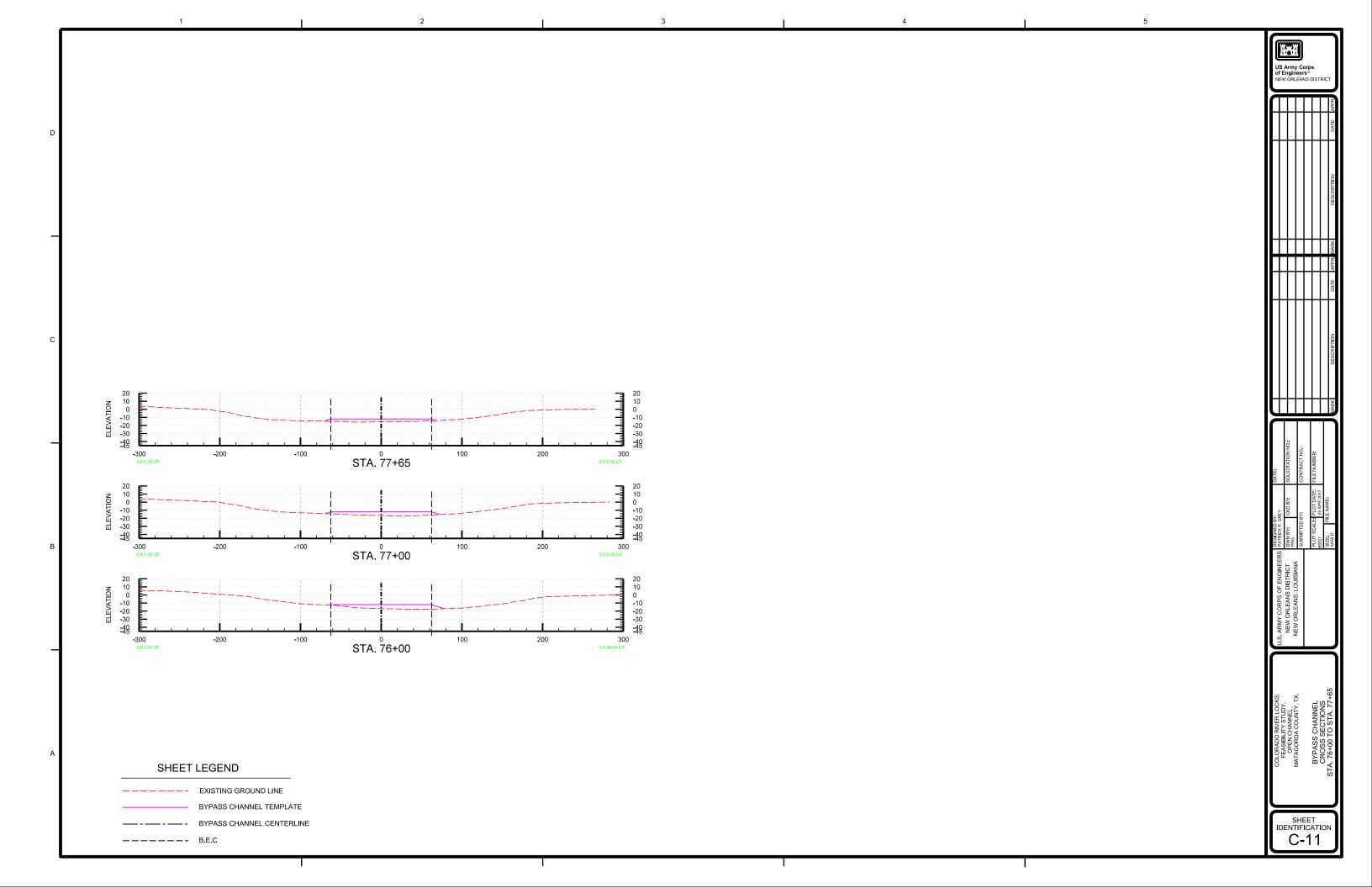


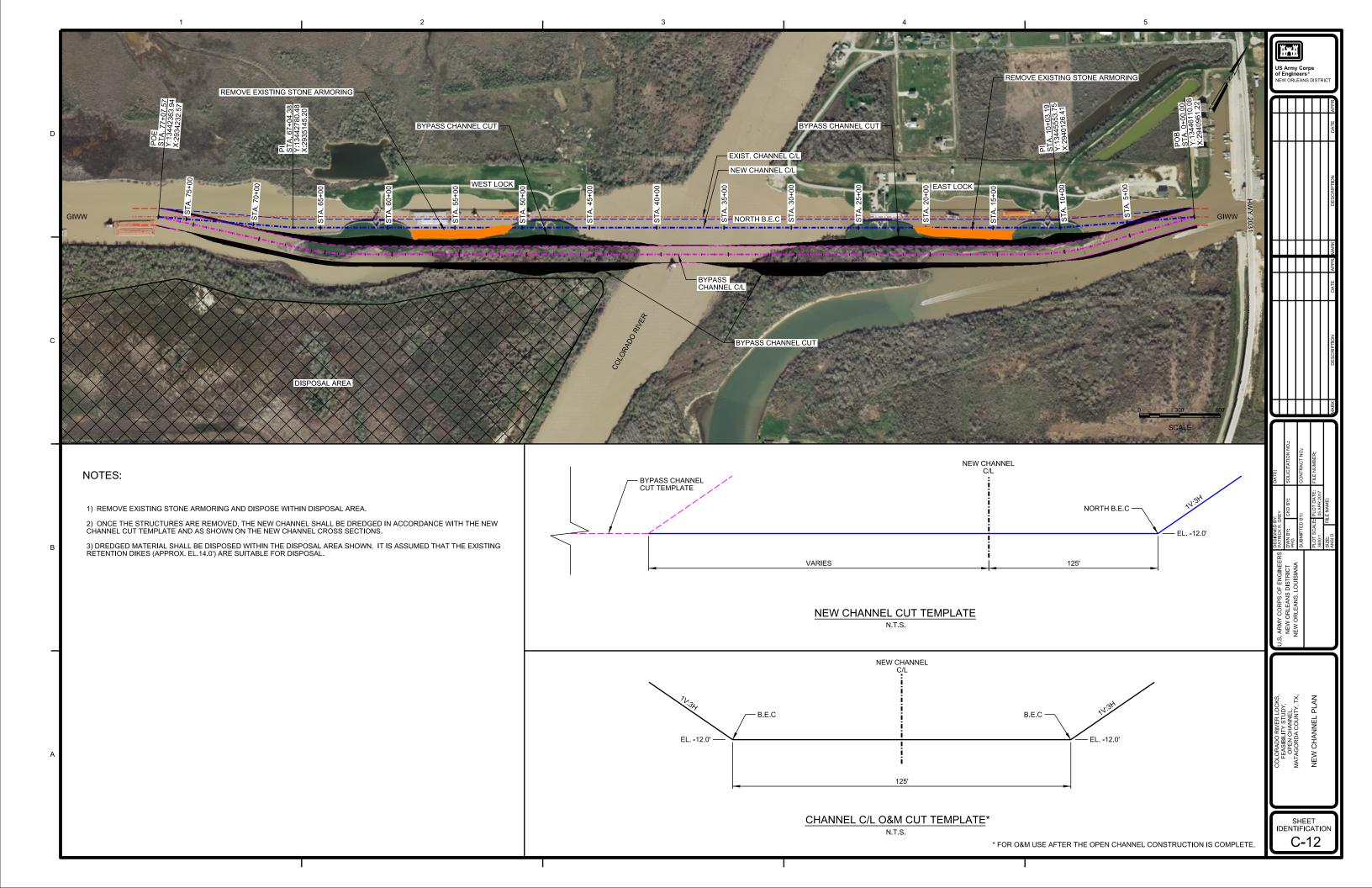


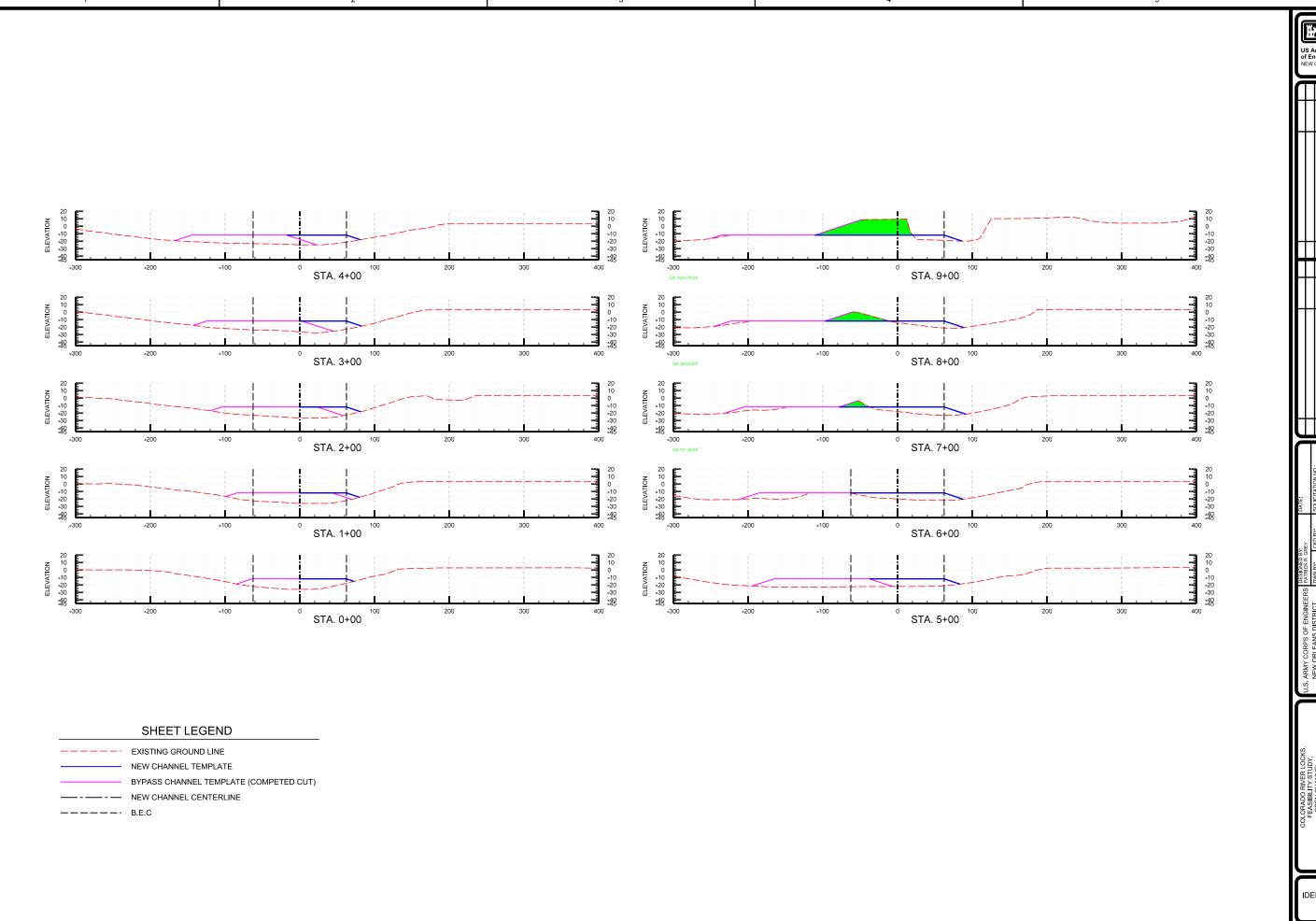










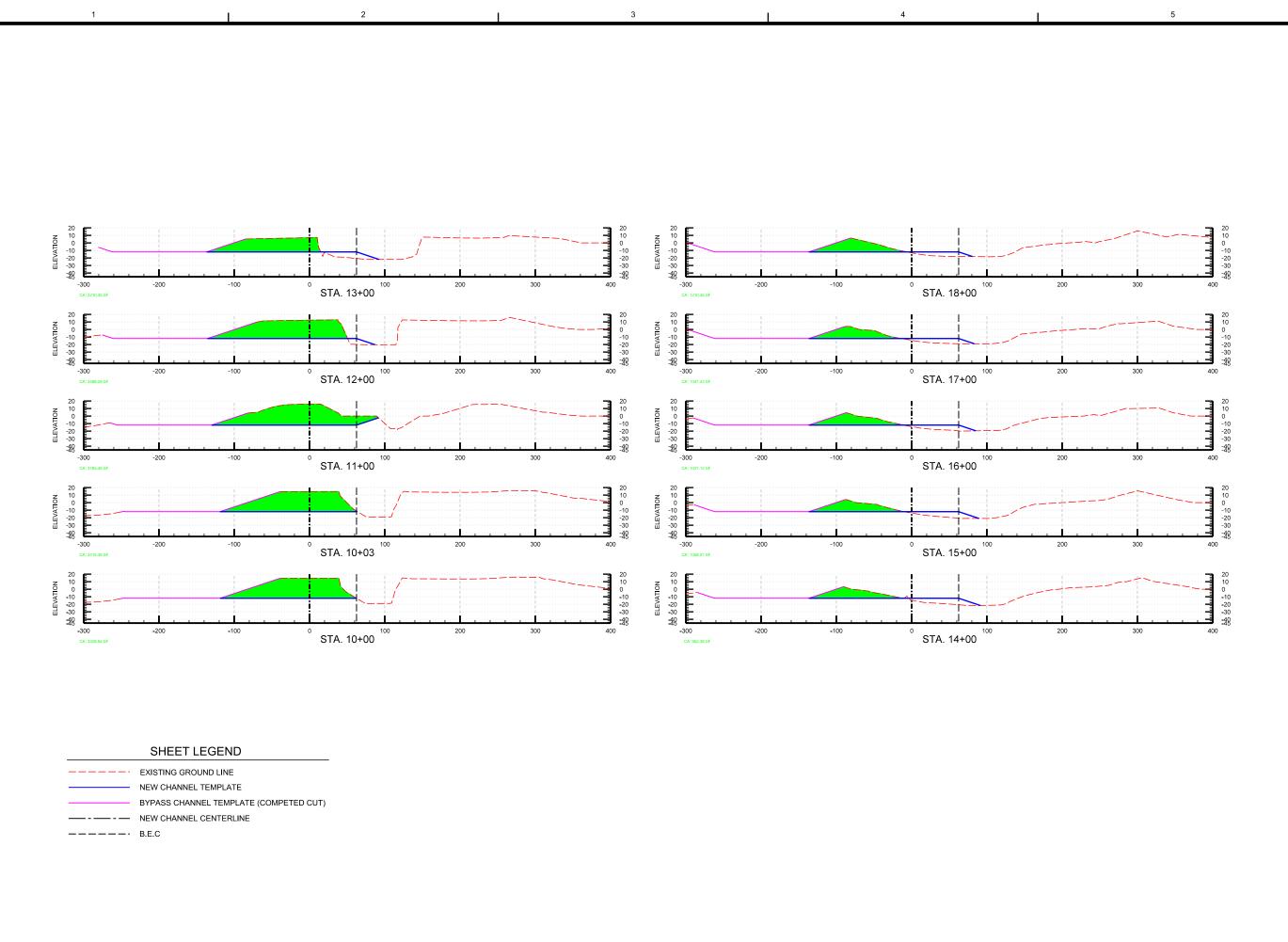


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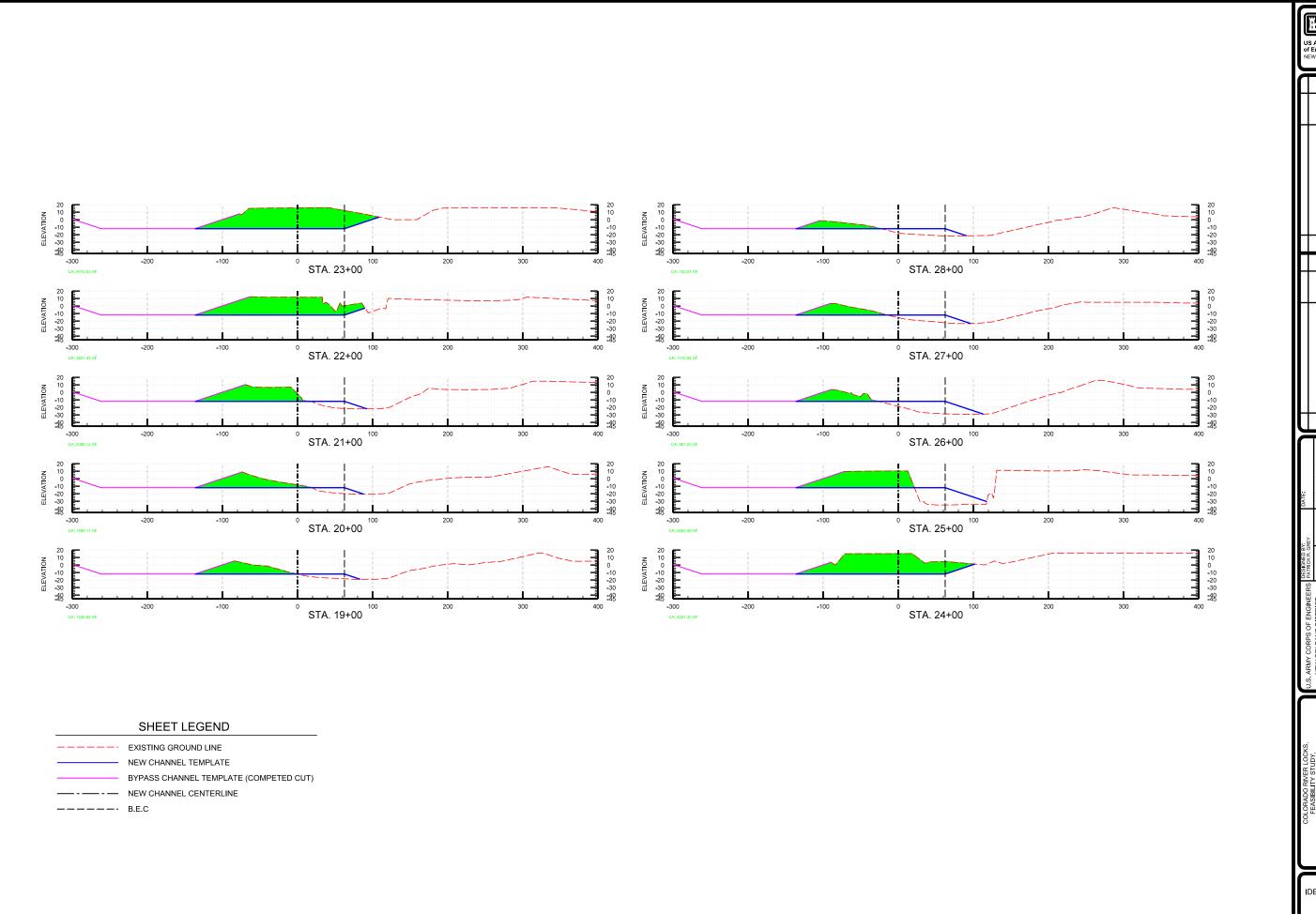
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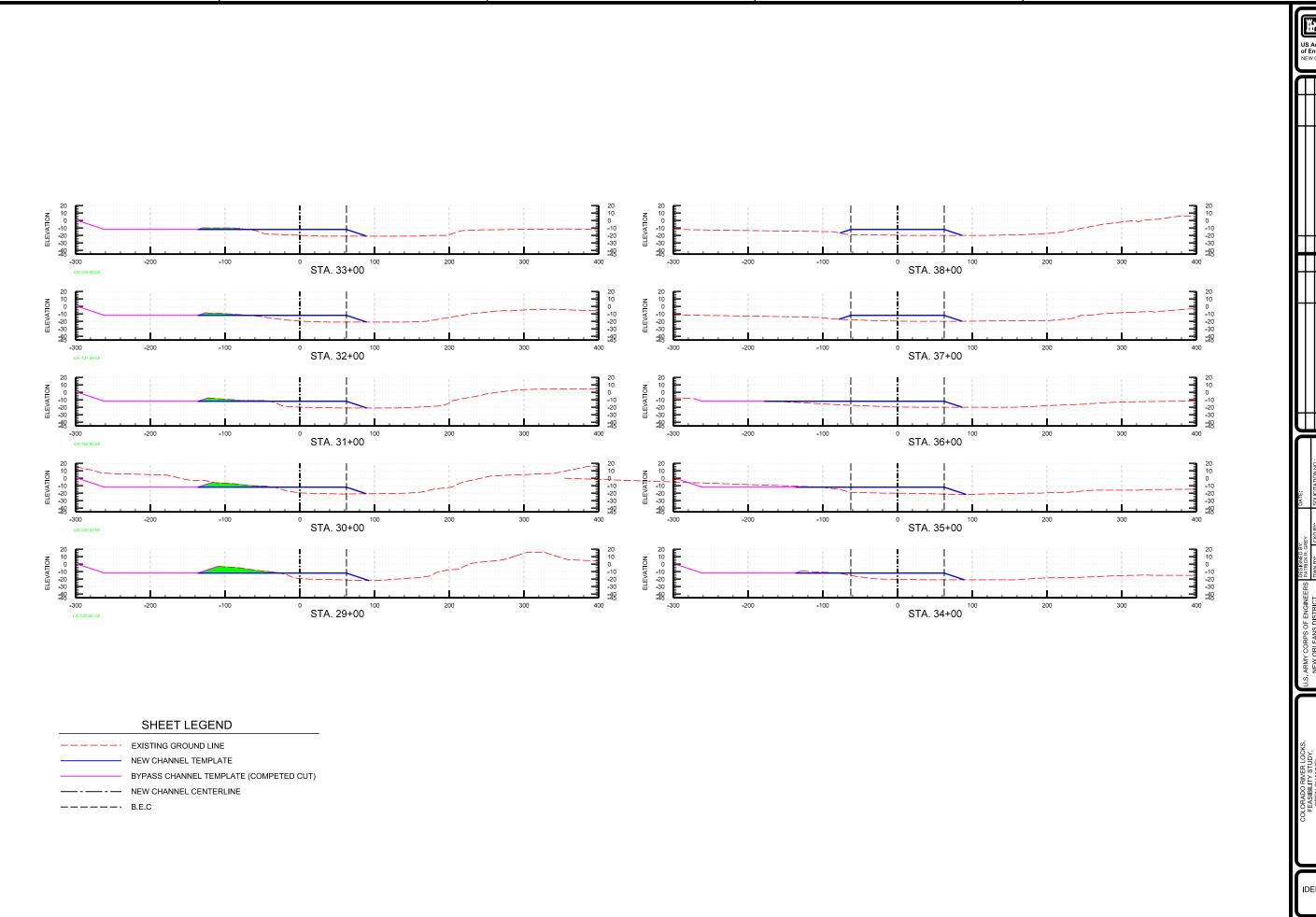
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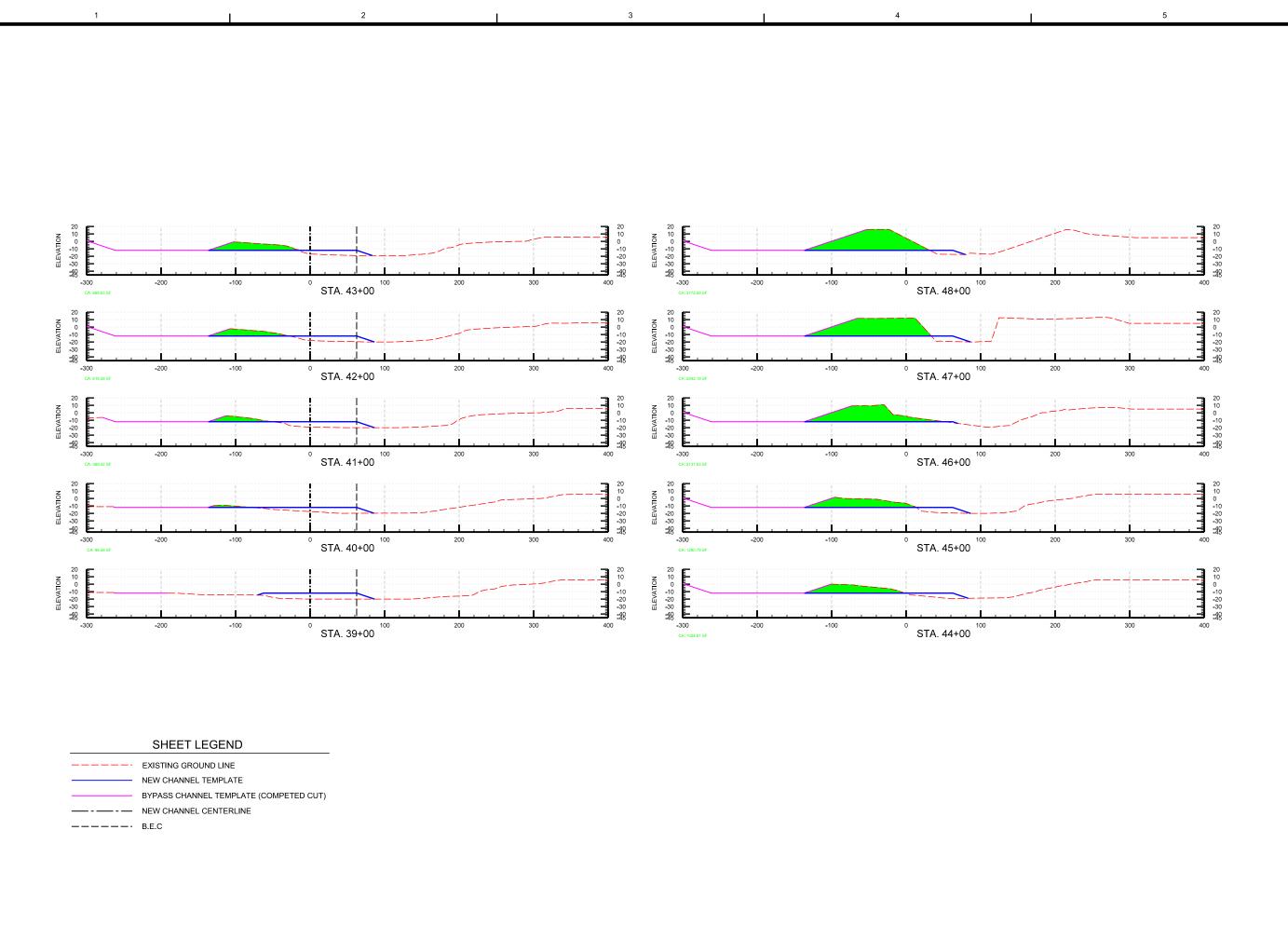
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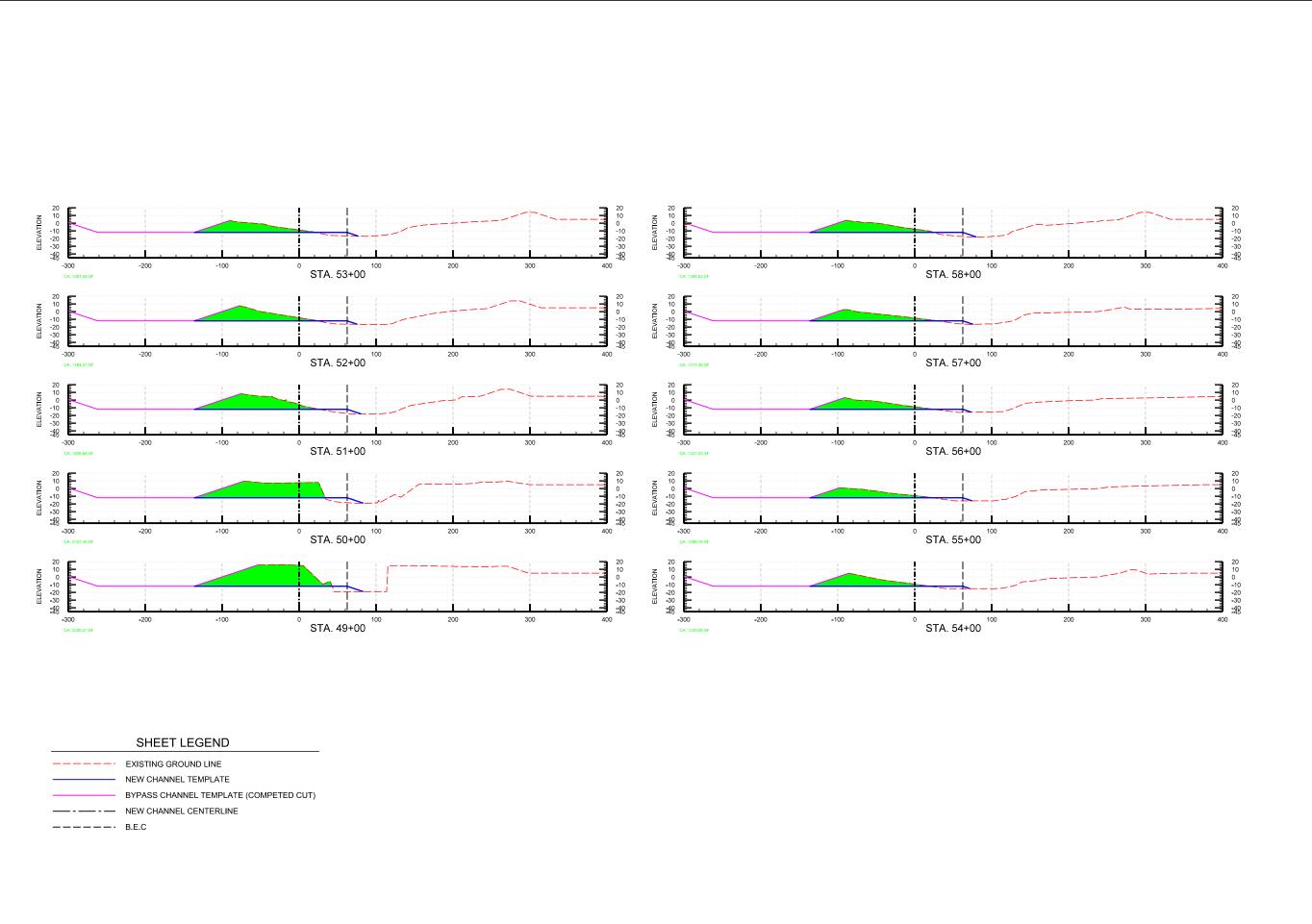
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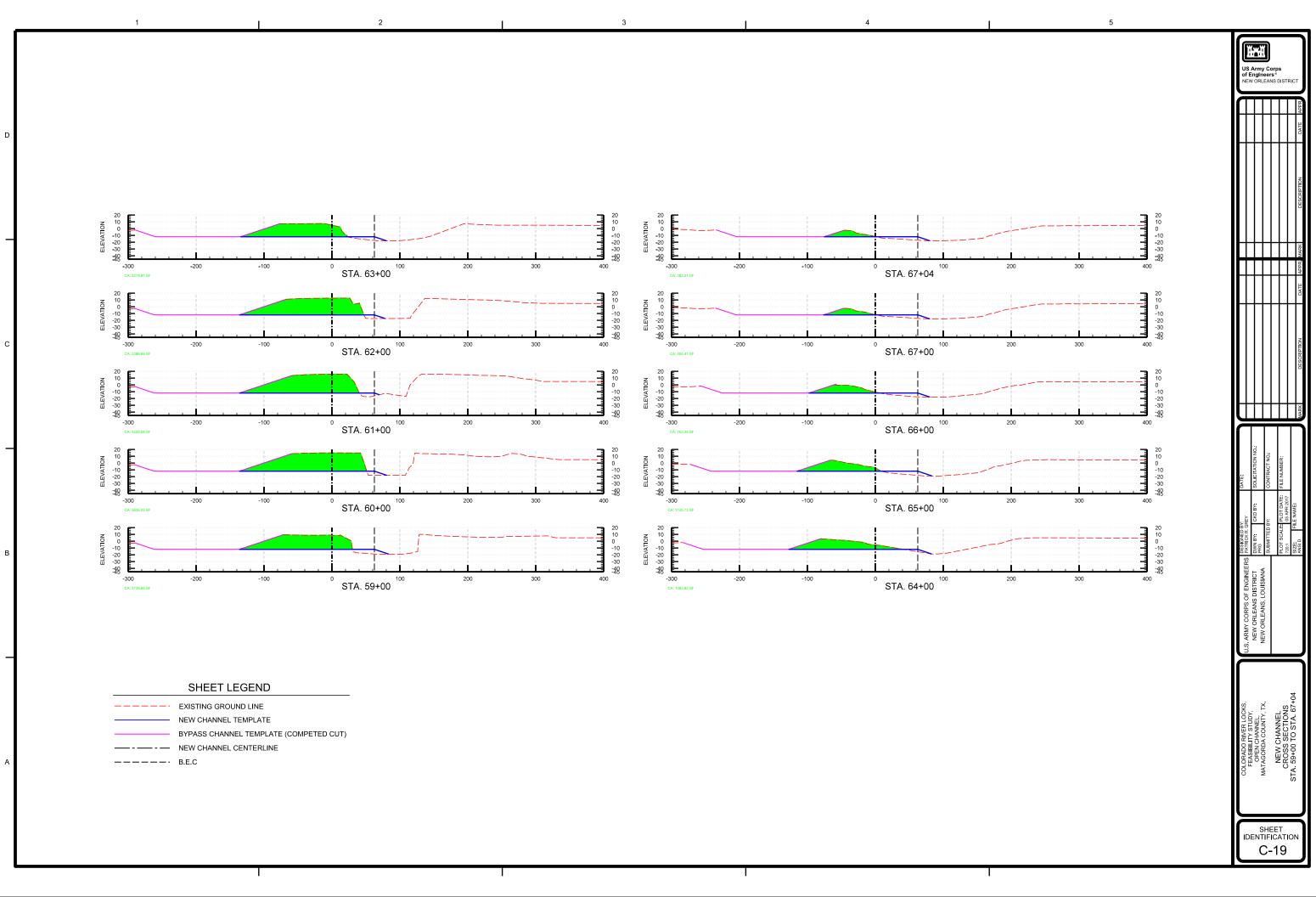
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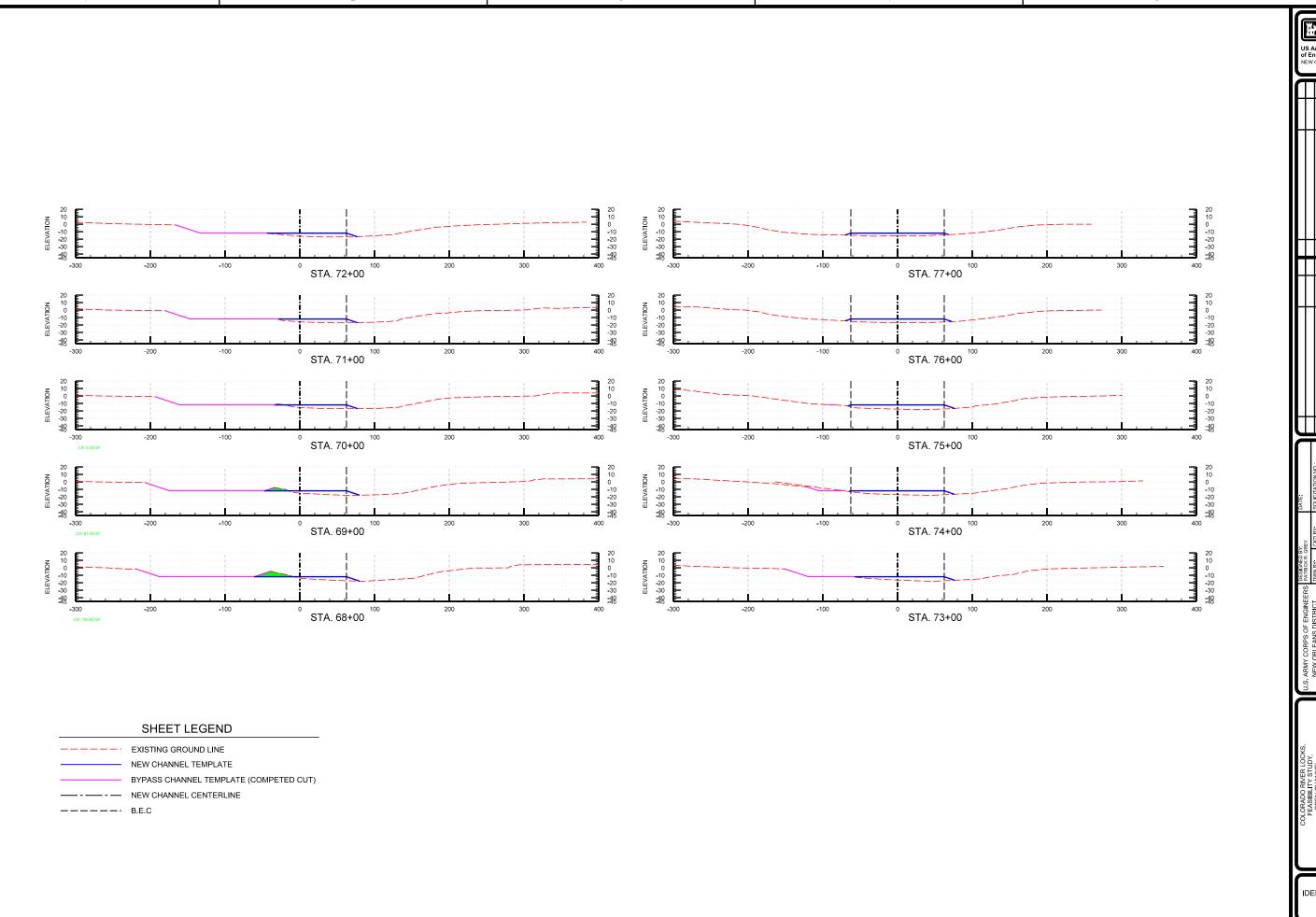
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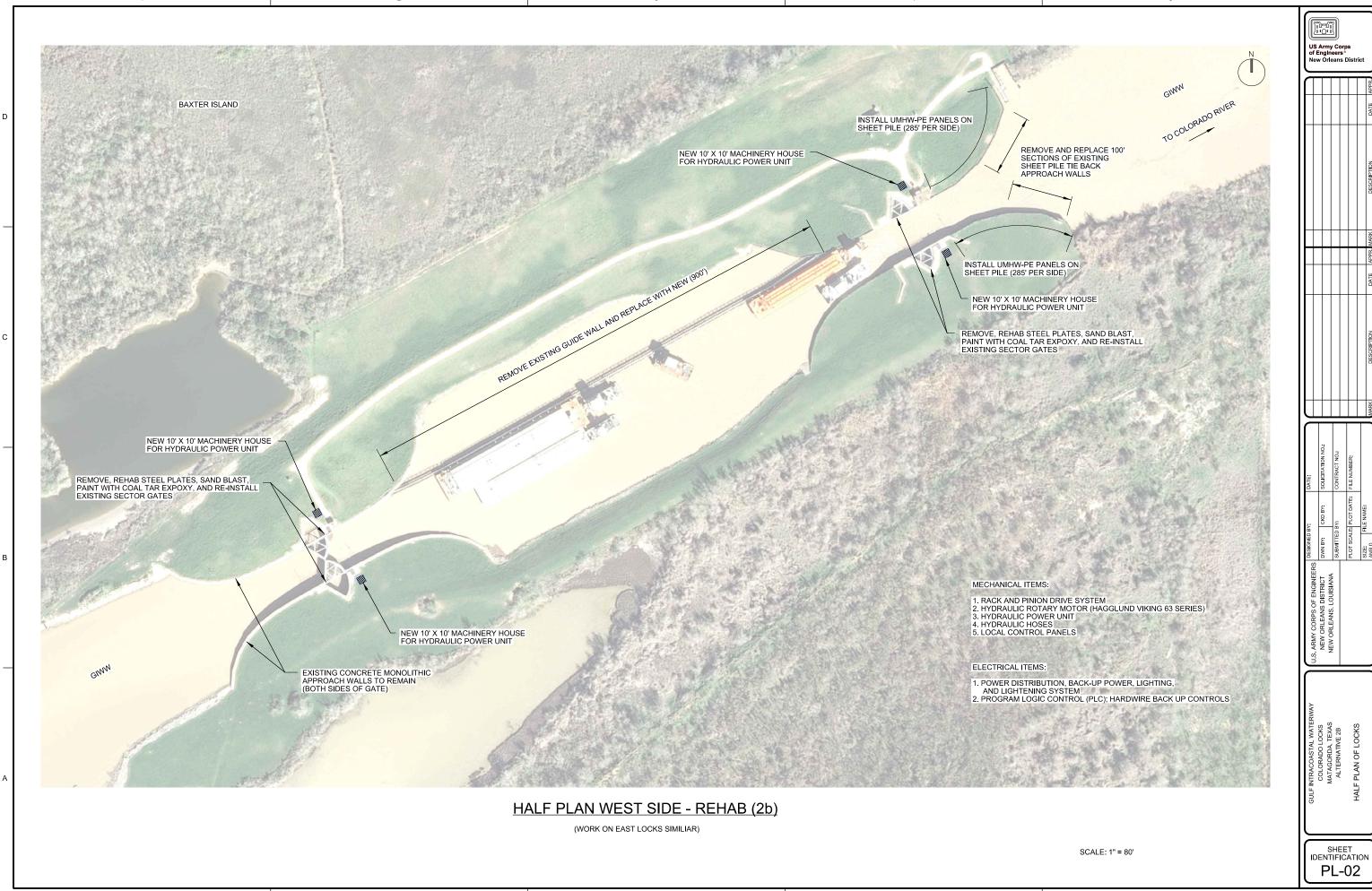


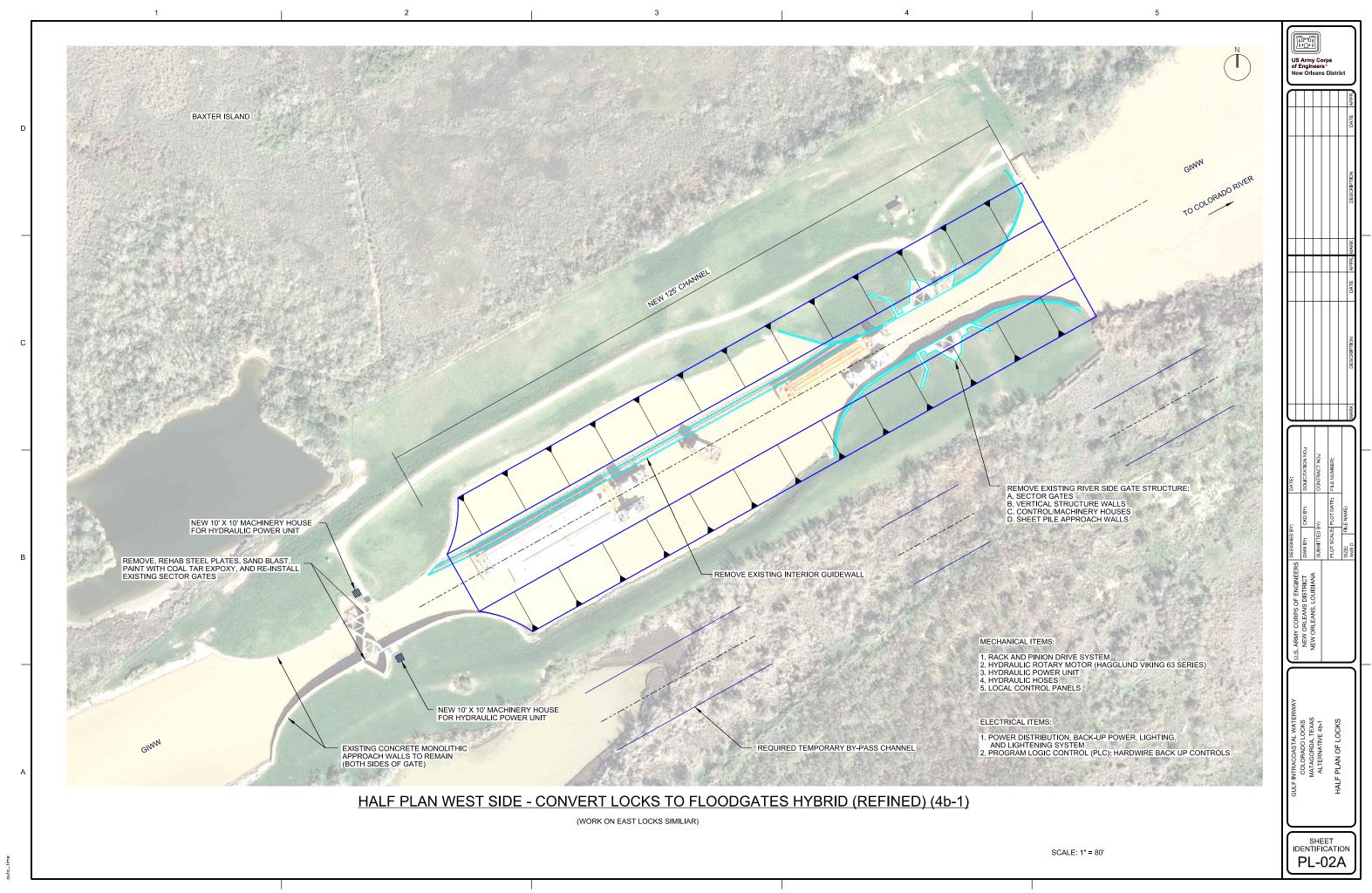
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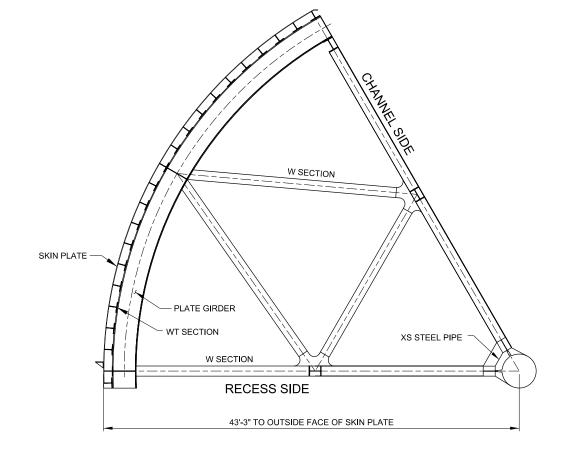
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FEASIBILITY STUDY,
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# **ELEVATION - CHANNEL TRUSS**

SCALE: 1/2" = 1'-0"

# PLAN - LOWER HORIZONTAL FRAME

SCALE: 1/2" = 1'-0"

# NOTES:

- 1. GATES SHALL BE REMOVED FROM SITE.
- 2. DAMAGED STEEL MEMBERS SHALL BE REPAIRED.
- 3. GEAR RACKS SHALL BE INSTALLED ON GATES.
- 4. GATES SHALL BE SAND BLASTED AND PRIMED.
- 5. GATES SHALL BE PAINTED WITH COAL TAR EXPOXY, SYSTEM NO. 6.
- 6. GATES SHALL BE INSTALLED BACK IN PLACE.

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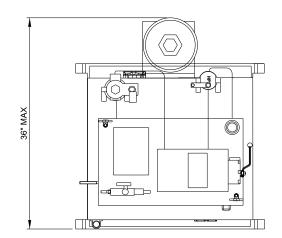
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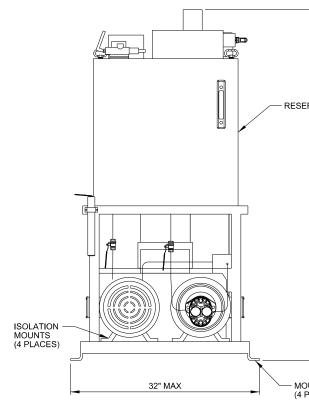
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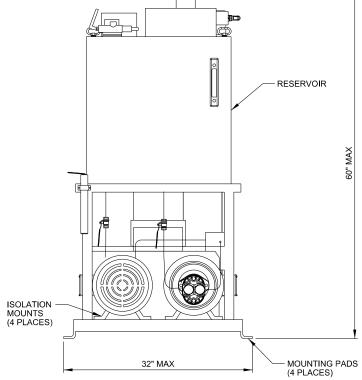
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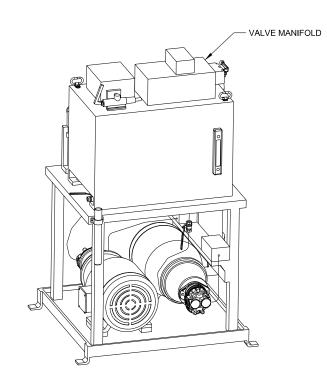








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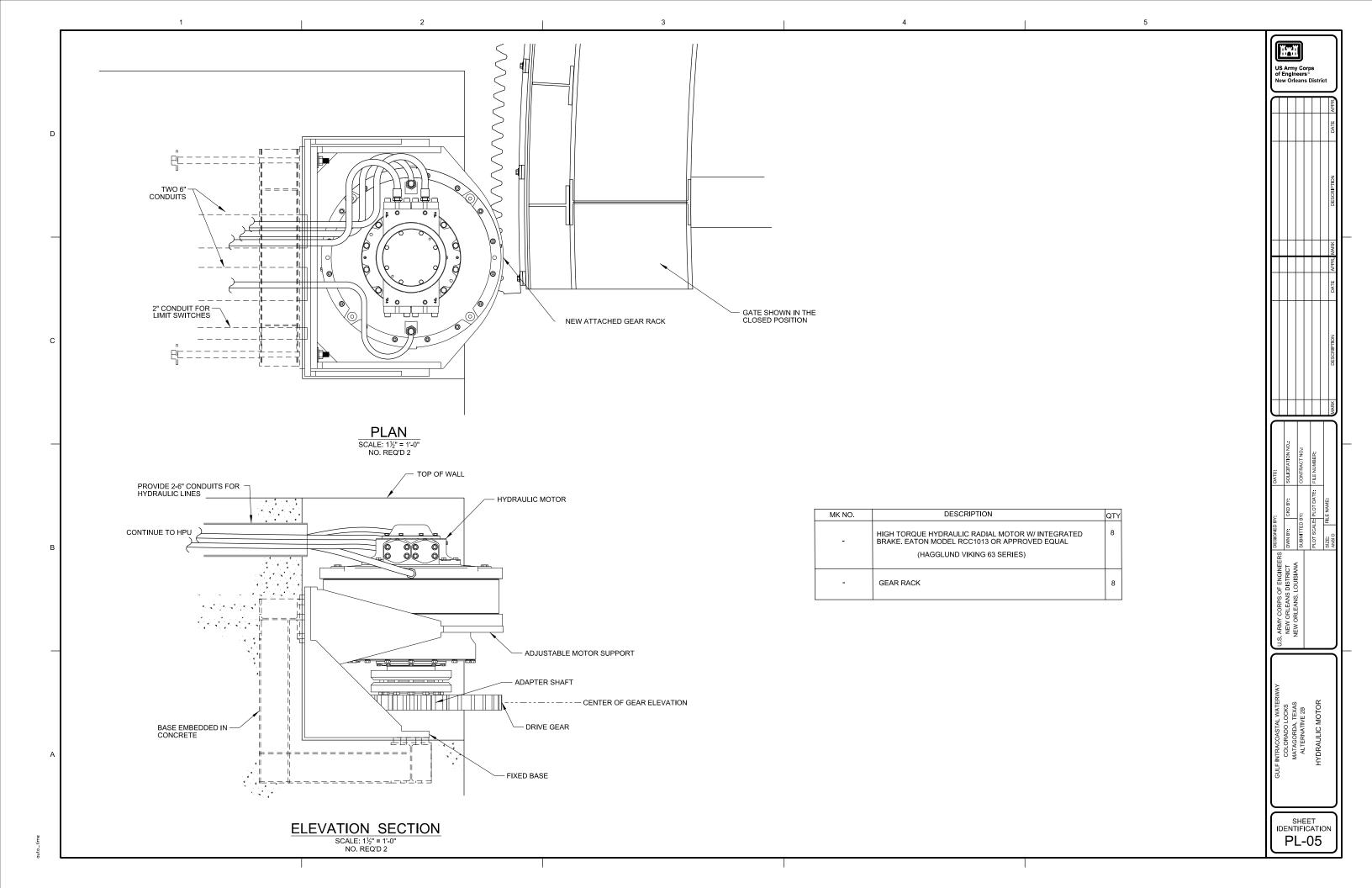
# NOTES:

- 1. HPU UNITS ARE TO BE PROVIDED FOR EACH GATE.
- 2. HPU SET UP IS TO INLCUDE HYDRAULIC HOSES AND FITTINGS.

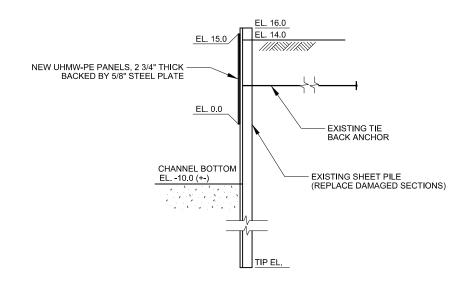
SHEET IDENTIFICATION PL-04

KLEEN VENT -AIR SYSTEM

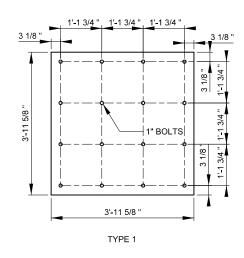
TOTALLY ENCLOSED — FAN COOLED ELECTRIC MOTOR WITH PUMP

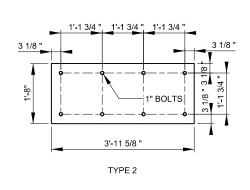


TIE-BACK WALL ANCHOR SYSTEM RIVER SIDE SECTOR GATE LEAF SHEET PILE WALL EL. -17.0 C/L GIWW CHANNEL - SHEET PILE WALL TO COLORADO RIVER PLAN OF SHEET PILE APPROACH WALL SCALE: 1" = 200'









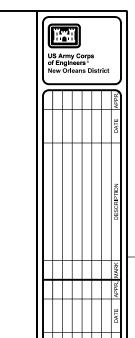
NOTE:

A 3" GAP WILL BE MAINTAINED BETWEEN PA ACCOMODATE 1/2" WELD OF 5/8" PANEL BAG PLATE.

HEAVY DUTY GRADE

# COLORADO RIVER SIDE APPROACH WALLS UHMW-PE PANELS

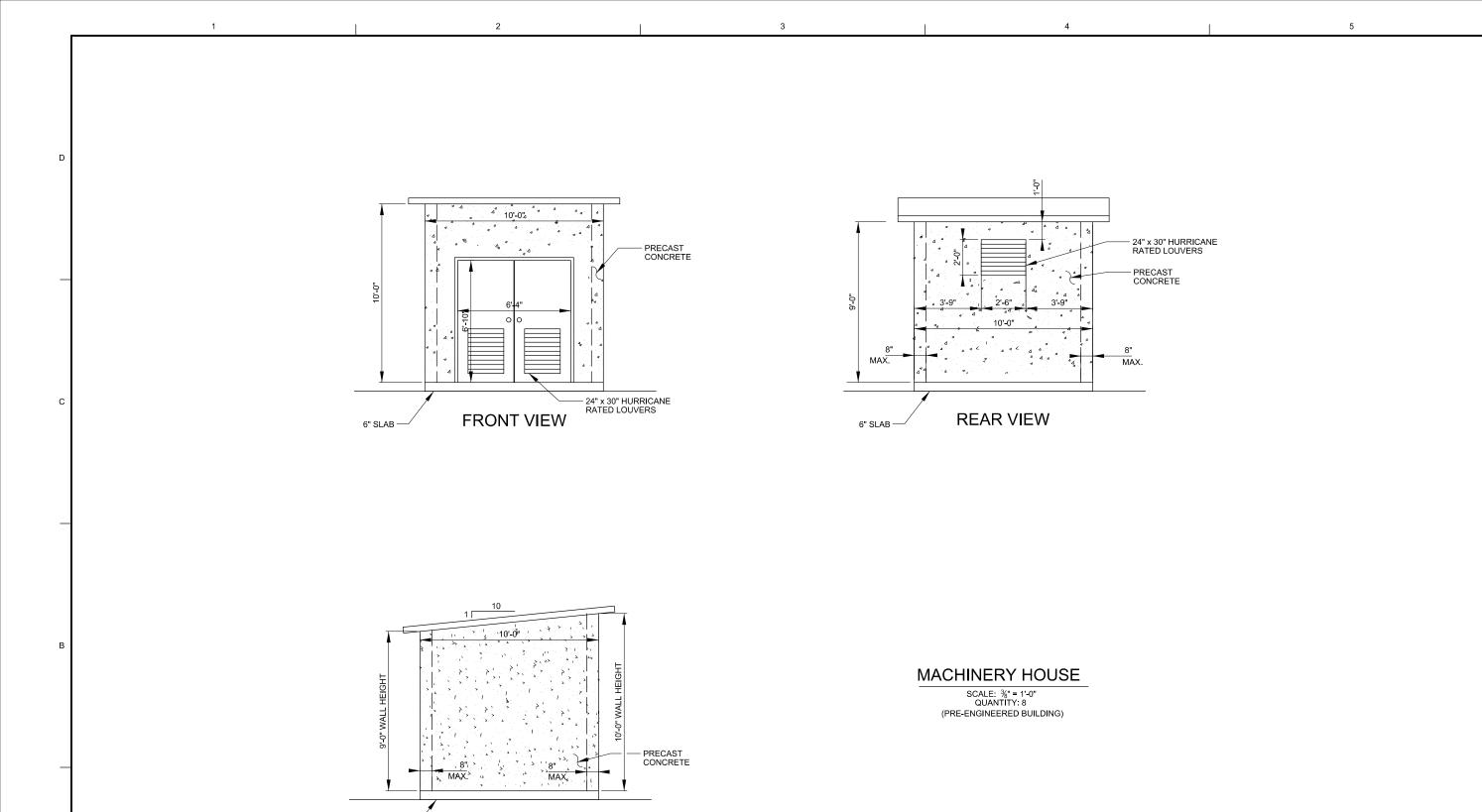
SCALE: 3/4" = 1'-0"



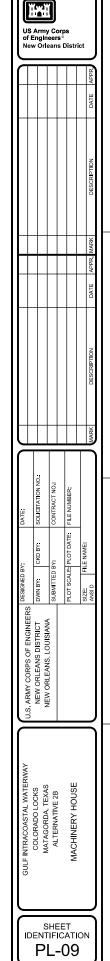
							MARK	
DATE:		SOLICITATION NO.:		CONTRACT NO.:	PLOT SCALE: PLOT DATE: FILE NUMBER:			
Υ.		CKD BY:		BY:	PLOT DATE:	FILE NAME:		
DESIGNED BY:		DWN BY:		SUBMITTED BY:	PLOT SCALE	SIZE		
SOLUTION TO SOUCH AND A	S ARIMIT CORPS OF ENGINEERS	NEW ORLEANS DISTRICT	NEW ORI EANS LOUISIANA	, , , , , , , , , , , , , , , , , , , ,				

SHEET IDENTIFICATION PL-08

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SIDE VIEW



# DRAFT ENGINEERING APPENDIX A APPENDIX 4 QUANTITIES

New Orleans District	Brazos River Floodgates Feasibility Study Alternative 2a - Major Rehab Existing Structure	Designed By Checked By	JK GK
	Quantities Estimate	14-Sep-2017	
Number	Number Description	Quantity	Unit
1	Mob & Demob	LUMPSUM	-
2	Major Rehabilitation (Quantities are for Existing West and East Gates)		
	Existing Sector Gates (2 sector gates, 4 leafs)		
	Remove and Rehab Sector Gate (2 gates, 4 leafs, east & west channel)	365	TON
	- Assume Gate Major Rehabilitation Work Costs 50% of New Cost		
3	Raise/Relocate Gate Operator Buildings		
	Raise Exist. West and East Gate Operator Buildings 4 feet higher		
	Raise Operator Building with New Foundation	2	LS
	Modify (Raise) Gate Machinery Pits		
	Raise Exist. West and East Gate Machinery Pits 4 feet higher		
	Raise Machinery Pit with New Foundation	4	LS
5	Channel Maintenance Structure		
	Add Channel Maintenance Structure to help with navigation		
	Install a Dolphin Alignment Structure at the River Side for Each Gate	2	LS
	Modify Guide Walls		
	Replace Existing Timber Rub Facing with UHMW Panels		
	Remove Exist. Timber Facing on Guidewalls (incl. hardware)		
	1. West Gate 12"x12" Timbers	13,680	SF
	2. East Gate 12"x12" Timbers	10,260	
	Total =	23,940	
	Rub Face UHMW Panels Mounted to Steel Plate Attached to Exist. Sheet Pile Fac		
	1. West Gate Rub Face UHMW Panel (2 3/4" thick)	13,680	
	2. East Gate Rub Face UHMW Panel (2 3/4" thick)	10,260	
	Total =	23,940	SF
	1 West Cate Steel Plate (5/8" thick)	13,680	SE.
	West Gate Steel Plate (5/8" thick)     East Gate Steel Plate (5/8" thick)	10,260	
	Total =	23,940	
		20,040	<u> </u>
7	Mechanical		
ı	Replace All Operating Machinery for Each Gate	2	LS
			<u> </u>
8	Electrical	-	
8	Electrical  1. Replace All Electrical Equipment for Each Gate	2	LS
8		2	LS
8		2	LS

# Major Rehabilitation of the exiting floodgates is expected to include the following management measures:

MR - Major Rehab of the Floodgates (includes repair/replacement of damaged components, repainting, and replacement of cathodic protection)

RO - Raise/Relocate Gate Operator Buildings

MP - Modify (Raise) Gate Machinery Pit Location

MG - Modify Guidewalls

CS - Channel Maintenance Structures

Note: The most recent BRFG rehabilitation contract (W912HY11C0009) was for \$9.6M, lasted 6 years and was completed in mid-2017.

# existing Gate:

Each gate (lb) = 364,500 (2 leafs)

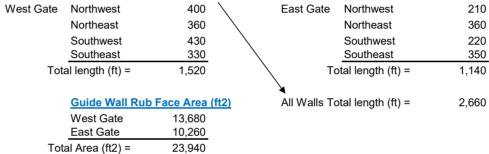
Each gate (ton) = 182.3 (2 leafs)

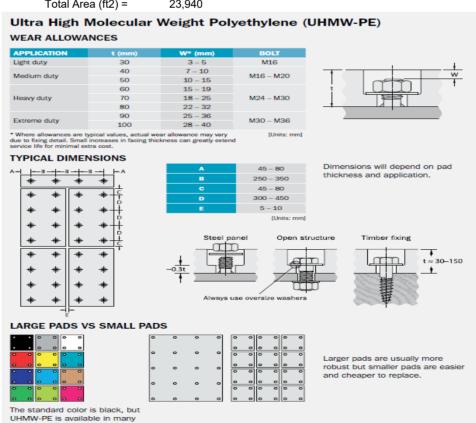
Two gates removed (ton) = **365** (4 leafs)

other colours if required.

Guide wall rub face: Use UHMW sheets attached to steel plate mounted to sheet pile face. WT steel vertical guide for steel plate attachment to sheet pile face. The total height of UHMW panels and steel plate estimated at 9 feet tall. 2 3/4" thick UHMW sheet attached to 5/8" thick steel plate. UHMW attached to steel plate with 1" diameter bolts with 1' x 1' bolt spacing grid. The length of rub face below is the same as the lengths of guide wall above, only difference is the specific location to the gate is broken down.

# **Guide Wall Rub Face Lengths (ft)**





Bony Carps registers; Black Ballet	Quantities Estimate	14-Sep-2017	
umber	Number Description  Mob & Demob	Quantity LUMPSUM	Ļ
		LUMPSUM	١
2	Demolition (Quantities are for existing West and East Gates)		
	Existing Sector Gates (2 sector gates, 4 leafs)	365	١,
	Remove and Salvage Sector Gate (2 gates, 4 leafs, east & west channel)     Remove and Dispose Gate Foundation (2 gates)	15,310	(
	Remove and Dispose Timber Piles (2 gates)	1,970	E
			L
	Guide Walls	4,324	-
	Remove and Salvage Guide Walls (8 walls, east & west channel)	4,024	Ť
3	Excavation and Fill  Move Gates Farther Back in Existing Channel		ł
	Excavation		
	Excavate Existing West Gate Channel     Excavate Existing East Cate Channel	268,700	1
	Excavate Existing East Gate Channel     Excavate West Bypass Channel	181,800 863,200	i
	Excavate East Bypass Channel     Excavation Total =	888,800 2 202 500	и
	Fill		t
	Fill 1. Fill Existing Channel to Create Vessel Channel, West Gate 2. Fill Existing Channel to Create Vessel Channel Fast Gate	188,300	١
	Fill Existing Channel to Create Vessel Channel, East Gate	201,000	Ľ
	Fill Total =	389,300	t
	Riprap (3' Thick Layer)	8,000	+
_		0,000	t
4	Cofferdam (Cofferdam placed around sector gates, 2 gates, 2 dams)  1. Excavation	35,600	Ļ
	Sand and Fill	12,600	ť
	3. Waler System - WF Members	440	Ť
	4. Sheet Piles - AZ 38-700N	105,280	
	5. Internal Bracing (Struts) - 24" Dia. X 0.625" Thk. 6. King Post Piling (Piles 30" Dia. X 0.625" Thk.) 7. Support Piling 24" Dia. X 0.625" Thk.	4,600 3,400	ı
	6. King Post Piling (Piles 30" Dia. X 0.625" Thk.)  7. Support Piling 24" Dia. X 0.625" Thk.	3,400 4,200	ľ
	8. Misc. Steel	10	ŀ
	9. Temporary Dewatering System	2	
	10. Removal of Cofferdam	2	ľ
5	Concrete Structure and Gate (Quantities are for 2 sector gates, 4 leafs)		
5	Sector Gate Monolith	3.400	
5	Sector Gate Monolith  1. Sand and Gravel Bedding  2. Tremic Concrete - Seal Stab	3,400 9,000	1
5	Sector Gate Monolith  1. Sand and Gravel Bedding  2. Tremic Concrete - Seal Stab	9,000	
5	Sector Gate Monolith  1. Sand and Gravel Badding  2. Termic Concrete - Seal Slab  3. Reinforced Concrete Bases Slab  4. Reinforced Concrete Monolith	9,000 17,800 8,000	0
5	Sector Gate Monolith  1. Sand and Gravel Badding  2. Termic Concrete - Seal Slab  3. Reinforced Concrete Bases Slab  4. Reinforced Concrete Monolith	9,000 17,800 8,000 40,200	
5	Sector Gate Monolith  1. Sand and Gaves Bedding  2. Tremic Concrete - Seal Slab  3. Reinforced Concrete - Seal Slab  4. Reinforced Concrete Monolith  5. Pilings:  a. Pilings - Vertical Spiral Piles - 30° Dia. X 0.625° Thk.  D. Pilings - Bartes Spiral Piles - 30° Dia. X 0.625° Thk.	9,000 17,800 8,000 40,200 44,838	1
5	Sector Gate Monolith  1. Sand and Grave Bedding  2. Tremie Concrete - Seal Stab  3. Renirfoxed Concrete Bass Stab  4. Renirfoxed Concrete Monolith  5. Pilings: a Pilings - Vertical Spiral Piles - 30" Dia. X 0.625" Thk. b. Pilings - Batter Spiral Piles - 30" Dia. X 0.625" Thk.  6. Tension Connection	9,000 17,800 8,000 40,200 44,838 550	1
5	Sector Gate Monolith  1. Sand and Gaves Bedding  2. Tremic Concrete - Seal Slab  3. Reinforced Concrete - Seal Slab  4. Reinforced Concrete Monolith  5. Pilings:  a. Pilings - Vertical Spiral Piles - 30° Dia. X 0.625° Thk.  D. Pilings - Bartes Spiral Piles - 30° Dia. X 0.625° Thk.	9,000 17,800 8,000 40,200 44,838	1
5	Sector Cate Monolith  1. Sand and Gravel Bedding  2. Tremic Concrete - Seal Slab  3. Reinforced Concrete Base Slab  4. Reinforced Concrete Base Slab  5. Pilings: a. Pilings - Vertical Spiral Piles - 30" Dia. X 0.625" Thk. b. Pilings - Batter Spiral Piles - 30" Dia. X 0.625" Thk.  6. Tension Connection  7. Bulkhead Slos - Stainless Steel w/Seals (Embedded in Monolith)	9,000 17,800 8,000 40,200 44,838 550 200	1
5	Sector Gate Monolith  1. Sand and Gaves Bedding  2. Tremic Concrete - Seal Slab  3. Reinforced Concrete Seal Slab  4. Reinforced Concrete Seal Slab  4. Reinforced Concrete Seal Slab  5. Pilings:  a. Pilings - Vertical Spiral Piles - 30" Dia X 0.625" Thk.  b. Pilings - Batter Spiral Piles - 30" Dia X 0.625" Thk.  6. Tension Connection  7. Bullshead Slots - Stainless Steel wiSeals (Embedded in Monolith)  8. Ladder Slots - Stainless Steel wiLadders (Embedded in Monolith)  Sactor Gate	9,000 17,800 8,000 40,200 44,838 550 200	1
5	Sector Gate Monolith  1. Sand and Gaves Bedding  2. Tremic Concrete - Seal Slab  3. Reinforced Concrete - Seal Slab  4. Reinforced Concrete Base Slab  4. Reinforced Concrete Monolith  5. Pilinas:  a. Pilings - Vertical Spirarl Piles - 30" Dia. X 0.625" Thk.  b. Pilings - Bertical Spirarl Piles - 30" Dia. X 0.625" Thk.  6. Tension Connection  7. Builchard Slots - Stainless Steel wilcadders (Embedded in Monolith)  5. Ladder Slots - Stainless Steel wilcadders (Embedded in Monolith)  Sector Gates  1. Sector Gates  1. Sector Gates  2. Prites and Hinnes (Kino post)	9,000 17,800 8,000 40,200 44,838 550 200 100	1
5	Sector Gate Monolith  1. Sand and Gaves Bedding  2. Tremic Concrete - Seal Slab  3. Reinforced Concrete - Seal Slab  4. Reinforced Concrete Base Slab  4. Reinforced Concrete Monolith  5. Pilinas:  a. Pilings - Vertical Spirar Piles - 30" Dia. X 0.625" Thk.  b. Pilings - Bertical Spirar Piles - 30" Dia. X 0.625" Thk.  6. Tension Connection  7. Builchard Slots - Stainless Steel wilcadders (Embedded in Monolith)  5. Ladder Slots - Stainless Steel wilcadders (Embedded in Monolith)  Sector Gates  1. Sector Gates  1. Sector Gates  2. Prites and Hinnes (Kino post)	9,000 17,800 8,000 40,200 44,838 550 200 100	1
5	Sector Cate Monolith  1. Sand and Grave Bedding  2. Tremier Concrete - Seal Slab  3. Reinforced Concrete Sans Slab  4. Reinforced Concrete Base Slab  4. Reinforced Concrete Base Slab  5. Pillings.  5. Pillings.  5. Pillings.  6. Pillings.  6. Pillings.  6. Pillings.  6. Pillings.  6. Pillings.  6. Pillings.  6. Pillings.  7. Pillings.  7. Pillings.  7. Pillings.  8. Pillings.  8. Pillings.  8. Pillings.  8. Pillings.  8. Pillings.  8. Ladder Slots - Stainless Steel will.  8. Ladders (Embedded in Monolith)  8. Ladder Slots - Stainless Steel will.  8. Sector Cate  9. Pillings.  9. Sector Gate  1. Sect	9,000 17,800 8,000 40,200 44,838 550 200 100 1,136 2 2,360 2	
5	Sector Gate Monolith  1. Sand and Gaves Bedding  2. Tremic Concrete - Seal Slab  3. Reinforced Concrete - Seal Slab  4. Reinforced Concrete Base Slab  4. Reinforced Concrete Monolith  5. Pilinas:  a. Pilings - Vertical Spirar Piles - 30" Dia. X 0.625" Thk.  b. Pilings - Bertical Spirar Piles - 30" Dia. X 0.625" Thk.  6. Tension Connection  7. Builchard Slots - Stainless Steel wilcadders (Embedded in Monolith)  5. Ladder Slots - Stainless Steel wilcadders (Embedded in Monolith)  Sector Gates  1. Sector Gates  1. Sector Gates  2. Prites and Hinnes (Kino post)	9,000 17,800 8,000 40,200 44,838 550 200 100	
5	Sector Cate Monolith  1. Sand and Grave Bedding  2. Tremier Concrete - Seal Slab  3. Reinforced Concrete Sans Slab  4. Reinforced Concrete Base Slab  4. Reinforced Concrete Base Slab  5. Pillings.  5. Pillings.  5. Pillings.  6. Pillings.  6. Pillings.  6. Pillings.  6. Pillings.  6. Pillings.  6. Pillings.  6. Pillings.  7. Pillings.  7. Pillings.  7. Pillings.  8. Pillings.  8. Pillings.  8. Pillings.  8. Pillings.  8. Pillings.  8. Ladder Slots - Stainless Steel will.  8. Ladders (Embedded in Monolith)  8. Ladder Slots - Stainless Steel will.  8. Sector Cate  9. Pillings.  9. Sector Gate  1. Sect	9,000 17,800 8,000 40,200 44,838 550 200 100 1,136 2 2,360 2	
5	Sector Cate Monolith  1. Sand and Grave Bedding  2. Tremier Concrete - Seal Slab  3. Reinforced Concrete Sans Slab  4. Reinforced Concrete Base Slab  4. Reinforced Concrete Base Slab  5. Pillings.  5. Pillings.  5. Pillings.  6. Pillings.  6. Pillings.  6. Pillings.  6. Pillings.  6. Pillings.  6. Pillings.  6. Pillings.  7. Pillings.  7. Pillings.  7. Pillings.  8. Pillings.  8. Pillings.  8. Pillings.  8. Pillings.  8. Pillings.  8. Ladder Slots - Stainless Steel will.  8. Ladders (Embedded in Monolith)  8. Ladder Slots - Stainless Steel will.  8. Sector Cate  9. Pillings.  9. Sector Gate  1. Sect	9,000 17,800 8,000 40,200 44,838 550 200 100 1,136 2 2,360 2	
5	Sector Gate Monolith  1. Sand and Grave Bedding  2. Tremis Concrete - Seal Slab  3. Reinforced Concrete Sane Slab  4. Reinforced Concrete Base Slab  4. Reinforced Concrete Monolith  5. Pillings.  4. Pillings.  4. Pillings.  5. Pillings.  6. Pillings.  6. Pillings.  6. Pillings.  6. Pillings.  6. Pillings.  6. Pillings.  6. Pillings.  6. Pillings.  6. Pillings.  6. Pillings.  6. Pillings.  7. Pillings.  7. Pillings.  7. Pillings.  7. Pillings.  7. Pillings.  8. Ladder Slots.  9. Sealor Gate  1. Seator Gate  1. Gate Seating Surfaces and Gate Track  6. Gate Seating Surfaces and Gate Track  6. Gate Seating Surfaces and Gate Track  6. Gate Odder Protection	9,000 17,800 8,000 40,200 44,838 550 200 100 1,136 2 2,360 2	
	Sector Gate Monolith  1. Sand and Grave Bedding  2. Tremite Concrete - Seal Slab  3. Reinforced Concrete Base Slab  4. Reinforced Concrete Base Slab  4. Reinforced Concrete Base Slab  5. Pilings: a. Pilings. Seal Slab  6. Pilings: b. Pilings. Seal Slab  7. Pilings: b. Pilings. Seal Slab  7. Pilings: b. Pilings. Seal Slab  7. Pilings: b. Pilings. Seal Slab  7. Pilings: b. Pilings. Seal Slab  7. Pilings: b. Pilings. Seal Slab  7. Pilings: b. Seal Slab  7. Pilings: b. Seal Slab  7. Pilings: b. Ladder Slots - Stainless Steel will-Seals (Embedded in Monolith)  8. Ladder Slots - Stainless Steel will-Seals (Embedded in Monolith)  8. Ladder Slots - Stainless Steel will-Adders (Embedded in Monolith)  8. Ladder Slots - Stainless Steel will-Adders (Embedded in Monolith)  8. Sector Gate  1. Sealor Gate  1. Sealor Gate  1. Sealor Gate Protection Fenders  4. Gate Seals Seal Bearing Surfaces and Gate Track  5. Cathodic Protection  Maintenance Dewatering System (Meintenance Bulkhead)	9,000 17,800 8,000 40,200 44,838 5555 200 100 1,136 2 2 2,2360 2 2	
	Sector Gate Monolith  1. Sand and Grave Bedding  2. Tremic Concrete - Seal Slab  3. Reinforced Concrete Base Slab  4. Reinforced Concrete Base Slab  4. Reinforced Concrete Base Slab  5. Pillings: a. Pillings - Vertical Spiral Piles - 30° Dia. X 0.825° Thk. b. Pillings - Batter Spiral Piles - 30° Dia. X 0.825° Thk. 6. Tension Connection  7. Bulkhead Slots - Stainless Steel wiSeals (Embedded in Monolith)  8. Ladder Slots - Stainless Steel wiSeals (Embedded in Monolith)  8. Ladder Slots - Stainless Steel wiLadders (Embedded in Monolith)  Sector Gate  1. Sector Gates  1. Sector Gates  2. Printes and Finges (King post) 3. Sector Gate Protection Fendiers 4. Cathodic Protection Fendiers 5. Cathodic Protection  Maintenance Dewatering System  Sector Gate Dewatering System  Sector Gate Dewatering System  Sector Gate Dewatering System  Sector Gate Dewatering System  Sector Gate Dewatering System (Maintenance Bulkhead)	9,000 17,800 8,000 40,200 44,838 550 200 100 1,136 2 2,360 2	
	Sector Gate Monolith  1. Sand and Grave Bedding  2. Tramin Concrete - Seal Stab  3. Reinforced Concrete - Seal Stab  4. Reinforced Concrete Base Stab  4. Reinforced Concrete Base Stab  5. Pilings.  5. Pilings.  6. Pilings.  6. Pilings.  6. Pilings.  7. Bulkhead Stab  7. Bulkhead Stab  7. Bulkhead Stab  7. Bulkhead Stab  8. Ensisin Connection  7. Bulkhead Stab  8. Ensisin Connection  7. Bulkhead Stab  8. Ensisin Connection  7. Bulkhead Stab  8. Ender Gate  8. Ender Gate  9. Sector Gate  9. Sector Gate  9. Sector Gate  9. Sector Gate  9. Sector Gate Protection Funders  4. Gate Seals, Seal Bearing Surfaces and Gate Track  5. Cathodic Protection  Maintenance Dewatering System  Sactor Gate Dewatering System  Sactor Gate Dewatering System  Sactor Gate Dewatering System  Sactor Gate Dewatering System  Sactor Gate Dewatering System  Sactor Gate Dewatering System  Sactor Gate Dewatering System Maintenance Bulkhead  2. Maintenance Dulkhead  2. Maintenance Bulkhead  2. Maintenance Bulkhead  3. Steel Firming  8. Sector Gate Dewatering  9. Sect	9,000 8,000 8,000 40,200 44,838 550 200 100 1,136 2,380 2,38	
	Sector Cate Monolith  1. Sand and Grave Bedding  2. Tremic Concrete - Seal Slab  3. Reinforced Concrete Seal Slab  4. Reinforced Concrete Base Slab  4. Reinforced Concrete Base Slab  4. Reinforced Concrete Monolith  5. Pilings  a. Pilings Vertical Spiral Piles - 30° Dia. X 0.825° Thk.  b. Filings - Batter Spiral Piles - 30° Dia. X 0.825° Thk.  5. Tension Connection  7. Builched Slots - Stainless Steel wilcaels (Embedded in Monolith)  8. Ladder Slots - Stainless Steel wilcaels (Embedded in Monolith)  Sactor Cate Post - Stainless Steel wilcaels (Embedded in Monolith)  Sactor Cate Protection Fenders  4. Gate Seal Seal Seal Seal Seal Seal Seal Sea	9,000 9,000 17,800 8,000 8,000 40,200 44,338 5500 200 100 100 100 100 100 100 100 100 1	
	Sector Gate Monolith  1. Sand and Grave Bedding  2. Tramin Concrete - Seal Stab  3. Reinforced Concrete - Seal Stab  4. Reinforced Concrete Base Stab  4. Reinforced Concrete Base Stab  5. Pilings.  5. Pilings.  6. Pilings.  6. Pilings.  6. Pilings.  7. Bulkhead Stab  7. Bulkhead Stab  7. Bulkhead Stab  7. Bulkhead Stab  8. Ensisin Connection  7. Bulkhead Stab  8. Ensisin Connection  7. Bulkhead Stab  8. Ensisin Connection  7. Bulkhead Stab  8. Ender Gate  8. Ender Gate  9. Sector Gate  9. Sector Gate  9. Sector Gate  9. Sector Gate  9. Sector Gate Protection Funders  4. Gate Seals, Seal Bearing Surfaces and Gate Track  5. Cathodic Protection  Maintenance Dewatering System  Sactor Gate Dewatering System  Sactor Gate Dewatering System  Sactor Gate Dewatering System  Sactor Gate Dewatering System  Sactor Gate Dewatering System  Sactor Gate Dewatering System  Sactor Gate Dewatering System Maintenance Bulkhead  2. Maintenance Dulkhead  2. Maintenance Bulkhead  2. Maintenance Bulkhead  3. Steel Firming  8. Sector Gate Dewatering  9. Sect	9,000 8,000 8,000 40,200 44,838 550 200 100 1,136 2,380 2,38	
	Sector Cate Monolith  1. Sand and Grave Bedding  2. Tremic Concrete - Seal Slab  3. Reinforced Concrete Seal Slab  4. Reinforced Concrete Base Slab  4. Reinforced Concrete Base Slab  4. Reinforced Concrete Monolith  5. Pilings  a. Pilings Vertical Spiral Piles - 30° Dia. X 0.825° Thk.  b. Filings - Batter Spiral Piles - 30° Dia. X 0.825° Thk.  5. Tension Connection  7. Builched Slots - Stainless Steel wilcaels (Embedded in Monolith)  8. Ladder Slots - Stainless Steel wilcaels (Embedded in Monolith)  Sactor Cate Post - Stainless Steel wilcaels (Embedded in Monolith)  Sactor Cate Protection Fenders  4. Gate Seal Seal Seal Seal Seal Seal Seal Sea	9,000 9,000 17,800 8,000 8,000 40,200 44,338 5500 200 100 100 100 100 100 100 100 100 1	
	Sector Gate Monolith  1. Sand and Gravet Bedding  2. Tremic Concrete - Seal Slab  3. Reinforced Concrete Seal Slab  4. Reinforced Concrete Seal Slab  4. Reinforced Concrete Seal Slab  5. Pilmos  a. Pilmos  b. Pilmos  6. Pilmos  6. Tension Connection  7. Buthlead Slots - Slatifies Spiral Piles - 30° Dia. X 0.625° Thk.  5. Tension Connection  7. Buthlead Slots - Slatifies Sleet will Seals (Embedded in Monolith)  8. Ladder Slots - Startiess Sleet will Seals (Embedded in Monolith)  8. Ladder Slots - Startiess Sleet will Adders (Embedded in Monolith)  Sector Cale  1. Sector Gate  2. Pintes and Hinges (King post)  3. Sector Gate Protection Fenders  4. Gate Seals Seal Bearing Surfaces and Gate Track  5. Cathodic Protection  Maintenance Dewatering System  Maintenance Dewatering System  Maintenance Dewatering System  Sector Gate Poweatering System  8. Maintenance Bulkhead  1. Maintenance Bulkhead  2. Maintenance Bulkhead  5. Pilmos Bulkhead  5. Pilmos Supports  1. Pilmos - 36° Dia. X 0.625° Thk.	9,000 9,000 17,800 8,000 8,000 40,200 44,338 5500 200 100 100 100 100 100 100 100 100 1	
6	Sector Cate Monolith  1. Sand and Grave Bedding  2. Tremic Concrete - Seal Slab  3. Reinforced Concrete Seas Slab  4. Reinforced Concrete Seas Slab  4. Reinforced Concrete Seas Slab  4. Reinforced Concrete Seas Slab  5. Pilinas: a. Pilings - Vertical Spiral Piles - 30° Dia. X 0.625° Thk. b. Pilings - Seater Spiral Piles - 30° Dia. X 0.625° Thk.  6. Ternisch Connection  7. Builchead Slots - Stainless Steel wiSeals (Embedded in Monolith)  8. Ladder Slots - Stainless Steel wiLadders (Embedded in Monolith)  Sector Cate  1. Sector Cate  1. Sector Cate  2. Pilitas and Hinges (King post)  3. Sector Cate Protection Fenders  4. Gate Seals, Seal Searing Surfaces and Gate Track  5. Cathodic Protection  Maintenance Dewatering System  Maintenance Dewatering System (Maintenance Bulkhead)  1. Maintenance Bulkhead  2. Maintenance Bulkhead  2. Maintenance Bulkhead  3. Seas Serving Storage Platform  a. Steel Fraining  b. Piling Supports  1. Pilings - 36° Dia. X 0.625° Thk.	9,000 9,000 17,800 8,000 8,000 40,200 44,338 5500 200 100 100 100 100 100 100 100 100 1	
6	Sector Gate Monolith  1. Sector Gate Monolith  2. Tremine Concrete - Seal Slab  3. Reinforced Concrete Seal Slab  4. Reinforced Concrete Seal Slab  4. Reinforced Concrete Seal Slab  5. Pillings  5. Pillings  6. Pillings  6. Pillings  6. Pillings  6. Pillings  6. Pillings  6. Pillings  6. Pillings  6. Pillings  6. Pillings  6. Ladder Slots Seal Pillings  7. Builthead Slots - Stainless Steel will Seals (Embedded in Monolith)  7. Builthead Slots - Stainless Steel will Seals (Embedded in Monolith)  8. Ladder Slots - Stainless Steel will Seals (Embedded in Monolith)  8. Ladder Slots - Stainless Steel will Seals (Embedded in Monolith)  8. Sector Gate  9. Pintes and Hinges (King post)  9. Sector Gate Pillings (King post)  9. Sector Gate Pillings (King post)  9. Sector Gate Pillings (King post)  9. Sector Gate Pillings (King post)  9. Sector Gate Pillings (King post)  9. Sector Gate Pillings (King post)  9. Sector Gate Pillings (King post)  9. Ladder Slots - Stainless Steel will All Maintenance Buikhead  1. Maintenance Buikhead  1. Maintenance Buikhead  1. Maintenance Buikhead  1. Maintenance Buikhead  1. Pillings - 36' Dia X 0.625' Thk.  Guide Walls  6. Seale Walls  6. Seale Villings Fillings (King post)  1. Pillings - 36' Dia X 0.625' Thk.	9,000 9,000 17,800 8,000 8,000 8,000 8,000 10,000 1	
6	Sector Gate Monolith  1. Sand and Grave Bedding  2. Tremic Concrete - Seal Slab  3. Reinforced Concrete Sand Slab  4. Reinforced Concrete Sand Slab  4. Reinforced Concrete Sand Slab  4. Reinforced Concrete Sand Slab  5. Pilmins: a. Pilmings - Vertical Spiral Piles - 30° Dia. X 0.625° Thk. b. Filmings - Sand Spiral Piles - 30° Dia. X 0.625° Thk. b. Filmings - Sand Spiral Piles - 30° Dia. X 0.625° Thk. b. Tension Connection  7. Buthfreed Slots - Stainless Steel will Seals (Embedded in Monolith)  8. Ladder Slots - Stainless Steel will Ladders (Embedded in Monolith)  8. Ladder Slots - Stainless Steel will Ladders (Embedded in Monolith)  8. Sector Gate  1. Sector Gate  2. Pintes and Hinges (King post) 3. Sector Gate Povedection Fenders 4. Gaté Seals, Seal Bearing Surfaces and Gate Track  5. Cathodic Protection  Maintenance Dewatering System  Sector Gate Dewatering System  Sector Gate Dewatering System Maintenance Buikhead  2. Maintenance Bulkhead  2. Maintenance Bulkhead  3. Leining Supports  1. Pilming Supports  1. Wast Gate North Guide Wall Teet Back to Sheef Pile Anchors  All Sheef Pile Pc-35 Unless Noted Otherwise  1. West Gate North Guide Wall Teet Back to Sheef Pile Anchors  All Sheef Pile Pc-35 Unless Noted Otherwise	9,000 17,800 8,000 40,200 44,838 550 200 100 1,136 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2	
6	Sector Gate Monolith  1. Sand and Grave Bedding  2. Tremic Concrete - Seal Slab  3. Reinforced Concrete Seal Slab  4. Reinforced Concrete Base Slab  4. Reinforced Concrete Base Slab  4. Reinforced Concrete Monolith  5. Pilmos  a. Pilmos  b. Pilmos  6. Pilmos  6. Persistor Spiral Piles - 30° Dia. X 0.625° Thk.  6. Tensistor Connection  7. Buthfreed Slots - Stainless Steel will Seals (Embedded in Monolith)  8. Ladder Slots - Stainless Steel will Ladders (Embedded in Monolith)  8. Ladder Slots - Stainless Steel will Ladders (Embedded in Monolith)  8. Sector Gate  1. Sector Gate  2. Pintes and Hinges (King post)  3. Sector Gate  4. Gaté Seals, Seal Bearing Surfaces and Gate Track  5. Cathodic Protection  Maintenance Dewatering System  Sector Gate Dewatering System  All Sector Gate Dewatering System  Sector Gate Dewatering System  All Sector Gate Dewatering System  Sector Gate Dewatering System  Sector Gate Dewatering System  Sector Gate Dewatering System  Sector Gate Dewatering System  Sector Gate Dewatering System  Sector Gate Dewatering System  Sector Gate Dewatering System  Sector Gate Dewatering System  Sector Gate Dewatering System  Sector Gate Dewatering System  Sector Gate Dewatering System  Sector Gate Dewatering System  Sector Gate Dewatering System  Sector Gate Dewatering System  Sector Gate Dewatering System  Sector Gate Dewatering System  Sector Gate Dewatering System  Sector Gate Dewatering Sys	9,000 9,000 17,800 8,000 8,000 8,000 18,000 14,838 550 2000 100 100 11,136 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 3,800 100 100 100 100 100 100 100 100 100	
6	Sector Gate Monolith  1. Sand and Grave Bedding  2. Tremine Concrete - Seal Slab  3. Reinforced Concrete Seal Slab  4. Reinforced Concrete Base Slab  4. Reinforced Concrete Base Slab  5. Pillings  5. Pillings  6. Pillings  6. Pillings  6. Pillings  6. Pillings  6. Pillings  6. Pillings  6. Pillings  6. Ladder Slota - Stanieless Steel with Seals (Embedded in Monolith)  7. Builthead Slots - Stainless Steel with Seals (Embedded in Monolith)  8. Ladder Slots - Stainless Steel with Seals (Embedded in Monolith)  8. Ladder Slots - Stainless Steel with Seals (Embedded in Monolith)  8. Sector Gate  9. Pintes and Hinges (King post)  5. Sector Gate Protection Fandless  6. Cathodic Protection  Maintenance Dewatering System (Maintenance Buikhead)  1. Maintenance Buikhead  1. Maintenance Buikhead  1. Maintenance Buikhead  1. Maintenance Buikhead  1. Maintenance Buikhead  1. Pillings - 36° Dia X 0 625° Thk  Guide Wate  1. Pillings - 36° Dia X 0 625° Thk  Guide Wate  1. Pillings - 36° Dia X 0 625° Thk  1. Wast Gate North Guide Wall  1. Wast Gale North Guide Wall  1. Wast Gale North Guide Wall  3. East Gale North Guide Wall  3. East Gale North Guide Wall	9,000 17,800 8,000 40,200 44,838 550 200 100 1,136 2,236 63 2,236 63 2,246 63,840 63,840 47,880 47,880	
6	Sector Gate Monolith  1. Sand and Grave Bedding  2. Tremic Concrete - Seal Slab  3. Reinforced Concrete Seal Slab  4. Reinforced Concrete Base Slab  4. Reinforced Concrete Base Slab  4. Reinforced Concrete Monolith  5. Pilmos  a. Pilmos  b. Pilmos  6. Pilmos  6. Persistor Spiral Piles - 30° Dia. X 0.625° Thk.  6. Tensistor Connection  7. Buthfreed Slots - Stainless Steel will Seals (Embedded in Monolith)  8. Ladder Slots - Stainless Steel will Ladders (Embedded in Monolith)  8. Ladder Slots - Stainless Steel will Ladders (Embedded in Monolith)  8. Sector Gate  1. Sector Gate  2. Pintes and Hinges (King post)  3. Sector Gate  4. Gaté Seals, Seal Bearing Surfaces and Gate Track  5. Cathodic Protection  Maintenance Dewatering System  Sector Gate Dewatering System  All Sector Gate Dewatering System  Sector Gate Dewatering System  All Sector Gate Dewatering System  Sector Gate Dewatering System  Sector Gate Dewatering System  Sector Gate Dewatering System  Sector Gate Dewatering System  Sector Gate Dewatering System  Sector Gate Dewatering System  Sector Gate Dewatering System  Sector Gate Dewatering System  Sector Gate Dewatering System  Sector Gate Dewatering System  Sector Gate Dewatering System  Sector Gate Dewatering System  Sector Gate Dewatering System  Sector Gate Dewatering System  Sector Gate Dewatering System  Sector Gate Dewatering System  Sector Gate Dewatering System  Sector Gate Dewatering Sys	9,000 9,000 17,800 8,000 8,000 8,000 18,000 14,838 550 2000 100 100 11,136 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 3,800 100 100 100 100 100 100 100 100 100	
6	Sector Gate Monolith  1. Sand and Grave Beading  2. Tremin Concrete - Seal Stab  3. Reinforced Concrete Base Stab  4. Reinforced Concrete Base Stab  4. Reinforced Concrete Base Stab  5. Reinforced Concrete Base Stab  6. Reinforced Concrete Monolith  5. Pilings.  5. Pilings.  6. Pilings.  6. The Stab Stab Stab Stab Stab Stab  7. Bullshard Stab Stab Stab Stab Stab Stab Stab Stab	9,000 17,800 8,000 40,200 44,838 550 200 100 1,136 2,236 63 2,236 63 2,246 63,840 63,840 47,880 47,880	
6	Sector Cate Monolith  1. Sand and Grave Bedding  2. Tremits Concrete - Seal Slab  3. Reinforced Concrete Base Slab  4. Reinforced Concrete Base Slab  4. Reinforced Concrete Base Slab  5. Pilings:  A. Pilings:  A. Pilings:  A. Pilings:  A. Pilings:  B. Pilings:  B. Pilings:  B. Pilings:  B. Pilings:  B. Pilings:  B. Pilings:  B. Pilings:  B. Sand Files - 30° Dia. X 0.625° Thk.  B. Tresion Concentral Systaf Piles - 30° Dia. X 0.625° Thk.  B. Laddes Solst - Stainless Steel will Seals (Embedded in Monolith)  8. Laddes Solst - Stainless Steel will Adders (Embedded in Monolith)  8. Laddes Solst - Stainless Steel will Adders (Embedded in Monolith)  8. Laddes Solst - Stainless Steel will Adders (Embedded in Monolith)  8. Sector Gate  1. Sector Gate  1. Sector Gate  1. Sector Gate  1. Sector Gate  1. Gate Seal Bearing Surfaces and Gate Track  5. Cathodic Protection  Maintenance Dewatering System  Sector Gate Dewatering  Sector Gate Dewatering  Sector Gate Dewatering  Sector Gate Dewater	9,000 17,800 8,000 40,200 44,838 550 200 100 1,136 2,236 2,236 3,236 2,236 2,236 3,236 2,236 3,236 4,236 4,340 47,880 47,880 47,880 47,880 47,880	
6	Sector Gate Monolith  1. Sand and Grave Beading  2. Tremin Concrete - Seal Stab  3. Reinforced Concrete Base Stab  4. Reinforced Concrete Base Stab  4. Reinforced Concrete Base Stab  5. Reinforced Concrete Base Stab  6. Reinforced Concrete Monolith  5. Pilings.  5. Pilings.  6. Pilings.  6. The Stab Stab Stab Stab Stab Stab  7. Bullshard Stab Stab Stab Stab Stab Stab Stab Stab	9,000 17,800 8,000 40,200 44,838 550 200 100 1,136 2,236 63 2,236 63 2,246 63,840 63,840 47,880 47,880	

#### DEMOLITION

#### Existing Gate:

Each gate (lb) = 364,500 (2 leafs) Each gate (ton) = 182.3 (2 leafs) Two gates removed (ton) = 365 (4 leafs)

Conc. Foundation, one gate (cy) = 7,655 Foundation, wing walls, approach aprons entract Bid Documents used 25 feet timber pile length for bidding purposes.

985 Piles per gate

Total weight guide walls, one gate (lb) = 4,323,700 Quantities based on East Gate Guide Wall take off, Guide Walls B5, B6, B7, B8, West Gate guide wall similar. Total weight walls, one gate (ton) = 2.162 Weight is steel material; sheet pile, anchor bar, waler, wall contact, pile cap, tangent plate, fender plate

	Guide Wall	Anchor Wall	
Wall No	Sht Pile (sf)	Sht Pile (sf)	Total (sf)
B5	25,243	12,067	37,310
B6	21,736	10,076	31,812
B7	13,184	6,486	19,670
B8	13,184	6,486	19,670
			109 462

Note: The bypass channels would likely be turned into barge mooring/storage channels after construction, similar to the existing Texas Barge and Boat facility on Alignment C.
Alignment C was the bypass channel during the construction of the existing BRFG facility, and now a portion of it has been turned into the existing Texas Barge and Boat facility.

#### SEE BOTTOM OF SPREADSHEET FOR EXCAVATION AND FILL QUANTITIES

Excavation Disposal Note: The current plan for the disposal of excavation material is to use the existing placement areas (PA) located along the GIWW

Placement Areas No. 88 and 89 are the closest to the Brazos Floodgates and they were reported to have combined remaining capacity of approximately 3.8 million cubic yards Based on SGCP\* Gulf Side Sector Gate, 46.5' x 110' Sector Gate

Foundation = 116' x 260' \*Similar Gulf Coast Project Brazos Sector Gate 31' x 125'

Cofferdam Note: Prior to cofferdam construction, install guide walls and fill in the wet to create vessel chamber and land adjacent to Control of the contro

Perimeter of cofferdam (ft) = 752

etimeter of cottectam (t) = "172 Estimate for sheep light hat half of height is embedded and half the height is above mudline, estimate sheet pile tength of 70 feet. Estimate the length of King post piling to be embedded 50 feet and 35 feet above mudline, for length of 85 feet. Estimate that 20 King posts are required. Estimate the length of support piling to be 70 feet, that the length is embedded. Estimate the 30 support piling are required. The length of 85 feet and 50 support piling are required. The length is an embedded. Estimate the support piling to be 70 feet, that the length is embedded. Estimate the support piling to 50 feet, that the length is embedded in the support piling to 50 feet, and the length is embedded 50 feet and 50 feet piling to 50 feet, and 50 feet piling to 50 feet, and 50 feet piling to 50 feet, and 50 feet piling to 50 feet, and 50 feet piling to 50 feet, and 50 feet piling to 50 feet, and 50 feet piling to 50 feet piling t evaluated, propose use of well points for dewatering system

The construction cofferdam would be designed and detailed by the construction contractor. However, it is anticipated that the cofferdam would include some larger diameter piles (king posts) by help support the lateral loads on the cofferdam. Typically the internal bracing (stuts) would weld to the larger diameter piles (king posts) for lateral support. Some smaller diameter support piles are also anticipated to be required to help vertically support and reduce the unbraced length of the internal bracing members.

This estimated sand and fill quantity is a minor item to help provide a stable work surface floor within the cofferdam and to fill in any holes where the geotechnical conditions may require

→ Pile Lengths (ft) Vertical = 169 Batter = 178 Sector Gate Weight (ton) = 537 No of vertical piles = 134 No of batter piles = 141 Based on SGCP Gulf Side Sector Gate, 46.5' x 110' Sector Gate Foundation = 116' x 260' Brazos Sector Gate 31' x 125' (2 gates, 4 leafs)

No of vertical piles = 288 Vertical pile length (ft) = 150
No of batter piles = 282 Batter pile length (ft) = 159 <= Enter vertical value, batter will be calculated

The weight per enclosed volume of a sector gate leaf was calculated for several existing projects including the existing Brazos sector gate. The data results are as follows, Brazos 6.2 lbm3 (pcf), RNO 6.7 pcf, and SGCP 4.8 pcf. The awreage weight per enclosed volume for these projects is 5.9 pcf. The estimated weight of the new Brazos sector gate leaf is based on this similar project average of 5.9 pcf for the proposed 3'x 1125' gate. The estimated weight of the proposed sector gate (2 leafs) is 568 tons. INNC refers to the inner Harbor Navigation Canal project. The top of the gates will match the top of the wall deviation 1-100 NAVD88 which matches the Coloract River Locks, who were recently surveyed.

Based on SCGP Gulf Side Sector Gate, 46.5' x 110' Sector Gate. Maintenance bulkheads provide 29 feet of water protection. The bulkheads are 110' feet long and to be placed across the channel opening. 5 bulkheads stacked on top of each other used at each end of monofilh, total of 10 units to perform maintenance on a sector gate. Each bulkhead weighs 63 tons. Provide one completes et al. (10 units) for one gate, maintenance performed on one gate at a time.

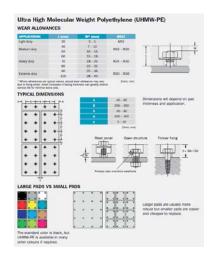
The maintenance bulkhead storage platform is estimated to require a total deck area of approximately 18,060 square feet in order to store 10 bulkhead sections stacked 2 high. The required footprint on the platform would be for 5 bulkheads. The exact plan configuration of the storage platform would depend on the land available and how the USACE would like to storelarrange the bulkheads. One possible platform deck configuration would be 5/f et evide for 255 feet and 36 feet wide for 130 feet. Typical pile lengths are 86 feet for the maintenance bulkhead

Since the guide walls must retain fill soil, use sheet pile guide walls similar to the type currently in use, sheet pile face fied back to sheet pile used as anchor. Quantities based on quantity take off of existing East gate guide walls BS, B6, B7, and B8, raised 6 feet to match top of wall elevation +16.00 NAVD88 at the Colorado River Locks, which were recently surveyed.

See Demolition Above for Sheet Pile Area Breakout Existing East Guide Wall Lengths (ft) Exist.Guide Wall Take Off Weight (lb) <=For Existing Wall sections B5, B6, B7, B8 PZ 35 sheet pile 3.796.100 Wall section B5 487 В6 408 Anchor bar 170,470 B7 257 Waler 140.990 Hardware weight per foot (lb/ft) Wall contact B8 257 29.196 375 Total length (ft) = Pile cap 114,870 Tangent wall plate 42 385 Fender plate 29,661

Total Steel Weight (lb) = 4,323,700 29,661

Sel	Brazos River Floodgates Feasibility Study	Designed By	JK
US Army Corps of Engineers	Alternative 3a - Move Gates Farther Back in Exist. Channel	Checked By	GK
Her Where Ballet	Quantities Estimate	14-Sep-2017	
Number	Number Description		
reambon	Trumbu Bossipasii	Quantity	Unit
	West Gate Rub Face UHMW Panel (2 3/4" thick)	13,680	SF
	2. East Gate Rub Face UHMW Panel (2 3/4" thick)	10,260	SF
	Total =	23,940	SF
	West Gate Steel Plate (5/8" thick)	13,680	SF
	2. East Gate Steel Plate (5/8" thick)	10,260	SF
	Total =	23,940	SF
8	Mechanical		
0	Rack and Pinion System	2	LS
		_	
9	Electrical	2	LS



Existing Weight per Linear Foot of Sheet Pile Guide Wall (lb/ft) = 3,069

# Use sheet pile 56 feet total face sheet length (56 sf per linear foot) plus 50% wall face area for anchor sheet.

# For Alternative 3a at New Location Farther Back in Existing Channel New Guide Wall Lengths (ft)

West Gate	North	760
	South	760
East Gate	North	570
	South	570
Total length (ft) =		2,660

New Guide V	Vall Area (sf)	New Guide Wall Hardware (ton)		
North	63,840	North	143	
South	63,840	South	143	
North	47,880	North	107	
South	47,880	South	107	
otal Area (sf) =	223,440	Total Weight (ton) =	499	

Guide wall rub face: Use UHMW sheets attached to steel plate mounted to sheet pile face. WT steel vertical guide for steel plate attachment to sheet pile face. The total height of UHMW panels and steel pilate estimated at 9 feet tall. 2 3/4" thick UHMW sheet attached to 5/6" thick steel plate. UHMW attached to steel plate with 1" diameter botts with 1" x1" bit obts spacing grid. The length of rub face below is the same as the lengths of guide wall above, any difference is the specific location to the gate is broken down.

## Guide Wall Rub Face Lengths (ft)

Location Area (ft2)

West Gate	Northwest	400		Northwest	210
	Northeast	360		Northeast	360
	Southwest	430		Southwest	220
	Southeast	330		Southeast	350
Tota	al length (ft) =	1,520	, T	otal length (ft) =	1,140
	Guide Wall Ru	b Face Area	ft2) All Walls T	otal length (ft) =	2,660
	West Gate	13,680			
	East Gate	10,260			
Tot	al Area (ft2) =	23 940			

## CHANNEL EXCAVATION

		Location	Aiba (ItZ)		Volume (yuu	4		
	( w	est channel north	169,830		113,300	}	268,700	
Exist.channel excavated	W	est channel south	232,990		155,400	J		
to open channel	٦ ا	ast channel north	85,120		56,800	}	181,800	
	LΕ	ast channel south	187,500		125,000	J		
		West bypass	1,294,800		863,200			
		East bypass	1,333,100	-	888,800	_		
		Sum =	3,303,340	ft2	2,202,500	yd3	Average depth of excav-	ation used = 18 ft

Volume (vrl3)

# FILL EXISTING CHANNEL

	Location	Area (ft2)		Volume (yd3)	
For new gate locations	West channel	282,370		188,300	
	East channel	301,370		201,000	
	Sum =	583,740	ft2	389,300 yd3	Average depth of fill used = 18 ft

US Army Corps of Engineers New Orleans District	Brazos River Floodgates Feasibility Study Alternative 3a.1: 3a East + Open Exist. Channel West Quantities Estimate	Designed By Checked By 11-Oct-2017	
Number	Number Description	Quantity	Unit
1	Mob & Demob	LUMPSUM	
2	Demolition (Quantities are for existing West and East Gates)		
	Existing Sector Gates (2 sector gates, 4 leafs)		
	Remove and Salvage Sector Gate (2 gates, 4 leafs, east & west channel)	365	TON
	Remove and Dispose Gate Foundation (2 gates)	15,310	
	3. Remove and Dispose Timber Piles (2 gates)	1,970	_
	Guide Walls		
	Remove and Salvage Guide Walls (8 walls, east & west channel)	4,324	TON
3	Excavation and Fill		
	Move Gates Farther Back in Existing Channel		
	Excavation		
	Excavate Existing West Gate Channel	268,700	
	Excavate Existing East Gate Channel     Excavate West Purpose Channel	181,800	
	Excavate West Bypass Channel     Excavate East Bypass Channel	431,600 888,800	_
	Excavation Total =	1,770,900	
	Fill	1,110,000	
	Fill Existing Channel to Create Vessel Channel, West	0	CY
	Fill Existing Channel to Create Vessel Channel, East Gate	201,000	
	Fill Total =	201,000	CY
4	Cofferdam (Cofferdam placed around sector gates, 1 gate, 1 dam)		
	1. Excavation	17,800	_
	2. Sand and Fill	6,300	
	3. Waler System - WF Members	220	_
	4. Sheet Piles - AZ 38-700N	52,640	
	5. Internal Bracing (Struts) - 24" Dia. X 0.625" Thk.	2,300	
	6. King Post Piling (Piles 30" Dia. X 0.625" Thk.) 7. Support Piling 24" Dia. X 0.625" Thk.	1,700 2,100	
	8. Misc. Steel		TN
	9. Temporary Dewatering System		LS
	10. Removal of Cofferdam		LS
5	Concrete Structure and Gate (Quantities are for 1 sector gate, 2 leafs)		
	Sector Gate Monolith  1. Sand and Gravel Bedding	1,700	CV
	2. Tremie Concrete - Seal Slab	4,500	
	3. Reinforced Concrete Base Slab	8,900	
	Reinforced Concrete Monolith	4,000	
	5. Pilings:		
	a. Pilings - Vertical Spiral Piles - 30" Dia. X 0.625" Thk.	20,100	
	b. Pilings - Batter Spiral Piles - 30" Dia. X 0.625" Thk.	22,419	
	6. Tension Connection	275	
	7. Bulkhead Slots - Stainless Steel w/Seals (Embedded in Monolith)	100	
	Ladder Slots - Stainless Steel w/Ladders (Embedded in Monolith)	50	LF

# DEMOLITION

# **Existing Gate:**

Each gate (lb) = 364,500 (2 leafs)
Each gate (ton) = 182.3 (2 leafs)
Two gates removed (ton) = 365 (4 leafs)

Conc. Foundation, one gate (cv) = 7.655

Foundation, wing walls, approach aprons

Contract Bid Documents used 25 feet timber pile length for bidding purposes.

985 Piles per gate

Total weight guide walls, one gate (lb) = **4,323,700**Total weight walls, one gate (ton) = **2,162** 

Quantities based on East Gate Guide Wall take off, Guide Walls B5, B6, B7, B8, West Gate guide wall similar.

Weight is steel material: sheet pile, anchor bar, waler, wall contact, pile cap, tangent plate, fender plate

	Guide Wall	Anchor Wall	
Wall No	Sht Pile (sf)	Sht Pile (sf)	Total (sf)
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108,462

Note: The bypass channels would likely be turned into barge mooring/storage channels after construction, similar to the existing Texas Barge and Boat facility on Alignment C. Alignment C was the bypass channel during the construction of the existing BRFG facility, and now a portion of it has been turned into the existing Texas Barge and Boat facility. **SEE BOTTOM OF SPREADSHEET FOR EXCAVATION AND FILL QUANTITIES** 

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Based on SGCP\* Gulf Side Sector Gate, 46.5' x 110' Sector Gate

Foundation = 116' x 260'
\*Similar Gulf Coast Project

Brazos Sector Gate 31' x 125'

Cofferdam Note: Prior to cofferdam construction, install guide walls and fill in the wet to create vessel chamber and land adjacent to gates. Cofferdam placed around each sector gate, 1 gate, 1 cofferdam. The intent is to build the guide walls first, so that the temporary cofferdam will be reduced in length and will be less expensive. The temporary cofferdam will be installed between the permanent guide walls, and then dewatered in order to perform the monolith and sector gate construction work in the dry.

Perimeter of cofferdam (ft) = 752

Estimate for sheet pile that half of height is embedded and half the height is above mudline, estimate sheet pile length of 70 feet. Estimate the length of King post piling to be embedded 50 feet and 35 feet above mudline, for length of 85 feet. Estimate that 20 King posts are required. Estimate the length of support piling to be 70 feet, half the length is embedded. Estimate that 30 support piling are required. The lengths and quantity estimated above is a rough estimate and may change based on geotechnical conditions. Geotechnical conditions have not been evaluated, propose use of well points for dewatering system.

The construction cofferdam would be designed and detailed by the construction contractor. However, it is anticipated that the cofferdam would include some larger diameter piles (king posts) to help support the lateral loads on the cofferdam. Typically the internal bracing (struts) would weld to the larger diameter piles (king posts) for lateral support. Some smaller diameter support piles are also anticipated to be required to help vertically support and reduce the unbraced length of the internal bracing members.

This estimated sand and fill quantity is a minor item to help provide a stable work surface floor within the cofferdam and to fill in any holes where the geotechnical conditions may require overexcavation to reach a stable subgrade.

Based on SGCP Gulf Side Sector Gate, 46.5' x 110' Sector Gate Foundation = 116' x 260'

→ Pile Lengths (ft) Vertical = 169 Sector Gate Weight (ton) = 537 No of vertical piles = 134

Batter = 178

No of batter piles = 141

Brazos Sector Gate 31' x 125' (1 gate, 2 leafs)

No of vertical piles = 134 Vertical pile length (ft) = 150 No of batter piles = 141 Batter pile length (ft) = 159 <= Enter vertical value, batter will be calculated

3v:1h

Sector Gate   1. Sector Gates   568 TN   2. Pintles and Hinges (King post)   1. LS   3. Sector Gate Protection Fenders   1.180 LF   4. Gate Seals, Seal Bearing Surfaces and Gate Track   1. LS   5. Cathodic Protection   1. Cathodic Protection   1. LS   5. Cathodic Protection   1. LS   5. Cathodic Protection   1. LS   5. Cathodic Protection   1. Cathodic		<u>,                                      </u>		
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1. Sector Gates				
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3. Sector Gate Protection Fenders 4. Gate Seals, Seal Bearing Surfaces and Gate Track 1. LS 5. Cathodic Protection 1. LS 5. Cathodic Protection 1. LS 5. Cathodic Protection 1. LS 6. Maintenance Dewatering System Sector Gate Dewatering System (Maintenance Bulkhead) 2. Maintenance Bulkhead Storage Platform a. Steel Framing 2. Maintenance Bulkhead Storage Platform 5. Piling Supports 1. Pilings -36" Dia. X 0.625" Thk. 2. 2816 LF 7. Guide Walls Sheet Pile Guide Wall Tied Back to Sheet Pile Anchors All Sheet Pile PZ-35 Unless Noted Otherwise 1. West Gate North Guide Wall 2. West Gate South Guide Wall 3. East Gate North Guide Wall 4. East Gate South Guide Wall 4. East Gate South Guide Wall 5. Seat Gate North Guide Wall 6. SF 6. Guide Wall Hardware 7. Total = Wall Hardware 7. Total Guide Wall Hardware 7. Total Guide Wall Hardware 8. Less Gate Rub Face UHMW Panel (2 3/4" thick) 7. Cathodic Seat Cathodic Seat Plate (5/8" thick) 7. Cathodic Seat Cathodic Seat Plate (5/8" thick) 7. Cathodic Seat Cathodic Seat Plate (5/8" thick) 7. Cathodic Seat Cathodic Seat Plate (5/8" thick) 7. Cathodic Seat Cathodic Seat Plate (5/8" thick) 7. Cathodic Seat Cathodic Seat Plate (5/8" thick) 7. Cathodic Seat Cathodic Seat Plate (5/8" thick) 7. Cathodic Seat Cathodic Seat Plate (5/8" thick) 7. Cathodic Seat Cathodic Seat Plate (5/8" thick) 7. Cathodic Seat Cathodic Seat Plate (5/8" thick) 7. Cathodic Seat Cathodic Seat Plate (5/8" thick) 7. Cathodic Seat Cathodic Seat Plate (5/8" thick) 7. Cathodic Seat Cathodic Seat Plate (5/8" thick) 7. Cathodic Seat Cathodic Seat Plate (5/8" thick) 7. Cathodic Seat Cathodic Seat Plate (5/8" thick) 7. Cathodic Seat Cathodic Seat Plate (5/8" thick) 7. Cathodic Seat Plate (5/8" thick) 7. Cathodic Seat Plate (5/8" thick) 7. Cathodic Seat Plate (5/8" thick) 7. Cathodic Seat Plate (5/8" thick) 7. Cathodic Seat Plate (5/8" thick) 7. Cathodic Seat Plate (5/8" thick) 7. Cathodic Seat Plate (5/8" thick) 7. Cathodic Seat Plate (5/8" thick) 7. Cathodic Seat Plate (5/8" thick) 7. Cathodic Seat Plate (5/8" thick) 7. C				_
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5. Cathodic Protection		4. Gate Seals Seal Rearing Surfaces and Gate Track	,	
6 Maintenance Dewatering System Sector Gate Dewatering System (Maintenance Bulkhead)  1. Maintenance Bulkhead 633 TN 2. Maintenance Bulkhead 52 Maintenance Bulkhead 633 TN 2. Maintenance Bulkhead 53 TN 2. Maintenance Bulkhead 54 Storage Platform a. Steel Framing 294 TN b. Piling Supports  1. Pilings - 36" Dia. X 0.625" Thk. 2,816 LF  7 Guide Walls Sheet Pile Guide Wall Tied Back to Sheet Pile Anchors All Sheet Pile PZ-35 Unless Noted Otherwise  1. West Gate North Guide Wall 0 SF 2. West Gate South Guide Wall 0 SF 3. East Gate North Guide Wall 47,880 SF 4. East Gate South Guide Wall 47,880 SF 4. East Gate South Guide Wall 70 SF Guide Wall Hardware 70 SF Guide Wall Hardware 70 SF Guide Wall Hardware (All walls) 214 TN  Rub Face UHMW Sheets Mounted to Steel Plate Attached to Sheet Pile Face 1. West Gate Rub Face UHMW Panel (2 3/4" thick) 0 SF 2. East Gate Rub Face UHMW Panel (2 3/4" thick) 10,260 SF 1. West Gate Steel Plate (5/8" thick) 0 SF 2. East Gate Steel Plate (5/8" thick) 0 SF 2. East Gate Steel Plate (5/8" thick) 10,260 SF 1. West Gate Steel Plate (5/8" thick) 10,260 SF 1. Rack and Pinion System 1 LS				
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Sector Gate Dewatering System (Maintenance Bulkhead)   1. Maintenance Bulkhead   633 TN   2. Maintenance Bulkhead Storage Platform				
Sector Gate Dewatering System (Maintenance Bulkhead)   1. Maintenance Bulkhead   633 TN   2. Maintenance Bulkhead Storage Platform				
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2. East Gate Steel Plate (5/8" thick) 10,260 SF  Total = 10,260 SF  8 Mechanical				
Total =   10,260   SF				
8         Mechanical           1. Rack and Pinion System         1 LS		2. East Gate Steel Plate (5/8" thick)	10,260	SF
8         Mechanical           1. Rack and Pinion System         1 LS		Total =	10,260	SF
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The weight per enclosed volume of a sector gate leaf was calculated for several existing projects including the existing Brazos sector gate. The data results are as follows, Brazos 6.2 lb/ft3 (pcf), IHNC 6.7 pcf, and SGCP 4.8 pcf. The average weight per enclosed volume for these projects is 5.9 pcf. The estimated weight of the new Brazos sector gate leaf is based on this similar project average of 5.9 pcf for the proposed 31' x 125' gate. The estimated weight of the proposed sector gate (2 leafs) is 568 tons. IHNC refers to the Inner Harbor Navigation Canal project. The top of the gates will match the top of the wall elevation +16.00 NAVD88 which matches the Colorado River Locks, which were recently surveyed.

Based on SCGP Gulf Side Sector Gate, 46.5' x 110' Sector Gate. Maintenance bulkheads provide 29 feet of water protection. The bulkheads are 110' feet long and to be placed across the channel opening. 5 bulkheads stacked on top of each other used at each end of monolith, total of 10 units to perform maintenance on a sector gate. Each bulkhead weighs 63 tons. Provide one complete set (10 units) for one gate, maintenance performed on one gate at a time.

The maintenance bulkhead storage platform is estimated to require a total deck area of approximately 18,060 square feet in order to store 10 bulkhead sections stacked 2 high. The required footprint on the platform would be for 5 bulkheads. The exact plan configuration of the storage platform would depend on the land available and how the USACE would like to store/arrange the bulkheads. One possible platform deck configuration would be 54 feet wide for 255 feet and 33 feet wide for 130 feet. Typical pile lengths are 88 feet for the maintenance bulkhead storage platform.

Since the guide walls must retain fill soil, use sheet pile guide walls similar to the type currently in use, sheet pile face tied back to sheet pile used as anchor. Quantities based on quantity take off of existing East gate guide walls B5, B6, B7, and B8, raised 6 feet to match top of wall elevation +16.00 NAVD88 at the Colorado River Locks, which were recently surveyed.

			See Demolition Above for Sheet Pile Area Breakout
Guide Wall Lengths (ft)	Exist.Guide Wal	I Take Off Wei	eight (lb) <=For Existing Wall sections B5, B6, B7, B8
487	PZ 35 sheet pile	3,796,100	
408	Anchor bar	170,470	
257	Waler	140,990	Hardware weight per foot (lb/ft)
257	Wall contact	29,196	375
1,409	Pile cap	114,870	
	Tangent wall plate	42,385	
	_Fender plate	29,661	
	Total Steel Weight (lb) =	4,323,700	
	487 408 257 257	487 PZ 35 sheet pile 408 Anchor bar 257 Waler 257 Wall contact 1,409 Pile cap Tangent wall plate Fender plate	487 PZ 35 sheet pile 3,796,100 408 Anchor bar 170,470 257 Waler 140,990 257 Wall contact 29,196 1,409 Pile cap 114,870 Tangent wall plate 42,385 Fender plate 29,661

Existing Weight per Linear Foot of Sheet Pile Guide Wall (lb/ft) = 3,069

For Alternative 3a at New Location Farther Back in Existing Channel

	New Guide Wa	II Lengths (ft)
West Gate	North	0
	South	0
East Gate	North	570
	South	570
Total length (ft) = 1,140		

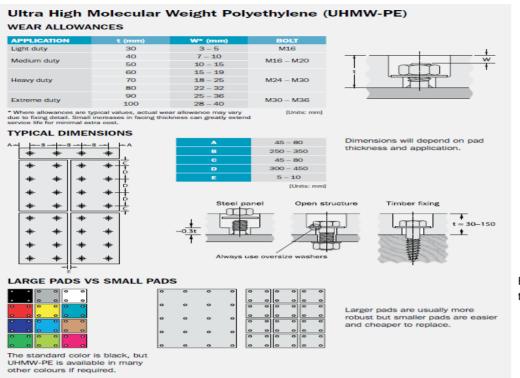
Use sheet pile 56 feet total face sheet length (56 sf per linear foot) plus 50% wall face area for anchor sheet.

New Guide W	all Area (sf)	New Guide Wa	II Hardware (ton)
North	0	North	0
South	0	South	0
North	47,880	North	107
South	47,880	South	107
Total Area (sf) =	95,760	Total Weight (ton) =	214

Guide wall rub face: Use UHMW sheets attached to steel plate mounted to sheet pile face. WT steel vertical guide for steel plate attachment to sheet pile face. The total height of UHMW panels and steel plate estimated at 9 feet tall. 2 3/4" thick UHMW sheet attached to 5/8" thick steel plate. UHMW attached to steel plate with 1" diameter bolts with 1' x 1' bolt spacing grid. The length of rub face below is the same as the lengths of guide wall above, only difference is the specific location to the gate is broken down.

# **Guide Wall Rub Face Lengths (ft)**

West Gate	Northwest	0	East Gate	Northwest	210
	Northeast	0		Northeast	360
	Southwest	0		Southwest	220
	Southeast	0		Southeast	350
Tota	al length (ft) =	0	To	otal length (ft) =	1,140





# CHANNEL EXCAVATION

West Gate

East Gate

Total Area (ft2) =

0

10,260

10,260

		Location	Area (ft2)		Volume	yd3	3)		
	Wes	st channel north	169,830		113,	300	>	268,700	
Exist.channel excavated	Wes	t channel south	232,990		155,	400	J		
to open channel	. ↓ Eas	st channel north	85,120		56,8	300	>	181,800	
	Eas	t channel south	187,500		125,	000	J		
	_	West bypass	647,400		431,	600			
		East bypass	1,333,100	_	888,	800	_		
		Sum =	2,655,940	ft2	1,770	,900	vd3		Average depth of excavation used = 18 f

# FILL EXISTING CHANNEL

	<u>Location</u>	Area (ft2)		Volume (yd3)	
For new gate locations	West channel	0		0	
	East channel	301,370	_	201,000	
	Sum =	301,370	ft2	<b>201,000</b> yd3	Average depth of fill used = 18 ft

Ini	Brazos River Floodgates Feasibility Study	Designed By	JK
JS Anny Corps of Engineers	Alternative 9a - Open Channel on Alignment C without Gates	Checked By	GK
Asser Orleans Disprett	Quantities Estimate	14-Sep-2017	
Number	Number Description		
Number	Number Description	Quantity	Unit
1	Mob & Demob	LUMPSUM	LS
	Demolition (Quantities are for existing West and East Gates)		
	Existing Sector Gates (2 sector gates, 4 leafs)		
	Remove and Salvage Sector Gate (2 gates, 4 leafs, east & west channel)	365	TON
	Existing Gate Foundation and Piles to Remain (2 gates)	0	CY
2	Excavation and Fill		
	Open Channel on Alignment C, Fill Existing Channels		0) (
	Excavate New West Open Channel	908,200	
	2. Excavate New East Open Channel	695,600	
	Excavation Total =	1,603,800	CY
	Fill Existing West Vessel Channel	108,200	CV
	Fill Existing West Vessel Channel     Fill Existing East Vessel Channel	63,400	
	Fill Total =	171,600	
	T III TOCKI	11 1,000	Ŭ.
3	Electrical		
	Site Electrical	1	LS
	Real Estate Acquisition and Relocation for Alignment C		

Remove only Gates for Alternative 9a
(2 leafs)
(2 leafs) (4 leafs)

CHANNEL EXCAVATION Alignment C through existing barge factors are a spartially excavated.	cility.	CADD channel excavation overlaid with aerial image of existing channel outline West channel currently not being used, East channel is occupied, West requires more excavation (subtract less)				
Existing channel areas: West channel (Barge facility)  East channel		Use 75% of area for depth of exca		Area (ft2) 265,144 495,000	Subtract this area from CADD value	
(Barge facility) East channel  Location	550,000 Area (ft2)	use 90% or area for depth of exca	Location	495,000 Area (ft2)	(Area already excavated)  Volume (yd3)	
Channel excavation required from CADD West channel East channel	1,627,310 1,538,370		West channel East channel Sum =	1,362,166 1,043,370 <b>2,405,536</b>	695,600	

Average depth of excavation used = 18 ft

# FILL EXISTING CHANNEL

| Location | Location | Location | Location | Location | Location | Location | Location | Location | Location | Location | Location | Location | Location | Location | Location | Location | Location | Location | Location | Location | Location | Location | Location | Location | Location | Location | Location | Location | Location | Location | Location | Location | Location | Location | Location | Location | Location | Location | Location | Location | Location | Location | Location | Location | Location | Location | Location | Location | Location | Location | Location | Location | Location | Location | Location | Location | Location | Location | Location | Location | Location | Location | Location | Location | Location | Location | Location | Location | Location | Location | Location | Location | Location | Location | Location | Location | Location | Location | Location | Location | Location | Location | Location | Location | Location | Location | Location | Location | Location | Location | Location | Location | Location | Location | Location | Location | Location | Location | Location | Location | Location | Location | Location | Location | Location | Location | Location | Location | Location | Location | Location | Location | Location | Location | Location | Location | Location | Location | Location | Location | Location | Location | Location | Location | Location | Location | Location | Location | Location | Location | Location | Location | Location | Location | Location | Location | Location | Location | Location | Location | Location | Location | Location | Location | Location | Location | Location | Location | Location | Location | Location | Location | Location | Location | Location | Location | Location | Location | Location | Location | Location | Location | Location | Location | Location | Location | Location | Location | Location | Location | Location | Location | Location | Location | Location | Location | Location | Location | Location | Location | Location | Location | Location | Location | Location

ny Corps.	Brazos River Floodgates Feasibility Study Alternative 9b - New Gates on Alignment C w/o Sediment Contro		
ana Dhaonati	Quantities Estimate	14-Sep-2017	
mber	Number Description	Quantity	ι
1	Mob & Demob	LUMPSUM	LS
2	Demolition (Quantities are for existing West and East Cates)		-
	Demolition (Quantities are for existing West and East Gates) Existing Sector Gates (2 sector gates, 4 leafs)		
	Remove and Salvage Sector Gate (2 gates, 4 leafs, east & west channel)	365	ТО
	Remove and Dispose Gate Foundation (2 gates)	15,310	CY
	Remove and Dispose Timber Piles (2 gates)		ΕA
	Guide Walls	1001	Ŧ
	Remove and Salvage Guide Walls (8 walls, east & west channel)	4,324	10
^	5		
3	Excavation and Fill New Gates on Alignment C		
	New West Channel Excavation	697,900	CV
	New Yest Ghannel Excavation	476,500	
	Excavation Total =	1,174,400	CY
	1. Fill for New Gate Location, West Gate	98,700	
	Fill for New Gate Location, East Gate     Fill Existing West Vessel Channel	88,200 108,200	CY
	Fill Existing Fast Vessel Channel		CY
	Fill Total =	358,500	CY
			1
	Riprap (3' Thick Layer)	8,000	10
4	Cofferdam (Cofferdam placed around sector gates, 2 gates, 2 dams)  1. Excavation	35,600	CY
	2. Sand and Fill	12,600	
	3. Waler System - WF Members	440	
	4. Sheet Piles - AZ 38-700N	105,280	
	5. Internal Bracing (Struts) - 24" Dia. X 0.625" Thk.	4,600	
	6. King Post Piling (Piles 30" Dia. X 0.625" Thk.)	3,400	LF
	7. Support Piling 24" Dia. X 0.625" Thk.	4,200	LF
	8. Misc. Steel	10	
	9. Temporary Dewatering System		LS
	10. Removal of Cofferdam	2	LS
			_
5	Concrete Structure and Gate (Quantities are for 2 sector gates, 4 leafs) Sector Gate Monolith		
	Sand and Gravel Bedding	3,400	
	2. Tremie Concrete - Seal Slab	9,000	
	3. Reinforced Concrete Base Slab	7	CY
	4. Reinforced Concrete Monolith	8,000	CY
	5. Pilings: a. Pilings - Vertical Spiral Piles - 30" Dia. X 0.625" Thk.	40,200	LF
	b. Pilings - Batter Spiral Piles - 30" Dia. X 0.625" Thk.		īЬ
	6. Tension Connection	550	EΑ
	7. Bulkhead Slots - Stainless Steel w/Seals (Embedded in Monolith)	200	
	Ladder Slots - Stainless Steel w/Ladders (Embedded in Monolith)	100	LF
	Sector Gate  1. Sector Gates	1.136	TN
			LS
	Pintles and Hinges(King post)		LF
	Pintles and Hinges(King post)     Sector Gate Protection Fenders	-,	_
	Sector Gate Protection Fenders     Gate Seals, Seal Bearing Surfaces and Gate Track	2	LS
	Sector Gate Protection Fenders		_
	Sector Gate Protection Fenders     Gate Seals, Seal Bearing Surfaces and Gate Track	2	LS
	Sector Gate Protection Fenders     Gate Seals, Seal Bearing Surfaces and Gate Track	2	LS

#### DEMOLITION

#### Existing Gate:

Each gate (lb) = 364,500 (2 leafs)
Each gate (ton) = 182.3 (2 leafs)
Two gates removed (ton) = **365** (4 leafs)

Conc. Foundation, one gate (cy) = 7,655 Foundation, wing walls, approach aprons

Contract Bid Documents used 25 feet timber pile length for bidding purposes. 985 Piles per gate

Total weight guide walls, one gate (tb) = 4,323,700

Quantities based on East Gate Guide Walls atke off, Guide Walls B5, B6, B7, B8, West Gate guide walls similar.

Total weight guide walls, one gate (ton) = 2,162

Weight is steel material: sheet pile, anchor bar, waler, wall contact, pile cap, tangent plate, fender plate

	Guide Wall		
Wall No	Sht Pile (sf)	Sht Pile (sf)	Total (sf)
B5	25,243	12,067	37,310
B6	21,736	10,076	31,812
B7	13,184	6,486	19,670
B8	13,184	6,486	19,670
			108 462

#### SEE BOTTOM OF SPREADSHEET FOR EXCAVATION AND FILL QUANTITIES

Excavation Disposal Note: The current plan for the disposal of excavation material is to use the existing placement areas (PA) located along the GIWW.

Placement Areas No. 88 and 89 are the closest to the Brazos Floodgates and they were reported to have combined remaining capacity of approximately 3.8 million cubic yards.

Based on SGCP\* Gulf Side Sector Gate, 46.5' x 110' Sector Gate

Foundation = 116' x 260'
\*Similar Gulf Coast Project
Brazos Sector Gate 31' x 125'

Cofferdam Note: Prior to cofferdam construction, install guide walls and fill in the wet to create vessel chamber and land adjacent to gates. Cofferdam placed around each sector gate, 2 gates, 2 cofferdams. The intent is to build the guide walls first, so that the temporary cofferdam will be reduced in length and will be less expensive. The temporary cofferdam will be installed between the permanent guide walls, and then dewatered in order to perform the monolith and sector gate construction work in the dry.

Perimeter of cofferdam (ft) = 752

Estimate for sheet pile that half of height is embedded and half the height is above mudline, estimate sheet pile length of 70 feet. Estimate the length of King post piling to be embedded 50 feet and 35 feet above mudline, for length of 85 feet. Estimate that 20 King post are required. Estimate the length of support piling to be 70 feet, half the length is embedded. Estimate that 30 support piling are required. The lengths and quantity estimated above is a rough estimate and may change based on geotechnical conditions. Geotechnical conditions have not been evaluated, propose use of well points for dewatering system.

The construction cofferdam would be designed and detailed by the construction contractor. However, it is anticipated that the cofferdam would include some larger diameter piles (king posts) to help support the lateral loads on the cofferdam. Typically the internal bracing (struts) would weld to the larger diameter piles (king posts) for lateral support. Some smaller diameter support piles are also anticipated to be required to help vertically support and reduce the unbraced length of the internal bracing members.

This estimated sand and fill quantity is a minor item to help provide a stable work surface floor within the cofferdam and to fill in any holes where the geotechnical conditions may require overexcavation to reach a stable subgrade.

Based on SGCP Gulf Side Sector Gate, 46.5' x 110' Sector Gate Foundation = 116' x 260'

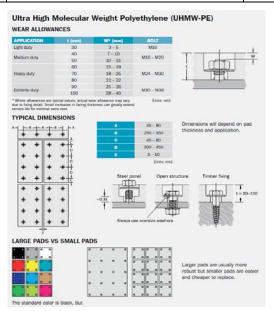
Pile Lengths (ft) Sector Gate Weight (ton) = 537
Vertical = 169 No of vertical piles = 134
Batter = 178 No of batter piles = 141

# Brazos Sector Gate 31' x 125' (2 gates, 4 leafs)

No of vertical piles = 268 Vertical pile length (ft) = 150 <= Enter vertical value, batter will be calculated No of batter piles = 282 Batter pile length (ft) = 159

The weight per enclosed volume of a sector gate leaf was calculated for several existing projects including the existing Brazos sector gate. The data results are as follows, Brazos 6.2 lb/fl3 (pcf), IHNC 6.7 pcf, and SGCP 4.8 pcf. The average weight per enclosed volume for these projects is 5.9 pcf. The estimated weight of the new Brazos sector gate leaf is based on this similar project average of 5.9 pcf for the proposed 31 x 125 gate. The estimated weight of the proposed sector gate (2 leafs) is 568 tons. IHNC refers to the Inner Harbor Navigation Canal project. The top of the gates will match the top of the wall elevation +16.00 NAVD88 which matches the Colorado Ruc Locks, which were recently surveyed.

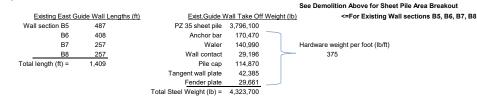
101	Brazos River Floodgates Feasibility Study	Designed By	JK
S Anny Corps	Alternative 9b - New Gates on Alignment C w/o Sediment Contro	Checked By	GK
n than boot	Quantities Estimate	14-Sep-2017	
Number	Number Description		
140111501	-	Quantity	Uni
	Sector Gate Dewatering System (Maintenance Bulkhead)		
	Maintenance Bulkhead	633	TN
	Maintenance Bulkhead Storage Platform		
	a. Steel Framing	294	TN
	b. Piling Supports		
	1. Pilings - 36" Dia. X 0.625" Thk.	2,816	LF
7	Guide Walls		
	Sheet Pile Guide Wall Tied Back to Sheet Pile Anchors		
	All Sheet Pile PZ-35 Unless Noted Otherwise		
	West Gate North Guide Wall	63,840	QE.
	West Gate North Guide Wall     West Gate South Guide Wall	63,840	
	3. East Gate North Guide Wall	47.880	
	4. East Gate South Guide Wall	47,880	
	Total =	223,440	
	Guide Wall Hardware		
	Total Guide Wall Hardware (All walls)	499	TN
	Rub Face UHMW Sheets Mounted to Steel Plate Attached to Sheet Pile Face		
	West Gate Rub Face UHMW Panel (2 3/4" thick)	13,680	
	2. East Gate Rub Face UHMW Panel (2 3/4" thick)	10,260	
	Total =	23,940	SF
	West Gate Steel Plate (5/8" thick)	13,680	SF
	2. East Gate Steel Plate (5/8" thick)	10,260	SF
	Total =	23,940	SF
8	Mechanical		
	1. Rack and Pinion System	2	LS
9	Electrical	2	LS
9	Licutival		LO



Based on SCGP Gulf Side Sector Gate, 46.5' x 110' Sector Gate. Maintenance bulkheads provide 29 feet of water protection. The bulkheads are 110' feet long and to be placed across the channel opening. 5 bulkheads stacked on top of each other used at each end of monolith, total of 10 units to perform maintenance on a sector gate. Each bulkhead weighs 63 tons. Provide one complete set (10 units) for one gate, maintenance performed on one gate at a time.

The maintenance bulkhead storage platform is estimated to require a total deck area of approximately 18,060 square feet in order to store 10 bulkhead sections stacked 2 high. The required footprint on the platform would be for 5 bulkheads. The exact plan configuration of the storage platform would depend on the land available and how the USACE would like to store/arrange the bulkheads. One possible platform deck configuration would be 54 feet wide for 255 feet and 33 feet wide for 130 feet. Typical pile lengths are 88 feet for the maintenance bulkhead storage platform.

Since the guide walls must retain fill soil, use sheet pile guide walls similar to the type currently in use, sheet pile face tied back to sheet pile used as anchor. Quantities based on quantity take off of existing East gate guide walls B5, B6, B7, and B8, raised 6 feet to match top of wall elevation +16.00 NAVD88 at the Colorado River Locks, which were recently surveyed.



Existing Weight per Linear Foot of Sheet Pile Guide Wall (lb/ft) = 3,069

# For Alternative 9c, New Gates on Alignment C with Sediment Control

# West Gate New Guide Wall Lengths (ft) North 760 South 760 East Gate North 570 South 570

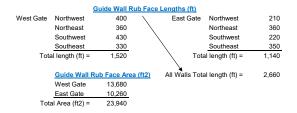
2.660

Total Length (ft) =

Use sheet pile 56 feet total face sheet length (56 sf per linear foot) plus 50% wall face area for anchor sheet.

_			
New Guide Wa	III Area (sf)	New Guide Wa	Il Hardware (ton)
North	63,840	North	143
South	63,840	South	143
North	47,880	North	107
South	47,880	South	107
otal Area (sf) =	223,440	Total Weight (ton) =	499

Guide wall rub face: Use UHMW sheets attached to steel plate mounted to sheet pile face. WT steel vertical guide for steel plate attachment to sheet pile face. The total height of UHMW panels and steel plate estimated at 9 feet tall. 2 3/4" thick UHMW sheet attached to 5/8" thick steel plate. UHMW attached to steel plate with 1" diameter bolts with 1'x 1" bolt spacing grid. The length of rub face below is the same as the lengths of ruide wall above, only difference is the specific location to the gate is broken down.



CHANNEL EXCAVATION

CADD channel excavation overlaid with aerial image of existing channel outline

US Army Corps of Engineers . New Others District		ver Floodgates Feasibility Study Cates on Alignment C w/o Sediment Contro Quantities Estimate	Designed By Checked By 14-Sep-2017	JK GK
Number		Number Description		
			Quantity	Unit
	UHMW-PE is available in many			

	Alianment C throu	gh existing barge faci	litv.	West channel currently not being used, East channel is occupied, West requires				
	The area is partially excavated.			more excavation (subtract less)		1 / 1		
		Location	Area (ft2)	<b>k</b>	Area (ft2)			
E	Exist. channel area	as: West channel	353,600	Use 75% of area for depth of excavation	265,200	Subtract this area from channel excavation		
(	Barge facility)	East channel	550,000	Use 90% of area for depth of excavation	495,000	(Area already excavated)		
(	Alignment C)	Location	Area (ft2)	Location	Area (ft2)	Volume (yd3)		
Ċ	Channel excavatio	n West channel	1,312,000	Channel Excavation West channel	1,046,800	697,900		
г	equired from CAE	DD East channel	1,209,700	East channel	el 714,700	476,500		
		West channel north	169,830	West channel nort	h 169,830	113,300 ~ 268,700		
Exist.channel	excavated	West channel south	232,990	West channel sout	h 232,990	155,400 🗸		
to op	en channel ≺	East channel north	85,120		h 85,120	56,800 > 181,800		
(A	lignment A)	East channel south	187,500	East channel sout	h 187,500	125,000 _		
				Sum	= 2,436,940	ft2 <b>1,624,900</b> yd3		

Average depth of excavation used = 18 ft

# FILL FOR NEW GATE LOCATIONS

•	Sum =	560,370	ft2	186,900 yd3	Average depth of fill used = 9 ft
	East Gate	264,420		88,200	
For the new gate locations	West Gate	295,950		98,700	
	Location	Area (ft2)		Volume (yd3)	

£	Brazos River Floodgates Feasibility Study	Designed By	J
nny Corps	Alternative 9c - New Gates on Alignment C w/ Sediment Control	Checked By	G
rhans (harve)	Quantities Estimate	14-Sep-2017	
umber			
umber	Number Description	Quantity	U
1	Mob & Demob	LUMPSUM	LS
2	Demolition (Quantities are for existing West and East Gates)		
	Existing Sector Gates (2 sector gates, 4 leafs)		
	Remove and Salvage Sector Gate (2 gates, 4 leafs, east & west channel)		
	Remove and Dispose Gate Foundation (2 gates)	15,310	
	Remove and Dispose Timber Piles (2 gates)	1,970	EΑ
	Guide Walls		
	Remove and Salvage Guide Walls (8 walls, east & west channel)	4,324	TO
3	Excavation and Fill		
	New Gates on Alignment C		
	New West Channel Excavation	697,900	
	2. New East Channel Excavation	476,500	
	3. Excavate Existing West Gate Channel	268,700	
	Excavation Total =	1,443,100	UΥ
	Fill for New Gate Location, West Gate	98,700	CV
	2. Fill for New Gate Location, West Gate		
	3. Fill Existing East Vessel Channel	63,400	
	Fill Total =	250,300	
	Riprap (3' Thick Layer)	8,000	TO
4	Cofferdam (Cofferdam placed around sector gates, 2 gates, 2 dams)  1. Excavation	05.000	CY
		,	
	2. Sand and Fill		
	3. Waler System - WF Members	440	TN
	4. Sheet Piles - AZ 38-700N	105,280	
	5. Internal Bracing (Struts) - 24" Dia. X 0.625" Thk.	4,600	
	6. King Post Piling (Piles 30" Dia. X 0.625" Thk.)	3,400	
	7. Support Piling 24" Dia. X 0.625" Thk.	4,200	
	8. Misc. Steel	10	TN
	Temporary Dewatering System     Removal of Cofferdam	_	LS LS
	10. Nemoval di Conerdam		LO
5	Concrete Structure and Gate (Quantities are for 2 sector gates, 4 leafs)		_
	Sector Gate Monolith  1. Sand and Gravel Bedding	3,400	CV
	Sand and Gravel Bedding     Tremie Concrete - Seal Slab	9,000	
		17.800	
	Reinforced Concrete Base Slab     Reinforced Concrete Monolith	8,000	
	Reinforced Concrete Monolith     Pilings:	6,000	UΥ
	a. Pilings - Vertical Spiral Piles - 30" Dia. X 0.625" Thk.	40,200	LF
	b. Pilings - Batter Spiral Piles - 30" Dia. X 0.625" Thk.		
	6. Tension Connection	550	EΑ
	7. Bulkhead Slots - Stainless Steel w/Seals (Embedded in Monolith)	200	
	Ladder Slots - Stainless Steel w/Ladders (Embedded in Monolith)	100	LF
			_
	Sector Gate	1.136	TN
	1. Sector Gates 2. Pintles and Hingas/King post)		TN LS
	Pintles and Hinges(King post)     Sector Gate Protection Fenders		
	Gate Seals, Seal Bearing Surfaces and Gate Track	2,300	LS
			LS
	5. Cathodic Protection	2	
	5. Cathodic Protection	2	LO
	5. Cathodic Protection	2	
	5. Cathodic Protection	2	

#### DEMOLITION

#### Existing Gate:

Each gate (lb) = 364,500 (2 leafs)
Each gate (ton) = 182.3 (2 leafs)
Two gates removed (ton) = **365** (4 leafs)

Conc. Foundation, one gate (cy) = 7,655 Foundation, wing walls, approach aprons

Contract Bid Documents used 25 feet timber pile length for bidding purposes. 985 Piles per gate

Total weight guide walls, one gate (lb) = **4,323,700**Quantities based on East Gate Guide Wall take off, Guide Walls B5, B6, B7, B8, West Gate guide wall similar.

Total weight guide walls, one gate (ton) = **2,162**Weight is steel material: sheet pile, anchor bar, waler, wall contact, pile cap, tangent plate, fender plate

Wall No	Guide Wall Sht Pile (sf)		
B5	25,243	12.067	37.310
B6	21,736	10,076	31,812
B7	13.184	6.486	19.670
B8	13,184	6,486	19,670
			108 462

#### SEE BOTTOM OF SPREADSHEET FOR EXCAVATION AND FILL QUANTITIES

Excavation Disposal Note: The current plan for the disposal of excavation material is to use the existing placement areas (PA) located along the GIWW.

Placement Areas No. 88 and 89 are the closest to the Brazos Floodgates and they were reported to have combined remaining capacity of approximately 3.8 million cubic yards.

Based on SGCP\* Gulf Side Sector Gate, 46.5' x 110' Sector Gate

\*Similar Gulf Coast Project

Brazos Sector Gate 31' x 125'

Cofferdam Note: Prior to cofferdam construction, install guide walls and fill in the wet to create vessel chamber and land adjacent to gates. Cofferdam placed around each sector gate, 2 gates, 2 cofferdams. The intent is to build the guide walls first, so that the temporary cofferdam will be reduced in length and will be less expensive. The temporary cofferdam will be installed between the permanent guide walls, and then dewatered in order to perform the monolith and sector gate construction work in the dry.

Perimeter of cofferdam (ft) = 752

Estimate for sheet pile that half of height is embedded and half the height is above mudline, estimate sheet pile length of 70 feet. Estimate the length of King post piling to be embedded 50 feet and 35 feet above mudline, for length of 85 feet. Estimate that 20 King post are required. Estimate the length of support piling to be 70 feet, half the length is embedded. Estimate that 30 support piling are required. The lengths and quantity estimated above is a rough estimate and may change based on geotechnical conditions. Geotechnical conditions have not been evaluated, propose use of well points for dewatering system.

The construction cofferdam would be designed and detailed by the construction contractor. However, it is anticipated that the cofferdam would include some larger diameter piles (king posts) to help support the lateral loads on the cofferdam. Typically the internal bracing (struts) would weld to the larger diameter piles (king posts) for lateral support. Some smaller diameter support piles are also anticipated to be required to help vertically support and reduce the unbraced length of the internal bracing members.

This estimated sand and fill quantity is a minor item to help provide a stable work surface floor within the cofferdam and to fill in any holes where the geotechnical conditions may require overexcavation to reach a stable subgrade.

Based on SGCP Gulf Side Sector Gate, 46.5' x 110' Sector Gate
Foundation = 116' x 260'

Pile Lengths (ft)
Vertical = 169
Batter = 178
No of vertical piles = 131
No of batter piles = 141

Brazos Sector Gate 31' x 125' (2 gates, 4 leafs)

No of vertical piles = 268 Vertical pile length (ft) = 150 <= Enter vertical value, batter will be calculated
No of batter piles = 282 Batter pile length (ft) = 159

The weight per enclosed volume of a sector gate leaf was calculated for several existing projects including the existing Brazos sector gate. The data results are as follows, Brazos 6.2 lb/fl3 (pcf), lhNC 6.7 pcf, and SGCP 4.8 pcf. The average weight per enclosed volume for these projects is 5.9 pcf. The estimated weight of the new Brazos sector gate leaf is based on this similar project average of 5.9 pcf for the proposed 31 x 125 gate. The estimated weight of the proposed sector gate (2 leafs) is 568 tons. IHNC refers to the Inner Harbor Navigation Canal project. The top of the gates will match the top of the wait elevation +16.00 NAV/D88 which matches the Colorado Ricc Locks, which were recently surveyed.

M	Brazos River Floodgates Feasibility Study	Designed By	JK
US Anny Corps of Engineers	Alternative 9c - New Gates on Alignment C w/ Sediment Control		GK
New Orleans (Nativel)	Quantities Estimate	14-Sep-2017	
Number	Number Description	Quantity	Unit
	Sector Gate Dewatering System (Maintenance Bulkhead)		
	Maintenance Bulkhead	633	TN
	Maintenance Bulkhead Storage Platform		
	a. Steel Framing	294	TN
	b. Piling Supports		
	1. Pilings - 36" Dia. X 0.625" Thk.	2,816	LF
	- · · · · · ·		
7	Guide Walls		
	All Sheet Pile PZ-35 Unless Noted Otherwise		
	All Sheet File F2-33 Offiess Noted Otherwise		
	West Gate North Guide Wall	63.840	SF
	West Gate South Guide Wall		
	East Gate North Guide Wall	ring System (Maintenance Bulkhead)  Jikhead Storage Platform  g	SF
	East Gate South Guide Wall		SF
	Total =	223,440	SF
	Guide Wall Hardware		
	Total Guide Wall Hardware (All walls)	499	TN
	· ·		
	Rub Face UHMW Sheets Mounted to Steel Plate Attached to Sheet Pile Face		
	1. West Gate Rub Face UHMW Panel (2 3/4" thick)	13,680	SF
	2. East Gate Rub Face UHMW Panel (2 3/4" thick)		
	West Gate Steel Plate (5/8" thick)	13,680	SF
	2. East Gate Steel Plate (5/8" thick)		
	Total =	23,940	SF
8	Mechanical		
	Rack and Pinion System	2	LS
9	Electrical	2	LS
10	Sediment Control or Sluice Gates		
	1 Structure		
	Piling - 14 x 73 H-piles, 90' length		
	Sheetpile - PZ-22, 52.75' length		
	Concrete Base Slab		
	Concrete Walls and Slabs		
<u> </u>	Sluice Gates (Rodney Hunt with Stem and Gear Box)		
<u> </u>	Hand Rail, 2" Standard Aluminum Pipe		
	Bulkheads (4)		
<u> </u>	Rip Rap	6,000	ION
	T: : 01 1 1 P7 05 0011 11	0.000	05
	Tie-in Sheetpile - PZ-35, 60' length	3,600	
-	Tie-in Embankment	2,000	UΥ
-	Forth Dougtoring Dom		
-	Earth Dewatering Dam		
-	10' Crown, 1:3 Side Slopes Sand Core	3,426	CV
	2' Clay Cap	1,158	
	e oray oup	1,130	J .
I			1

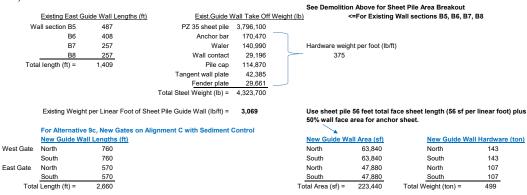
# Ultra High Molecular Weight Polyethylene (UHMW-PE) WEAR ALLOWANCES

APPLICATION		W* (mm)	BOLT	
Light duty	30	3-5	M16	
	40	7-10	M16 - M20	T
Modium duty	50	10 - 15	M16 - M20	Cortes T
	60	15-19		i lulu '
Heavy duty	70	18 - 25	M24 - M30	12:31
	80	22 - 32		1 4 1
	90	25 - 36	200000000000000000000000000000000000000	

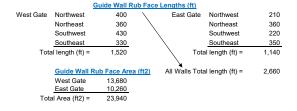
Based on SCGP Gulf Side Sector Gate, 46.5' x 110' Sector Gate. Maintenance bulkheads provide 29 feet of water protection. The bulkheads are 110' feet long and to be placed across the channel opening. 5 bulkheads stacked on top of each other used at each end of monolity lotal of 10 units to perform maintenance on a sector gate. Each bulkhead weighs 63 tons. Provide one complete set (10 units) for one gate, maintenance performed on one gate at a time.

The maintenance bulkhead storage platform is estimated to require a total deck area of approximately 18,060 square feet in order to store 10 bulkhead sections stacked 2 high. The required footprint on the platform would be for 5 bulkheads. The exact plan configuration of the storage platform would depend on the land available and how the USACE would like to store/arrange the bulkheads. One possible platform deck configuration would be 54 feet wide for 255 feet and 33 feet wide for 130 feet. Typical pile lengths are 88 feet for the maintenance bulkhead storage platform.

Since the guide walls must retain fill soil, use sheet pile guide walls similar to the type currently in use, sheet pile face tied back to sheet pile used as anchor. Quantities based on quantity take off of existing East gate guide walls B5, B6, B7, and B8, raised 6 feet to match top of wall elevation +16.00 NAVD88 at the Colorado River Locks, which were recently surveved



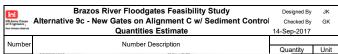
Guide wall rub face: Use UHMW sheets attached to steel plate mounted to sheet pile face. WT steel vertical guide for steel plate attachment to sheet pile face. The total height of UHMW panels and steel plate estimated at 9 feet tall. 2 3/4" thick UHMW sheet attached to 5/8" thick steel plate. UHMW attached to steel plate with 1" diameter bolts with 1'x 1' bolt spacing grid. The length of rub face below is the same as the lengths of guide wall above, only difference is the specific location to the gate is broken down.

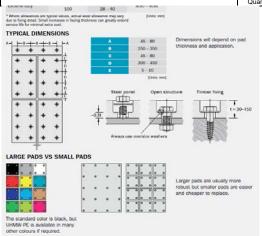


CHANNEL EXCAVATION

Alignment C through existing barge facility. The area is partially excavated.

CADD channel excavation overlaid with aerial image of existing channel outline. West channel currently not being used, East channel is occupied, West requires more excavation (subtract less)





Exist. channel areas: (Barge facility)	Location West channel East channel	Area (ft2) 353,600 550,000	Use 75% of area for depth of excavation Use 90% of area for depth of excavation	Area (ft2) 265,200 495,000	Subtract this area from channel excavation (Area already excavated)
(Alignment C)	Location	Area (ft2)	_	ocation Area (ft2)	Volume (yd3)
Channel excavation required from CADD	West channel East channel	1,312,000 1,209,700		channel 1,046,800 channel 714,700	697,900 476.500
, w	est channel north	169,830	West chan	nel north 169,830	113,300 268,700
Exist.channel excavated We	est channel south	232,990	West chan	nel south 232,990	ل 155,400
to open channel ≺ E	ast channel north	85,120	✓ East chan	nel north 85,120	56,800 > 181,800
(Alignment A) Ea	ast channel south	187,500	East chan	nel south 187,500	
				Sum = 2,436,940	ft2 <b>1,624,900</b> yd3

Average depth of excavation used = 18 ft

## FILL FOR NEW GATE LOCATIONS

•	Sum =	560,370	ft2	186,900	yd3	Average depth of fill used = 9 ft
_	East Gate	264,420	_	88,200	_	
For the new gate locations	West Gate	295,950		98,700		
	Location	Area (ft2)		Volume (yd3	3)	

PROJECT:	CIVIL CONSTRUCTION COST ESTIMATE - ROM CRL, OPEN CHANNEL		SHEET	1 OF 1 AUG 2017	
PROJECT:	CRL, OPEN CHANNEL		BY: Grey	,	
		COMBO	EST BY:	Petitbon	
ITEM	DESCRIPTION	QUANTITY	UNIT	UNIT COST	AMOUNT
	BLH -DRY Enhancement (99 AC)				
1.	MOB AND DEMOB	1	JOB	\$0.00	\$0.00
2.	Clearing and Grubbing Clearing and grubbing is to be completed prior to dredging the bypass channel. Trees are to be removed to ground level and stumps and roots are to be removed. All cleared material will be placed within the disposal area and burned on site. East Lock 8.5 AC, West Lock 10.5 AC	19	AC	\$0.00	\$0.00
3	Bypass Channel Stone Removal Prior to dredging, stone armoring needs to be removed. The stone will be disposed of within the disposal area. Armoring is assumed to be 2-ft thick 500lb stone. 599 tons of stone is within the East Lock.	3,850	TONS	\$0.00	\$0.00
4.	Bypass Channel Dredging If the land within the bypass channel is cleared and grubbed and the stones remove. The bypass channel can dredged via hydraulic dredge. Dredge material will be disposed of within the existing disposal area. It is assumed that the disposal area retention dikes and available capacity is suitable.	586,700	CY	\$0.00	\$0.00
5.	Lock Chamber Stone Armoring Removal To be completed prior to dredging the new channel. Assume a 50/50 split between East and West Lock for quantity.	9,550	TONS	\$0.00	\$0.00
6.	New Channel Dredging The new channel dredging will remove the remaining material between the bypass channel cut and the existing 125' wide channel. This would be completed after the existing lock structures are removed. Structures will provide quantity estimates.	355,900	CY	\$0.00	\$0.00
7	Existing Gate and Wall Demolition The limits of the new open channel will extend into the existing lock structure. Demolition will be required on the concrete approach	20,184 50,000 50' Sheet pile	CY SF	\$0.00 \$0.00	\$0.00 \$0.00
	walls, sector gate walls, sector gate removal, interior guidewall, and existing sheet pile approach walls on the river side. This is to be done only on the side of the structure with the open channel. Existing	Remove 4 Sector Gates	JOB	\$0.00	\$0.00
	CONSTRUCTION SUBTOTAL:				\$0.00
	E&D S&A	6% 8%			\$0.00 \$0.00
	SUBTOTAL (CONSTRUCTION + E&D + S&A):				\$0.00
	CONTINGENCIES	25	%		\$0.00
	TOTAL COST :				\$0.00

<b>H-H</b>	Colorado Locks Rehab Estimate	Designed By	JMR
US Army Corps of Engineers	Matagorda, Texas	Checked By	DPL
of Engineers New Orleans District	Gate Rehab and Guidewall Replacement		
Number	Number Description		
Number	Number Description	Quantity	Unit
1	Mob & Demob	LUMPSUM	LS
2	Foundation Guidewall		
	18" Pipe Pile, 1/2" Wall	46,735	LF
	Tension Connector	576	EA
	Paint top 15 feet of pile excluding slab embedded 1'-0", Coaltar Expoxy, System 6	8,640	LF
	Taint top 10 feet of pile excluding slab embedded 1-0, obaltaf Expoxy, dystem o	0,040	Li
3	Sector Gate		
	Replacement Plates (ASTM A-572, Grade 50)	2,400	LBS
	Sand Blast and Paint 8 Gates	87,600	SF
	Paint Sector Gates, Coaltar Expoxy, System 6-A-Z		
4	Structural Concrete		
	Guidewall		
	Reinforced slabs	3,900	CY
	Reinforced walls	3,150	CY
	Machinery House		
	Concrete Soil Founded Slab, 6" thick (10'x10') - 8 total (#6@12" Middle, Each Way)	15	CY
5	Miscellaneous Metals		
	Guidewall (Chamber)		
	3/4" SST Anchor Rod, with 2 Nuts and Washers, 18"	6,480	EA
	1" SST Anchor Rod, with 2 Nuts and Washers, 18"	216	EA
	3/8" SST Corner Plate, 6" Radius, 1'-0" top to bottom, with 2 L #5 studs 2'-0" OC	1,800	LF
	Mooring Bollard	36	EA . =
	8"x12" Reinforced Marine Composite Timber	16,200	LF
6	Mechanical		
	Sector Gate		
	Rack & Pinion System - drive gear and rack sections	LUMPSUM	LS
	Hydraulic Rotary Motor (Hagglund Viking 63 series)		
	Hydraulic Power Unit with redundant motor/pump assembly		
	Hydraulic Hoses		
	Local Control Panels		
	Machinery House ( 8 total, 1 for each gate) 10'x10'x10' Pre-fab building	LUMP SUM	LS
7	Electrical		
	Lock Complex		
	Power Distribution, Back-up power, Lighting, and Lightening Systems	LUMPSUM	LS
	Program Logic Control (PLC); Hardwire Back-up Controls	LUMPSUM	LS

(\$120,000 per gate) (\$1,000,000 total from Rachael for all items)

(\$1,000,000 from Jabeen) (\$600,000 from Jabeen)

3	Riverside Gate Channel Inlet Sheetpile Replacement		
	100 feet on 4 sides; original sheet 50 foot long; New Sheet PZ-35 - 75 foot long	30,000	SF
	Paint top 20 feet, Coaltar Epoxy, System 6	8,000	LF
	UHMW-PE Panels - Heavy Duty Grade - Type 1	396	EA
	UHMW-PE Panels - Heavy Duty Grade - Type 2	168	EA
	UHMW-PE 1" Bolts	7,744	EA
	5/8" Steel Backing Plate	8,172	SF

	Colorado Locks Rehab Estimate	Designed By	JMR
	Matagorda, Texas	Checked By	DPL
US Army Corps of Engineers New Orleans District	Riverside Gate Removal Alternative 4b.1	S.165.162 2,	2. 2
Number	Number Description	Quantity	Unit
1	Mob & Demob	LUMPSUM	LS
2	Demolition		
	Remove Existing Interior Guidewall	LUMPSUM	LS
	Remove 4 Existing Sector Gates	LUMPSUM	LS
	Remove Existing Control House and Machinery Buildings (4 total)	LUMPSUM	LS
	Sheet Pile Approach Wall Removal (50 ft long)	103,250	SF
	Main Structure Demolition (Vertical Walls Only)	11,180	CY
	East Side Parking Lot Slab	45	CY
	Channel Work (125') Land Excavation	50,000	01/
		50,930	CY
	Dredging	34,000	CY
	Riprap (3' Layer)	4,000	TON
4	Sector Gate (Existing Structure Rehab)		
	Replacement Plates (ASTM A-572, Grade 50)	2,400	LBS
	Sand Blast and Paint 4 Gates	87,600	SF
	Paint Sector Gates, Coaltar Expoxy, System 6-A-Z		
5	Structural Concrete (Existing Structure Rehab)		
	Machinery House		
	Concrete Soil Founded Slab, 6" thick (10'x10') -4 total (#6@12" Middle, Each Way)	8	CY
6	Mechanical (Existing Structure Rehab)		
	Sector Gate		
	Rack & Pinion System - drive gear and rack sections	LUMPSUM	LS
	Hydraulic Rotary Motor (Hagglund Viking 63 series)		
	Hydraulic Power Unit with redundant motor/pump assembly		
	Hydraulic Hoses		
	Local Control Panels		
	Machinery House ( 4 total, 1 for each gate) 10'x10'x10' Pre-fab building	LUMP SUM	LS
7	Electrical (Existing Structure Rehab)		
	Gate Complex		
	Power Distribution, Back-up power, Lighting, and Lightening Systems	LUMPSUM	LS
	Program Logic Control (PLC); Hardwire Back-up Controls	LUMPSUM	LS

# DRAFT ENGINEERING APPENDIX A APPENDIX 4 COSTS

Print Date Wed 10 January 2018 Eff. Date 8/16/2017 U.S. Army Corps of Engineers Project : Colorado-Brazos Locks Feasibility Study GIWW Brazos River and Colorado River Systems - Review Report

Title Page

Time 16:26:43

Colorado-Brazos Locks Feasibility Study Alternatives prior to TSP

Estimated by

Designed by Colorado - MVN Structures Br; Brazos - TxDOT

Prepared by John Petitbon, Miguel Ramos

Preparation Date 8/16/2017
Effective Date of Pricing 8/16/2017

Estimated Construction Time Days

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#### U.S. Army Corps of Engineers Project : Colorado-Brazos Locks Feasibility Study GIWW Brazos River and Colorado River Systems - Review Report

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bid schedule summary Page 1

Description	Quantity	UOM	ContractCost	Contingency	Escalation	ProjectCost
bid schedule summary			623,419,288.45	0.00	5,917,033.37	629,336,321.83
1 Colorado River Locks	1.0000	EA	94,386,148.83 <b>94,386,148.83</b>	0.00	4,318,249.55	98,704,398.39 <b>98,704,398.39</b>
1 Alt 3 - CLR Open Channel Alternative	1.0000	EA	11,122,844.90 <b>11,122,844.90</b>	0.00	0.00	11,122,844.90 <b>11,122,844.90</b>
09 Channels AND Canals	1.0000	EA	11,122,844.90 <b>11,122,844.90</b>	0.00	0.00	<i>11,122,844.90</i> <b>11,122,844.90</b>
09 01 Channels	1.0000	EA	11,122,844.90 <b>11,122,844.90</b>	0.00	0.00	<i>11,122,844.90</i> <b>11,122,844.90</b>
09 01 01 Mobilization and Demobilization	1.0000	EA	2,973,830.66 <b>2,973,830.66</b>	0.00	0.00	2,973,830.66 <b>2,973,830.66</b>
09 01 02 Clearing and Grubbing	1.0000	EA	52,095.10 <b>52,095.10</b>	0.00	0.00	52,095.10 <b>52,095.10</b>
09 01 03 Bypass Channel Stone Removal	1.0000	EA	59,549.09 <b>59,549.09</b>	0.00	0.00	59,549.09 <b>59,549.09</b>
09 01 04 Bypass Channel Dredging	1.0000	EA	2,778,582.77 <b>2,778,582.77</b>	0.00	0.00	2,778,582.77 <b>2,778,582.77</b>
09 01 05 Lock Chamber Stone Armoring Removal	1.0000	EA	147,712.68 <b>147,712.68</b>	0.00	0.00	147,712.68 <b>147,712.68</b>
09 01 06 New Channel Dredging	1.0000	EA	1,700,715.46 <b>1,700,715.46</b>	0.00	0.00	1,700,715.46 <b>1,700,715.46</b>
09 01 07 Demolition	1.0000	EA	3,410,359.14 <b>3,410,359.14</b>	0.00	0.00	3,410,359.14 <b>3,410,359.14</b>
2 Alt 2B - CLR Gate Rehab and Guidewall Replacement	1.0000	EA	42,073,555.48 <b>42,073,555.48</b>	0.00	1,629,528.13	<i>43</i> ,703,083.62 <b>43,703,083.62</b>
05 LOCKS	1.0000	EA	42,073,555.48 <b>42,073,555.48</b>	0.00	1,629,528.13	43,703,083.62 <b>43,703,083.62</b>
05 01 Colorado LOCK	1.0000	EA	42,073,555.48 <b>42,073,555.48</b>	0.00	1,629,528.13	43,703,083.62 <b>43,703,083.62</b>
05 01 01 Mobilization and Demobilization	1.0000	EA	1,942,496.64 <b>1,942,496.64</b>	0.00	0.00	1,942,496.64 <b>1,942,496.64</b>
05 01 02 Foundation	1.0000	EA	9,659,340.07 <b>9,659,340.07</b>	0.00	0.00	9,659,340.07 <b>9,659,340.07</b>
05 01 06 Sector Gate	1.0000	EA	11,324,031.51 11,324,031.51	0.00	1,629,528.13	12,953,559.64 <b>12,953,559.64</b>

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bid schedule summary Page 2

Description	Quantity	UOM	ContractCost	Contingency	Escalation	ProjectCost
05 01 07 Structural Concrete	1.0000	EA	5,670,809.92 <b>5,670,809.92</b>	0.00	0.00	5,670,809.92 <b>5,670,809.92</b>
05 01 09 Miscellaneous Metals	1.0000	EA	387,314.95 <b>387,314.95</b>	0.00	0.00	387,314.95 <b>387,314.95</b>
05 01 10 Mechanical	1.0000	EA	3,312,359.18 <b>3,312,359.18</b>	0.00	0.00	3,312,359.18 <b>3,312,359.18</b>
05 01 11 Electrical	1.0000	EA	4,794,124.81 <b>4,794,124.81</b>	0.00	0.00	4,794,124.81 <b>4,794,124.81</b>
05 01 13 Guide Wall (1,800 feet) - 36 @ 50 ft monoliths	1.0000	EA	3,964,898.36 <b>3,964,898.36</b>	0.00	0.00	3,964,898.36 <b>3,964,898.36</b>
05 01 14 Demolition	1.0000	EA	1,018,180.06 <b>1,018,180.06</b>	0.00	0.00	1,018,180.06 <b>1,018,180.06</b>
3 Alt 4b.1 Hybrid - CLR Inland Gate Rehab and Riverside Gate removal	1.0000	EA	17,611,915.31 <b>17,611,915.31</b>	0.00	1,059,193.29	18,671,108.60 <b>18,671,108.60</b>
05 LOCKS	1.0000	EA	17,611,915.31 <b>17,611,915.31</b>	0.00	1,059,193.29	18,671,108.60 <b>18,671,108.60</b>
05 01 Colorado LOCK	1.0000	EA	17,611,915.31 <b>17,611,915.31</b>	0.00	1,059,193.29	18,671,108.60 <b>18,671,108.60</b>
05 01 01 Mobilization and Demobilization	1.0000	EA	647,498.88 <b>647,498.88</b>	0.00	0.00	647,498.88 <b>647,498.88</b>
05 01 02 Demolition	1.0000	EA	3,499,730.23 <b>3,499,730.23</b>	0.00	0.00	3,499,730.23 <b>3,499,730.23</b>
05 01 03 Channel work	1.0000	EA	672,093.02 <b>672,093.02</b>	0.00	0.00	672,093.02 <b>672,093.02</b>
05 01 06 Sector Gate	1.0000	EA	7,360,620.48 <b>7,360,620.48</b>	0.00	1,059,193.29	8,419,813.77 <b>8,419,813.77</b>
05 01 10 Mechanical	1.0000	EA	1,777,445.93 <b>1,777,445.93</b>	0.00	0.00	1,777,445.93 <b>1,777,445.93</b>
05 01 11 Electrical	1.0000	EA	3,654,526.78 <b>3,654,526.78</b>	0.00	0.00	3,654,526.78 <b>3,654,526.78</b>
3 Alt 2B1 - CLR Gate Rehab with NO Guidewall	1.0000	EA	23,577,833.14 <b>23,577,833.14</b>	0.00	1,629,528.13	25,207,361.27 <b>25,207,361.27</b>
05 LOCKS	1.0000	EA	23,577,833.14 <b>23,577,833.14</b>	0.00	1,629,528.13	25,207,361.27 <b>25,207,361.27</b>
05 01 Colorado LOCK	1.0000	EA	23,577,833.14 <b>23,577,833.14</b>	0.00	1,629,528.13	25,207,361.27 <b>25,207,361.27</b>

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Description	Quantity	<u>UOM</u>	ContractCost	Contingency	Escalation	ProjectCost
05 01 01 Mobilization and Demobilization	1.0000	EA	776,998.66 <b>776,998.66</b>	0.00	0.00	776,998.66 <b>776,998.66</b>
05 01 02 Foundation	1.0000	EA	3,370,318.99 <b>3,370,318.99</b>	0.00	0.00	3,370,318.99 <b>3,370,318.99</b>
05 01 06 Sector Gate	1.0000	EA	11,324,031.51 <b>11,324,031.51</b>	0.00	1,629,528.13	12,953,559.64 <b>12,953,559.64</b>
05 01 10 Mechanical	1.0000	EA	3,312,359.18 <b>3,312,359.18</b>	0.00	0.00	3,312,359.18 <b>3,312,359.18</b>
05 01 11 Electrical	1.0000	EA	4,794,124.81 <b>4,794,124.81</b>	0.00	0.00	4,794,124.81 <b>4,794,124.81</b>
2 Brazos River Floodgates	1.0000	EA	529,033,139.62 <b>529,033,139.62</b>	0.00	1,598,783.82	530,631,923.44 <b>530,631,923.44</b>
1 Alt 9a - Brazos Open Channel Alternative	1.0000	EA	13,181,715.54 13,181,715.54	0.00	0.00	13,181,715.54 13,181,715.54
09 Channnels AND Canals	1.0000		13,181,715.54 13,181,715.54	0.00	0.00	13,181,715.54 13,181,715.54
09 01 CHANNELS	1.0000		13,181,715.54 13,181,715.54	0.00	0.00	13,181,715.54 13,181,715.54
09 01 01 Mobilization and Demobilization	1.0000		1,779,062.42 <b>1,779,062.42</b>	0.00	0.00	1,779,062.42 <b>1,779,062.42</b>
09 01 02 Demolition	1.0000		467,750.85 <b>467,750.85</b>	0.00	0.00	467,750.85 <b>467,750.85</b>
09 01 03 Excavation and Fill	1.0000		10,774,175.43 10,774,175.43	0.00	0.00	10,774,175.43 10,774,175.43
			80,363.42			80,363.42
09 01 04 Electrical	2.0000		<b>160,726.83</b> 141,208,411.98	0.00	0.00	<b>160,726.83</b> 141,208,411.98
2 Alt 9c - Brazos River Alignment C with Sediment Control	1.0000		<b>141,208,411.98</b> <i>141,208,411.98</i>	0.00		<b>141,208,411.98</b> <i>141,208,411.98</i>
15 Floodway Control and Diversion Structures	1.0000	EA	<b>141,208,411.98</b> <i>133,421,512.45</i>	0.00	0.00	<b>141,208,411.98</b> <i>133,421,512.45</i>
15 01 Brazos Floodgates	1.0000	EA	133,421,512.45	0.00	0.00	133,421,512.45 133,421,512.45
15 01 01 Mobilization and Demobilization	1.0000	EA	11,374,582.39 11,374,582.39	0.00	0.00	11,374,582.39 <b>11,374,582.39</b>
15 01 02 Demolition	1.0000	EA	<i>4</i> ,142,975.09 <b>4,142,975.09</b>	0.00	0.00	<i>4</i> ,142,975.09 <b>4,142,975.09</b>

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Description	Quantity	UOM	ContractCost	Contingency	Escalation	ProjectCost
15 01 03 Excavation and Fill	1.0000	EA	12,266,952.98 <b>12,266,952.98</b>	0.00	0.00	12,266,952.98 <b>12,266,952.98</b>
15 01 04 cofferdam	1.0000	EA	15,256,400.14 <b>15,256,400.14</b>	0.00	0.00	15,256,400.14 <b>15,256,400.14</b>
15 01 05 Concrete Structure and Gate	1.0000	EA	61,500,709.33 <b>61,500,709.33</b>	0.00	0.00	61,500,709.33 <b>61,500,709.33</b>
15 01 06 Maintenance Dewatering System	1.0000	EA	6,319,638.00 <b>6,319,638.00</b>	0.00	0.00	6,319,638.00 <b>6,319,638.00</b>
15 01 07 Guide walls	1.0000	EA	18,522,091.99 <b>18,522,091.99</b>	0.00	0.00	18,522,091.99 <b>18,522,091.99</b>
15 01 08 Mechanical	2.0000	EA	465,083.96 <b>930,167.92</b>	0.00	0.00	465,083.96 <b>930,167.92</b>
15 01 09 Electrical	2.0000	EA	1,553,997.31 <b>3,107,994.62</b>	0.00	0.00	1,553,997.31 <b>3,107,994.62</b>
15 02 Sediment Control or Sluice Gates	1.0000	EA	7,786,899.53 <b>7,786,899.53</b>	0.00	0.00	7,786,899.53 <b>7,786,899.53</b>
01 Mob & Demob	1.0000	LS	647,498.88	0.00	0.00	647,498.88
02 Earthen Dewatering Dam	1.0000	EA	171,610.06 <b>171,610.06</b>	0.00	0.00	171,610.06 <b>171,610.06</b>
05 Civil	1.0000	EA	422,601.00 <b>422,601.00</b>	0.00	0.00	422,601.00 <b>422,601.00</b>
06 Foundation	1.0000	EA	2,832,262.98 <b>2,832,262.98</b>	0.00	0.00	2,832,262.98 <b>2,832,262.98</b>
07 Structure Concrete	1.0000	LS	821,125.71	0.00	0.00	821,125.71
08 Structural Steel	1.0000	LS	2,310,829.95	0.00	0.00	2,310,829.95
03 Tie-in Sheetpile Walls	1.0000	EA	167,628.24 <b>167,628.24</b>	0.00	0.00	167,628.24 <b>167,628.24</b>
09 Miscellaneous Metals	1.0000	LS	41,301.97	0.00	0.00	41,301.97
10 Mechanical	1.0000	LS	125,303.95	0.00	0.00	125,303.95
12 Electrical	1.0000	LS	133,939.03	0.00	0.00	133,939.03
14 Timber Pile Clusters (7 Pile)	4.0000	EA	28,199.44 <b>112,797.75</b>	0.00	0.00	28,199.44 <b>112,797.75</b>
3 Alt 3a - Brazos River - Move gates back further in Existing Channel	1.0000	EA	139,648,629.19 <b>139,648,629.19</b>	0.00	0.00	139,648,629.19 139,648,629.19

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Description	Quantity	<u>UOM</u>	ContractCost	Contingency	Escalation	ProjectCost
15 Floodway Control and Diversion Structures	1.0000	EA	139,648,629.19 <b>139,648,629.19</b>	0.00	0.00	139,648,629.19 <b>139,648,629.19</b>
15 01 Brazos Floodgates	1.0000	EA	139,648,629.19 <b>139,648,629.19</b>	0.00	0.00	139,648,629.19 <b>139,648,629.19</b>
15 01 01 Mobilization and Demobilization	1.0000	EA	11,303,638.55 <b>11,303,638.55</b>	0.00	0.00	11,303,638.55 <b>11,303,638.55</b>
15 01 02 Demolition	1.0000	EA	4,142,975.09 <b>4,142,975.09</b>	0.00	0.00	4,142,975.09 <b>4,142,975.09</b>
15 01 03 Excavation and Fill	1.0000	EA	18,558,733.33 <b>18,558,733.33</b>	0.00	0.00	18,558,733.33 <b>18,558,733.33</b>
15 01 04 cofferdam	1.0000	EA	15,256,400.14 <b>15,256,400.14</b>	0.00	0.00	15,256,400.14 <b>15,256,400.14</b>
15 01 05 Concrete Structure and Gate	1.0000	EA	61,506,989.55 <b>61,506,989.55</b>	0.00	0.00	61,506,989.55 <b>61,506,989.55</b>
15 01 06 Maintenance Dewatering System	1.0000	EA	6,319,638.00 <b>6,319,638.00</b>	0.00	0.00	6,319,638.00 <b>6,319,638.00</b>
15 01 07 Guide walls	1.0000	EA	18,522,091.99 <b>18,522,091.99</b>	0.00	0.00	18,522,091.99 <b>18,522,091.99</b>
15 01 08 Mechanical	2.0000	EA	465,083.96 <b>930,167.92</b>	0.00	0.00	465,083.96 <b>930,167.92</b>
15 01 09 Electrical	2.0000	ΕA	1,553,997.31 <b>3,107,994.62</b>	0.00	0.00	1,553,997.31 <b>3,107,994.62</b>
4 Alt 2a - Brazos Gate Rehab	1.0000		21,957,346.11 <b>21,957,346.11</b>	0.00	1,598,783.82	23,556,129.93 <b>23,556,129.93</b>
15 Floodway Control and Diversion Structures	1.0000		21,957,346.11 21,957,346.11	0.00	1,598,783.82	23,556,129.93 <b>23,556,129.93</b>
15 01 Brazos Floodgates	1.0000		21,957,346.11 21,957,346.11	0.00	1,598,783.82	23,556,129.93 <b>23,556,129.93</b>
15 01 01 Mobilization and Demobilization	1.0000		906,498.43			906,498.43 <b>906,498.43</b>
			<b>906,498.43</b> 8,808,726.28	0.00	0.00	10,407,510.10
15 01 02 Sector Gate Rehab	1.0000	EA	<b>8,808,726.28</b> <i>194.249.66</i>	0.00	1,598,783.82	<b>10,407,510.10</b> <i>194.249.66</i>
15 01 03 Raise / Relocate Gate Operator Buildings	2.0000	EA	388,499.33	0.00	0.00	388,499.33
15 01 04 Modify / Raise Gate Machinery Pits	4.0000	EA	37,444.24 <b>149,776.95</b>	0.00	0.00	37,444.24 <b>149,776.95</b>

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WW Brazos River and Colorado River Systems - Review Report	bid schedule summary Page 6

Description	Quantity	UOM	ContractCost	Contingency	Escalation	ProjectCost
15 01 05 Channel Maintenance Structure	2.0000	EA	262,022.94 <b>524,045.88</b>	0.00	0.00	262,022.94 <b>524,045.88</b>
15 01 06 Guide Walls	1.0000	EA	6,924,243.37 <b>6,924,243.37</b>	0.00	0.00	6,924,243.37 <b>6,924,243.37</b>
15 01 07 Mechanical	2.0000	EA	520,205.02 <b>1,040,410.04</b>	0.00	0.00	520,205.02 <b>1,040,410.04</b>
15 01 08 Electrical	2.0000	EA	1,607,572.92 <b>3,215,145.85</b>	0.00	0.00	1,607,572.92 <b>3,215,145.85</b>
5 Alt 9b - Brazos River Alignment C withOUT Sediment Control	1.0000	EA	134,701,490.83 <b>134,701,490.83</b>	0.00	0.00	134,701,490.83 <b>134,701,490.83</b>
15 Floodway Control and Diversion Structures	1.0000	EA	134,701,490.83 <b>134,701,490.83</b>	0.00	0.00	134,701,490.83 <b>134,701,490.83</b>
15 01 Brazos Floodgates	1.0000	EA	134,701,490.83 <b>134,701,490.83</b>	0.00	0.00	134,701,490.83 <b>134,701,490.83</b>
15 01 01 Mobilization and Demobilization	1.0000	EA	<i>11,374,582.39</i> <b>11,374,582.39</b>	0.00	0.00	<i>11,374,582.39</i> <b>11,374,582.39</b>
15 01 02 Demolition	1.0000	EA	4,142,975.09 <b>4,142,975.09</b>	0.00	0.00	4,142,975.09 <b>4,142,975.09</b>
15 01 03 Excavation and Fill	1.0000	EA	13,546,931.36 <b>13,546,931.36</b>	0.00	0.00	13,546,931.36 <b>13,546,931.36</b>
15 01 04 cofferdam	1.0000	EA	15,256,400.14 <b>15,256,400.14</b>	0.00	0.00	15,256,400.14 <b>15,256,400.14</b>
15 01 05 Concrete Structure and Gate	1.0000	EA	61,500,709.33 <b>61,500,709.33</b>	0.00	0.00	61,500,709.33 <b>61,500,709.33</b>
15 01 06 Maintenance Dewatering System	1.0000	EA	6,319,638.00 <b>6,319,638.00</b>	0.00	0.00	6,319,638.00 <b>6,319,638.00</b>
15 01 07 Guide walls	1.0000	EA	18,522,091.99 <b>18,522,091.99</b>	0.00	0.00	18,522,091.99 <b>18,522,091.99</b>
15 01 08 Mechanical	2.0000	EA	465,083.96 <b>930,167.92</b>	0.00	0.00	465,083.96 <b>930,167.92</b>
15 01 09 Electrical	2.0000	EA	1,553,997.31 <b>3,107,994.62</b>	0.00	0.00	1,553,997.31 <b>3,107,994.62</b>
6 Alt 3a.1 Hybrid - Brazos River - Open channel west side and Move gate back further in Existing Channel on East side	1.0000	EA	78,335,545.97 <b>78,335,545.97</b>	0.00	0.00	78,335,545.97 <b>78,335,545.97</b>
			78,335,545.97			78,335,545.97

U.S. Army Corps of Engineers Project : Colorado-Brazos Locks Feasibility Study GIWW Brazos River and Colorado River Systems - Review Report

bid schedule summary Page 7

Description	Quantity	UOM	ContractCost	Contingency	Escalation	ProjectCost
15 Floodway Control and Diversion Structures	1.0000	EA	78,335,545.97	0.00	0.00	78,335,545.97
15 01 Brazos Floodgates	1.0000	EA	78,335,545.97 <b>78,335,545.97</b>	0.00	0.00	78,335,545.97 <b>78,335,545.97</b>
15 01 01 Mobilization and Demobilization	1.0000	EA	7,030,145.94 <b>7,030,145.94</b>	0.00	0.00	7,030,145.94 <b>7,030,145.94</b>
15 01 02 Demolition	1.0000	EA	4,142,975.09 <b>4,142,975.09</b>	0.00	0.00	4,142,975.09 <b>4,142,975.09</b>
15 01 03 Excavation and Fill	1.0000	EA	12,323,477.45 <b>12,323,477.45</b>	0.00	0.00	12,323,477.45 <b>12,323,477.45</b>
15 01 04 cofferdam	1.0000	EA	7,632,622.80 <b>7,632,622.80</b>	0.00	0.00	7,632,622.80 <b>7,632,622.80</b>
15 01 05 Concrete Structure and Gate	1.0000	EA	30,929,193.16 <b>30,929,193.16</b>	0.00	0.00	30,929,193.16 <b>30,929,193.16</b>
15 01 06 Maintenance Dewatering System	1.0000	EA	6,319,638.00 <b>6,319,638.00</b>	0.00	0.00	6,319,638.00 <b>6,319,638.00</b>
15 01 07 Guide walls	1.0000	EA	7,938,412.27 <b>7,938,412.27</b>	0.00	0.00	7,938,412.27 <b>7,938,412.27</b>
15 01 08 Mechanical	1.0000	EA	465,083.96 <b>465,083.96</b>	0.00	0.00	465,083.96 <b>465,083.96</b>
15 01 09 Electrical	1.0000	EA	1,553,997.31 <b>1,553,997.31</b>	0.00	0.00	1,553,997.31 <b>1,553,997.31</b>

Alternative	Construction Duration (year)
Brazos Alt 2a - Rehab	1.25
Brazos Alt 3a - Move gates back	2.25
Brazos Alt 3a.1 - Move gate back East + Open channel West	2.00
Brazos Alt 9a - Open channel	1.00
Brazos Alt 9b - New gates Align C w/o Sediment Control	2.25
Brazos Alt 9c - New gates Align C with Sediment Control	3.00
Colorado Alt 4b.1 Hybrid - Rehab Inland gate + Remove Riverside gate	1.25
Colorado Alt 2b - Rehab w/ Guidewall	1.50
Colorado Alt 2b1 - Rehab w/ NO Guidewall	1.25
Colorado Alt 3 - Open channel	1.00

New construction durations. <u>Do Not</u> include contingency

## **Abbreviated Risk Analysis**

Project (less than \$40M): **Brazos River Floodgate**Project Development Stage/Alternative: **Feasibility (Alternatives)** 

Risk Category: Moderate Risk: Typical Project Construction Type

Meeting Date: 10/4/2017

Alternative: Alt 2a - Major Rehab Existing

Total Estimated Construction Contract Cost = \$ 23,556,130

<u>CWWBS</u>		Feature of Work	<u>Estir</u>	Estimated Cost		ency <u>\$ C</u>	Contingency	<u>Total</u>
01 LANDS AND DAMAGES	Real Estate		\$	27,000	20.0%	\$	5,400 \$	32,400
1 02 RELOCATIONS	Relocations		\$	_	0%	\$	- \$	-
2 06 FISH AND WILDLIFE FACILITIES	Mitigation		<b>\$</b>	-	0%	\$	- \$	-
3 15 FLOODWAY CONTROL AND DIVERSI	ON STRUCTURES Mob/Demob		\$	906,499	13%	\$	117,748 \$	1,024,247
4 15 FLOODWAY CONTROL AND DIVERSI	ON STRUCTURES Sector Gate	Rehab	\$	10,407,510	45%	\$	4,641,134 \$	15,048,644
5 15 FLOODWAY CONTROL AND DIVERSI	ON STRUCTURES Raise / Reloc	cate Gate Operator Bldg	\$	388,499	25%	\$	98,323 \$	486,822
6 15 FLOODWAY CONTROL AND DIVERSI	ON STRUCTURES Modify / Rais	se Gate Machinery pit	\$	149,777	57%	\$	85,582 \$	235,359
7 15 FLOODWAY CONTROL AND DIVERSI	ON STRUCTURES Channel Mai	intenance Structure	\$	524,046	36%	\$	190,089 \$	714,135.18
8 15 FLOODWAY CONTROL AND DIVERSI	ON STRUCTURES Guide Walls		\$	6,924,243	42%	\$	2,928,231 \$	9,852,474.36
9 15 FLOODWAY CONTROL AND DIVERSI	ON STRUCTURES Mechanical		\$	1,040,410	37%	\$	381,160 \$	1,421,569.57
10 15 FLOODWAY CONTROL AND DIVERSI	ON STRUCTURES Electrical		\$	3,215,146	44%	\$	1,404,565 \$	4,619,710.90
11 15 FLOODWAY CONTROL AND DIVERSI	ON STRUCTURES		\$	_	0%	\$	- \$	-
12 All Other	Remaining C	Construction Items	\$	-	0.0% 0%	\$	- \$	-
13 30 PLANNING, ENGINEERING, AND DES	IGN Planning, En	ngineering, & Design	\$	-	0%	\$	- \$	-
14 31 CONSTRUCTION MANAGEMENT	Construction	n Management	\$	-	0%	\$	- \$	-
XX FIXED DOLLAR RISK ADD (EQUALLY DIS	SPERSED TO ALL, MUST INCLUDE JUSTI	FICATION SEE BELOW)				\$	_	

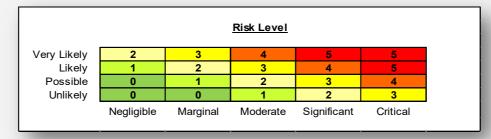
Totals						
Real Estate	\$	27,000	20%	Ç	\$ 5,400	\$ 32,400.00
Total Construction Estimate	\$	23,556,130	42%	(	\$ 9,846,832	\$ 33,402,962
Total Planning, Engineering & Design	າ \$	-	0%	Ç	\$ -	\$ -
Total Construction Management	t \$	-	0%	(	\$ -	\$ -
Total Excluding Real Estate	\$	23,556,130	42%	,	\$ 9,846,832	\$ 33,402,962
				Base	50%	80%
Confidence Level Range Estimate (\$000's)			\$2	23,556k	 \$29,464k	\$33,403k

\* 50% based on base is at 5% CL.

**Fixed Dollar Risk Add:** (Allows for additional risk to be added to the risk analsyis. Must include justification. Does not allocate to Real Estate.

## Brazos River Floodgate Alt 2a - Major Rehab Existing

Feasibility (Alternatives)
Abbreviated Risk Analysis **Meeting Date:** 4-Oct-17



# Risk Register

Risk Element	Feature of Work	Concerns	PDT Discussions & Conclusions (Include logic & justification for choice of Likelihood &	Impact	Likelihood	Risk Level
NISK Element	r catalic of work	Constitution	Impact)	impuot	Eincimood	THISK ECVE
Project Ma	nagement & Scope Growth			Maximum Proje	75%	
PS-1	Relocations	Are there any Relocations in area?	Lisa MThere are no railroads or utilities that will be impacted for the project. This alternative only for Rehab of the existing structure.	Negligible	Unlikely	0
PS-2	Mitigation	Is mitigation required?	No, this alternative only for Rehab of the existing structure.	Negligible	Unlikely	0
PS-3	Mob/Demob	no concern for scope growth	standard type work. If additional scope added Mob would increase.	Negligible	Possible	0
PS-4	Sector Gate Rehab	concern for scope growth?	Based on similar existing scopes for rehab of the existing structures that is done periodincally and cost used should be representative of processes required. Do we really know what is out there? Considering this is an alternative to totally replacing the structures, the scope could grow to replace things not typically done under a periodic rehab. Note - there are other items on the bid schedule that replace additional items.	Moderate	Likely	3
PS-5	Raise / Relocate Gate Operator Bldg	potential for scope growth, added features?	Conservatively assuming replacement. However exact details not developed and status of existing conditions not known so could have additional work - covered in technical and qty risk.	Marginal	Possible	1
PS-6	Modify / Raise Gate Machinery pit	potential for scope growth, added features?	Assuming machinery pit can be raised or modified. However exact details not developed and status of existing conditions not certain. Could have to replace with new building.	Significant	Possible	3
PS-7	Channel Maintenance Structure	potential for scope growth, added features?	This item is for a dolphin alignment structure. Exact details not developed yet. Optimum size could increase based on barge simulation testing or other investigations.	Significant	Possible	3
PS-8	Guide Walls	potential for scope growth, added features?	Assuming replacing existing timber facing with new UHMW panels covering whole guidewall. Could existing guidwall require repair/refurbish prior to installing new face? There are drawings of the intersection of GIWW and Brazos River showing some possible modifications to the shoreline and river bathymetry to improve navigability.	Moderate	Likely	3
PS-9	Mechanical	potential for scope growth, added features?	current scope assumes replacing all existing mechanical with typical mechanical used by MVN.	Marginal	Possible	1
PS-10	Electrical	potential for scope growth, added features?	current scope assumes replacing existing electrical. Scope of "existing" not defined specifically. Scope could grow.	Moderate	Possible	2
PS-11	0				Unlikely	0

PS-12	Remaining Construction Items			Negligible	Unlikely	0
PS-13	Planning, Engineering, & Design	potential for scope growth, added features?	added features and changes to scope would require additional PED. The unkonwns of dealing with existing conditions allow for a greater chance of additional PED.	Marginal	Likely	N/A
PS-14	Construction Management		added features and changes to scope would require additional S&A	Marginal	Likely	N/A
<u>Acquisition</u>	n Strategy			Maximum Proje	ct Growth	30%
AS-1	Relocations	none identified	none identified	Negligible	Unlikely	0
AS-2	Mitigation	unknown	No, this alternative only for Rehab of the existing structure.	Negligible	Unlikely	0
AS-3	Mob/Demob	is there an established acquisition plan?	Acquisition strategy is anticipated to be sealed bid per PM. Cost estimate assumes large business, open competition but includes typical tiering of subcontractors. If projects were to go small business, Best Value, or some type of set-a-aside would increase cost.	Marginal	Likely	2
AS-4	Sector Gate Rehab	is there an established acquisition plan?	Acquisition strategy is anticipated to be sealed bid per PM. Cost estimate assumes large business, open competition but includes typical tiering of subcontractors. If projects were to go small business, Best Value, or some type of set-a-aside would increase cost.	Marginal	Likely	2
AS-5	Raise / Relocate Gate Operator Bldg	is there an established acquisition plan?	Acquisition strategy is anticipated to be sealed bid per PM. Cost estimate assumes large business, open competition but includes typical tiering of subcontractors. If projects were to go small business, Best Value, or some type of set-a-aside would increase cost.	Marginal	Likely	2
AS-6	Modify / Raise Gate Machinery pit	is there an established acquisition plan?	Acquisition strategy is anticipated to be sealed bid per PM. Cost estimate assumes large business, open competition but includes typical tiering of subcontractors. If projects were to go small business, Best Value, or some type of set-a-aside would increase cost.	Marginal	Likely	2
AS-7	Channel Maintenance Structure	is there an established acquisition plan?	Acquisition strategy is anticipated to be sealed bid per PM. Cost estimate assumes large business, open competition but includes typical tiering of subcontractors. If projects were to go small business, Best Value, or some type of set-a-aside would increase cost.	Marginal	Likely	2
AS-8	Guide Walls	is there an established acquisition plan?	Acquisition strategy is anticipated to be sealed bid per PM. Cost estimate assumes large business, open competition but includes typical tiering of subcontractors. If projects were to go small business, Best Value, or some type of set-a-aside would increase cost.	Marginal	Likely	2
AS-9	Mechanical	is there an established acquisition plan?	Acquisition strategy is anticipated to be sealed bid per PM. Cost estimate assumes large business, open competition but includes typical tiering of subcontractors. If projects were to go small business, Best Value, or some type of set-a-aside would increase cost.		Likely	2
AS-10	Electrical	is there an established acquisition plan?	Acquisition strategy is anticipated to be sealed bid per PM. Cost estimate assumes large business, open competition but includes typical tiering of subcontractors. If projects were to go small business, Best Value, or some type of set-a-aside would increase cost.	Marginal	Likely	2

AS-11	0			Marginal	Likely	2
AS-12	Remaining Construction Items			Marginal	Likely	2
AS-13	Planning, Engineering, & Design			Marginal	Unlikely	N/A
AS-14	Construction Management	is there an established acquisition plan?	Acquisition strategy is anticipated to be sealed bid per PM. Cost estimate assumes large business, open competition but includes typical tiering of subcontractors. If projects were to go small business, Best Value, or some type of set-a-aside would increase cost.	Marginal	Likely	N/A
Constructi	ion Elements		Maximum Proje	ct Growth	25%	
CON-1	Relocations	none identified	none identified	Negligible	Unlikely	0
CE-2	Mitigation		No, this alternative only for Rehab of the existing structure.	Negligible	Unlikely	0
CE-3	Mob/Demob	High risk or complex construction elements, site access, in-water? Unique construction methods? Special mobilization?	typical construction, no special concerns. Access by land and water.	Negligible	Possible	0
CE-4	Sector Gate Rehab	High risk or complex construction elements, site access, in-water? Special equipment or subcontractors needed? Potential for construction modification and claims?	Based on similar existing scopes for rehab of the existing structures that is done periodically and cost used should be representative of processes required Since the existing facilities are old, actual site conditions and construction may be different than expected. Potential for modifications and claims exists.	Marginal	Likely	2
CE-5	Raise / Relocate Gate Operator Bldg	Accelerated schedule or harsh weather schedule? Special equipment or subcontractors needed? Potential for construction modification and claims?	Typical work, nothing special required. Since the existing facilities are old, actual site conditions could be different. Potential for modifications and claims exists.	Marginal	Possible	1
CE-6	Modify / Raise Gate Machinery pit	High risk or complex construction elements, site access, in-water? Unique construction methods? Special equipment or subcontractors needed? Potential for construction modification and claims?	work is trying to retrofit an existing structure and might be slightly higher risk portion of work since existing conditions not exact. No special equipment or contractors should be needed. There is potential for modifications and claims based on unknown site conditions.	Marginal	Likely	2
CE-7	Channel Maintenance Structure	High risk or complex construction elements, site access, in-water? Unique construction methods? Special equipment or subcontractors needed? Potential for construction modification and claims?	typical construction, no special concerns. Access by land and water. No special contractors or equipment required. Potential for modifications and claims.	Marginal	Possible	1
CE-8	Guide Walls	High risk or complex construction elements, site access, in-water? Unique construction methods? Special equipment or subcontractors needed? Potential for construction modification and claims?	typical construction, no special concerns. Access by land and water. No special contractors or equipment required. Potential for modifications and claims based on unknown site conditions.			2
CE-9	Mechanical	High risk or complex construction elements, site access, in-water? Unique construction methods? Special equipment or subcontractors needed? Potential for construction modification and claims?	typical work and design taken into account. There is potential for modifications and claims based on unknown site conditions.	Marginal Likely		2
CE-10	Electrical	High risk or complex construction elements, site access, in-water? Unique construction methods? Special equipment or subcontractors needed? Potential for construction modification and claims?	should be typical construction. assumes commonly used equipment and processes. There is potential for modifications and claims based on unknown site conditions.	Marginal	Likely	2

Column   C						,	
CC-12 Planuary Communication Name   Communication N	CE-11	0			Negligible	Unlikely	0
Specialty Construction or Fabrication  Specialty Construction or Fabrication  Specialty Construction or Fabrication  See distinct  See a section  See a section  Sect	CE-12	Remaining Construction Items			Negligible	Unlikely	0
Specialty Construction or Fabrication  Sci   Scoolbox   Construction or Fabrication   Construction   Constructi	CE-13	Planning, Engineering, & Design		modifications and claims would cause increased PED costs	Negligible	Likely	N/A
SC1 Redocidary one identified one identified one identified of page 1 and 1 and 1 and 1 and 1 and 1 and 1 and 1 and 1 and 1 and 2 an	CE-14	Construction Management		modifications and claims would cause increased CM costs	Marginal	Likely	N/A
SC-2 Magation	Specialty C	Construction or Fabrication			Maximum Proje	ct Growth	65%
Mehit Tomob Appeal construction elements, unusual material or equipment anautrature or institutors or instituto	SC-1	Relocations	Negligible	Unlikely	0		
Social Multi-Demois Institution of Institution (Confidence in institution)  Social Confidence in construction demonstrate unusual material or equipment appearance of Institution (Confidence in construction)  Social Confidence in construction (Confidence	SC-2	Mitigation	no concern	No, this alternative only for Rehab of the existing structure.	Negligible	Unlikely	0
Sector Gale Rehab  manufactured or installar? Confidence in construction Co	SC-3	Mob/Demob	manufactured or installed?	typical construction	Negligible	Possible	0
Rate / Relocate Gate Operator Bidg Confidence in constructibility or methodology?  Alphical construction elements, unusual material or equipment manufactured or installed?  SC-6 Channel Mantenance Structure  Applical construction elements, unusual material or equipment manufactured or installed? Confidence in constructibility or methodology?  SC-7 Channel Mantenance Structure  Applical construction elements, unusual material or equipment manufactured or installed? Confidence in constructibility or methodology?  SC-8 Cuide Walls  Applical construction elements, unusual material or equipment manufactured or installed? Confidence in construction elements, unusual material or equipment manufactured or installed? Confidence in construction elements, unusual material or equipment manufactured or installed? Confidence in construction elements, unusual material or equipment manufactured or installed? Confidence in construction elements, unusual material or equipment manufactured or installed? Confidence in construction elements, unusual material or equipment manufactured or installed? Confidence in construction elements, unusual material or equipment manufactured or installed? Confidence in construction elements, unusual material or equipment manufactured or installed? Confidence in construction elements, unusual material or equipment manufactured or equipment manufactured or installed? Confidence in construction elements, unusual material or equipment and processes.  SC-10 Electrical  Applical construction elements, unusual material or equipment manufactured or installed? Confidence in construction elements, unusual material or equipment and processes.  Applical construction elements, unusual material or equipment manufactured or installed? Confidence in construction elements, unusual material or equipment and processes.  SC-10 Electrical  Applical construction elements, unusual material or equipment and processes.  Negligible Unilkely  Occurrents  SC-10 Electrical  Applical construction in construction elements, unus	SC-4	Sector Gate Rehab	manufactured or installed?	processes required. But since it is a retrofit there is a chance something	Marginal	Possible	1
Sc-8 Modify / Raise Gate Machinery pit manufactured or installed? Confidence is nonstruction elements, unusual material or equipment manufactured or installed? Confidence is nonstruction elements, unusual material or equipment manufactured or installed? Confidence is nonstruction elements, unusual material or equipment manufactured or installed? Confidence is nonstruction elements, unusual material or equipment manufactured or installed? Confidence is nonstruction elements, unusual material or equipment manufactured or installed? Confidence is nonstruction elements, unusual material or equipment manufactured or installed? Confidence is nonstruction elements, unusual material or equipment manufactured or installed? Confidence is nonstruction elements, unusual material or equipment manufactured or installed? Confidence is nonstructive elements, unusual material or equipment manufactured or installed? Confidence is nonstructive elements, unusual material or equipment manufactured or installed? Confidence is nonstructive elements, unusual material or equipment manufactured or installed? Confidence is nonstructive elements, unusual material or equipment manufactured or installed? Confidence is nonstructive elements, unusual material or equipment manufactured or installed? Confidence is nonstructive elements, unusual material or equipment manufactured or installed? Confidence is nonstructive elements, unusual material or equipment manufactured or installed? Confidence is nonstructive elements, unusual material or equipment manufactured or installed? Confidence is nonstructive elements, unusual material or equipment manufactured or installed? Confidence is nonstructive elements, unusual material or equipment manufactured or installed? Confidence is nonstructive elements, unusual material or equipment manufactured or installed? Confidence is nonstructive elements, unusual material or equipment manufactured or installed? Confidence is nonstructive elements, unusual material or equipment manufactured or installed? Confid	SC-5	Raise / Relocate Gate Operator Bldg	manufactured or installed?	should be typical construction	Negligible	Unlikely	0
Sc7 Channel Maintenance Structure Confidence in construction manufactured or installed? Confidence in construction elements, unusual material or equipment manufactured or installed? Confidence in construction elements, unusual material or equipment manufactured or installed? Confidence in construction elements, unusual material or equipment manufactured or installed? Sc9 Mechanical Appical construction elements, unusual material or equipment manufactured or installed? Confidence in constructibility or methodology?  Alypical construction but you are trying to retrofit an existing facility and could require specialty construction to make it work. Currently assumes commonly used equipment manufactured or installed? Confidence in constructibility or methodology?  Sc10 Electrical Appical construction elements, unusual material or equipment manufactured or installed? Confidence in constructibility or methodology?  Sc11 0  Sc12 Remaining Construction lemes  Negligible Unlikely  Onlikely	SC-6	Modify / Raise Gate Machinery pit	manufactured or installed?	processes required. But since it is a retrofit there is a chance something	Marginal	Possible	1
SC-8 Cuide Walls  Confidence in constructibility or methodology?  SC-9 Mechanical  Alypical construction elements, unusual material or equipment manufactured or installed? Confidence in constructibility or methodology?  SC-9 Mechanical  Alypical construction elements, unusual material or equipment manufactured or installed? Confidence in constructibility or methodology?  SC-10 Electrical  Alypical construction elements, unusual material or equipment manufactured or installed? Confidence in constructibility or methodology?  SC-10 Electrical  Alypical construction elements, unusual material or equipment manufactured or installed? Confidence in construction elements, unusual material or equipment manufactured or installed? SC-10 Electrical  SC-11 0  Alypical construction elements, unusual material or equipment manufactured or installed? Confidence in construction elements, unusual material or equipment and processes.  Negligible  Moderate Possible  2  SC-11 0  Negligible  Unlikely  O  SC-12 Remaining Construction Items  Negligible  Unlikely  N/A  SC-13 Planning, Engineering, & Design  Negligible  Unlikely  N/A  Negligible  Unlikely  N/A	SC-7	Channel Maintenance Structure	manufactured or installed?	should be typical construction	Negligible	Unlikely	0
manufactured or installed? Confidence in constructibility or methodology?  Atypical construction elements, unusual material or equipment manufactured or installed? SC-10 Electrical  Atypical construction elements, unusual material or equipment manufactured or installed? Confidence in constructibility or methodology?  SC-11 0  SC-11 0  Remaining Construction Items  Possible  2  2  2  2  2  2  2  2  2  2  2  2  2	SC-8	Guide Walls	manufactured or installed?	should be typical construction	Negligible	Unlikely	0
SC-10 Electrical manufactured or installed? Confidence in constructibility or methodology? and could require specialty techniques. currently assumes commonly used equipment and processes.  Negligible Unlikely 0  SC-11 0  Remaining Construction Items  SC-12 Planning, Engineering, & Design  SC-13 Construction Management  Negligible Unlikely N/A  Negligible Unlikely N/A	SC-9	Mechanical	manufactured or installed?	facility and could require specialty construction to make it work. Currently	Moderate	Possible	2
SC-11 0 Remaining Construction Items Negligible Unlikely 0 Planning, Engineering, & Design Negligible Unlikely N/A Construction Management Negligible Unlikely N/A	SC-10	Electrical	manufactured or installed?	and could require specialty techniques. currently assumes commonly used	Moderate	Possible	2
SC-12  Planning, Engineering, & Design  Negligible  Unlikely  N/A  SC-14  Construction Management  Negligible  Unlikely  N/A	SC-11	0			Negligible	Unlikely	0
Planning, Engineering, & Design  Negligible	SC-12	Remaining Construction Items			Negligible	Unlikely	0
SC-14 Construction Management Negligible Unlikely N/A		Planning, Engineering, & Design			Negligible	Unlikely	N/A
		Construction Management			Negligible	Unlikely	N/A
Technical Design & Quantities		Design & Quantities			Maximum Proje	ct Growth	30%

T-1	Relocations	none identified	unknown	Negligible	Unlikely	0
T-2	Mitigation		No, this alternative only for Rehab of the existing structure.	Negligible	Unlikely	0
T-3	Mob/Demob	no concern	no concern	Negligible	Possible	0
T-4	Sector Gate Rehab	Level of confidence based on design and assumptions? Appropriate methods applied to calculate quantities? Sufficient investigations to develop quantities? Quality control check applied?	Based on similar scopes for rehab of the existing structures that is done periodincally. Details of exact work required unknown. Since the existing facilities are old, actual site conditions and construction may be different than expected.	Moderate	Possible	2
T-5	Raise / Relocate Gate Operator Bldg	Level of confidence based on design and assumptions? Appropriate methods applied to calculate quantities? Sufficient investigations to develop quantities? Quality control check applied?	Assuming replacement with typical MVN designs however exact details not developed and existing conditions not detailed yet so could have additional work.	Marginal	Likely	2
T-6	Modify / Raise Gate Machinery pit	Level of confidence based on design and assumptions? Appropriate methods applied to calculate quantities? Sufficient investigations to develop quantities? Quality control check applied?	Assuming machinery pit can be raised or modified. However exact details not developed and status of existing conditions not certain.	Moderate	Likely	3
T-7	Channel Maintenance Structure	Level of confidence based on design and assumptions? Appropriate methods applied to calculate quantities? Sufficient investigations to develop quantities? Quality control check applied?	Qtys based on similar Gulf coast project designs - could be variations when site specific conditions applied.	Marginal	Likely	2
T-8	Guide Walls	Level of confidence based on design and assumptions? Appropriate methods applied to calculate quantities? Sufficient investigations to develop quantities? Quality control check applied?	Qtys based on similar Gulf coast project designs - could be variations when site specific conditions applied and designs detailed.	Moderate	Possible	2
T-9	Mechanical	Level of confidence based on design and assumptions? Appropriate methods applied to calculate quantities? Sufficient investigations to develop quantities? Quality control check applied?	Based on similar / typical MVN project designs, however exact details not developed yet. Retrofitting existing facility so could have changes.	Moderate	Possible	2
T-10	Electrical	Level of confidence based on design and assumptions? Appropriate methods applied to calculate quantities? Sufficient investigations to develop quantities? Quality control check applied?	Based on similar / typical MVN project designs, however exact details not developed yet. Retrofitting existing facility so could have changes.	Significant	Possible	3
T-11	0			Negligible		0
T-12	Remaining Construction Items			Moderate	Possible	2
T-13	Planning, Engineering, & Design		further data will be obtained during PED and additional engineering will be done	Mardinal		N/A
T-14	Construction Management		changes in designs and assumption could cause longer construction times	Marginal	Likely	N/A
Cost Estim	Cost Estimate Assumptions			Maximum Proje	ct Growth	35%
EST-1	Relocations	none identified	none identified	Negligible	Unlikely	0
EST-2	Mitigation		No, this alternative only for Rehab of the existing structure.	Negligible	Unlikely	0

EST-3	Mob/Demob	no concern	typical construction anticipated and appropriate mob/demob included in cost estimate.	Negligible	Possible	0
EST-4	Sector Gate Rehab	Assumptions related to prime and subcontractor markups/assignments? Assumptions regarding crew, productivity, overtime? Site accessibility, transport delays, congestion? Overuse of Cost Book, lump sum, allowances? Lack confidence on critical cost items?	Cost used for this item is average of bids from recent similar work.  Typical construction features and cost used should be representative of processes required. Existing conditions and required repairs may not be as in past contracts and different techniques could be needed. cost estimate includes typical prime and subcontractor tiering.	Moderate	Likely	3
EST-5	Raise / Relocate Gate Operator Bldg	Assumptions related to prime and subcontractor markups/assignments? Assumptions regarding crew, productivity, overtime? Site accessibility, transport delays, congestion? Overuse of Cost Book, lump sum, allowances? Lack confidence on critical cost items?	Cost used for this item is average of bids from recent similar work. Typical construction features. Exact design / typical section not developed yet but assuming replacing whole building. Could be additional costs for transferring to a new building on existing site vs. new building on new site, although other bid items could cover some of these costs.	Moderate	Possible	2
EST-6	Modify / Raise Gate Machinery pit	Assumptions related to prime and subcontractor markups/assignments? Assumptions regarding crew, productivity, overtime? Site accessibility, transport delays, congestion? Overuse of Cost Book, lump sum, allowances? Lack confidence on critical cost items?	cost estimate includes typical prime and subcontractor tiering. All items have detailed crews and related productivity and overtime. Typical construction features, however exact design/typical sections not developed yet. When they get into it, may require different methods since trying to retrofit an existing structure. Site accessibility by both land and water, however work location is confined. Current quotes on most major materials.	Significant	Likely	4
EST-7		Assumptions related to prime and subcontractor markups/assignments? Assumptions regarding crew, productivity, overtime? Site accessibility, transport delays, congestion? Overuse of Cost Book, lump sum, allowances? Lack confidence on critical cost items?	cost estimate includes typical prime and subcontractor tiering. All items have detailed crews and related productivity and overtime. Typical construction features, however exact design/typical sections not developed yet. Nothing unique about materials and methods. Site accessibility by both land and water. Current quotes on most major materials.	Marginal	Likely	2
EST-8		Assumptions related to prime and subcontractor markups/assignments? Assumptions regarding crew, productivity, overtime? Site accessibility, transport delays, congestion? Overuse of Cost Book, lump sum, allowances? Lack confidence on critical cost items?	cost estimate includes typical prime and subcontractor tiering. All items have detailed crews and related productivity and overtime. Typical construction features, however exact design/typical sections not developed yet. Nothing unique about most materials and methods, except for new UHMW impact sheet. Site accessibility by both land and water. Current quotes on most major materials. Jerica R Currently there are no restrictions that limit construction. There may be some scheduling necessary to maintain traffic.	Moderate	Likely	3
EST-9	Assumptions related to prime and subcontractor markups Assumptions regarding crew, productivity, overtime? Site accessibility, transport delays, congestion? Overuse of Cost Book, lump sum, allowances? Lack confidence on critical cost items?  Mechanical		Cost used for this item developed by mechanical engineer based on recent similar work. Typical MVN construction features, however exact design/typical sections not developed yet. Retrofitting existing facility so could have changes. Site accessibility by both land and water.	Moderate	Likely	3
EST-10	Electrical	Assumptions related to prime and subcontractor markups/assignments? Assumptions regarding crew, productivity, overtime? Site accessibility, transport delays, congestion? Overuse of Cost Book, lump sum, allowances? Lack confidence on critical cost items?	Cost used for this item developed by electrical engineer based on recent similar work. Typical MVN construction features, however exact design/typical sections not developed yet. Retrofitting existing facility so could have changes. Site accessibility by both land and water.	Moderate	Likely	3
EST-11	0			Negligible	Unlikely	0

					_	
EST-12	Remaining Construction Items			Marginal	Likely	2
EST-13	Planning, Engineering, & Design	no concern		Marginal	Possible	N/A
EST-14	Construction Management	no concern	since S&A is directly linked to construction items and cost, this item would have similar risk to construction items.	Marginal	Likely	N/A
External P	<u>roject Risks</u>			Maximum Proje	40%	
	I					•
EX-1	Relocations	none identified	none identified	Negligible	Unlikely	0
EX-2	Mitigation	no concern	No, this alternative only for Rehab of the existing structure.	Negligible	Unlikely	0
EX-3	Mob/Demob	<ul> <li>Potential for severe adverse weather?</li> <li>Political influences, lack of support, obstacles?</li> <li>Unanticipated inflations in fuel, key materials?</li> <li>Potential for market volatility impacting competition, pricing?</li> <li>Funding Constraints</li> </ul>	The project is located a bit inland so severe adverse weather should not be an issue. The inflation of fuel and key materials is always a possibility and fuel is a cost driver for the mob/demob but would probably have a marginal impact. The users of the GIWW fully support improving these crossings as does the NFS. The Inland Users Water Board does not have this project ranked for immediate construction, even if an approved Chief's Report and funding become available.	Marginal	Possible	1
EX-4	Sector Gate Rehab	Potential for severe adverse weather? Political influences, lack of support, obstacles? Unanticipated inflations in fuel, key materials? Potential for market volatility impacting competition, pricing? Funding Constraints	The project is located a bit inland so severe adverse weather should not be an issue. The inflation of fuel and key materials is always a possibility, however it is not a large cost driver for this item and will not place a large demand on the supply. The users of the GIWW fully support improving these crossings as does the NFS. The Inland Users Water Board does not have this project ranked for immediate construction, even if an approved Chief's Report and funding become available.	Marginal	Possible	1
EX-5	Raise / Relocate Gate Operator Bldg	<ul> <li>Potential for severe adverse weather?</li> <li>Political influences, lack of support, obstacles?</li> <li>Unanticipated inflations in fuel, key materials?</li> <li>Potential for market volatility impacting competition, pricing?</li> <li>Funding Constraints</li> </ul>	The project is located a bit inland so severe adverse weather should not be an issue. The inflation of fuel and key materials is always a possibility, however it is not a large cost driver for this item and will not place a large demand on the supply. The users of the GIWW fully support improving these crossings as does the NFS. The Inland Users Water Board does not have this project ranked for immediate construction, even if an approved Chief's Report and funding become available.	Marginal	Possible	1
EX-6	Modify / Raise Gate Machinery pit	Potential for severe adverse weather? Political influences, lack of support, obstacles? Unanticipated inflations in fuel, key materials? Potential for market volatility impacting competition, pricing? Funding Constraints	The project is located a bit inland so severe adverse weather should not be an issue. The inflation of fuel and key materials is always a possibility, however it is not a large cost driver for this item and will not place a large demand on the supply. The users of the GIWW fully support improving these crossings as does the NFS. The Inland Users Water Board does not have this project ranked for immediate construction, even if an approved Chief's Report and funding become available.	Marginal	Possible	1
EX-7	Channel Maintenance Structure	<ul> <li>Potential for severe adverse weather?</li> <li>Political influences, lack of support, obstacles?</li> <li>Unanticipated inflations in fuel, key materials?</li> <li>Potential for market volatility impacting competition, pricing?</li> <li>Funding Constraints</li> </ul>	The project is located a bit inland so severe adverse weather should not be an issue. The inflation of fuel and key materials is always a possibility, however it is not a large cost driver for this item and will not place a large demand on the supply. The users of the GIWW fully support improving these crossings as does the NFS. The Inland Users Water Board does not have this project ranked for immediate construction, even if an approved Chief's Report and funding become available.	Marginal	Possible	1

EX-8	Guide Walls	Potential for severe adverse weather? Political influences, lack of support, obstacles? Unanticipated inflations in fuel, key materials? Potential for market volatility impacting competition, pricing? Funding Constraints	The project is located a bit inland so severe adverse weather should not be an issue. The inflation of fuel and key materials is always a possibility, however it is not a large cost driver for this item and will not place a large demand on the supply. The users of the GIWW fully support improving these crossings as does the NFS. The Inland Users Water Board does not have this project ranked for immediate construction, even if an approved Chief's Report and funding become available.	Marginal	Possible	1
EX-9	Mechanical	Potential for severe adverse weather? Political influences, lack of support, obstacles? Unanticipated inflations in fuel, key materials? Potential for market volatility impacting competition, pricing? Funding Constraints	The project is located a bit inland so severe adverse weather should not be an issue. The inflation of fuel and key materials is always a possibility, however it is not a large cost driver for this item and will not place a large demand on the supply. The users of the GIWW fully support improving these crossings as does the NFS. The Inland Users Water Board does not have this project ranked for immediate construction, even if an approved Chief's Report and funding become available.	Marginal	Possible	1
EX-10	Electrical	Potential for severe adverse weather? Political influences, lack of support, obstacles? Unanticipated inflations in fuel, key materials? Potential for market volatility impacting competition, pricing? Funding Constraints	The project is located a bit inland so severe adverse weather should not be an issue. The inflation of fuel and key materials is always a possibility, however it is not a large cost driver for this item and will not place a large demand on the supply. The users of the GIWW fully support improving these crossings as does the NFS. The Inland Users Water Board does not have this project ranked for immediate construction, even if an approved Chief's Report and funding become available.	Marginal	Possible	1
EX-11	0			Negligible	Unlikely	0
EX-12	Remaining Construction Items	Potential for severe adverse weather? Political influences, lack of support, obstacles? Unanticipated inflations in fuel, key materials? Potential for market volatility impacting competition, pricing? Funding Constraints	The project is located a bit inland so severe adverse weather should not be an issue. The inflation of fuel and key materials is always a possibility, however it is not a large cost driver for this item and will not place a large demand on the supply. The users of the GIWW fully support improving these crossings as does the NFS. The Inland Users Water Board does not have this project ranked for immediate construction, even if an approved Chief's Report and funding become available.	Marginal	Possible	1
EX-13	Planning, Engineering, & Design	<ul> <li>Potential for severe adverse weather?</li> <li>Political influences, lack of support, obstacles?</li> <li>Unanticipated inflations in fuel, key materials?</li> <li>Potential for market volatility impacting competition, pricing?</li> <li>Funding Constraints</li> </ul>	The project is located a bit inland so severe adverse weather should not be an issue. The inflation of fuel and key materials is always a possibility, however it is not a large cost driver for this item and will not place a large demand on the supply. The users of the GIWW fully support improving these crossings as does the NFS. The Inland Users Water Board does not have this project ranked for immediate construction, even if an approved Chief's Report and funding become available.	Marginal	Possible	N/A
EX-14	Construction Management	no concern	S&A is linked to construction items and cost, but most external risks would not make the project take longer once started.	Negligible	Possible	N/A

## **Abbreviated Risk Analysis**

Project (less than \$40M): **Brazos River Floodgate**Project Development Stage/Alternative: **Feasibility (Alternatives)** 

Risk Category: Moderate Risk: Typical Project Construction Type

Alternative: Alt 3a - Move gates back in Existing

Meeting Date: 10/4/2017

Total Estimated Construction Contract Cost = \$ 139,953,629

	<u>CWWBS</u>	Feature of Work	Estimated Cost % Contingency		<u>(</u> \$ (	Contingency	<u>Total</u>	
	01 LANDS AND DAMAGES	Real Estate	\$	27,000	20%	\$	5,400 \$	32,400
1	02 RELOCATIONS	Relocations	\$	_	0%	\$	- \$	-
2	06 FISH AND WILDLIFE FACILITIES	Mitigation	\$	305,000	25%	\$	76,590 \$	381,590
3	15 FLOODWAY CONTROL AND DIVERSION STRUCTURES	Mob/Demob	\$	11,303,639	13%	\$	1,468,268 \$	12,771,907
4	15 FLOODWAY CONTROL AND DIVERSION STRUCTURES	Demolition	\$	4,142,975	45%	\$	1,858,926 \$	6,001,901
5	15 FLOODWAY CONTROL AND DIVERSION STRUCTURES	Excavation and Fill	\$	18,558,733	49%	\$	9,157,691 \$	27,716,424
6	15 FLOODWAY CONTROL AND DIVERSION STRUCTURES	cofferdam	\$	15,256,400	31%	\$	4,765,394 \$	20,021,794
7	15 FLOODWAY CONTROL AND DIVERSION STRUCTURES	concrete structure and gate	\$	61,506,989	45%	\$	27,414,724 \$	88,921,712.81
8	15 FLOODWAY CONTROL AND DIVERSION STRUCTURES	maintenance dewatering system	\$	6,319,638	17%	\$	1,100,595 \$	7,420,233.33
9	15 FLOODWAY CONTROL AND DIVERSION STRUCTURES	guidewalls	\$	18,522,092	63%	\$	11,643,306 \$	30,165,398.33
10	15 FLOODWAY CONTROL AND DIVERSION STRUCTURES	mechanical + electrical	\$	4,038,163	27%	\$	1,100,107 \$	5,138,269.75
11	15 FLOODWAY CONTROL AND DIVERSION STRUCTURES		\$	_	0%	\$	- \$	-
12	All Other	Remaining Construction Items	\$	-	0.0% 0%	\$	- \$	-
13	30 PLANNING, ENGINEERING, AND DESIGN	Planning, Engineering, & Design	\$	_	0%	\$	- \$	-
14	31 CONSTRUCTION MANAGEMENT	Construction Management	\$	-	0%	\$	- \$	-
XX	FIXED DOLLAR RISK ADD (EQUALLY DISPERSED TO ALL, MU	ST INCLUDE JUSTIFICATION SEE BELOW)				\$	_	

Totals						
Real Estate	\$	27,000	20%		\$ 5,400	\$ 32,400.00
Total Construction Estimate	\$	139,953,629	42%		\$ 58,585,602	\$ 198,539,231
Total Planning, Engineering & Design	\$	-	0%		\$ -	\$ -
Total Construction Management	\$	-	0%		\$ -	\$ -
Total Excluding Real Estate	\$	139,953,629	42%		\$ 58,585,602	\$ 198,539,231
		_		Base	50%	80%
Confidence I	_evel	Range Estimate (\$000's)	\$13	9,954k	\$175,105k	\$198,539k

\* 50% based on base is at 5% CL.

**Fixed Dollar Risk Add:** (Allows for additional risk to be added to the risk analsyis. Must include justification. Does not allocate to Real Estate.

## Brazos River Floodgate Alt 3a - Move gates back in Existing C

Feasibility (Alternatives)
Abbreviated Risk Analysis
Meeting Date: 4-Oct-17

				Risk Level		
Very	Likely	2	3	4	5	5
	Likely	1	2	3	4	5
Po	ossible	0	1	2	3	4
U	nlikely	0	0	1	2	3
		Negligible	Marginal	Moderate	Significant	Critical

# Risk Register

Risk Element	Feature of Work	Concerns	PDT Discussions & Conclusions (Include logic & justification for choice of Likelihood & Impact)	Impact	Likelihood	Risk Level
Project Mai	nagement & Scope Growth			Maximum Projec	ct Growth	75%
PS-1	Relocations	Are there any Relocations in area?	Lisa MThere are no railroads or utilities that will be impacted for either project except Texas Barge and Boat. most likely our easements are valid therefore at this time acquisition is not included however, we allow for the business relocation. Cost for this is covered in RE. There are 6 wells located around the area of the Brazos floodgates - all appear to have been plugged. The best knowledge is there is a pipeline near the east side of Brazos, but we do not anticipate we will impact. There are some existing roads in the area but they dead end at the existing projects. Alt 9c, 9b, and 9A is impacting an existing barge facility (Texas Barge and Boat - not sure what they do there - repairs?) Jerica R Relocations have been considered (TX Barge/Boat). There are currently no HTRW concerns for the area.	Significant	Possible	3
PS-2	Mitigation	Is mitigation required?	yes. assumptions include the footprint of disturbance would be mitigated for each alternative. Not included in the estimate is the annualization of habitat improvements over the 50 year period of analysis. Taking into account the maturation of the mitigation area over time, the mitigation costs would be a conservative estimate of mitigation requirements. To compare the alternatives, we took the wetland habitat impact estimates and multiplied them by \$/acre to estimate mitigation costs for each alternative. it appears that there are no active mitigation banks that cover coastal marsh mitigation in the BRFG or CRL areas. So currently, mitigation banks are not likely an option.	Marginal	Possible	1
PS-3	Mob/Demob	no concern for scope growth	standard type work	Negligible	Possible	0
PS-4	Demolition	little concern for scope growth	assuming removing whole existing structure. Have some orignal dwgs. Do we really know what is out there?	Moderate	Possible	2
PS-5	Excavation and Fill	potential for scope growth, added features?	potential changes small. Channel designs follow existing channel parameters. For Alt 3A the eventual disposition of the bypass channels has not been included - backfill? Dam off? what?	Moderate	Likely	3
PS-6	cofferdam	potential for scope growth, added features?	currently sassuming to build in the wet and backfill around.	Negligible	Unlikely	0
PS-7	concrete structure and gate	potential for scope growth, added features?	project currently scoped at 125 ft wide. Optimum size could increase based on barge simulation testing to say 150 ft width. Existing features on GIWW are already at 125 ft - i.e. bridge piers at Colorado Locks - so it would not be likely for a change to a wider structure for that reason, however simulation testing could recommend a wider structure for safe transit through the structure. Structures on both IHNC Barrier and WCC are larger than the authorized channel for this reason.	Significant	Possible	3
PS-8	maintenance dewatering system	potential for scope growth, added features?	Assuming bulkhead sytem now - for 1 structure at a time. PDT does not see any reason for 2 sets. Currently assuming conservative, worst case and placing across channel opening to block off whole chamber. Could block off recesses only, save on center piles, etc. but would need to increase side wing concrete and piles for access around when dewatered.	Marginal	Possible	1

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PS-9	guidewalls	potential for scope growth, added features?	current design assumes tied back sheetpile guidewalls. Could want more expensive reinforced concrete walls which would also require more extensive cofferdam - Alt 3A, 9b, and 9C. Length of entrance guidewalls could become longer.	Significant	Likely	4
PS-10	mechanical + electrical	little concern for scope growth	typical scope for this type construction	Negligible	Possible	0
PS-11	0			Negligible	Unlikely	0
PS-12	Remaining Construction Items			Negligible	Unlikely	0
PS-13	Planning, Engineering, & Design	potential for scope growth, added features?	added features and changes to scope would require additional PED	Marginal	Possible	N/A
PS-14	Construction Management		added features and changes to scope would require additional S&A	Marginal	Possible	N/A
Acquisition	1 Strategy			Maximum Proje	ct Growth	30%
AS-1	Relocations	none identified	none identified	Moderate	Possible	2
AS-2	Mitigation	unknown	it appears that there are no active mitigation banks that cover coastal marsh mitigation in the BRFG or CRL areas. So currently, mitigation banks are not likely an option.	Significant	Possible	3
AS-3	Mob/Demob	is there an established acquisition plan?	Acquisition strategy is anticipated to be sealed bid per PM. Cost estimate assumes large business, open competition but includes typical tiering of subcontractors. If projects were to go small business, Best Value, or some type of set-a-aside would increase cost.	Marginal	Likely	2
AS-4	Demolition	is there an established acquisition plan?	Acquisition strategy is anticipated to be sealed bid per PM. Cost estimate assumes large business, open competition but includes typical tiering of subcontractors. If projects were to go small business, Best Value, or some type of set-a-aside would increase cost.	Marginal	Likely	2
AS-5	Excavation and Fill	is there an established acquisition plan?	Acquisition strategy is anticipated to be sealed bid per PM. Cost estimate assumes large business, open competition but includes typical tiering of subcontractors. If projects were to go small business, Best Value, or some type of set-a-aside would increase cost.	Marginal	Likely	2
AS-6	cofferdam	is there an established acquisition plan?	Acquisition strategy is anticipated to be sealed bid per PM. Cost estimate assumes large business, open competition but includes typical tiering of subcontractors. If projects were to go small business, Best Value, or some type of set-a-aside would increase cost.	Marginal	Likely	2
AS-7	concrete structure and gate	is there an established acquisition plan?	Acquisition strategy is anticipated to be sealed bid per PM. Cost estimate assumes large business, open competition but includes typical tiering of subcontractors. If projects were to go small business, Best Value, or some type of set-a-aside would increase cost.	Marginal	Likely	2
AS-8	maintenance dewatering system	is there an established acquisition plan?	Acquisition strategy is anticipated to be sealed bid per PM. Cost estimate assumes large business, open competition but includes typical tiering of subcontractors. If projects were to go small business, Best Value, or some type of set-a-aside would increase cost.	Marginal	Likely	2
AS-9	guidewalls	is there an established acquisition plan?	Acquisition strategy is anticipated to be sealed bid per PM. Cost estimate assumes large business, open competition but includes typical tiering of subcontractors. If projects were to go small business, Best Value, or some type of set-a-aside would increase cost.	Marginal	Likely	2
AS-10	mechanical + electrical	is there an established acquisition plan?	Acquisition strategy is anticipated to be sealed bid per PM. Cost estimate assumes large business, open competition but includes typical tiering of subcontractors. If projects were to go small business, Best Value, or some type of set-a-aside would increase cost.	Marginal	Likely	2
AS-11	0			Negligible	Unlikely	0

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AS-12	Remaining Construction Items			Marginal	Likely	2
AS-13	Planning, Engineering, & Design			Marginal	Unlikely	N/A
AS-14	Construction Management	is there an established acquisition plan?	Acquisition strategy is anticipated to be sealed bid per PM. Cost estimate assumes large business, open competition but includes typical tiering of subcontractors. If projects were to go small business, Best Value, or some type of set-a-aside would increase cost.	Marginal	Likely	N/A
Construct	ion Elements			Maximum Proje	ct Growth	25%
				Negligible	Unlikaly	0
CON-1	Relocations	none identified	none identified	Negligible	Unlikely	0
CE-2	Mitigation			Negligible	Unlikely	0
CE-3	Mob/Demob	High risk or complex construction elements, site access, in-water? Unique construction methods? Special mobilization?	typical construction, no special concerns. Access by land and water.	Negligible	Possible	0
CE-4	Demolition	High risk or complex construction elements, site access, in-water? Special equipment or subcontractors needed? Potential for construction modification and claims?	potential changes. Since the existing facilities are old, actual site conditions and construction may be different than expected. High potential for modifications and claims exists.	Moderate	Likely	3
CE-5	Excavation and Fill	Accelerated schedule or harsh weather schedule? Special equipment or subcontractors needed? Potential for construction modification and claims?	Item is mostly new channel excavation. Interior work so harsh weather should not be a factor. Typical work, nothing special required. Since the existing facilities are old, actual site conditions could be different. Potential for modifications and claims exists.	Marginal	Likely	2
CE-6	cofferdam	High risk or complex construction elements, site access, in-water? Unique construction methods? Special equipment or subcontractors needed? Potential for construction modification and claims?	typical work and design takes this into account, but might be slightly higher risk portion of work. No special equipment or contractors needed. There is potential for modifications and claims based on unknown site conditions and limited geotech.	Marginal	Likely	2
CE-7	concrete structure and gate	High risk or complex construction elements, site access, in-water? Unique construction methods? Special equipment or subcontractors needed? Potential for construction modification and claims?	typical construction, no special concerns. Access by land and water. No special contractors or equipment required. Potential for modifications and claims.	Marginal	Likely	2
CE-8	maintenance dewatering system	no special concerns		Negligible	Possible	0
CE-9	guidewalls	High risk or complex construction elements, site access, in-water? Unique construction methods? Special equipment or subcontractors needed? Potential for construction modification and claims?	typical work and design takes this into account. No special equipment or contractors needed. There is potential for modifications and claims based on unknown site conditions and limited geotech.	Marginal	Likely	2
CE-10	mechanical + electrical	no special concerns	should be typical construction with little concern. assumes commonly used equipment and processes.	Marginal	Likely	2
CE-11	0			Negligible	Unlikely	0
CE-12	Remaining Construction Items			Negligible	Unlikely	0
CE-13	Planning, Engineering, & Design		modifications and claims would cause increased PED costs	Negligible	Likely	N/A
CE-14	Construction Management		modifications and claims would cause increased CM costs	Marginal	Likely	N/A
Specialty	Construction or Fabrication			Maximum Proje	ct Growth	65%
<u> </u>	Relocations	none identified	none identified	Significant	Possible	3
SC-1	Mitigation	no concern		Negligible	Possible	0
SC-2			1			

				=.		
SC-3	Mob/Demob	Atypical construction elements, unusual material or equipment manufactured or installed?  Confidence in constructibility or methodology?	typical construction, little or no concern	Negligible	Possible	0
SC-4	Demolition	Atypical construction elements, unusual material or equipment manufactured or installed?  Confidence in constructibility or methodology?	should be typical construction with little concern. However, since the existing facilities are old, actual site conditions and construction may be different than expected and require special techniques over and above what is included in cost estimate.	Moderate	Possible	2
SC-5	Excavation and Fill	Atypical construction elements, unusual material or equipment manufactured or installed?  Confidence in constructibility or methodology?	should be typical construction with low concern.	Negligible	Unlikely	0
SC-6	cofferdam	Atypical construction elements, unusual material or equipment manufactured or installed?  Confidence in constructibility or methodology?	should be typical construction with low concern.	Negligible	Possible	0
SC-7	concrete structure and gate	Atypical construction elements, unusual material or equipment manufactured or installed?  Confidence in constructibility or methodology?	should be typical construction with low concern.	Negligible	Unlikely	0
SC-8	maintenance dewatering system	Atypical construction elements, unusual material or equipment manufactured or installed?  Confidence in constructibility or methodology?	should be typical construction with low concern.	Negligible	Unlikely	0
SC-9	guidewalls	Atypical construction elements, unusual material or equipment manufactured or installed?  Confidence in constructibility or methodology?	should be typical construction with low concern.	Negligible	Possible	0
SC-10	Atypical construction elements, unusual material or installed?  Confidence in constructibility or methodology?		should be typical construction with low concern. assumes commonly used equipment and processes. More of a concern on the alternatives that are being renovated and trying to fit in and work with existing facilities.	Marginal	Possible	1
SC-11	0			Negligible Unlikely		0
SC-12	Remaining Construction Items			Negligible	Unlikely	0
SC-13	Planning, Engineering, & Design			Negligible	Unlikely	N/A
SC-14	Construction Management			Negligible	Unlikely	N/A
Technical l	Design & Quantities			Maximum Proje	ct Growth	30%
T-1	Relocations	none identified	none identified	Significant	Possible	3
T-2	Mitigation		assumptions include the footprint of disturbance would be mitigated for each alternative. it appears that there are no active mitigation banks that cover coastal marsh mitigation in the BRFG or CRL areas. So currently, mitigation banks are not likely an option. Unit costs provided by RTS. Based on average of costs per acre of similar mitigation in the area.	Moderate	Possible	2
T-3	Mob/Demob	no concern	no concern	Negligible	Possible	0
T-4	Demolition	Level of confidence based on design and assumptions? Appropriate methods applied to calculate quantities? Sufficient investigations to develop quantities? Quality control check applied?	demolition information based on original plans. Existing conditions may not be as originally planned/built. Design and quantites QC by MVN Structures.	Significant	Possible	3
T-5	Excavation and Fill	Level of confidence based on design and assumptions? Appropriate methods applied to calculate quantities? Sufficient investigations to develop quantities? Quality control check applied?	Excavation and fill quantities based on limited information available. Do not have current, accurate land surveys of area. Channel designs follow existing channel parameters.	Marginal	Likely	2
T-6	cofferdam	Level of confidence based on design and assumptions? Appropriate methods applied to calculate quantities? Sufficient investigations to develop quantities? Quality control check applied?	Qtys based on similar Gulf coast project designs. Geotech conditions have not been evaluated and could cause changes to existing assumptions/qtys.	Marginal	Likely	2

T-7	concrete structure and gate	Level of confidence based on design and assumptions? Appropriate methods applied to calculate quantities? Sufficient investigations to develop quantities? Quality control check applied?	Qtys based on similar Gulf coast project designs - could be variations when site specific conditions applied. Concrete may need to be raised to match top elevation of guidewalls and Colorado Lock height - Alt 3A, 9b, and 9C. Geotech conditions have not been evaluated and could cause changes to existing assumptions/qtys on foundation pilings.	Marginal	Likely	2
T-8	maintenance dewatering system	Level of confidence based on design and assumptions? Appropriate methods applied to calculate quantities? Sufficient investigations to develop quantities? Quality control check applied?	Assuming bulkhead sytem now - for 1 structure at a time. PDT does not see any reason for 2 sets. Currently assuming conservative, worst case and placing across channel opening to block off whole chamber. Could block off recesses only, save on center piles, etc. but would need to increase side wing concrete and piles for access around when dewatered. Possible savings.	Negligible	Possible	0
T-9	guidewalls	Level of confidence based on design and assumptions? Appropriate methods applied to calculate quantities? Sufficient investigations to develop quantities? Quality control check applied?	Qtys based on similar Gulf coast project designs. Geotech conditions have not been evaluated and could cause changes to existing assumptions/qtys however reasonable assumptions have been included.	Moderate	Possible	2
T-10	mechanical + electrical	Level of confidence based on design and assumptions? Appropriate methods applied to calculate quantities? Sufficient investigations to develop quantities? Quality control check applied?	concepts based on similar Gulf coast projects and MVN commonly used systems. No specific design at this stage. More of a concern on the alternatives that are being renovated and trying to fit in and work with existing facilities.	Marginal	Possible	1
T-11	0			Negligible	Unlikely	0
T-12	Remaining Construction Items			Moderate	Possible	2
T-13	Planning, Engineering, & Design		further data will be obtained during PED and additional engineering will be done	Marginal	Likely	N/A
T-14	Construction Management		changes in designs and assumption could cause longer construction times	Marginal	Likely	N/A
Cost Estima	ate Assumptions			Maximum Projec	t Growth	35%
EST-1	Relocations	none identified	none identified	Significant	Possible	3
EST-2	Mitigation		it appears that there are no active mitigation banks that cover coastal marsh mitigation in the BRFG or CRL areas. So currently, mitigation banks are not likely an option. Unit costs provided by RTS. Based on average of costs per acre of similar mitigation in the area.	Moderate	Possible	2
EST-3	Mob/Demob	no concern	typical construction anticipated and appropriate mob/demob included in cost estimate.	Negligible	Possible	0
EST-4	Demolition	Assumptions related to prime and subcontractor markups/assignments? Assumptions regarding crew, productivity, overtime? Site accessibility, transport delays, congestion? Overuse of Cost Book, lump sum, allowances? Lack confidence on critical cost items?	cost estimate includes typical prime and subcontractor tiering. All items have detailed crews and related productivity and overtime. Typical construction features. Demolition information based on original plans. Existing conditions may not be as originally planned/built and different techniques could be needed.	Significant	Possible	3
	Excavation and Fill	Assumptions related to prime and subcontractor markups/assignments? Assumptions regarding crew, productivity, overtime? Site accessibility, transport delays, congestion? Overuse of Cost Book, lump sum, allowances? Lack confidence on critical cost items?	cost estimate includes typical prime and subcontractor tiering. All items have detailed crews and related productivity and overtime. Typical construction features. Dredging unit costs developed in CEDEP, however no geotech available and virgin cut. New bypass channels going through existing disposal areas on 3A with unknown geotech and possible debris. There is still questions as to fill and possible sources. Jerica R Currently there are no restrictions that limit construction. There may be some scheduling necessary to maintain traffic in the area which would increase cost. Includes bypass channel, should not be issue.	Moderate	Likely	3

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EST-6	cofferdam	Assumptions related to prime and subcontractor markups/assignments? Assumptions regarding crew, productivity, overtime? Site accessibility, transport delays, congestion? Overuse of Cost Book, lump sum, allowances? Lack confidence on critical cost items?	cost estimate includes typical prime and subcontractor tiering. All items have detailed crews and related productivity and overtime. Typical construction features, however exact design/typical sections not developed yet. Nothing unique about materials and methods. Site accessibility by both land and water. Current quotes on most major materials. Jerica R Currently there are no restrictions that limit construction. There may be some schedule necessary to maintain traffic in the area, but for this alternative the new channel is in a new location and traffic can be maintained through the old channel.	Moderate	Likely	3
EST-7	concrete structure and gate	Assumptions related to prime and subcontractor markups/assignments? Assumptions regarding crew, productivity, overtime? Site accessibility, transport delays, congestion? Overuse of Cost Book, lump sum, allowances? Lack confidence on critical cost items?	cost estimate includes typical prime and subcontractor tiering. All items have detailed crews and related productivity and overtime. Typical construction features, however exact design/typical sections not developed yet. Nothing unique about materials and methods. Site accessibility by both land and water. Current quotes on most major materials.	Moderate	Likely	3
EST-8	maintenance dewatering system	Assumptions related to prime and subcontractor markups/assignments? Assumptions regarding crew, productivity, overtime? Site accessibility, transport delays, congestion? Overuse of Cost Book, lump sum, allowances? Lack confidence on critical cost items?	cost estimate includes typical prime and subcontractor tiering. All items have detailed crews and related productivity and overtime. Typical construction features, however exact design/typical sections not developed yet. Nothing unique about materials and methods. Site accessibility by both land and water. Current quotes on most major materials.	Marginal	Likely	2
EST-9	guidewalls	Assumptions related to prime and subcontractor markups/assignments? Assumptions regarding crew, productivity, overtime? Site accessibility, transport delays, congestion? Overuse of Cost Book, lump sum, allowances? Lack confidence on critical cost items?	cost estimate includes typical prime and subcontractor tiering. Most items have detailed crews and related productivity and overtime. Typical construction features, however exact design/typical sections not developed yet. Nothing unique about most materials and methods, except for new UHMW impact sheet. Site accessibility by both land and water. Current quotes on most major materials. Jerica R Currently there are no restrictions that limit construction. There may be some schedule necessary to maintain traffic in the area, but for this alternative the new channel is in a new location and traffic can be maintained through the old channel.	Moderate	Likely	3
EST-10	mechanical + electrical	Assumptions related to prime and subcontractor markups/assignments? Assumptions regarding crew, productivity, overtime? Site accessibility, transport delays, congestion? Overuse of Cost Book, lump sum, allowances? Lack confidence on critical cost items?	cost estimate includes typical prime and subcontractor tiering. Have detailed line items but costs are based on mechanical and electrical engineer professional experience and bids in MVN. Typical construction features. Nothing unique about materials and methods. No quotes on the major materials.	Moderate	Likely	3
EST-11	0			Negligible	Unlikely	0
EST-12	Remaining Construction Items			Marginal	Likely	2
EST-13	Planning, Engineering, & Design	no concern		Negligible	Possible	N/A
EST-14	Construction Management	no concern	since S&A is directly linked to construction items and cost, this item would have similar risk to construction items.	Marginal	Likely	N/A
External Pr	oject Risks			Maximum Projec	ct Growth	40%
EX-1	Relocations	none identified	none identified	Negligible	Unlikely	0
EX-2	Mitigation	no concern	no concern	Negligible	Possible	0

				=		
EX-3	Mob/Demob	<ul> <li>Potential for severe adverse weather?</li> <li>Political influences, lack of support, obstacles?</li> <li>Unanticipated inflations in fuel, key materials?</li> <li>Potential for market volatility impacting competition, pricing?</li> <li>Funding Constraints</li> </ul>	The project is located a bit inland so severe adverse weather should not be an issue. The inflation of fuel and key materials is always a possibility and fuel is a cost driver for the mob/demob but would probably have a marginal impact. The users of the GIWW fully support improving these crossings as does the NFS. The Inland Users Water Board does not have this project ranked for immediate construction, even if an approved Chief's Report and funding become available.	Marginal	Possible	1
EX-4	Demolition	<ul> <li>Potential for severe adverse weather?</li> <li>Political influences, lack of support, obstacles?</li> <li>Unanticipated inflations in fuel, key materials?</li> <li>Potential for market volatility impacting competition, pricing?</li> <li>Funding Constraints</li> </ul>	The project is located a bit inland so severe adverse weather should not be an issue. The inflation of fuel and key materials is always a possibility, however it is not a large cost driver for this item and will not place a large demand on the supply. The users of the GIWW fully support improving these crossings as does the NFS. The Inland Users Water Board does not have this project ranked for immediate construction, even if an approved Chief's Report and funding become available.	Negligible	Possible	0
EX-5	Excavation and Fill	<ul> <li>Potential for severe adverse weather?</li> <li>Political influences, lack of support, obstacles?</li> <li>Unanticipated inflations in fuel, key materials?</li> <li>Potential for market volatility impacting competition, pricing?</li> <li>Funding Constraints</li> </ul>	Political influences, lack of support, obstacles? fuel is a cost driver for the dredging and would increase the cost. The users of the GIWW fully support improving these crossings as does the NFS. The Inland Users Water Board does not have this project ranked for immediate		Likely	3
EX-6	cofferdam	<ul> <li>Potential for severe adverse weather?</li> <li>Political influences, lack of support, obstacles?</li> <li>Unanticipated inflations in fuel, key materials?</li> <li>Potential for market volatility impacting competition, pricing?</li> <li>Funding Constraints</li> </ul>	The project is located a bit inland so severe adverse weather should not be an issue. The inflation of fuel and key materials is always a possibility and steel is a cost driver for the cofferdam and could increase the cost. The users of the GIWW fully support improving these crossings as does the NFS. The Inland Users Water Board does not have this project ranked for immediate construction, even if an approved Chief's Report and funding become available.	Moderate	Possible	2
EX-7	concrete structure and gate	<ul> <li>Potential for severe adverse weather?</li> <li>Political influences, lack of support, obstacles?</li> <li>Unanticipated inflations in fuel, key materials?</li> <li>Potential for market volatility impacting competition, pricing?</li> <li>Funding Constraints</li> </ul>	The project is located a bit inland so severe adverse weather should not be an issue. The inflation of fuel and key materials is always a possibility and steel is a cost driver for the gates and piles and could increase the cost. The users of the GIWW fully support improving these crossings as does the NFS. The Inland Users Water Board does not have this project ranked for immediate construction, even if an approved Chief's Report and funding become available.	Moderate	Possible	2
EX-8	maintenance dewatering system	<ul> <li>Potential for severe adverse weather?</li> <li>Political influences, lack of support, obstacles?</li> <li>Unanticipated inflations in fuel, key materials?</li> <li>Potential for market volatility impacting competition, pricing?</li> <li>Funding Constraints</li> </ul>	The project is located a bit inland so severe adverse weather should not be an issue. The inflation of fuel and key materials is always a possibility, however it is not a large cost driver for this item and will not place a large demand on the supply. The users of the GIWW fully support improving these crossings as does the NFS. The Inland Users Water Board does not have this project ranked for immediate construction, even if an approved Chief's Report and funding become available.	Negligible	Possible	0

EX-9	guidewalls	<ul> <li>Potential for severe adverse weather?</li> <li>Political influences, lack of support, obstacles?</li> <li>Unanticipated inflations in fuel, key materials?</li> <li>Potential for market volatility impacting competition, pricing?</li> <li>Funding Constraints</li> </ul>	The project is located a bit inland so severe adverse weather should not be an issue. The inflation of fuel and key materials is always a possibility and steel is a cost driver for the guidewalls and could increase the cost. The users of the GIWW fully support improving these crossings as does the NFS The Inland Users Water Board does not have this project ranked for immediate construction, even if an approved Chief's Report and funding become available.	Moderate	Possible	2
EX-10	mechanical + electrical	Potential for severe adverse weather? Political influences, lack of support, obstacles? Unanticipated inflations in fuel, key materials? Potential for market volatility impacting competition, pricing? Funding Constraints	The project is located a bit inland so severe adverse weather should not be an issue. The inflation of fuel and key materials is always a possibility, however it is not a large cost driver for this item and will not place a large demand on the supply. The users of the GIWW fully support improving these crossings as does the NFS. The Inland Users Water Board does not have this project ranked for immediate construction, even if an approved Chief's Report and funding become available.	Negligible	Possible	0
<b>-</b> V.44				Negligible	Unlikely	0
EX-11						
EX-12	Remaining Construction Items	<ul> <li>Potential for severe adverse weather?</li> <li>Political influences, lack of support, obstacles?</li> <li>Unanticipated inflations in fuel, key materials?</li> <li>Potential for market volatility impacting competition, pricing?</li> <li>Funding Constraints</li> </ul>	The project is located a bit inland so severe adverse weather should not be an issue. The inflation of fuel and key materials is always a possibility, however it is not a large cost driver for this item and will not place a large demand on the supply. At this stage there is no reason to believe there will be out of the ordinary market volatility that would affect competition and pricing as this is not a mega-project requiring large or specialty assets. The users of the GIWW fully support improving these crossings as does the NFS. The Inland Users Water Board does not have this project ranked for immediate construction, even if an approved Chief's Report and funding become available. This could cause increased reviews and updates due to delays in starting the project for lack of funding.	Marginal	Possible	1
EX-13	Planning, Engineering, & Design	<ul> <li>Potential for severe adverse weather?</li> <li>Political influences, lack of support, obstacles?</li> <li>Unanticipated inflations in fuel, key materials?</li> <li>Potential for market volatility impacting competition, pricing?</li> <li>Funding Constraints</li> </ul>	The project is located a bit inland so severe adverse weather should not be an issue. The inflation of fuel and key materials is always a possibility. At this stage there is no reason to believe there will be out of the ordinary market volatility that would affect competition and pricing as this is not a mega-project requiring large or specialty assets. The users of the GIWW fully support improving these crossings as does the NFS. The Inland Users Water Board does not have this project ranked for immediate construction, even if an approved Chief's Report and funding become available. This could cause increased reviews and updates due to delays in starting the project for lack of funding.	Marginal	Likely	N/A
EX-14	Construction Management	no concern	S&A is linked to construction items and cost, but most external risks would not make the project take longer once started.	Negligible	Possible	N/A

## **Abbreviated Risk Analysis**

Project (less than \$40M): **Brazos River Floodgate**Project Development Stage/Alternative: **Feasibility (Alternatives)** 

Risk Category: Moderate Risk: Typical Project Construction Type

Alternative: Alt 3a1 Hybrid - Open Chl west and r

Meeting Date: 10/4/2017

Total Estimated Construction Contract Cost = \$ 78,640,546

	<u>CWWBS</u>	Feature of Work	<u>Est</u>	imated Cost	% Contingency	\$ (	Contingency	<u>Total</u>
	01 LANDS AND DAMAGES	Real Estate	\$	27,000	20%	\$	5,400 \$	32,400
1	02 RELOCATIONS	Relocations	\$	_	0%	\$	- \$	-
2	06 FISH AND WILDLIFE FACILITIES	Mitigation	\$	305,000	25%	\$	76,590 \$	381,590
3	15 FLOODWAY CONTROL AND DIVERSION STRUCTURES	Mob/Demob	\$	7,030,146	13%	\$	913,169 \$	7,943,315
4	15 FLOODWAY CONTROL AND DIVERSION STRUCTURES	Demolition	\$	4,142,975	45%	\$	1,858,926 \$	6,001,901
5	15 FLOODWAY CONTROL AND DIVERSION STRUCTURES	Excavation and Fill	\$	12,323,477	49%	\$	6,080,943 \$	18,404,420
6	15 FLOODWAY CONTROL AND DIVERSION STRUCTURES	cofferdam	\$	7,632,623	31%	\$	2,384,079 \$	10,016,702
7	15 FLOODWAY CONTROL AND DIVERSION STRUCTURES	concrete structure and gate	\$	30,929,194	45%	\$	13,785,674 \$	44,714,868.20
8	15 FLOODWAY CONTROL AND DIVERSION STRUCTURES	maintenance dewatering system	\$	6,319,638	17%	\$	1,100,595 \$	7,420,233.33
9	15 FLOODWAY CONTROL AND DIVERSION STRUCTURES	guidewalls	\$	7,938,412	63%	\$	4,990,223 \$	12,928,634.63
10	15 FLOODWAY CONTROL AND DIVERSION STRUCTURES	mechanical + electrical	\$	2,019,081	27%	\$	550,053 \$	2,569,134.24
11	15 FLOODWAY CONTROL AND DIVERSION STRUCTURES		\$		0%	\$	- \$	-
12	All Other	Remaining Construction Items	\$	_	0.0% 0%	\$	- \$	-
13	30 PLANNING, ENGINEERING, AND DESIGN	Planning, Engineering, & Design	\$	-	0%	\$	- \$	-
14	31 CONSTRUCTION MANAGEMENT	Construction Management	\$	-	0%	\$	- \$	-
XX	FIXED DOLLAR RISK ADD (EQUALLY DISPERSED TO ALL, MU	ST INCLUDE JUSTIFICATION SEE BELOW)				\$	_	

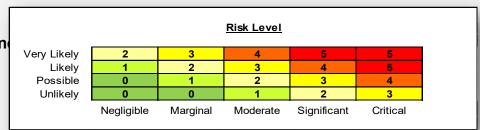
Confiden	co Lovol F	Range Estimate (\$000's)	<b>Ba</b> \$78.6	ase	<b>50%</b> \$97.685k	<b>80</b> % \$110.381k
Total Excluding Real Es	tate \$	78,640,546	40%	\$	31,740,253	\$ 110,380,799
Total Construction Managen	nent \$	-	0%	\$	-	\$ -
Total Planning, Engineering & Des	•	-	0%	\$	-	\$ -
Total Construction Estim	nate \$	78,640,546	40%	\$	31,740,253	\$ 110,380,799
Real Es	tate \$	27,000	20%	\$	5,400	\$ 32,400.00
als Real Fs	tate \$	27 000	20%	\$	5 400	\$ 32

\* 50% based on base is at 5% CL.

**Fixed Dollar Risk Add:** (Allows for additional risk to be added to the risk analsyis. Must include justification. Does not allocate to Real Estate.

## Brazos River Floodgate Alt 3a1 Hybrid - Open Chl west and n

Feasibility (Alternatives)
Abbreviated Risk Analysis
Meeting Date: 4-Oct-17



# Risk Register

Risk Element	Feature of Work	Concerns	PDT Discussions & Conclusions (Include logic & justification for choice of Likelihood &	Impact	Likelihood	Risk Level
Project Management & Scope Growth					Maximum Project Growth	
PS-1	Relocations	Are there any Relocations in area?	Lisa MThere are no railroads or utilities that will be impacted for either project except Texas Barge and Boat. most likely our easements are valid therefore at this time acquisition is not included however, we allow for the business relocation. Cost for this is covered in RE. There are 6 wells located around the area of the Brazos floodgates - all appear to have been plugged. The best knowledge is there is a pipeline near the east side of Brazos, but we do not anticipate we will impact. There are some existing roads in the area but they dead end at the existing projects. Alt 9c, 9b, and 9A is impacting an existing barge facility (Texas Barge and Boat - not sure what they do there - repairs?) Jerica R Relocations have been considered (TX Barge/Boat). There are currently no HTRW concerns for the area.	Significant	Possible	3
PS-2	Mitigation	Is mitigation required?	yes. assumptions include the footprint of disturbance would be mitigated for each alternative. Not included in the estimate is the annualization of habitat improvements over the 50 year period of analysis. Taking into account the maturation of the mitigation area over time, the mitigation costs would be a conservative estimate of mitigation requirements. To compare the alternatives, we took the wetland habitat impact estimates and multiplied them by \$/acre to estimate mitigation costs for each alternative. it appears that there are no active mitigation banks that cover coastal marsh mitigation in the BRFG or CRL areas. So currently, mitigation banks are not likely an option.	Marginal	Possible	1
PS-3	Mob/Demob	no concern for scope growth	standard type work	Negligible	Possible	0
PS-4	Demolition	little concern for scope growth	assuming removing whole existing structure. Have some orignal dwgs.  Do we really know what is out there?	Moderate	Possible	2
PS-5	Excavation and Fill	potential for scope growth, added features?	potential changes small. Channel designs follow existing channel parameters. For Alt 3A, 3a1 the eventual disposition of the bypass channels has not been included - backfill? Dam off? what?	Moderate	Likely	3
PS-6	cofferdam	potential for scope growth, added features?	currently sassuming to build in the wet and backfill around.	Negligible	Unlikely	0
PS-7	concrete structure and gate	potential for scope growth, added features?	project currently scoped at 125 ft wide. Optimum size could increase based on barge simulation testing to say 150 ft width. Existing features on GIWW are already at 125 ft - i.e. bridge piers at Colorado Locks - so it would not be likely for a change to a wider structure for that reason, however simulation testing could recommend a wider structure for safe transit through the structure. Structures on both IHNC Barrier and WCC are larger than the authorized channel for this reason.	Significant	Possible	3

PS-8	maintenance dewatering system	potential for scope growth, added features?	Assuming bulkhead sytem now - for 1 structure at a time. PDT does not see any reason for 2 sets. Currently assuming conservative, worst case and placing across channel opening to block off whole chamber. Could block off recesses only, save on center piles, etc. but would need to increase side wing concrete and piles for access around when dewatered.	Marginal	Possible	1
PS-9	guidewalls	potential for scope growth, added features?	current design assumes tied back sheetpile guidewalls. Could want more expensive reinforced concrete walls which would also require more extensive cofferdam - Alt 3A, 3a1, 9b, and 9C. Length of entrance guidewalls could become longer.	Significant	Likely	4
PS-10	mechanical + electrical	little concern for scope growth	typical scope for this type construction	Negligible	Possible	0
PS-11	0			Negligible	Unlikely	0
PS-12	Remaining Construction Items			Negligible	Unlikely	0
PS-13	Planning, Engineering, & Design	potential for scope growth, added features?	added features and changes to scope would require additional PED	Marginal	Possible	N/A
PS-14	Construction Management		added features and changes to scope would require additional S&A	Marginal	Possible	N/A
Acquisition	n Strategy			Maximum Proje	ct Growth	30%
AS-1	Relocations	none identified	none identified	Moderate	Possible	2
AS-2	Mitigation	unknown	it appears that there are no active mitigation banks that cover coastal marsh mitigation in the BRFG or CRL areas. So currently, mitigation banks are not likely an option.	Significant	Possible	3
AS-3	Mob/Demob	is there an established acquisition plan?	Acquisition strategy is anticipated to be sealed bid per PM. Cost estimate assumes large business, open competition but includes typical tiering of subcontractors. If projects were to go small business, Best Value, or some type of set-a-aside would increase cost.	Marginal	Likely	2
AS-4	Demolition	is there an established acquisition plan?	Acquisition strategy is anticipated to be sealed bid per PM. Cost estimate assumes large business, open competition but includes typical tiering of subcontractors. If projects were to go small business, Best Value, or some type of set-a-aside would increase cost.	Marginal	Likely	2
AS-5	Excavation and Fill	is there an established acquisition plan?	Acquisition strategy is anticipated to be sealed bid per PM. Cost estimate assumes large business, open competition but includes typical tiering of subcontractors. If projects were to go small business, Best Value, or some type of set-a-aside would increase cost.	Marginal	Likely	2
AS-6	cofferdam	is there an established acquisition plan?	Acquisition strategy is anticipated to be sealed bid per PM. Cost estimate assumes large business, open competition but includes typical tiering of subcontractors. If projects were to go small business, Best Value, or some type of set-a-aside would increase cost.	Marginal	Likely	2
AS-7	concrete structure and gate	is there an established acquisition plan?	Acquisition strategy is anticipated to be sealed bid per PM. Cost estimate assumes large business, open competition but includes typical tiering of subcontractors. If projects were to go small business, Best Value, or some type of set-a-aside would increase cost.	Marginal	Likely	2
AS-8	maintenance dewatering system	is there an established acquisition plan?	Acquisition strategy is anticipated to be sealed bid per PM. Cost estimate assumes large business, open competition but includes typical tiering of subcontractors. If projects were to go small business, Best Value, or some type of set-a-aside would increase cost.	Marginal	Likely	2
AS-9	guidewalls	is there an established acquisition plan?	Acquisition strategy is anticipated to be sealed bid per PM. Cost estimate assumes large business, open competition but includes typical tiering of subcontractors. If projects were to go small business, Best Value, or some type of set-a-aside would increase cost.	Marginal	Likely	2

AS-10	mechanical + electrical	is there an established acquisition plan?	Acquisition strategy is anticipated to be sealed bid per PM. Cost estimate assumes large business, open competition but includes typical tiering of subcontractors. If projects were to go small business, Best Value, or some type of set-a-aside would increase cost.	Marginal	Likely	2
AS-11	0			Negligible	Unlikely	0
				Marginal	Likely	2
AS-12	Remaining Construction Items			<u> </u>	,	_
AS-13	Planning, Engineering, & Design			Marginal	Unlikely	N/A
AS-14	Construction Management	is there an established acquisition plan?	Acquisition strategy is anticipated to be sealed bid per PM. Cost estimate assumes large business, open competition but includes typical tiering of subcontractors. If projects were to go small business, Best Value, or some type of set-a-aside would increase cost.	Marginal	Likely	N/A
Constructi	on Elements			Maximum Project Growth		25%
CON-1	Relocations	none identified	none identified	Negligible	Unlikely	0
CE-2	Mitigation			Negligible	Unlikely	0
CE-3	Mob/Demob	High risk or complex construction elements, site access, in-water? Unique construction methods? Special mobilization?	typical construction, no special concerns. Access by land and water.	Negligible	Possible	0
CE-4	Demolition	High risk or complex construction elements, site access, in-water? Special equipment or subcontractors needed? Potential for construction modification and claims?	potential changes. Since the existing facilities are old, actual site conditions and construction may be different than expected. High potential for modifications and claims exists.	Moderate	Likely	3
CE-5	Excavation and Fill	Accelerated schedule or harsh weather schedule? Special equipment or subcontractors needed? Potential for construction modification and claims?	Item is mostly new channel excavation. Interior work so harsh weather should not be a factor. Typical work, nothing special required. Since the existing facilities are old, actual site conditions could be different. Potential for modifications and claims exists.	Marginal	Likely	2
CE-6	cofferdam	High risk or complex construction elements, site access, in-water? Unique construction methods? Special equipment or subcontractors needed? Potential for construction modification and claims?	typical work and design takes this into account, but might be slightly higher risk portion of work. No special equipment or contractors needed. There is potential for modifications and claims based on unknown site conditions and limited geotech.	Marginal	Likely	2
CE-7	concrete structure and gate	High risk or complex construction elements, site access, in-water? Unique construction methods? Special equipment or subcontractors needed? Potential for construction modification and claims?	typical construction, no special concerns. Access by land and water. No special contractors or equipment required. Potential for modifications and claims.	Marginal	Likely	2
CE-8	maintenance dewatering system	no special concerns		Negligible	Possible	0
CE-9	guidewalls	High risk or complex construction elements, site access, in-water? Unique construction methods? Special equipment or subcontractors needed? Potential for construction modification and claims?	typical work and design takes this into account. No special equipment or contractors needed. There is potential for modifications and claims based on unknown site conditions and limited geotech.	Marginal	Likely	2
CE-10	mechanical + electrical	no special concerns	should be typical construction with little concern. assumes commonly used equipment and processes.	Marginal	Likely	2
				Negligible	Unlikely	0
CE-11	0  Remaining Construction Items			Negligible	Unlikely	0

	_	T		1		
CE-13	Planning, Engineering, & Design		modifications and claims would cause increased PED costs	Negligible	Likely	N/A
CE-14	Construction Management		modifications and claims would cause increased CM costs	Marginal	Likely	N/A
<b>Specialty</b>	Construction or Fabrication			Maximum Proje	ct Growth	65%
SC-1	Relocations	none identified	none identified	Significant	Possible	3
SC-2	Mitigation	no concern		Negligible	Possible	0
SC-3	Mob/Demob	Atypical construction elements, unusual material or equipment manufactured or installed? Confidence in constructibility or methodology?	typical construction, little or no concern	Negligible	Possible	0
SC-4	Demolition	Atypical construction elements, unusual material or equipment manufactured or installed?  Confidence in constructibility or methodology?	should be typical construction with little concern. However, since the existing facilities are old, actual site conditions and construction may be different than expected and require special techniques over and above what is included in cost estimate.	Moderate	Possible	2
SC-5	Excavation and Fill	Atypical construction elements, unusual material or equipment manufactured or installed?  Confidence in constructibility or methodology?	should be typical construction with low concern.	Negligible	Unlikely	0
SC-6	cofferdam	Atypical construction elements, unusual material or equipment manufactured or installed? Confidence in constructibility or methodology?	should be typical construction with low concern.	Negligible	Possible	0
SC-7	concrete structure and gate	Atypical construction elements, unusual material or equipment manufactured or installed? Confidence in constructibility or methodology?	should be typical construction with low concern.	Negligible	Unlikely	0
SC-8	maintenance dewatering system	Atypical construction elements, unusual material or equipment manufactured or installed? Confidence in constructibility or methodology?	should be typical construction with low concern.	Negligible	Unlikely	0
SC-9	guidewalls	Atypical construction elements, unusual material or equipment manufactured or installed?  Confidence in constructibility or methodology?	should be typical construction with low concern.	Negligible	Possible	0
SC-10	mechanical + electrical	Atypical construction elements, unusual material or equipment manufactured or installed? Confidence in constructibility or methodology?	should be typical construction with low concern. assumes commonly used equipment and processes. More of a concern on the alternatives that are being renovated and trying to fit in and work with existing facilities.	Marginal	Possible	1
SC-11	0			Negligible	Unlikely	0
SC-12	Remaining Construction Items			Negligible	Unlikely	0
SC-13	Planning, Engineering, & Design			Negligible	Unlikely	N/A
SC-14	Construction Management			Negligible	Unlikely	N/A
	Design & Quantities			Maximum Proje	ct Growth	30%
T-1	Relocations	none identified	none identified	Significant	Possible	3
T-2	Mitigation		assumptions include the footprint of disturbance would be mitigated for each alternative. it appears that there are no active mitigation banks that cover coastal marsh mitigation in the BRFG or CRL areas. So currently, mitigation banks are not likely an option. Unit costs provided by RTS. Based on average of costs per acre of similar mitigation in the area.	Moderate	Possible	2
T-3	Mob/Demob	no concern	no concern	Negligible	Possible	0
1-3	1	I .	L	<u> </u>		

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T-4	Demolition	Level of confidence based on design and assumptions? Appropriate methods applied to calculate quantities? Sufficient investigations to develop quantities? Quality control check applied?	demolition information based on original plans. Existing conditions may not be as originally planned/built. Design and quantites QC by MVN Structures.	Significant	Possible	3
T-5	Excavation and Fill	Level of confidence based on design and assumptions? Appropriate methods applied to calculate quantities? Sufficient investigations to develop quantities? Quality control check applied?	Excavation and fill quantities based on limited information available. Do not have current, accurate land surveys of area. Channel designs follow existing channel parameters.	Marginal	Likely	2
T-6	cofferdam	Level of confidence based on design and assumptions? Appropriate methods applied to calculate quantities? Sufficient investigations to develop quantities? Quality control check applied?	Qtys based on similar Gulf coast project designs. Geotech conditions have not been evaluated and could cause changes to existing assumptions/qtys.	Marginal	Likely	2
T-7	concrete structure and gate	Level of confidence based on design and assumptions? Appropriate methods applied to calculate quantities? Sufficient investigations to develop quantities? Quality control check applied?	Qtys based on similar Gulf coast project designs - could be variations when site specific conditions applied. Concrete may need to be raised to match top elevation of guidewalls and Colorado Lock height - Alt 3A, 3a1, 9b and 9C. Geotech conditions have not been evaluated and could cause changes to existing assumptions/qtys on foundation pilings.	Marginal	Likely	2
T-8	maintenance dewatering system	Level of confidence based on design and assumptions? Appropriate methods applied to calculate quantities? Sufficient investigations to develop quantities? Quality control check applied?	Assuming bulkhead sytem now - for 1 structure at a time. PDT does not see any reason for 2 sets. Currently assuming conservative, worst case and placing across channel opening to block off whole chamber. Could block off recesses only, save on center piles, etc. but would need to increase side wing concrete and piles for access around when dewatered. Possible savings.	Negligible	Possible	0
T-9	guidewalls	Level of confidence based on design and assumptions? Appropriate methods applied to calculate quantities? Sufficient investigations to develop quantities? Quality control check applied?	Qtys based on similar Gulf coast project designs. Geotech conditions have not been evaluated and could cause changes to existing assumptions/qtys however reasonable assumptions have been included.	Moderate	Possible	2
T-10	mechanical + electrical	Level of confidence based on design and assumptions? Appropriate methods applied to calculate quantities? Sufficient investigations to develop quantities? Quality control check applied?	concepts based on similar Gulf coast projects and MVN commonly used systems. No specific design at this stage. More of a concern on the alternatives that are being renovated and trying to fit in and work with existing facilities.	Marginal	Possible	1
T-11	0			Negligible	Unlikely	0
T-12	Remaining Construction Items			Moderate	Possible	2
T-13	Planning, Engineering, & Design		further data will be obtained during PED and additional engineering will be done	Marginal	Likely	N/A
T-14	Construction Management		changes in designs and assumption could cause longer construction times	Marginal	Likely	N/A
Cost Estim	nate Assumptions			Maximum Proje	ct Growth	35%
EST-1	Relocations	none identified	none identified	Significant	Possible	3
EST-2	Mitigation		it appears that there are no active mitigation banks that cover coastal marsh mitigation in the BRFG or CRL areas. So currently, mitigation banks are not likely an option. Unit costs provided by RTS. Based on average of costs per acre of similar mitigation in the area.	Moderate	Possible	2
EST-3	Mob/Demob	no concern	typical construction anticipated and appropriate mob/demob included in cost estimate.	Negligible	Possible	0
EST-4	Demolition	Assumptions related to prime and subcontractor markups/assignments? Assumptions regarding crew, productivity, overtime? Site accessibility, transport delays, congestion? Overuse of Cost Book, lump sum, allowances? Lack confidence on critical cost items?	cost estimate includes typical prime and subcontractor tiering. All items have detailed crews and related productivity and overtime. Typical construction features. Demolition information based on original plans. Existing conditions may not be as originally planned/built and different techniques could be needed.	Significant	Possible	3

EX-1	Relocations	none identified	none identified	Negligible	Unlikely	0
External P	External Project Risks Maximum Project Growth			ct Growth	40%	
EST-14	Construction Management	no concern	since S&A is directly linked to construction items and cost, this item would have similar risk to construction items.	Marginal	Likely	N/A
EST-13	Planning, Engineering, & Design	no concern		Negligible	Possible	N/A
EST-12	Remaining Construction Items			Marginal	Likely	2
EST-11	0			Negligible	Unlikely	0
EST-10	mechanical + electrical	Assumptions related to prime and subcontractor markups/assignments? Assumptions regarding crew, productivity, overtime? Site accessibility, transport delays, congestion? Overuse of Cost Book, lump sum, allowances? Lack confidence on critical cost items?	cost estimate includes typical prime and subcontractor tiering. Have detailed line items but costs are based on mechanical and electrical engineer professional experience and bids in MVN. Typical construction features. Nothing unique about materials and methods. No quotes on the major materials.	Moderate	Likely	3
EST-9	guidewalls	Assumptions related to prime and subcontractor markups/assignments? Assumptions regarding crew, productivity, overtime? Site accessibility, transport delays, congestion? Overuse of Cost Book, lump sum, allowances? Lack confidence on critical cost items?	cost estimate includes typical prime and subcontractor tiering. Most items have detailed crews and related productivity and overtime. Typical construction features, however exact design/typical sections not developed yet. Nothing unique about most materials and methods, except for new UHMW impact sheet. Site accessibility by both land and water. Current quotes on most major materials. Jerica R Currently there are no restrictions that limit construction. There may be some schedule necessary to maintain traffic in the area, but for this alternative the new channel is in a new location and traffic can be maintained through the old channel.	Moderate	Likely	3
EST-8	maintenance dewatering system	Assumptions related to prime and subcontractor markups/assignments? Assumptions regarding crew, productivity, overtime? Site accessibility, transport delays, congestion? Overuse of Cost Book, lump sum, allowances? Lack confidence on critical cost items?	cost estimate includes typical prime and subcontractor tiering. All items have detailed crews and related productivity and overtime. Typical construction features, however exact design/typical sections not developed yet. Nothing unique about materials and methods. Site accessibility by both land and water. Current quotes on most major materials.	Marginal	Likely	2
EST-7		Assumptions related to prime and subcontractor markups/assignments? Assumptions regarding crew, productivity, overtime? Site accessibility, transport delays, congestion? Overuse of Cost Book, lump sum, allowances? Lack confidence on critical cost items?	cost estimate includes typical prime and subcontractor tiering. All items have detailed crews and related productivity and overtime. Typical construction features, however exact design/typical sections not developed yet. Nothing unique about materials and methods. Site accessibility by both land and water. Current quotes on most major materials.	Moderate	Likely	3
EST-6	cofferdam	Assumptions related to prime and subcontractor markups/assignments? Assumptions regarding crew, productivity, overtime? Site accessibility, transport delays, congestion? Overuse of Cost Book, lump sum, allowances? Lack confidence on critical cost items?	cost estimate includes typical prime and subcontractor tiering. All items have detailed crews and related productivity and overtime. Typical construction features, however exact design/typical sections not developed yet. Nothing unique about materials and methods. Site accessibility by both land and water. Current quotes on most major materials. Jerica R Currently there are no restrictions that limit construction. There may be some schedule necessary to maintain traffic in the area, but for this alternative the new channel is in a new location and traffic can be maintained through the old channel.	Moderate	Likely	3
EST-5	Excavation and Fill	Assumptions related to prime and subcontractor markups/assignments? Assumptions regarding crew, productivity, overtime? Site accessibility, transport delays, congestion? Overuse of Cost Book, lump sum, allowances? Lack confidence on critical cost items?	cost estimate includes typical prime and subcontractor tiering. All items have detailed crews and related productivity and overtime. Typical construction features. Dredging unit costs developed in CEDEP, however no geotech available and virgin cut. New bypass channels going through existing disposal areas on 3A with unknown geotech and possible debris. There is still questions as to fill and possible sources. Jerica R Currently there are no restrictions that limit construction. There may be some scheduling necessary to maintain traffic in the area which would increase cost. Includes bypass channel, should not be issue.	Moderate	Likely	3

EX-2	Mitigation	no concern	no concern	Negligible	Possible	0
EX-3	Mob/Demob	<ul> <li>Potential for severe adverse weather?</li> <li>Political influences, lack of support, obstacles?</li> <li>Unanticipated inflations in fuel, key materials?</li> <li>Potential for market volatility impacting competition, pricing?</li> <li>Funding Constraints</li> </ul>	The project is located a bit inland so severe adverse weather should not be an issue. The inflation of fuel and key materials is always a possibility and fuel is a cost driver for the mob/demob but would probably have a marginal impact. The users of the GIWW fully support improving these crossings as does the NFS. The Inland Users Water Board does not have this project ranked for immediate construction, even if an approved Chief's Report and funding become available.	Marginal	Possible	1
EX-4	Demolition	<ul> <li>Potential for severe adverse weather?</li> <li>Political influences, lack of support, obstacles?</li> <li>Unanticipated inflations in fuel, key materials?</li> <li>Potential for market volatility impacting competition, pricing?</li> <li>Funding Constraints</li> </ul>	The project is located a bit inland so severe adverse weather should not be an issue. The inflation of fuel and key materials is always a possibility, however it is not a large cost driver for this item and will not place a large demand on the supply. The users of the GIWW fully support improving these crossings as does the NFS. The Inland Users Water Board does not have this project ranked for immediate construction, even if an approved Chief's Report and funding become available.	Negligible	Possible	0
EX-5	Excavation and Fill	<ul> <li>Potential for severe adverse weather?</li> <li>Political influences, lack of support, obstacles?</li> <li>Unanticipated inflations in fuel, key materials?</li> <li>Potential for market volatility impacting competition, pricing?</li> <li>Funding Constraints</li> </ul>	The project is located a bit inland so severe adverse weather should not be an issue. The inflation of fuel and key materials is always a possibility and fuel is a cost driver for the dredging and would increase the cost. The users of the GIWW fully support improving these crossings as does the NFS. The Inland Users Water Board does not have this project ranked for immediate construction, even if an approved Chief's Report and funding become available.	Moderate	Likely	3
EX-6	cofferdam	<ul> <li>Potential for severe adverse weather?</li> <li>Political influences, lack of support, obstacles?</li> <li>Unanticipated inflations in fuel, key materials?</li> <li>Potential for market volatility impacting competition, pricing?</li> <li>Funding Constraints</li> </ul>	The project is located a bit inland so severe adverse weather should not be an issue. The inflation of fuel and key materials is always a possibility and steel is a cost driver for the cofferdam and could increase the cost. The users of the GIWW fully support improving these crossings as does the NFS. The Inland Users Water Board does not have this project ranked for immediate construction, even if an approved Chief's Report and funding become available.	Moderate	Possible	2
EX-7	concrete structure and gate	<ul> <li>Potential for severe adverse weather?</li> <li>Political influences, lack of support, obstacles?</li> <li>Unanticipated inflations in fuel, key materials?</li> <li>Potential for market volatility impacting competition, pricing?</li> <li>Funding Constraints</li> </ul>	The project is located a bit inland so severe adverse weather should not be an issue. The inflation of fuel and key materials is always a possibility and steel is a cost driver for the gates and piles and could increase the cost. The users of the GIWW fully support improving these crossings as does the NFS. The Inland Users Water Board does not have this project ranked for immediate construction, even if an approved Chief's Report and funding become available.	Moderate	Possible	2

EX-8	maintenance dewatering system	<ul> <li>Potential for severe adverse weather?</li> <li>Political influences, lack of support, obstacles?</li> <li>Unanticipated inflations in fuel, key materials?</li> <li>Potential for market volatility impacting competition, pricing?</li> <li>Funding Constraints</li> </ul>	The project is located a bit inland so severe adverse weather should not be an issue. The inflation of fuel and key materials is always a possibility, however it is not a large cost driver for this item and will not place a large demand on the supply. The users of the GIWW fully support improving these crossings as does the NFS. The Inland Users Water Board does not have this project ranked for immediate construction, even if an approved Chief's Report and funding become available.	Negligible	Possible	0
EX-9	guidewalls	<ul> <li>Potential for severe adverse weather?</li> <li>Political influences, lack of support, obstacles?</li> <li>Unanticipated inflations in fuel, key materials?</li> <li>Potential for market volatility impacting competition, pricing?</li> <li>Funding Constraints</li> </ul>	The project is located a bit inland so severe adverse weather should not be an issue. The inflation of fuel and key materials is always a possibility and steel is a cost driver for the guidewalls and could increase the cost. The users of the GIWW fully support improving these crossings as does the NFS. The Inland Users Water Board does not have this project ranked for immediate construction, even if an approved Chief's Report and funding become available.	Moderate	Possible	2
EX-10	mechanical + electrical	<ul> <li>Potential for severe adverse weather?</li> <li>Political influences, lack of support, obstacles?</li> <li>Unanticipated inflations in fuel, key materials?</li> <li>Potential for market volatility impacting competition, pricing?</li> <li>Funding Constraints</li> </ul>	The project is located a bit inland so severe adverse weather should not be an issue. The inflation of fuel and key materials is always a possibility, however it is not a large cost driver for this item and will not place a large demand on the supply. The users of the GIWW fully support improving these crossings as does the NFS. The Inland Users Water Board does not have this project ranked for immediate construction, even if an approved Chief's Report and funding become available.	Negligible	Possible	0
EX-11	0			Negligible	Unlikely	0
EX-12	Remaining Construction Items	<ul> <li>Potential for severe adverse weather?</li> <li>Political influences, lack of support, obstacles?</li> <li>Unanticipated inflations in fuel, key materials?</li> <li>Potential for market volatility impacting competition, pricing?</li> <li>Funding Constraints</li> </ul>	The project is located a bit inland so severe adverse weather should not be an issue. The inflation of fuel and key materials is always a possibility, however it is not a large cost driver for this item and will not place a large demand on the supply. At this stage there is no reason to believe there will be out of the ordinary market volatility that would affect competition and pricing as this is not a mega-project requiring large or specialty assets. The users of the GIWW fully support improving these crossings as does the NFS. The Inland Users Water Board does not have this project ranked for immediate construction, even if an approved Chief's Report and funding become available. This could cause increased reviews and updates due to delays in starting the project for lack of funding.	Marginal	Possible	1
EX-13	Planning, Engineering, & Design	<ul> <li>Potential for severe adverse weather?</li> <li>Political influences, lack of support, obstacles?</li> <li>Unanticipated inflations in fuel, key materials?</li> <li>Potential for market volatility impacting competition, pricing?</li> <li>Funding Constraints</li> </ul>	The project is located a bit inland so severe adverse weather should not be an issue. The inflation of fuel and key materials is always a possibility. At this stage there is no reason to believe there will be out of the ordinary market volatility that would affect competition and pricing as this is not a mega-project requiring large or specialty assets. The users of the GIWW fully support improving these crossings as does the NFS. The Inland Users Water Board does not have this project ranked for immediate construction, even if an approved Chief's Report and funding become available. This could cause increased reviews and updates due to delays in starting the project for lack of funding.	Marginal	Likely	N/A
EX-14	Construction Management	no concern	S&A is linked to construction items and cost, but most external risks would not make the project take longer once started.	Negligible	Possible	N/A

#### **Abbreviated Risk Analysis**

Project (less than \$40M): Brazos River Floodgate
Project Development Stage/Alternative: Feasibility (Alternatives)

Risk Category: Moderate Risk: Typical Project Construction Type

Alternative: Alt 9a - Open Channel Alignment C

Meeting Date: 10/4/2017

Total Estimated Construction Contract Cost = \$ 14,706,716

<u>CWWBS</u>	Feature of Work	<u>Esti</u>	mated Cost	% Contingency	<u>\$ C</u>	Contingency	<u>Total</u>
01 LANDS AND DAMAGES	Real Estate	\$	1,766,600	24.8%	\$	438,520 \$	2,205,120
1 02 RELOCATIONS	Relocations	\$	-	0%	\$	- \$	-
2 06 FISH AND WILDLIFE FACILITIES	Mitigation	\$	1,525,000	27%	\$	411,983 \$	1,936,983
3 15 FLOODWAY CONTROL AND DIVERSION STRUCTURES	Mob/Demob	\$	1,779,062	20%	\$	356,598 \$	2,135,660
4 15 FLOODWAY CONTROL AND DIVERSION STRUCTURES	Demolition	\$	467,751	69%	\$	321,108 \$	788,859
5 15 FLOODWAY CONTROL AND DIVERSION STRUCTURES	Excavation and Fill	\$	10,774,176	40%	\$	4,358,941 \$	15,133,117
6 15 FLOODWAY CONTROL AND DIVERSION STRUCTURES		\$	_	0%	\$	- \$	
7 15 FLOODWAY CONTROL AND DIVERSION STRUCTURES		\$	_	0%	\$	- \$	<u>-</u>
8 15 FLOODWAY CONTROL AND DIVERSION STRUCTURES		\$	_	0%	\$	- \$	<u>-</u>
9 15 FLOODWAY CONTROL AND DIVERSION STRUCTURES		\$	_	0%	\$	- \$	<u>-</u>
10 15 FLOODWAY CONTROL AND DIVERSION STRUCTURES	electrical	\$	160,727	38%	\$	60,778 \$	221,505.44
11 15 FLOODWAY CONTROL AND DIVERSION STRUCTURES		\$	_	0%	\$	- \$	-
12 All Other	Remaining Construction Items	\$	-	0.0% 0%	\$	- \$	-
13 30 PLANNING, ENGINEERING, AND DESIGN	Planning, Engineering, & Design	\$	-	0%	\$	- \$	-
14 31 CONSTRUCTION MANAGEMENT	Construction Management	\$	-	0%	\$	- \$	-
XX FIXED DOLLAR RISK ADD (EQUALLY DISPERSED TO ALL, MU	IST INCLUDE JUSTIFICATION SEE BELOW)				\$	_	

Totals						
Real Estate	\$	1,766,600	25%	\$	438,520	\$ 2,205,120.00
Total Construction Estimate	\$	14,706,716	37%	\$	5,509,408	\$ 20,216,124
Total Planning, Engineering & Design	\$	-	0%	\$	-	\$ -
Total Construction Management	\$	-	0%	\$	-	\$ -
Total Excluding Real Estate	\$	14,706,716	37%	\$	5,509,408	\$ 20,216,124
		_	В	ase	50%	80%
Confidence L	Confidence Level Range Estimate (\$000's)				\$18,012k	\$20,216k

\* 50% based on base is at 5% CL.

**Fixed Dollar Risk Add:** (Allows for additional risk to be added to the risk analsyis. Must include justification. Does not allocate to Real Estate.

### Brazos River Floodgate Alt 9a - Open Channel Alignment C

Feasibility (Alternatives)
Abbreviated Risk Analysis

Meeting Date: 4-Oct-17

Risk Level									
Very Likely	2	3	4	5	5				
Likely	1	2	3	4	5				
Possible	0	1	2	3	4				
Unlikely	0	0	1	2	3				
	Negligible	Marginal	Moderate	Significant	Critical				

# Risk Register

Risk Element	Feature of Work	Concerns	PDT Discussions & Conclusions (Include logic & justification for choice of Likelihood & Impact)	Impact	Likelihood	Risk Level
Project Ma	nagement & Scope Growth			Maximum Project Growth		75%
PS-1	Relocations	Are there any Relocations in area?	Lisa MThere are no railroads or utilities that will be impacted for either project except Texas Barge and Boat. most likely our easements are valid therefore at this time acquisition is not included however, we allow for the business relocation. Cost for this is covered in RE. There are 6 wells located around the area of the Brazos floodgates - all appear to have been plugged. The best knowledge is there is a pipeline near the east side of Brazos, but we do not anticipate we will impact. There are some existing roads in the area but they dead end at the existing projects. Alt 9c and 9A is impacting an existing barge facility (Texas Barge and Boat - not sure what they do there - repairs??) Jerica R Relocations have been considered (TX Barge/Boat) - in RE cost. There are currently no HTRW concerns for the area.	Significant	Possible	3
PS-2	Mitigation	Is mitigation required?	yes. assumptions include the footprint of disturbance would be mitigated for each alternative. Not included in the estimate is the annualization of habitat improvements over the 50 year period of analysis. Taking into account the maturation of the mitigation area over time, the mitigation costs would be a conservative estimate of mitigation requirements. To compare the alternatives, we took the wetland habitat impact estimates and multiplied them by \$/acre to estimate mitigation costs for each alternative. it appears that there are no active mitigation banks that cover coastal marsh mitigation in the BRFG or CRL areas. So currently, mitigation banks are not likely an option.	Marginal	Possible	1
PS-3	Mob/Demob	no concern for scope growth	standard type work	Negligible	Possible	0

PS-4	Demolition	potential for scope growth, added features?	assuming only removing gates, NOT whole existing concrete structure.  Could complete structure removal be required? Do we really know what is out there?	Critical	Possible	4
PS-5	Excavation and Fill	potential for scope growth, added features?	potential changes small. Could have to change flares at river entrance or similar - Alt 9C, 9b, and 9A. Channel designs follow existing channel parameters.	Marginal	Possible	1
PS-6	0			Negligible	Unlikely	0
PS-7	0			Negligible	Unlikely	0
PS-8	0			Negligible	Unlikely	0
PS-9	0			Negligible	Unlikely	0
PS-10	electrical	little concern for scope growth	typical scope for this type construction	Negligible	Possible	0
PS-11	0			Negligible	Unlikely	0
PS-12	Remaining Construction Items			Negligible	Unlikely	0
PS-13	Planning, Engineering, & Design	potential for scope growth, added features?	added features and changes to scope would require additional PED	Moderate	Possible	N/A
PS-14	Construction Management		added features and changes to scope would require additional S&A	Moderate	Possible	N/A

<u>Acquisition</u>	n Strategy			Maximum Proje	ct Growth	30%
AS-1	Relocations	none identified	none identified	Moderate	Possible	2
AS-2	Mitigation	unknown	it appears that there are no active mitigation banks that cover coastal marsh mitigation in the BRFG or CRL areas. So currently, mitigation banks are not likely an option.	Significant	Possible	3
AS-3	Mob/Demob	is there an established acquisition plan?	Acquisition strategy is anticipated to be sealed bid per PM. Cost estimate assumes large business, open competition but includes typical tiering of subcontractors. If projects were to go small business, Best Value, or some type of set-a-aside would increase cost.	Marginal	Likely	2
AS-4	Demolition	is there an established acquisition plan?	Acquisition strategy is anticipated to be sealed bid per PM. Cost estimate assumes large business, open competition but includes typical tiering of subcontractors. If projects were to go small business, Best Value, or some type of set-a-aside would increase cost.	Marginal	Likely	2
AS-5	Excavation and Fill	is there an established acquisition plan?	Acquisition strategy is anticipated to be sealed bid per PM. Cost estimate assumes large business, open competition but includes typical tiering of subcontractors. If projects were to go small business, Best Value, or some type of set-a-aside would increase cost.	Marginal	Likely	2
AS-6	0			Negligible	Unlikely	0
AS-7	0			Negligible	Unlikely	0
AS-8	0			Negligible	Unlikely	0

AS-9	0			Negligible	Unlikely	0
AS-10	electrical	is there an established acquisition plan?	Acquisition strategy is anticipated to be sealed bid per PM. Cost estimate assumes large business, open competition but includes typical tiering of subcontractors. If projects were to go small business, Best Value, or some type of set-a-aside would increase cost.	Marginal	Likely	2
AS-11	0			Negligible	Unlikely	0
AS-12	Remaining Construction Items			Marginal	Likely	2
AS-13	Planning, Engineering, & Design			Marginal	Unlikely	N/A
AS-14	Construction Management	is there an established acquisition plan?	Acquisition strategy is anticipated to be sealed bid per PM. Cost estimate assumes large business, open competition but includes typical tiering of subcontractors. If projects were to go small business, Best Value, or some type of set-a-aside would increase cost.	Marginal	Likely	N/A

Construction	on Elements			Maximum Proje	25%	
CON-1	Relocations	none identified	none identified	Negligible	Unlikely	0
CE-2	Mitigation	High risk or complex construction elements, site access, in-water? Unique construction methods? Special mobilization?	it appears that there are no active mitigation banks that cover coastal marsh mitigation in the BRFG or CRL areas. So currently, mitigation banks are not likely an option.	Marginal	Possible	1
CE-3	Mob/Demob	High risk or complex construction elements, site access, in-water? Unique construction methods? Special mobilization?	typical construction, no special concerns. Access by land and water.	Negligible	Possible	0
CE-4	Demolition	High risk or complex construction elements, site access, in-water? Special equipment or subcontractors needed? Potential for construction modification and claims?	potential changes. Since the existing facilities are old, actual site conditions and construction may be different than expected. Scope only includes removing gates, NOT the whole structure. Potential for modifications and claims exists.	Marginal	Likely	2
CE-5	Excavation and Fill	Accelerated schedule or harsh weather schedule? Special equipment or subcontractors needed? Potential for construction modification and claims?	Item is mostly new channel excavation. Interior work so harsh weather should not be a factor. Typical work, nothing special required. Since the existing facilities are old, actual site conditions could be different. Potential for modifications and claims exists.	Marginal	Possible	1
CE-6	0			Negligible	Unlikely	0
CE-7	0			Negligible	Unlikely	0
CE-8	0			Negligible	Unlikely	0
CE-9	0			Negligible	Unlikely	0
CE-10	electrical	no special concerns	should be typical construction with little concern. assumes commonly used equipment and processes.	Marginal	Likely	2
				Negligible	Unlikely	0
CE-11	0					

CE-12	Remaining Construction Items			Negligible	Unlikely	0
CE-13	Planning, Engineering, & Design		modifications and claims would cause increased PED costs	Negligible	Likely	N/A
CE-14	Construction Management		modifications and claims would cause increased CM costs	Marginal	Likely	N/A
Specialty (	Construction or Fabrication			Maximum Proje	ct Growth	65%
SC-1	Relocations	none identified	none identified	Negligible	Unlikely	0
SC-2	Mitigation	no concern		Negligible	Possible	0
SC-3	Mob/Demob	Atypical construction elements, unusual material or equipment manufactured or installed?  Confidence in constructibility or methodology?	typical construction, little or no concern	Negligible	Possible	0
SC-4	Demolition	Atypical construction elements, unusual material or equipment manufactured or installed?  Confidence in constructibility or methodology?	should be typical construction with little concern. However, since the existing facilities are old, actual site conditions and construction may be different than expected and require special techniques over and above what is included in cost estimate.	Moderate	Possible	2
SC-5	Excavation and Fill	Atypical construction elements, unusual material or equipment manufactured or installed?  Confidence in constructibility or methodology?	should be typical construction with low concern.	Negligible	Unlikely	0
SC-6	0			Negligible	Unlikely	0
SC-7	0			Negligible	Unlikely	0
SC-8	0			Negligible	Unlikely	0
SC-9	0			Negligible	Unlikely	0
SC-10	electrical	Atypical construction elements, unusual material or equipment manufactured or installed?  Confidence in constructibility or methodology?	should be typical construction with low concern. assumes commonly used equipment and processes.	Marginal	Possible	1

SC-11	0		Negligible	Possible	0
SC-12	Remaining Construction Items		Negligible	Unlikely	0
SC-13	Planning, Engineering, & Design		Negligible	Unlikely	N/A
SC-14	Construction Management		Negligible	Unlikely	N/A

<u>Technical I</u>	Design & Quantities		Maximum Projec	30%		
T-1	Relocations	none identified	unknown	Significant	Possible	3
T-2	Mitigation		assumptions include the footprint of disturbance would be mitigated for each alternative. it appears that there are no active mitigation banks that cover coastal marsh mitigation in the BRFG or CRL areas. So currently, mitigation banks are not likely an option. Unit costs provided by RTS. Based on average of costs per acre of similar mitigation in the area.	Moderate	Possible	2
T-3	Mob/Demob	no concern	no concern	Negligible	Possible	0
T-4	Demolition	Level of confidence based on design and assumptions? Appropriate methods applied to calculate quantities? Sufficient investigations to develop quantities? Quality control check applied?	demolition information based on original plans. Existing conditions may not be as originally planned/built. Only removing gates for this option, NOT removing the whole concrete structrure. Design and quantites QC by MVN Structures.	Moderate	Possible	2
T-5	Excavation and Fill	Level of confidence based on design and assumptions? Appropriate methods applied to calculate quantities? Sufficient investigations to develop quantities? Quality control check applied?	Excavation and fill quantities based on limited information available. Do not have current, accurate land surveys of area. Channel designs follow existing channel parameters.	Moderate	Likely	3
T-6	0			Negligible	Unlikely	0
T-7	0			Negligible	Unlikely	0
T-8	0			Negligible	Unlikely	0
T-9	0			Negligible	Unlikely	0

T-10	electrical	demolition information not detailed yet. Existing conditions may not be as originally planned/built.	Moderate	Likely	3
T-11	0		Negligible	Unlikely	0
T-12	Remaining Construction Items		Moderate	Possible	2
T-13	Planning, Engineering, & Design	further data will be obtained during PED and additional engineering will be done	Marginal	Likely	N/A
T-14	Construction Management	changes in designs and assumption could cause longer construction times	Marginal	Likely	N/A

Cost Estima	ate Assumptions			Maximum Proje	ct Growth	35%
EST-1	Relocations	none identified	none identified	Negligible	Unlikely	0
EST-2	Mitigation		it appears that there are no active mitigation banks that cover coastal marsh mitigation in the BRFG or CRL areas. So currently, mitigation banks are not likely an option. Unit costs provided by RTS. Based on average of costs per acre of similar mitigation in the area.	Moderate	Possible	2
EST-3	Mob/Demob	no concern	typical construction anticipated and appropriate mob/demob included in cost estimate.	Negligible	Possible	0
EST-4	Demolition	Assumptions related to prime and subcontractor markups/assignments? Assumptions regarding crew, productivity, overtime? Site accessibility, transport delays, congestion? Overuse of Cost Book, lump sum, allowances? Lack confidence on critical cost items?	cost estimate includes typical prime and subcontractor tiering. All items have detailed crews and related productivity and overtime. Typical construction features. Demolition information based on original plans but ONLY removing gates NOT the whole concrete structure for this alternative. Existing conditions may not be as originally planned/built and different techniques could be needed.	Moderate	Possible	2
EST-5	Excavation and Fill	Assumptions related to prime and subcontractor markups/assignments? Assumptions regarding crew, productivity, overtime? Site accessibility, transport delays, congestion? Overuse of Cost Book, lump sum, allowances? Lack confidence on critical cost items?	cost estimate includes typical prime and subcontractor tiering. All items have detailed crews and related productivity and overtime. Typical construction features. Dredging unit costs developed in CEDEP, however no geotech available and virgin cut. Channels going through existing barge facility on 9A, 9b, and 9C. There is still questions as to fill and possible sources. Jerica R Currently there are no restrictions that limit construction. There may be some scheduling necessary to maintain traffic in the area which would increase cost.	Moderate	Likely	3
EST-6	0			Negligible	Unlikely	0

EST-7	0			Negligible	Unlikely	0
EST-8	0			Negligible	Unlikely	0
EST-9	0			Negligible	Unlikely	0
EST-10	electrical	Assumptions related to prime and subcontractor markups/assignments? Assumptions regarding crew, productivity, overtime? Site accessibility, transport delays, congestion? Overuse of Cost Book, lump sum, allowances? Lack confidence on critical cost items?	demolition information not detailed yet. Existing conditions may not be as originally planned/built.	Marginal	Likely	2
EST-11	0			Negligible	Unlikely	0
EST-12	Remaining Construction Items			Marginal	Likely	2
EST-13	Planning, Engineering, & Design	no concern		Marginal	Possible	N/A

EST-14 Construction Management no concern since S&A is directly linked to construction items and cost, this item would have similar risk to construction items.

Marginal Likely N/A

External Pr	roject Risks			Maximum Proje	ct Growth	40%
EX-1	Relocations	none identified	none identified	Negligible	Unlikely	0
EX-2	Mitigation	no concern	no concern	Negligible	Unlikely	0
EX-3	Mob/Demob	<ul> <li>Potential for severe adverse weather?</li> <li>Political influences, lack of support, obstacles?</li> <li>Unanticipated inflations in fuel, key materials?</li> <li>Potential for market volatility impacting competition, pricing?</li> <li>Funding Constraints</li> </ul>	The project is located a bit inland so severe adverse weather should not be an issue. The inflation of fuel and key materials is always a possibility and fuel is a cost driver for the mob/demob but would probably have a marginal impact. At this stage there is no reason to believe there will be out of the ordinary market volatility that would affect competition and pricing as this is not a mega-project requiring large or specialty assets. The users of the GIWW fully support improving these crossings as does the NFS. Currently there is a lack of support for an open channel system (at least with those represented at the meetings), due to concerns for increased sedimentation downstream. The Inland Users Water Board does not have this project ranked for immediate construction, even if an approved Chief's Report and funding become available.	Moderate	Likely	3
EX-4	Demolition	Potential for severe adverse weather? Political influences, lack of support, obstacles? Unanticipated inflations in fuel, key materials? Potential for market volatility impacting competition, pricing? Funding Constraints	The project is located a bit inland so severe adverse weather should not be an issue. The inflation of fuel and key materials is always a possibility, however it is not a large cost driver for this item and will not place a large demand on the supply. At this stage there is no reason to believe there will be out of the ordinary market volatility that would affect competition and pricing as this is not a mega-project requiring large or specialty assets. The users of the GIWW fully support improving these crossings as does the NFS. Currently there is a lack of support for an open channel system (at least with those represented at the meetings), due to concerns for increased sedimentation downstream. The Inland Users Water Board does not have this project ranked for immediate construction, even if an approved Chief's Report and funding become available.	Moderate	Likely	3

EX-5	Excavation and Fill	<ul> <li>Potential for severe adverse weather?</li> <li>Political influences, lack of support, obstacles?</li> <li>Unanticipated inflations in fuel, key materials?</li> <li>Potential for market volatility impacting competition, pricing?</li> <li>Funding Constraints</li> </ul>	The project is located a bit inland so severe adverse weather should not be an issue. The inflation of fuel and key materials is always a possibility and fuel is a cost driver for the dredging and would increase the cost. At this stage there is no reason to believe there will be out of the ordinary market volatility that would affect competition and pricing as this is not a megaproject requiring large or specialty assets. The users of the GIWW fully support improving these crossings as does the NFS. Currently there is a lack of support for an open channel system (at least with those represented at the meetings), due to concerns for increased sedimentation downstream. The Inland Users Water Board does not have this project ranked for immediate construction, even if an approved Chief's Report and funding become available.	Moderate	Likely	3
EX-6	0			Negligible	Unlikely	0
EX-7	0			Negligible	Unlikely	0

EX-8	0			Negligible	Unlikely	0
EX-9	0			Negligible	Unlikely	0
	electrical	<ul> <li>Potential for severe adverse weather?</li> <li>Political influences, lack of support, obstacles?</li> <li>Unanticipated inflations in fuel, key materials?</li> <li>Potential for market volatility impacting competition, pricing?</li> <li>Funding Constraints</li> </ul>	The project is located a bit inland so severe adverse weather should not be an issue. The inflation of fuel and key materials is always a possibility, however it is not a large cost driver for this item and will not place a large demand on the supply. The users of the GIWW fully support improving these crossings as does the NFS. Currently there is a lack of support for an open channel system (at least with those represented at the meetings), due to concerns for increased sedimentation downstream. The Inland Users Water Board does not have this project ranked for immediate construction, even if an approved Chief's Report and funding become available.	Moderate	Likely	3

EX-11	0			Negligible	Unlikely	0
EX-12	Remaining Construction Items	<ul> <li>Potential for severe adverse weather?</li> <li>Political influences, lack of support, obstacles?</li> <li>Unanticipated inflations in fuel, key materials?</li> <li>Potential for market volatility impacting competition, pricing?</li> <li>Funding Constraints</li> </ul>	The project is located a bit inland so severe adverse weather should not be an issue. The inflation of fuel and key materials is always a possibility, however it is not a large cost driver for this item and will not place a large demand on the supply. At this stage there is no reason to believe there will be out of the ordinary market volatility that would affect competition and pricing as this is not a mega-project requiring large or specialty assets. The users of the GIWW fully support improving these crossings as does the NFS. Currently there is a lack of support for an open channel system (at least with those represented at the meetings), due to concerns for increased sedimentation downstream. The Inland Users Water Board does not have this project ranked for immediate construction, even if an approved Chief's Report and funding become available. This could cause increased reviews and updates due to delays in starting the project for lack of funding.	Moderate	Likely	3
EX-13	Planning, Engineering, & Design	<ul> <li>Potential for severe adverse weather?</li> <li>Political influences, lack of support, obstacles?</li> <li>Unanticipated inflations in fuel, key materials?</li> <li>Potential for market volatility impacting competition, pricing?</li> <li>Funding Constraints</li> </ul>	The project is located a bit inland so severe adverse weather should not be an issue. The inflation of fuel and key materials is always a possibility. At this stage there is no reason to believe there will be out of the ordinary market volatility that would affect competition and pricing as this is not a mega-project requiring large or specialty assets. The users of the GIWW fully support improving these crossings as does the NFS. Currently there is a lack of support for an open channel system (at least with those represented at the meetings), due to concerns for increased sedimentation downstream. The Inland Users Water Board does not have this project ranked for immediate construction, even if an approved Chief's Report and funding become available. This could cause increased reviews and updates due to delays in starting the project for lack of funding.	Moderate	Likely	N/A
EX-14	Construction Management	no concern	S&A is linked to construction items and cost, but most external risks would not make the project take longer once started.	Moderate	Likely	N/A

#### **Abbreviated Risk Analysis**

Project (less than \$40M): **Brazos River Floodgate**Project Development Stage/Alternative: **Feasibility (Alternatives)** 

Risk Category: Moderate Risk: Typical Project Construction Type

Alternative: Alt 9b - New Gates on Align C W/O S

Meeting Date: 10/4/2017

Total Estimated Construction Contract Cost = \$

	<u>CWWBS</u>	Feature of Work	<u>Esti</u>	mated Cost	% Contingency	<u>\$ (</u>	Contingency	<u>Total</u>
	01 LANDS AND DAMAGES	Real Estate	\$	1,766,600	24.8%	\$	438,520 \$	2,205,120
1	02 RELOCATIONS	Relocations	\$		0%	\$	- \$	-
2	06 FISH AND WILDLIFE FACILITIES	Mitigation	\$	1,425,000	25%	\$	357,841 \$	1,782,841
3	15 FLOODWAY CONTROL AND DIVERSION STRUCTURES	Mob/Demob	\$	11,374,582	13%	\$	1,477,483 \$	12,852,065
4	15 FLOODWAY CONTROL AND DIVERSION STRUCTURES	Demolition	\$	4,142,975	45%	\$	1,858,926 \$	6,001,901
5	15 FLOODWAY CONTROL AND DIVERSION STRUCTURES	Excavation and Fill	\$	13,546,932	38%	\$	5,199,241 \$	18,746,173
6	15 FLOODWAY CONTROL AND DIVERSION STRUCTURES	cofferdam	\$	15,256,400	31%	\$	4,765,394 \$	20,021,794
7	15 FLOODWAY CONTROL AND DIVERSION STRUCTURES	concrete structure and gate	\$	61,500,709	45%	\$	27,411,925 \$	88,912,633.71
8	15 FLOODWAY CONTROL AND DIVERSION STRUCTURES	maintenance dewatering system	\$	6,319,638	17%	\$	1,100,595 \$	7,420,233.33
9	15 FLOODWAY CONTROL AND DIVERSION STRUCTURES	guidewalls	\$	18,522,092	63%	\$	11,643,306 \$	30,165,398.33
10	15 FLOODWAY CONTROL AND DIVERSION STRUCTURES	mechanical + electrical	\$	4,038,163	27%	\$	1,100,107 \$	5,138,269.75
11	15 FLOODWAY CONTROL AND DIVERSION STRUCTURES				0%	\$	- \$	-
12	All Other	Remaining Construction Items	\$	-	0.0% 0%	\$	- \$	-
13	30 PLANNING, ENGINEERING, AND DESIGN	Planning, Engineering, & Design	\$	-	0%	\$	- \$	-
14	31 CONSTRUCTION MANAGEMENT	Construction Management	\$	-	0%	\$	- \$	-
XX	FIXED DOLLAR RISK ADD (EQUALLY DISPERSED TO ALL, MU	ST INCLUDE JUSTIFICATION SEE BELOW)				\$	-	

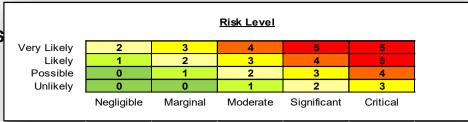
Totals								
Real Estate	\$	1,766,600	2	5%	\$	438,520	\$	2,205,120.00
Total Construction Estimate	\$ '	136,126,491	4	0%	\$	54,914,818	\$	191,041,309
Total Planning, Engineering & Design	\$	-	(	)%	\$	-	\$	-
Total Construction Management	\$	-	(	)%	\$	-	\$	-
Total Excluding Real Estate	\$ '	136,126,491	4	0%	\$	54,914,818	\$	191,041,309
				Ва	se	50%		80%
Confidence L	evel Rang	ge Estimate (\$000's	s)	\$136,1	26k	\$169,075k	·	\$191,041k

\* 50% based on base is at 5% CL.

**Fixed Dollar Risk Add:** (Allows for additional risk to be added to the risk analsyis. Must include justification. Does not allocate to Real Estate.

### Brazos River Floodgate Alt 9b - New Gates on Align C W/O S

Feasibility (Alternatives)
Abbreviated Risk Analysis
Meeting Date: 4-Oct-17



## Risk Register

			PDT Discussions & Conclusions				
Risk Element	Feature of Work	Concerns	(Include logic & justification for choice of Likelihood & Impact)	Impact	Likelihood	Risk Level	
Project Ma	nagement & Scope Growth			Maximum Proje	ct Growth	75%	
PS-1	Relocations	Are there any Relocations in area?	Lisa MThere are no railroads or utilities that will be impacted for either project except Texas Barge and Boat. most likely our easements are valid therefore at this time acquisition is not included however, we allow for the business relocation. Cost for this is covered in RE. There are 6 wells located around the area of the Brazos floodgates - all appear to have been plugged. The best knowledge is there is a pipeline near the east side of Brazos, but we do not anticipate we will impact. There are some existing roads in the area but they dead end at the existing projects. Alt 9c, 9b, and 9A is impacting an existing barge facility (Texas Barge and Boat - not sure what they do there - repairs?) Jerica R Relocations have been considered (TX Barge/Boat). There are currently no HTRW concerns for the area.		Possible	3	
PS-2	Mitigation	Is mitigation required?	yes. assumptions include the footprint of disturbance would be mitigated for each alternative. Not included in the estimate is the annualization of habitat improvements over the 50 year period of analysis. Taking into account the maturation of the mitigation area over time, the mitigation costs would be a conservative estimate of mitigation requirements. To compare the alternatives, we took the wetland habitat impact estimates and multiplied them by \$/acre to estimate mitigation costs for each alternative. it appears that there are no active mitigation banks that cover coastal marsh mitigation in the BRFG or CRL areas. So currently, mitigation banks are not likely an option.	Marginal	Possible	1	
PS-3	Mob/Demob	no concern for scope growth	standard type work	Negligible	Possible	0	
PS-4	Demolition	little concern for scope growth	assuming removing whole existing structure. Have some original dwgs. Do we really know what is out there?	Moderate	Possible	2	
PS-5	Excavation and Fill	potential for scope growth, added features?	potential small changes. Could have to change flares at river entrance or similar - Alt 9C, 9b, and 9A. Channel designs follow existing channel parameters. 9C - On west side possibly consider constriction at intersection with new approach channel to better contain sediment and increase effectiveness of sediment traps in GIWW.	Marginal	Possible	1	
PS-6	cofferdam	potential for scope growth, added features?	currently sassuming to build in the wet and backfill around. Alt 9c is a new alignment and may be possible to dam off and build in dry - cheaper.	Negligible	Unlikely	0	
PS-7	concrete structure and gate	potential for scope growth, added features?	project currently scoped at 125 ft wide. Optimum size could increase based on barge simulation testing to say 150 ft width. Existing features on GIWW are already at 125 ft - i.e. bridge piers at Colorado Locks - so it would not be likely for a change to a wider structure for that reason, however simulation testing could recommend a wider structure for safe transit through the structure. Structures on both IHNC Barrier and WCC are larger than the authorized channel for this reason.	Significant	Possible	3	

PS-8	maintenance dewatering system		Assuming bulkhead sytem now - for 1 structure at a time. PDT does not see any reason for 2 sets. Currently assuming conservative, worst case and placing across channel opening to block off whole chamber. Could block off recesses only, save on center piles, etc. but would need to increase side wing	Marginal	Possible	1		
PS-9	guidewalls	potential for scope growth, added features?  potential for scope growth, added features?	concrete and piles for access around when dewatered.  current design assumes tied back sheetpile guidewalls. Could want more expensive reinforced concrete walls which would also require more extensive cofferdam - Alt 3A, 9b and 9C. Length of entrance guidewalls could become longer.	Significant	Likely	4		
PS-10	mechanical + electrical	little concern for scope growth	typical scope for this type construction	Negligible	Possible	0		
PS-11	0			Negligible	Unlikely	N/A		
PS-12	Remaining Construction Items			Negligible	Unlikely	N/A		
PS-13	Planning, Engineering, & Design	potential for scope growth, added features?	added features and changes to scope would require additional PED	Marginal	Possible	N/A		
PS-14	Construction Management		added features and changes to scope would require additional S&A	Marginal	Possible	N/A		
Acquisition	n Strategy	Maximum Project Growth 3						
AS-1	Relocations	none identified	none identified	Moderate	Possible	2		
AS-2	Mitigation	unknown	it appears that there are no active mitigation banks that cover coastal marsh mitigation in the BRFG or CRL areas. So currently, mitigation banks are not likely an option.	Significant	Possible	3		
AS-3	Mob/Demob	is there an established acquisition plan?	Acquisition strategy is anticipated to be sealed bid per PM. Cost estimate assumes large business, open competition but includes typical tiering of subcontractors. If projects were to go small business, Best Value, or some type of set-a-aside would increase cost.	Marginal	Likely	2		
AS-4	Demolition	is there an established acquisition plan?	Acquisition strategy is anticipated to be sealed bid per PM. Cost estimate assumes large business, open competition but includes typical tiering of subcontractors. If projects were to go small business, Best Value, or some type of set-a-aside would increase cost.	Marginal	Likely	2		
AS-5	Excavation and Fill	is there an established acquisition plan?	Acquisition strategy is anticipated to be sealed bid per PM. Cost estimate assumes large business, open competition but includes typical tiering of subcontractors. If projects were to go small business, Best Value, or some type of set-a-aside would increase cost.	Marginal	Likely	2		
AS-6	cofferdam	is there an established acquisition plan?	Acquisition strategy is anticipated to be sealed bid per PM. Cost estimate assumes large business, open competition but includes typical tiering of subcontractors. If projects were to go small business, Best Value, or some type of set-a-aside would increase cost.	Marginal	Likely	2		
AS-7	concrete structure and gate	is there an established acquisition plan?	Acquisition strategy is anticipated to be sealed bid per PM. Cost estimate assumes large business, open competition but includes typical tiering of subcontractors. If projects were to go small business, Best Value, or some type of set-a-aside would increase cost.	Marginal	Likely	2		
AS-8	maintenance dewatering system	is there an established acquisition plan?	Acquisition strategy is anticipated to be sealed bid per PM. Cost estimate assumes large business, open competition but includes typical tiering of subcontractors. If projects were to go small business, Best Value, or some type of set-a-aside would increase cost.	Marginal	Likely	2		
AS-9	guidewalls	is there an established acquisition plan?	Acquisition strategy is anticipated to be sealed bid per PM. Cost estimate assumes large business, open competition but includes typical tiering of subcontractors. If projects were to go small business, Best Value, or some type of set-a-aside would increase cost.	Marginal	Likely	2		

				_		
AS-10	mechanical + electrical	is there an established acquisition plan?	Acquisition strategy is anticipated to be sealed bid per PM. Cost estimate assumes large business, open competition but includes typical tiering of subcontractors. If projects were to go small business, Best Value, or some type of set-a-aside would increase cost.	Marginal	Likely	2
AS-11	0			Negligible	Unlikely	N/A
AS-12	Remaining Construction Items			Marginal	Likely	N/A
AS-12	Planning, Engineering, & Design			Marginal	Unlikely	N/A
AS-14	Construction Management	is there an established acquisition plan?	Acquisition strategy is anticipated to be sealed bid per PM. Cost estimate assumes large business, open competition but includes typical tiering of subcontractors. If projects were to go small business, Best Value, or some type of set-a-aside would increase cost.	Marginal	Likely	N/A
Constructi	on Elements			Maximum Proje	ct Growth	25%
CON-1	Relocations	none identified	none identified	Negligible	Unlikely	0
CE-2	Mitigation			Negligible	Unlikely	0
CE-3	Mob/Demob	High risk or complex construction elements, site access, in-water? Unique construction methods? Special mobilization?	typical construction, no special concerns. Access by land and water.	Negligible	Possible	0
CE-4	Demolition	High risk or complex construction elements, site access, in-water? Special equipment or subcontractors needed? Potential for construction modification and claims?	potential changes. Since the existing facilities are old, actual site conditions and construction may be different than expected. High potential for modifications and claims exists.	Moderate	Likely	3
CE-5	Excavation and Fill	Accelerated schedule or harsh weather schedule? Special equipment or subcontractors needed? Potential for construction modification and claims?	Item is mostly new channel excavation. Interior work so harsh weather should not be a factor. Typical work, nothing special required. Since the existing facilities are old, actual site conditions could be different. Potential for modifications and claims exists.	Marginal	Likely	2
CE-6	cofferdam	High risk or complex construction elements, site access, in-water? Unique construction methods? Special equipment or subcontractors needed? Potential for construction modification and claims?	typical work and design takes this into account, but might be slightly higher risk portion of work. No special equipment or contractors needed. There is potential for modifications and claims based on unknown site conditions and limited geotech.	Marginal	Likely	2
CE-7	concrete structure and gate	High risk or complex construction elements, site access, in-water? Unique construction methods? Special equipment or subcontractors needed? Potential for construction modification and claims?	typical construction, no special concerns. Access by land and water. No special contractors or equipment required. Potential for modifications and claims.	Marginal	Likely	2
CE-8	maintenance dewatering system	no special concerns		Negligible	Possible	0
CE-9	guidewalls	High risk or complex construction elements, site access, in-water? Unique construction methods? Special equipment or subcontractors needed? Potential for construction modification and claims?	typical work and design takes this into account. No special equipment or contractors needed. There is potential for modifications and claims based on unknown site conditions and limited geotech.	Marginal	Likely	2
CE-10	mechanical + electrical	no special concerns	should be typical construction with little concern. assumes commonly used equipment and processes.	Marginal	Likely	2
CE-11	0			Negligible	Unlikely	N/A
	Remaining Construction Items			Negligible	Unlikely	N/A
CE-12 CE-13	Planning, Engineering, & Design		modifications and claims would cause increased PED costs	Negligible	Likely	N/A
CE-14	Construction Management		modifications and claims would cause increased CM costs	Marginal	Likely	N/A
	Construction or Fabrication			Maximum Proje		65%
<u>specialty (</u>	ZALIGH MANION OF TUDITCHION					00 /0

SC-1	Relocations	none identified	none identified	Significant	Possible	3
SC-2	Mitigation	no concern		Negligible	Possible	0
SC-3	Mob/Demob	Atypical construction elements, unusual material or equipment manufactured or installed?  Confidence in constructibility or methodology?	typical construction, little or no concern	Negligible	Possible	0
SC-4	Demolition	Atypical construction elements, unusual material or equipment manufactured or installed?  Confidence in constructibility or methodology?	should be typical construction with little concern. However, since the existing facilities are old, actual site conditions and construction may be different than expected and require special techniques over and above what is included in cost estimate.	Moderate	Possible	2
SC-5	Excavation and Fill	Atypical construction elements, unusual material or equipment manufactured or installed?  Confidence in constructibility or methodology?	should be typical construction with low concern.	Negligible	Unlikely	0
SC-6	cofferdam	Atypical construction elements, unusual material or equipment manufactured or installed?  Confidence in constructibility or methodology?	should be typical construction with low concern.	Negligible	Possible	0
SC-7	concrete structure and gate	Atypical construction elements, unusual material or equipment manufactured or installed?  Confidence in constructibility or methodology?	should be typical construction with low concern.	Negligible	Unlikely	0
SC-8	maintenance dewatering system	Atypical construction elements, unusual material or equipment manufactured or installed?  Confidence in constructibility or methodology?	should be typical construction with low concern.	Negligible	Unlikely	0
SC-9	guidewalls	Atypical construction elements, unusual material or equipment manufactured or installed?  Confidence in constructibility or methodology?	should be typical construction with low concern.	Negligible	Possible	0
SC-10	mechanical + electrical	Atypical construction elements, unusual material or equipment manufactured or installed?  Confidence in constructibility or methodology?	should be typical construction with low concern. assumes commonly used equipment and processes. More of a concern on the alternatives that are being renovated and trying to fit in and work with existing facilities.	Marginal	Possible	1
SC-11	0			Negligible	Unlikely	N/A
SC-12	Remaining Construction Items			Negligible	Unlikely	N/A
SC-13	Planning, Engineering, & Design			Negligible	Unlikely	N/A
SC-14	Construction Management			Negligible	Unlikely	N/A
<b>Technical</b>	Design & Quantities			Maximum Proje	ct Growth	30%
T-1	Relocations	none identified	unknown	Significant	Possible	3
T-2	Mitigation		assumptions include the footprint of disturbance would be mitigated for each alternative. it appears that there are no active mitigation banks that cover coastal marsh mitigation in the BRFG or CRL areas. So currently, mitigation banks are not likely an option. Unit costs provided by RTS. Based on average of costs per acre of similar mitigation in the area.	Moderate	Possible	2
T-3	Mob/Demob	no concern	no concern	Negligible	Possible	0
T-4	Demolition	Level of confidence based on design and assumptions? Appropriate methods applied to calculate quantities? Sufficient investigations to develop quantities? Quality control check applied?	demolition information based on original plans. Existing conditions may not be as originally planned/built. Design and quantites QC by MVN Structures.	Significant	Possible	3
T-5	Excavation and Fill	Level of confidence based on design and assumptions? Appropriate methods applied to calculate quantities? Sufficient investigations to develop quantities? Quality control check applied?	Excavation and fill quantities based on limited information available. Do not have current, accurate land surveys of area. Channel designs follow existing channel parameters.	Marginal	Likely	2
T-6	cofferdam	Level of confidence based on design and assumptions? Appropriate methods applied to calculate quantities? Sufficient investigations to develop quantities? Quality control check applied?	Qtys based on similar Gulf coast project designs. Geotech conditions have not been evaluated and could cause changes to existing assumptions/qtys.	Marginal	Likely	2

T-7	concrete structure and gate	Level of confidence based on design and assumptions? Appropriate methods applied to calculate quantities? Sufficient investigations to develop quantities? Quality control check applied?	Qtys based on similar Gulf coast project designs - could be variations when site specific conditions applied. Concrete may need to be raised to match top elevation of guidewalls and Colorado Lock height - <b>Alt 3A, 9b and 9C</b> . Geotech conditions have not been evaluated and could cause changes to existing assumptions/qtys on foundation pilings.	Marginal	Likely	2
T-8	maintenance dewatering system	Level of confidence based on design and assumptions? Appropriate methods applied to calculate quantities? Sufficient investigations to develop quantities? Quality control check applied?	Assuming bulkhead sytem now - for 1 structure at a time. PDT does not see any reason for 2 sets. Currently assuming conservative, worst case and placing across channel opening to block off whole chamber. Could block off recesses only, save on center piles, etc. but would need to increase side wing concrete and piles for access around when dewatered. Possible savings.	Negligible	Possible	0
T-9	guidewalls	Level of confidence based on design and assumptions? Appropriate methods applied to calculate quantities? Sufficient investigations to develop quantities? Quality control check applied?	Qtys based on similar Gulf coast project designs. Geotech conditions have not been evaluated and could cause changes to existing assumptions/qtys however reasonable assumptions have been included.	Moderate	Possible	2
T-10	mechanical + electrical	Level of confidence based on design and assumptions? Appropriate methods applied to calculate quantities? Sufficient investigations to develop quantities? Quality control check applied?	concepts based on similar Gulf coast projects and MVN commonly used systems. No specific design at this stage. More of a concern on the alternatives that are being renovated and trying to fit in and work with existing facilities.	Marginal	Possible	1
T-11	0			Negligible	Unlikely	N/A
T-12	Remaining Construction Items			Moderate	Possible	N/A
T-13	Planning, Engineering, & Design		further data will be obtained during PED and additional engineering will be done	Marginal	Likely	N/A
T-14	Construction Management		changes in designs and assumption could cause longer construction times	Marginal	Likely	N/A
	ate Assumptions			Maximum Proje	ct Growth	35%
	25timate Assumptions					
EST-1	Relocations	none identified	none identified	Significant	Possible	3
EST-1	Relocations  Mitigation	none identified	it appears that there are no active mitigation banks that cover coastal marsh mitigation in the BRFG or CRL areas. So currently, mitigation banks are not likely an option. Unit costs provided by RTS. Based on average of costs per acre of similar mitigation in the area.	Significant  Moderate	Possible	2
EST-2		none identified  no concern	it appears that there are no active mitigation banks that cover coastal marsh mitigation in the BRFG or CRL areas. So currently, mitigation banks are not likely an option. Unit costs provided by RTS. Based on average of			
	Mitigation		it appears that there are no active mitigation banks that cover coastal marsh mitigation in the BRFG or CRL areas. So currently, mitigation banks are not likely an option. Unit costs provided by RTS. Based on average of costs per acre of similar mitigation in the area.  typical construction anticipated and appropriate mob/demob included in	Moderate	Possible	2
EST-2 EST-3	Mitigation  Mob/Demob	no concern  Assumptions related to prime and subcontractor markups/assignments? Assumptions regarding crew, productivity, overtime? Site accessibility, transport delays, congestion? Overuse of Cost Book, lump sum, allowances?	it appears that there are no active mitigation banks that cover coastal marsh mitigation in the BRFG or CRL areas. So currently, mitigation banks are not likely an option. Unit costs provided by RTS. Based on average of costs per acre of similar mitigation in the area.  typical construction anticipated and appropriate mob/demob included in cost estimate.  cost estimate includes typical prime and subcontractor tiering. All items have detailed crews and related productivity and overtime. Typical construction features. Demolition information based on original plans. Existing conditions may not be as originally planned/built and different	Moderate Negligible	Possible	0

						<u>.</u>
EST-7	concrete structure and gate	Assumptions related to prime and subcontractor markups/assignments? Assumptions regarding crew, productivity, overtime? Site accessibility, transport delays, congestion? Overuse of Cost Book, lump sum, allowances? Lack confidence on critical cost items?	cost estimate includes typical prime and subcontractor tiering. All items have detailed crews and related productivity and overtime. Typical construction features, however exact design/typical sections not developed yet. Nothing unique about materials and methods. Site accessibility by both land and water. Current quotes on most major materials.	Moderate	Likely	3
EST-8	maintenance dewatering system	Assumptions related to prime and subcontractor markups/assignments? Assumptions regarding crew, productivity, overtime? Site accessibility, transport delays, congestion? Overuse of Cost Book, lump sum, allowances? Lack confidence on critical cost items?	cost estimate includes typical prime and subcontractor tiering. All items have detailed crews and related productivity and overtime. Typical construction features, however exact design/typical sections not developed yet. Nothing unique about materials and methods. Site accessibility by both land and water. Current quotes on most major materials.	Marginal	Likely	2
EST-9	guidewalls	Assumptions related to prime and subcontractor markups/assignments? Assumptions regarding crew, productivity, overtime? Site accessibility, transport delays, congestion? Overuse of Cost Book, lump sum, allowances? Lack confidence on critical cost items?	cost estimate includes typical prime and subcontractor tiering. Most items have detailed crews and related productivity and overtime. Typical construction features, however exact design/typical sections not developed yet. Nothing unique about most materials and methods, except for new UHMW impact sheet. Site accessibility by both land and water. Current quotes on most major materials. Jerica R Currently there are no restrictions that limit construction. There may be some schedule necessary to maintain traffic in the area, but for this alternative the new channel is in a new location and traffic can be maintained through the old channel.	Moderate	Likely	3
EST-10	mechanical + electrical	Assumptions related to prime and subcontractor markups/assignments? Assumptions regarding crew, productivity, overtime? Site accessibility, transport delays, congestion? Overuse of Cost Book, lump sum, allowances? Lack confidence on critical cost items?	cost estimate includes typical prime and subcontractor tiering. Have detailed line items but costs are based on mechanical and electrical engineer professional experience and bids in MVN. Typical construction features. Nothing unique about materials and methods. No quotes on the major materials.	Moderate	Likely	3
EST-11	0			Negligible	Unlikely	N/A
EST-12	Remaining Construction Items			Marginal	Likely	N/A
EST-13	Planning, Engineering, & Design	no concern		Negligible	Possible	N/A
EST-14	Construction Management	no concern	since S&A is directly linked to construction items and cost, this item would have similar risk to construction items.	Marginal	Likely	N/A
External P	roject Risks			Maximum Projec	ct Growth	40%
EX-1	Relocations	none identified	none identified	Negligible	Unlikely	0
EX-2	Mitigation	no concern	no concern	Negligible	Possible	0
EX-3	Mob/Demob	<ul> <li>Potential for severe adverse weather?</li> <li>Political influences, lack of support, obstacles?</li> <li>Unanticipated inflations in fuel, key materials?</li> <li>Potential for market volatility impacting competition, pricing?</li> <li>Funding Constraints</li> </ul>	The project is located a bit inland so severe adverse weather should not be an issue. The inflation of fuel and key materials is always a possibility and fuel is a cost driver for the mob/demob but would probably have a marginal impact. The users of the GIWW fully support improving these crossings as does the NFS. The Inland Users Water Board does not have this project ranked for immediate construction, even if an approved Chief's Report and funding become available.	Marginal	Possible	1
EX-4	Demolition	Potential for severe adverse weather? Political influences, lack of support, obstacles? Unanticipated inflations in fuel, key materials? Potential for market volatility impacting competition, pricing? Funding Constraints	The project is located a bit inland so severe adverse weather should not be an issue. The inflation of fuel and key materials is always a possibility, however it is not a large cost driver for this item and will not place a large demand on the supply. The users of the GIWW fully support improving these crossings as does the NFS. The Inland Users Water Board does not have this project ranked for immediate construction, even if an approved Chief's Report and funding become available.	Negligible	Possible	0

EX-5	Excavation and Fill	<ul> <li>Potential for severe adverse weather?</li> <li>Political influences, lack of support, obstacles?</li> <li>Unanticipated inflations in fuel, key materials?</li> <li>Potential for market volatility impacting competition, pricing?</li> <li>Funding Constraints</li> </ul>	The project is located a bit inland so severe adverse weather should not be an issue. The inflation of fuel and key materials is always a possibility and fuel is a cost driver for the dredging and would increase the cost. The users of the GIWW fully support improving these crossings as does the NFS. The Inland Users Water Board does not have this project ranked for immediate construction, even if an approved Chief's Report and funding become available.	Moderate	Likely	3
EX-6	cofferdam	<ul> <li>Potential for severe adverse weather?</li> <li>Political influences, lack of support, obstacles?</li> <li>Unanticipated inflations in fuel, key materials?</li> <li>Potential for market volatility impacting competition, pricing?</li> <li>Funding Constraints</li> </ul>	The project is located a bit inland so severe adverse weather should not be an issue. The inflation of fuel and key materials is always a possibility and steel is a cost driver for the cofferdam and could increase the cost. The users of the GIWW fully support improving these crossings as does the NFS. –The Inland Users Water Board does not have this project ranked for immediate construction, even if an approved Chief's Report and funding become available.	Moderate	Possible	2
EX-7	concrete structure and gate	<ul> <li>Potential for severe adverse weather?</li> <li>Political influences, lack of support, obstacles?</li> <li>Unanticipated inflations in fuel, key materials?</li> <li>Potential for market volatility impacting competition, pricing?</li> <li>Funding Constraints</li> </ul>	The project is located a bit inland so severe adverse weather should not be an issue. The inflation of fuel and key materials is always a possibility and steel is a cost driver for the gates and piles and could increase the cost. The users of the GIWW fully support improving these crossings as does the NFS. The Inland Users Water Board does not have this project ranked for immediate construction, even if an approved Chief's Report and funding become available.	Moderate	Possible	2
EX-8	maintenance dewatering system	<ul> <li>Potential for severe adverse weather?</li> <li>Political influences, lack of support, obstacles?</li> <li>Unanticipated inflations in fuel, key materials?</li> <li>Potential for market volatility impacting competition, pricing?</li> <li>Funding Constraints</li> </ul>	The project is located a bit inland so severe adverse weather should not be an issue. The inflation of fuel and key materials is always a possibility, however it is not a large cost driver for this item and will not place a large demand on the supply. The users of the GIWW fully support improving these crossings as does the NFS. The Inland Users Water Board does not have this project ranked for immediate construction, even if an approved Chief's Report and funding become available.	Negligible	Possible	0
EX-9	guidewalls	<ul> <li>Potential for severe adverse weather?</li> <li>Political influences, lack of support, obstacles?</li> <li>Unanticipated inflations in fuel, key materials?</li> <li>Potential for market volatility impacting competition, pricing?</li> <li>Funding Constraints</li> </ul>	The project is located a bit inland so severe adverse weather should not be an issue. The inflation of fuel and key materials is always a possibility and steel is a cost driver for the guidewalls and could increase the cost. The users of the GIWW fully support improving these crossings as does the NFS. The Inland Users Water Board does not have this project ranked for immediate construction, even if an approved Chief's Report and funding become available.	Moderate	Possible	2
EX-10	mechanical + electrical	<ul> <li>Potential for severe adverse weather?</li> <li>Political influences, lack of support, obstacles?</li> <li>Unanticipated inflations in fuel, key materials?</li> <li>Potential for market volatility impacting competition, pricing?</li> <li>Funding Constraints</li> </ul>	The project is located a bit inland so severe adverse weather should not be an issue. The inflation of fuel and key materials is always a possibility, however it is not a large cost driver for this item and will not place a large demand on the supply. The users of the GIWW fully support improving these crossings as does the NFS. The Inland Users Water Board does not have this project ranked for immediate construction, even if an approved Chief's Report and funding become available.	Negligible	Possible	0
EX-11	0			Negligible	Unlikely	N/A

EX-12	Remaining Construction Items	<ul> <li>Potential for severe adverse weather?</li> <li>Political influences, lack of support, obstacles?</li> <li>Unanticipated inflations in fuel, key materials?</li> <li>Potential for market volatility impacting competition, pricing?</li> <li>Funding Constraints</li> </ul>	The project is located a bit inland so severe adverse weather should not be an issue. The inflation of fuel and key materials is always a possibility, however it is not a large cost driver for this item and will not place a large demand on the supply. At this stage there is no reason to believe there will be out of the ordinary market volatility that would affect competition and pricing as this is not a mega-project requiring large or specialty assets. The users of the GIWW fully support improving these crossings as does the NFS. The Inland Users Water Board does not have this project ranked for immediate construction, even if an approved Chief's Report and funding become available. This could cause increased reviews and updates due to delays in starting the project for lack of funding.	Marginal	Possible	N/A
EX-13	Planning, Engineering, & Design	<ul> <li>Potential for severe adverse weather?</li> <li>Political influences, lack of support, obstacles?</li> <li>Unanticipated inflations in fuel, key materials?</li> <li>Potential for market volatility impacting competition, pricing?</li> <li>Funding Constraints</li> </ul>	The project is located a bit inland so severe adverse weather should not be an issue. The inflation of fuel and key materials is always a possibility. At this stage there is no reason to believe there will be out of the ordinary market volatility that would affect competition and pricing as this is not a mega-project requiring large or specialty assets. The users of the GIWW fully support improving these crossings as does the NFS. The Inland Users Water Board does not have this project ranked for immediate construction, even if an approved Chief's Report and funding become available. This could cause increased reviews and updates due to delays in starting the project for lack of funding.	Marginal	Likely	N/A
EX-14	Construction Management	no concern	S&A is linked to construction items and cost, but most external risks would not make the project take longer once started.	Negligible	Possible	N/A

#### **Abbreviated Risk Analysis**

Project (less than \$40M): Brazos River Floodgate Project Development Stage/Alternative: Feasibility (Alternatives)

Risk Category: Moderate Risk: Typical Project Construction Type

Alternative: Alt 9c - New Gates on Align C with S 10/4/2017

**Meeting Date:** 

Total Estimated Construction Contract Cost = \$

142,633,412

	<u>CWWBS</u>	Feature of Work	<u>Est</u>	imated Cost	% Contingen	<u>cy</u> \$ C	Contingency	<u>Total</u>
	01 LANDS AND DAMAGES	Real Estate	\$	1,766,600	24.8%	\$	438,520 \$	2,205,120
1	02 RELOCATIONS	Relocations	\$	_	0%	\$	- \$	-
2	06 FISH AND WILDLIFE FACILITIES	Mitigation	\$	1,425,000	25%	\$	357,841 \$	1,782,841
3	15 FLOODWAY CONTROL AND DIVERSION STRUCTURES	Mob/Demob	\$	11,374,582	13%	\$	1,477,483 \$	12,852,065
4	15 FLOODWAY CONTROL AND DIVERSION STRUCTURES	Demolition	\$	4,142,975	45%	\$	1,858,926 \$	6,001,901
5	15 FLOODWAY CONTROL AND DIVERSION STRUCTURES	Excavation and Fill	\$	12,266,953	38%	\$	4,707,992 \$	16,974,945
6	15 FLOODWAY CONTROL AND DIVERSION STRUCTURES	cofferdam	\$	15,256,400	31%	\$	4,765,394 \$	20,021,794
7	15 FLOODWAY CONTROL AND DIVERSION STRUCTURES	concrete structure and gate	\$	61,500,709	45%	\$	27,411,925 \$	88,912,633.71
8	15 FLOODWAY CONTROL AND DIVERSION STRUCTURES	maintenance dewatering system	\$	6,319,638	17%	\$	1,100,595 \$	7,420,233.33
9	15 FLOODWAY CONTROL AND DIVERSION STRUCTURES	guidewalls	\$	18,522,092	63%	\$	11,643,306 \$	30,165,398.33
10	15 FLOODWAY CONTROL AND DIVERSION STRUCTURES	mechanical + electrical	\$	4,038,163	27%	\$	1,100,107 \$	5,138,269.75
11	15 FLOODWAY CONTROL AND DIVERSION STRUCTURES	sediment control structure	\$	7,786,900	53%	\$	4,138,149 \$	11,925,049.49
12	All Other	Remaining Construction Items	\$	-	0.0% 0%	\$	- \$	-
13	30 PLANNING, ENGINEERING, AND DESIGN	Planning, Engineering, & Design	\$	-	0%	\$	- \$	-
14	31 CONSTRUCTION MANAGEMENT	Construction Management	\$	-	0%	\$	- \$	-
XX	FIXED DOLLAR RISK ADD (EQUALLY DISPERSED TO ALL, MUS	ST INCLUDE JUSTIFICATION SEE BELOW)				\$	-	

Totals					
Real Estate	\$ 1,766,6	00 25%	\$	438,520	\$ 2,205,120.00
Total Construction Estimate	\$ 142,633,4	12 41%	\$	58,561,718	\$ 201,195,130
Total Planning, Engineering & Design	\$	- 0%	\$	-	\$ -
Total Construction Management	\$	- 0%	\$	-	\$ -
Total Excluding Real Estate	\$ 142,633,4	12 41%	\$	58,561,718	\$ 201,195,130
			Base	50%	80%
Confidence L	Confidence Level Range Estimate (\$000		42,633k	\$177,770k	\$201,195k

\* 50% based on base is at 5% CL.

Fixed Dollar Risk Add: (Allows for additional risk to be added to the risk analsyis. Must include justification. Does not allocate to Real Estate.

### Brazos River Floodgate Alt 9c - New Gates on Align C with S

Feasibility (Alternatives)
Abbreviated Risk Analysis
Meeting Date: 4-Oct-17



## Risk Register

Risk Element	Feature of Work	Concerns	PDT Discussions & Conclusions (Include logic & justification for choice of Likelihood & Impact)	Impact	Likelihood	Risk Level
Project Ma	nagement & Scope Growth			Maximum Proje	ct Growth	75%
PS-1	Relocations	Are there any Relocations in area?	Lisa MThere are no railroads or utilities that will be impacted for either project except Texas Barge and Boat. most likely our easements are valid therefore at this time acquisition is not included however, we allow for the business relocation. Cost for this is covered in RE. There are 6 wells located around the area of the Brazos floodgates - all appear to have been plugged. The best knowledge is there is a pipeline near the east side of Brazos, but we do not anticipate we will impact. There are some existing roads in the area but they dead end at the existing projects. Alt 9c, 9b, and 9A is impacting an existing barge facility (Texas Barge and Boat - not sure what they do there - repairs?) Jerica R Relocations have been considered (TX Barge/Boat). There are currently no HTRW concerns for the area.	Significant	Possible	3
PS-2	Mitigation	Is mitigation required?	yes. assumptions include the footprint of disturbance would be mitigated for each alternative. Not included in the estimate is the annualization of habitat improvements over the 50 year period of analysis. Taking into account the maturation of the mitigation area over time, the mitigation costs would be a conservative estimate of mitigation requirements. To compare the alternatives, we took the wetland habitat impact estimates and multiplied them by \$/acre to estimate mitigation costs for each alternative. it appears that there are no active mitigation banks that cover coastal marsh mitigation in the BRFG or CRL areas. So currently, mitigation banks are not likely an option.	Marginal	Possible	1
PS-3	Mob/Demob	no concern for scope growth	standard type work	Negligible	Possible	0
PS-4	Demolition	little concern for scope growth	assuming removing whole existing structure. Have some orignal dwgs. Do we really know what is out there?	Moderate	Possible	2
PS-5	Excavation and Fill	potential for scope growth, added features?	potential small changes. Could have to change flares at river entrance or similar - Alt 9C, 9b, and 9A. Channel designs follow existing channel parameters. 9C - On west side possibly consider constriction at intersection with new approach channel to better contain sediment and increase effectiveness of sediment traps in GIWW.	Marginal	Possible	1
PS-6	cofferdam	potential for scope growth, added features?	currently sassuming to build in the wet and backfill around. Alt 9c is a new alignment and may be possible to dam off and build in dry - cheaper.	Negligible	Unlikely	0
PS-7	concrete structure and gate	potential for scope growth, added features?	project currently scoped at 125 ft wide. Optimum size could increase based on barge simulation testing to say 150 ft width. Existing features on GIWW are already at 125 ft - i.e. bridge piers at Colorado Locks - so it would not be likely for a change to a wider structure for that reason, however simulation testing could recommend a wider structure for safe transit through the structure. Structures on both IHNC Barrier and WCC are larger than the authorized channel for this reason.	Significant	Possible	3

			<del>-</del>			
PS-8	maintenance dewatering system	potential for scope growth, added features?	Assuming bulkhead sytem now - for 1 structure at a time. PDT does not see any reason for 2 sets. Currently assuming conservative, worst case and placing across channel opening to block off whole chamber. Could block off recesses only, save on center piles, etc. but would need to increase side wing concrete and piles for access around when dewatered.	Marginal	Possible	1
PS-9	guidewalls	potential for scope growth, added features?	current design assumes tied back sheetpile guidewalls. Could want more expensive reinforced concrete walls which would also require more extensive cofferdam - Alt 3A, 9b and 9C. Length of entrance guidewalls could become longer.	Significant	Likely	4
PS-10	mechanical + electrical	little concern for scope growth	typical scope for this type construction	Negligible	Possible	0
PS-11	sediment control structure	potential for scope growth, added features?	could a second structure on the east side be needed? "initial hydraulic modeling showed extremely infrequent closures at the east gate. Therefore, we've re-run the model only including a sluice gate on the west side. The quantities are updated to only include one sluice gate for alt 9c".	Significant	Possible	3
PS-12	Remaining Construction Items			Negligible	Unlikely	0
PS-13	Planning, Engineering, & Design	potential for scope growth, added features?	added features and changes to scope would require additional PED	Marginal	Possible	N/A
PS-14	Construction Management		added features and changes to scope would require additional S&A	Marginal	Possible	N/A
Acquisition	n Strategy			Maximum Proje	ct Growth	30%
AS-1	Relocations	none identified	none identified	Moderate	Possible	2
AS-2	Mitigation	unknown	it appears that there are no active mitigation banks that cover coastal marsh mitigation in the BRFG or CRL areas. So currently, mitigation banks are not likely an option.	Significant	Possible	3
AS-3	Mob/Demob	is there an established acquisition plan?	Acquisition strategy is anticipated to be sealed bid per PM. Cost estimate assumes large business, open competition but includes typical tiering of subcontractors. If projects were to go small business, Best Value, or some type of set-a-aside would increase cost.	Marginal	Likely	2
AS-4	Demolition	is there an established acquisition plan?	Acquisition strategy is anticipated to be sealed bid per PM. Cost estimate assumes large business, open competition but includes typical tiering of subcontractors. If projects were to go small business, Best Value, or some type of set-a-aside would increase cost.	Marginal	Likely	2
AS-5	Excavation and Fill	is there an established acquisition plan?	Acquisition strategy is anticipated to be sealed bid per PM. Cost estimate assumes large business, open competition but includes typical tiering of subcontractors. If projects were to go small business, Best Value, or some type of set-a-aside would increase cost.	Marginal	Likely	2
AS-6	cofferdam	is there an established acquisition plan?	Acquisition strategy is anticipated to be sealed bid per PM. Cost estimate assumes large business, open competition but includes typical tiering of subcontractors. If projects were to go small business, Best Value, or some type of set-a-aside would increase cost.	Marginal	Likely	2
AS-7	concrete structure and gate	is there an established acquisition plan?	Acquisition strategy is anticipated to be sealed bid per PM. Cost estimate assumes large business, open competition but includes typical tiering of subcontractors. If projects were to go small business, Best Value, or some type of set-a-aside would increase cost.	Marginal	Likely	2
AS-8	maintenance dewatering system	is there an established acquisition plan?	Acquisition strategy is anticipated to be sealed bid per PM. Cost estimate assumes large business, open competition but includes typical tiering of subcontractors. If projects were to go small business, Best Value, or some type of set-a-aside would increase cost.	Marginal	Likely	2
AS-9	guidewalls	is there an established acquisition plan?	Acquisition strategy is anticipated to be sealed bid per PM. Cost estimate assumes large business, open competition but includes typical tiering of subcontractors. If projects were to go small business, Best Value, or some type of set-a-aside would increase cost.	Marginal	Likely	2

Assessmentable and adjustment of the control of the							
at the served development of the company assembled?    Section 1	AS-10	mechanical + electrical	is there an established acquisition plan?	assumes large business, open competition but includes typical tiering of subcontractors. If projects were to go small business, Best Value, or some	Marginal	Likely	2
Section   Principle of Principle   Section		sediment control structure	is there an established acquisition plan?	assumes large business, open competition but includes typical tiering of subcontractors. If projects were to go small business, Best Value, or some	Marginal	Likely	2
Section   Principle of Principle   Section					Marginal	Likely	2
About Construction Elements  Construction Ele	AS-12	Remaining Construction Items			iviaigiliai	Likely	2
## Construction Elements    Construction Elements	AS-13	Planning, Engineering, & Design			Marginal	Unlikely	N/A
CDH Majorin  CE-2 Majorin  CE-3 Mile Guarde  Figh 16k in compact contribution exercits, site access, in celebral Variable  CE-5 Mile Guarde  Figh 16k in compact contribution exercits, site access, in celebral Variable  CE-6 Celebration  Figh 16k in compact contribution exercits, site access, in celebral Variable  CE-6 Celebration  Figh 16k in compact contribution exercities access, in celebral Variable  CE-6 Celebration  Figh 16k in compact contribution exercities access, in celebral Variable  CE-6 Celebration  CE-6 Celebration  Figh 16k in compact contribution exercities access, in celebral Variable in contribution  CE-6 Celebration  Figh 16k in compact contribution exercities access, in celebral Variable in contribution  Accelerated cheeds in the native contribution and celebration  Accelerated cheeds in the celebration and cel	AS-14	Construction Management	is there an established acquisition plan?	assumes large business, open competition but includes typical tiering of subcontractors. If projects were to go small business, Best Value, or some	Marginal	Likely	N/A
OD-11 Methodology  OD-12 Mitigates  CE-S ManDeruto  High raw or complex controllation descents, also access, neutron? Urage constitution methods? Special establishments, also access, neutron? Urage Operations  CE-S ManDeruto  High raw or complex controllation descents, also access, neutron? Urage operation methods? Special establishments, also access, neutron? Urage Operations and selection descents and select	Constructi	on Elements			Maximum Proje	ct Growth	25%
CE-3 McCDaneb	00N 4	Relocations	none identified	none identified	Negligible	Unlikely	0
Particle of compare confluence determent, after accosit, invasion? Unique confluence and comment of the access o			Hone identified	none identined	Newtote	I In Blenche	0
CE-5 Durantition    Significant or complete construction elements, pile excess, juveled? Special and constructions and claims of constructions and claims?   CE-6   Convention and Fil   Accordance of the construction elements, pile access, juveled? Placetal for construction modifications and claims?   CE-6   Convention and Fil   Accordance of the construction elements, pile access, juveled? Placetal for construction modifications and claims?   CE-7   Convention and pile   CE-7   Convention and pile   CE-7   Convention and pile   CE-7	GE-2	Miligation			Negligible	Unlikely	U
CE-4 Denotion equipment or subcontractors receive? Potential for construction may edifferent than sepacied. High potential for modification and clarified or icies.  CE-7 controlled excutation and glass construction or modified specified or modification and clarified policies.  CE-7 controlled excutation and glass construction modification and clarified policies.  CE-7 controlled excutation and glass construction modification and clarified policies.  CE-8 glidewards  CE-8 glidewards  To several modification and clarified policies.  CE-1 modification and clarified policies.  CE-1 modification and clarified policies.  CE-1 modification and clarified policies.  CE-1 modification and clarified policies.  CE-1 modification and clarified policies.  CE-1 modification and clarified policies.  CE-1 modification and clarified policies.  CE-1 modification and clarified policies.  CE-1 modification and clarified policies.  CE-1 modification and clarified policies.  CE-1 modification and clarified policies.  CE-1 modification and clarified policies.  CE-1 modification and clarified policies.  CE-1 modification and clarified policies.  CE-1 mo	CE-3	Mob/Demob		typical construction, no special concerns. Access by land and water.	Negligible	Possible	0
Accessed of and FII Accessed of and FII Accessed of production and design and design and design and design and design and design and design and design and design takes the not account, noting section regulared. Since the production and claims of the production and claims and design takes the not account, but might be slightly higher construction membed? Special equipment or subcontraction and claims?    High risk or complex construction in membed? Special equipment or subcontraction membed? Special eq	CE-4	Demolition	equipment or subcontractors needed? Potential for construction	and construction may be different than expected. High potential for	Moderate	Likely	3
CE-6 cofferdam  Conferdam  Confer	CE-5	Excavation and Fill		should not be a factor. Typical work, nothing special required. Since the existing facilities are old, actual site conditions could be different. Potential	Marginal	Likely	2
CE-7 concrete structure and gate Potential for construction methods? Special equipment or subcontractors needed? Potential for construction modification and claims?  CE-8 maintenance dewatering system no special concerns  High risk or complex construction elements, site access, in-water? Unique construction methods? Special equipment or subcontractors needed? Potential for construction methods? Special equipment or subcontractors needed? Increase potential for modifications and claims based on unknown site conditions and limited geotech.  CE-10 mechanical + electrical no special concerns  High risk or complex construction medification and claims?  Likely 2  CE-10 mechanical + electrical no special concerns  High risk or complex construction medification and claims?  Likely 2  construction seeded. There is potential for modifications and claims based on unknown site conditions and limited geotech.  High risk or complex construction medification and claims?  High risk or complex construction medification and claims?  Likely 2  construction seeded. There is potential for modifications and claims dependent on the structure and processes.  High risk or complex construction elements, site access, in-water? Unique construction with little concern. assumes commonly used equipment and processes.  High risk or complex construction elements, site access, in-water? Unique construction methods? Special equipment or subcontractors needed? Potential for modifications and claims. This time is assumed to be similar to previous structures but is more conceptual at this time and could change.  CE-12 Remaining Construction items  CE-13 Planning, Engineering, & Design  modifications and claims would cause increased PED costs  Negligible Likely N/A  CE-14 Construction Management  modifications and claims would cause increased CM costs  Marginal Likely N/A	CE-6	cofferdam	construction methods? Special equipment or subcontractors needed?	risk portion of work. No special equipment or contractors needed. There is potential for modifications and claims based on unknown site conditions and	Marginal	Likely	2
CE-9 guidewalls	CE-7	concrete structure and gate	construction methods? Special equipment or subcontractors needed?	special contractors or equipment required. Potential for modifications and	Marginal	Likely	2
High risk or complex construction elements, site access, in-water? Unique construction methods? Special equipment or subcontractors needed?  CE-9 guidewalls  CE-10 mechanical + electrical  no special concerns  High risk or complex construction medification and claims?  All pightiles or construction medification and claims?  Should be typical construction with little concern. assumes commonly used equipment and processes.  High risk or complex construction elements, site access, in-water? Unique construction medification and claims?  Likely  CE-11 sediment control structure  CE-12 Remaining Construction litems  CE-13 Planning, Engineering, & Design  modifications and claims would cause increased CM costs  Marginal  Likely  CE-14 Construction Management  typical work and design takes this into account. No special equipment or contractors needed?  potential for construction methods? Special equipment or subcontractors needed?  typical construction, no special concerns. Access by land and water. No special contractors or equipment required. Potential for modifications and claims. This tem is assumed to be similar to previous structures but is more conceptual at this time and could change.  Negligible  Unlikely  CE-13 Planning, Engineering, & Design  modifications and claims would cause increased CM costs  Marginal  Likely  N/A	CE-8	maintenance dewatering system	no special concerns		Negligible	Possible	0
CE-10 mechanical + electrical no special concerns should be typical construction with little concern. assumes commonly used equipment and processes.    High risk or complex construction elements, site access, in-water? Unique construction methods? Special equipment or subcontractors needed? Potential for construction methods? Special equipment or subcontractors needed? Potential for construction modification and claims. This item is assumed to be similar to previous structures but is more conceptual at this time and could change.    CE-12   Remaining Construction Items   Negligible   Unlikely   O			High risk or complex construction elements, site access, in-water? Unique construction methods? Special equipment or subcontractors needed?	contractors needed. There is potential for modifications and claims based on	Marginal	Likely	2
High risk or complex construction elements, site access, in-water? Unique construction methods? Special equipment or subcontractors needed? Potential for construction methods? Special equipment or subcontractors needed? Potential for construction modification and claims. This item is assumed to be similar to previous structures but is more conceptual at this time and could change.  Negligible Unlikely  CE-12 Remaining Construction Items  CE-13 Planning, Engineering, & Design  modifications and claims would cause increased PED costs  Negligible Likely N/A  CE-14 Construction Management  modifications and claims would cause increased CM costs  Marginal  Likely N/A	CE-10	mechanical + electrical	no special concerns		Marginal	Likely	2
CE-12 Remaining Construction Items  CE-13 Planning, Engineering, & Design  Marginal Likely N/A  CE-14 Construction Management  Marginal Likely N/A	CE-11	sediment control structure	construction methods? Special equipment or subcontractors needed?	special contractors or equipment required. Potential for modifications and claims. This item is assumed to be similar to previous structures but is more	Marginal	Likely	2
CE-13 Planning, Engineering, & Design modifications and claims would cause increased PED costs Negligible Likely N/A  CE-14 Construction Management modifications and claims would cause increased CM costs Marginal Likely N/A	05.40	Remaining Construction Items			Negligible	Unlikely	0
				modifications and claims would cause increased PED costs	Negligible	Likely	N/A
Specialty Construction or Fabrication Maximum Project Growth 65%	CE-14	Construction Management		modifications and claims would cause increased CM costs	Marginal	Likely	N/A
	Specialty Construction or Fabrication Maximum Project Growth					ct Growth	65%

SC-1	Relocations	none identified	none identified	Significant	Possible	3
SC-2	Mitigation	no concern		Negligible	Possible	0
SC-3	Mob/Demob	Atypical construction elements, unusual material or equipment manufactured or installed?  Confidence in constructibility or methodology?	typical construction, little or no concern	Negligible	Possible	0
SC-4	Demolition	Atypical construction elements, unusual material or equipment manufactured or installed?  Confidence in constructibility or methodology?	should be typical construction with little concern. However, since the existing facilities are old, actual site conditions and construction may be different than expected and require special techniques over and above what is included in cost estimate.	Moderate	Possible	2
SC-5	Excavation and Fill	Atypical construction elements, unusual material or equipment manufactured or installed?  Confidence in constructibility or methodology?	should be typical construction with low concern.	Negligible	Unlikely	0
SC-6	cofferdam	Atypical construction elements, unusual material or equipment manufactured or installed?  Confidence in constructibility or methodology?	should be typical construction with low concern.	Negligible	Possible	0
SC-7	concrete structure and gate	Atypical construction elements, unusual material or equipment manufactured or installed?  Confidence in constructibility or methodology?	should be typical construction with low concern.	Negligible	Unlikely	0
SC-8	maintenance dewatering system	Atypical construction elements, unusual material or equipment manufactured or installed?  Confidence in constructibility or methodology?	should be typical construction with low concern.	Negligible	Unlikely	0
SC-9	guidewalls	Atypical construction elements, unusual material or equipment manufactured or installed?  Confidence in constructibility or methodology?	should be typical construction with low concern.	Negligible	Possible	0
SC-10	mechanical + electrical	Atypical construction elements, unusual material or equipment manufactured or installed?  Confidence in constructibility or methodology?	should be typical construction with low concern. assumes commonly used equipment and processes. More of a concern on the alternatives that are being renovated and trying to fit in and work with existing facilities.	Marginal	Possible	1
SC-11	sediment control structure	Atypical construction elements, unusual material or equipment manufactured or installed?  Confidence in constructibility or methodology?	should be typical construction with low concern. assumes commonly used equipment and processes.	Negligible	Possible	0
SC-12	Remaining Construction Items			Negligible	Unlikely	0
SC-13	Planning, Engineering, & Design			Negligible	Unlikely	N/A
SC-14	Construction Management			Negligible	Unlikely	N/A
<b>Technical</b>	echnical Design & Quantities					30%
T-1	Relocations	none identified	unknown	Significant	Possible	3
T-2	Mitigation		assumptions include the footprint of disturbance would be mitigated for each alternative. it appears that there are no active mitigation banks that cover coastal marsh mitigation in the BRFG or CRL areas. So currently, mitigation banks are not likely an option. Unit costs provided by RTS. Based on average of costs per acre of similar mitigation in the area.	Moderate	Possible	2
T-3	Mob/Demob	no concern	no concern	Negligible	Possible	0
T-4	Demolition	Level of confidence based on design and assumptions? Appropriate methods applied to calculate quantities? Sufficient investigations to develop quantities? Quality control check applied?	demolition information based on original plans. Existing conditions may not be as originally planned/built. Design and quantites QC by MVN Structures.	Significant	Possible	3
T-5	Excavation and Fill	Level of confidence based on design and assumptions? Appropriate methods applied to calculate quantities? Sufficient investigations to develop quantities? Quality control check applied?	Excavation and fill quantities based on limited information available. Do not have current, accurate land surveys of area. Channel designs follow existing channel parameters.	Marginal	Likely	2
T-6	cofferdam	Level of confidence based on design and assumptions? Appropriate methods applied to calculate quantities? Sufficient investigations to develop quantities? Quality control check applied?	Qtys based on similar Gulf coast project designs. Geotech conditions have not been evaluated and could cause changes to existing assumptions/qtys.	Marginal	Likely	2

<u>T-7</u>	concrete structure and gate	Level of confidence based on design and assumptions? Appropriate methods applied to calculate quantities? Sufficient investigations to develop quantities? Quality control check applied?	Qtys based on similar Gulf coast project designs - could be variations when site specific conditions applied. Concrete may need to be raised to match top elevation of guidewalls and Colorado Lock height - <b>Alt 3A, 9b and 9C</b> . Geotech conditions have not been evaluated and could cause changes to existing assumptions/qtys on foundation pilings.	Marginal	Likely	2
T-8	maintenance dewatering system	Level of confidence based on design and assumptions? Appropriate methods applied to calculate quantities? Sufficient investigations to develop quantities? Quality control check applied?	Assuming bulkhead sytem now - for 1 structure at a time. PDT does not see any reason for 2 sets. Currently assuming conservative, worst case and placing across channel opening to block off whole chamber. Could block off recesses only, save on center piles, etc. but would need to increase side wing concrete and piles for access around when dewatered. Possible savings.	Negligible	Possible	0
T-9	guidewalls	Level of confidence based on design and assumptions? Appropriate methods applied to calculate quantities? Sufficient investigations to develop quantities? Quality control check applied?	Qtys based on similar Gulf coast project designs. Geotech conditions have not been evaluated and could cause changes to existing assumptions/qtys however reasonable assumptions have been included.	Moderate	Possible	2
T-10	mechanical + electrical	Level of confidence based on design and assumptions? Appropriate methods applied to calculate quantities? Sufficient investigations to develop quantities? Quality control check applied?	concepts based on similar Gulf coast projects and MVN commonly used systems. No specific design at this stage. More of a concern on the alternatives that are being renovated and trying to fit in and work with existing facilities.	Marginal	Possible	1
T-11	sediment control structure	Level of confidence based on design and assumptions? Appropriate methods applied to calculate quantities? Sufficient investigations to develop quantities? Quality control check applied?	Qtys based on similar projects but limited details available on the spcifics of this exact feature. Geotech conditions have not been evaluated and could cause changes to existing assumptions/qtys. This item is assumed to be similar to previous structures but is more conceptual at this time and could change.	Moderate	Likely	3
T-12	Remaining Construction Items			Moderate	Possible	2
T-13	Planning, Engineering, & Design		further data will be obtained during PED and additional engineering will be done	Marginal	Likely	N/A
T-14	Construction Management		changes in designs and assumption could cause longer construction times	Marginal	Likely	N/A
Cost Estim	Estimate Assumptions			Maximum Project Growth		35%
EST-1	Relocations	none identified	none identified	Significant	Possible	3
EST-1	Relocations  Mitigation	none identified	it appears that there are no active mitigation banks that cover coastal marsh mitigation in the BRFG or CRL areas. So currently, mitigation banks are not likely an option. Unit costs provided by RTS. Based on average of costs per acre of similar mitigation in the area.	Significant  Moderate	Possible  Possible	2
EST-2		none identified  no concern	it appears that there are no active mitigation banks that cover coastal marsh mitigation in the BRFG or CRL areas. So currently, mitigation banks are not likely an option. Unit costs provided by RTS. Based on average of			
	Mitigation		it appears that there are no active mitigation banks that cover coastal marsh mitigation in the BRFG or CRL areas. So currently, mitigation banks are not likely an option. Unit costs provided by RTS. Based on average of costs per acre of similar mitigation in the area.  typical construction anticipated and appropriate mob/demob included in	Moderate	Possible	2
EST-2 EST-3	Mitigation  Mob/Demob	no concern  Assumptions related to prime and subcontractor markups/assignments? Assumptions regarding crew, productivity, overtime? Site accessibility, transport delays, congestion? Overuse of Cost Book, lump sum, allowances?	it appears that there are no active mitigation banks that cover coastal marsh mitigation in the BRFG or CRL areas. So currently, mitigation banks are not likely an option. Unit costs provided by RTS. Based on average of costs per acre of similar mitigation in the area.  typical construction anticipated and appropriate mob/demob included in cost estimate.  cost estimate includes typical prime and subcontractor tiering. All items have detailed crews and related productivity and overtime. Typical construction features. Demolition information based on original plans. Existing conditions may not be as originally planned/built and different	Moderate Negligible	Possible	0

	Assumptions related to prime and subcontractor markups/assignments? Assumptions regarding crew, productivity, overtime? Site accessibility, transport delays, congestion? Overuse of Cost Book, lump sum, allowances? Lack confidence on critical cost items?	cost estimate includes typical prime and subcontractor tiering. All items have detailed crews and related productivity and overtime. Typical construction features, however exact design/typical sections not developed yet. Nothing unique about materials and methods. Site accessibility by both land and water. Current quotes on most major materials.	Moderate	Likely	3
	Assumptions related to prime and subcontractor markups/assignments? Assumptions regarding crew, productivity, overtime? Site accessibility, transport delays, congestion? Overuse of Cost Book, lump sum, allowances? Lack confidence on critical cost items?	cost estimate includes typical prime and subcontractor tiering. All items have detailed crews and related productivity and overtime. Typical construction features, however exact design/typical sections not developed yet. Nothing unique about materials and methods. Site accessibility by both land and water. Current quotes on most major materials.	Marginal	Likely	2
guidewalls	Assumptions related to prime and subcontractor markups/assignments? Assumptions regarding crew, productivity, overtime? Site accessibility, transport delays, congestion? Overuse of Cost Book, lump sum, allowances? Lack confidence on critical cost items?	cost estimate includes typical prime and subcontractor tiering. Most items have detailed crews and related productivity and overtime. Typical construction features, however exact design/typical sections not developed yet. Nothing unique about most materials and methods, except for new UHMW impact sheet. Site accessibility by both land and water. Current quotes on most major materials. Jerica R Currently there are no restrictions that limit construction. There may be some schedule necessary to maintain traffic in the area, but for this alternative the new channel is in a new location and traffic can be maintained through the old channel.	Moderate	Likely	3
mechanical + electrical	Assumptions related to prime and subcontractor markups/assignments? Assumptions regarding crew, productivity, overtime? Site accessibility, transport delays, congestion? Overuse of Cost Book, lump sum, allowances? Lack confidence on critical cost items?	cost estimate includes typical prime and subcontractor tiering. Have detailed line items but costs are based on mechanical and electrical engineer professional experience and bids in MVN. Typical construction features. Nothing unique about materials and methods. No quotes on the major materials.	Moderate	Likely	3
sediment control structure	Assumptions related to prime and subcontractor markups/assignments? Assumptions regarding crew, productivity, overtime? Site accessibility, transport delays, congestion? Overuse of Cost Book, lump sum, allowances? Lack confidence on critical cost items?	This item is assumed to be similar to previous structures but is more conceptual at this time and could change. Cost estimate includes typical prime and subcontractor tiering. Most items have detailed crews and related productivity and overtime. Typical construction features, however there are no project specific designs of this feature. Nothing unique about materials and methods. Site accessibility by both land and water. Current quotes on most major materials.	Moderate	Likely	3
Remaining Construction Items			Marginal	Likely	2
Planning, Engineering, & Design	no concern		Negligible	Possible	N/A
Construction Management	no concern	since S&A is directly linked to construction items and cost, this item would have similar risk to construction items.	Marginal	Likely	N/A
roject Risks			Maximum Proje	ct Growth	40%
Relocations	none identified	none identified	Negligible	Unlikely	0
Mitigation	no concern	no concern	Negligible	Possible	0
Mob/Demob	<ul> <li>Potential for severe adverse weather?</li> <li>Political influences, lack of support, obstacles?</li> <li>Unanticipated inflations in fuel, key materials?</li> <li>Potential for market volatility impacting competition, pricing?</li> <li>Funding Constraints</li> </ul>	The project is located a bit inland so severe adverse weather should not be an issue. The inflation of fuel and key materials is always a possibility and fuel is a cost driver for the mob/demob but would probably have a marginal impact. The users of the GIWW fully support improving these crossings as does the NFS. The Inland Users Water Board does not have this project ranked for immediate construction, even if an approved Chief's Report and funding become available.	Marginal	Possible	1
	maintenance dewatering system  guidewalls  mechanical + electrical  sediment control structure  Remaining Construction Items  Planning, Engineering, & Design  Construction Management  Toject Risks  Relocations  Mitigation	Assumptions regarding crew, productivity, overtime? Sits accessability, transport delays, congession? Overuse of Cost Book, lump sum, allowances? Lack confidence on critical cost Items?  Assumptions related to prime and subcontractor markupa/assignments? Assumptions regarding crew, productivity, overtime? Sits accessability, transport delays, congession? Overuse of Cost Book, lump pum, allowances? Lack confidence on critical cost items?  Assumptions related to prime and subcontractor markupa/assignments? Assumptions related to prime and subcontractor markupa/assignments? Assumptions related to prime and subcontractor markupa/assignments? Assumptions related to prime and subcontractor markupa/assignments? Assumptions related to prime and subcontractor markupa/assignments? Assumptions related to prime and subcontractor markupa/assignments? Assumptions related to prime and subcontractor markupa/assignments? Assumptions related to prime and subcontractor markupa/assignments? Assumptions related to prime and subcontractor markupa/assignments? Assumptions related to prime and subcontractor markupa/assignments? Assumptions related to prime and subcontractor markupa/assignments? Assumptions related to prime and subcontractor markupa/assignments? Assumptions related to prime and subcontractor markupa/assignments? Assumptions related to prime and subcontractor markupa/assignments? Assumptions related to prime and subcontractor markupa/assignments? Assumptions related to prime and subcontractor markupa/assignments? Assumptions related to prime and subcontractor markupa/assignments? Assumptions related to prime and subcontractor markupa/assignments? Assumptions related to prime and subcontractor markupa/assignments? Assumptions related to prime and subcontractor markupa/assignments? Assumptions related to prime and subcontractor markupa/assignments? Assumptions related to prime and subcontractor markupa/assignments? Assumptions related to prime and subcontractor markupa/assignments? Assumptions related to prime and subcont	Assumptions regarding rotes productingly, constitute? Clear constraints, instead or color, companied? Lack confidence on critical cost terms?  Assumptions soluted to prime and subcontractor mantaposessignment? Assumptions soluted to prime and subcontractor mantaposessignment? Assumptions soluted to prime and subcontractor mantaposessignment? Assumptions soluted to prime and subcontractor mantaposessignment? Assumptions soluted to prime and subcontractor mantaposessignment? Assumptions soluted to prime and subcontractor mantaposessignment? Assumptions soluted to prime and subcontractor mantaposessignment? Assumptions redated to prime and subcontractor mantaposessignments? Assumptions redated to prime and subcontractor mantaposessignments? Assumptions redated to prime and subcontractor mantapolessagnments? Lack confidence on a fixed cost fame?  Assumptions related to prime and subcontractor mantapolessagnments? Assumptions related to prime and subcontractor mantapolessagnments? Assumptions related to prime and subcontractor mantapolessagnments? Assumptions related to prime and subcontractor mantapolessagnments? Assumptions related to prime and subcontractor mantapolessagnments? Assumptions related to prime and subcontractor mantapolessagnments? Assumptions related to prime and subcontractor mantapolessagnments? Assumptions related to prime and subcontractor mantapolessagnments? Assumptions related to prime and subcontractor mantapolessagnments? Assumptions related to prime and subcontractor mantapolessagnments? Assumptions related to prime and subcontractor mantapolessagnments? Assumptions related to prime and subcontractor mantapolessagnments? Assumptions related to prime and subcontractor mantapolessagnments? Assumptions are related to prime an	Assumption regardly every post parties of the accessibility about the processor of the control of the accessibility about the processor of the control of the accessibility about the processor of the control of the processor of the control of the processor of the control of the processor of the control of the processor of the control of the processor of the control of the processor of the control of the processor of the control of the processor of the control of the processor of the control of the processor of the control of the processor of the	Assemptions equally grave, processfully confirmed to the process of the process o

EX-4	Demolition	Potential for severe adverse weather? Political influences, lack of support, obstacles? Unanticipated inflations in fuel, key materials? Potential for market volatility impacting competition, pricing? Funding Constraints	The project is located a bit inland so severe adverse weather should not be an issue. The inflation of fuel and key materials is always a possibility, however it is not a large cost driver for this item and will not place a large demand on the supply. The users of the GIWW fully support improving these crossings as does the NFS. The Inland Users Water Board does not have this project ranked for immediate construction, even if an approved Chief's Report and funding become available.	Negligible	Possible	0
EX-5	Excavation and Fill	<ul> <li>Potential for severe adverse weather?</li> <li>Political influences, lack of support, obstacles?</li> <li>Unanticipated inflations in fuel, key materials?</li> <li>Potential for market volatility impacting competition, pricing?</li> <li>Funding Constraints</li> </ul>	The project is located a bit inland so severe adverse weather should not be an issue. The inflation of fuel and key materials is always a possibility and fuel is a cost driver for the dredging and would increase the cost. The users of the GIWW fully support improving these crossings as does the NFS. The Inland Users Water Board does not have this project ranked for immediate construction, even if an approved Chief's Report and funding become available.	Moderate	Likely	3
EX-6	cofferdam	<ul> <li>Potential for severe adverse weather?</li> <li>Political influences, lack of support, obstacles?</li> <li>Unanticipated inflations in fuel, key materials?</li> <li>Potential for market volatility impacting competition, pricing?</li> <li>Funding Constraints</li> </ul>	The project is located a bit inland so severe adverse weather should not be an issue. The inflation of fuel and key materials is always a possibility and steel is a cost driver for the cofferdam and could increase the cost. The users of the GIWW fully support improving these crossings as does the NFSThe Inland Users Water Board does not have this project ranked for immediate construction, even if an approved Chief's Report and funding become available.	Moderate	Possible	2
EX-7	concrete structure and gate	<ul> <li>Potential for severe adverse weather?</li> <li>Political influences, lack of support, obstacles?</li> <li>Unanticipated inflations in fuel, key materials?</li> <li>Potential for market volatility impacting competition, pricing?</li> <li>Funding Constraints</li> </ul>	The project is located a bit inland so severe adverse weather should not be an issue. The inflation of fuel and key materials is always a possibility and steel is a cost driver for the gates and piles and could increase the cost. The users of the GIWW fully support improving these crossings as does the NFS. The Inland Users Water Board does not have this project ranked for immediate construction, even if an approved Chief's Report and funding become available.	Moderate	Possible	2
EX-8	maintenance dewatering system	<ul> <li>Potential for severe adverse weather?</li> <li>Political influences, lack of support, obstacles?</li> <li>Unanticipated inflations in fuel, key materials?</li> <li>Potential for market volatility impacting competition, pricing?</li> <li>Funding Constraints</li> </ul>	The project is located a bit inland so severe adverse weather should not be an issue. The inflation of fuel and key materials is always a possibility, however it is not a large cost driver for this item and will not place a large demand on the supply. The users of the GIWW fully support improving these crossings as does the NFS. The Inland Users Water Board does not have this project ranked for immediate construction, even if an approved Chief's Report and funding become available.	Negligible	Possible	0
EX-9	guidewalls	<ul> <li>Potential for severe adverse weather?</li> <li>Political influences, lack of support, obstacles?</li> <li>Unanticipated inflations in fuel, key materials?</li> <li>Potential for market volatility impacting competition, pricing?</li> <li>Funding Constraints</li> </ul>	The project is located a bit inland so severe adverse weather should not be an issue. The inflation of fuel and key materials is always a possibility and steel is a cost driver for the guidewalls and could increase the cost. The users of the GIWW fully support improving these crossings as does the NFS. The Inland Users Water Board does not have this project ranked for immediate construction, even if an approved Chief's Report and funding become available.	Moderate	Possible	2

EX-10	mechanical + electrical	<ul> <li>Potential for severe adverse weather?</li> <li>Political influences, lack of support, obstacles?</li> <li>Unanticipated inflations in fuel, key materials?</li> <li>Potential for market volatility impacting competition, pricing?</li> <li>Funding Constraints</li> </ul>	The project is located a bit inland so severe adverse weather should not be an issue. The inflation of fuel and key materials is always a possibility, however it is not a large cost driver for this item and will not place a large demand on the supply. The users of the GIWW fully support improving these crossings as does the NFS. The Inland Users Water Board does not have this project ranked for immediate construction, even if an approved Chief's Report and funding become available.	Negligible	Possible	0
EX-11	sediment control structure	<ul> <li>Potential for severe adverse weather?</li> <li>Political influences, lack of support, obstacles?</li> <li>Unanticipated inflations in fuel, key materials?</li> <li>Potential for market volatility impacting competition, pricing?</li> <li>Funding Constraints</li> </ul>	The project is located a bit inland so severe adverse weather should not be an issue. The inflation of fuel and key materials is always a possibility and this item contains several materials that are cost drivers and could increase the overall cost. The users of the GIWW fully support improving these crossings as does the NFS. The Inland Users Water Board does not have this project ranked for immediate construction, even if an approved Chief's Report and funding become available.	Moderate	Likely	3
EX-12	Remaining Construction Items	<ul> <li>Potential for severe adverse weather?</li> <li>Political influences, lack of support, obstacles?</li> <li>Unanticipated inflations in fuel, key materials?</li> <li>Potential for market volatility impacting competition, pricing?</li> <li>Funding Constraints</li> </ul>	The project is located a bit inland so severe adverse weather should not be an issue. The inflation of fuel and key materials is always a possibility, however it is not a large cost driver for this item and will not place a large demand on the supply. At this stage there is no reason to believe there will be out of the ordinary market volatility that would affect competition and pricing as this is not a mega-project requiring large or specialty assets. The users of the GIWW fully support improving these crossings as does the NFS. The Inland Users Water Board does not have this project ranked for immediate construction, even if an approved Chief's Report and funding become available. This could cause increased reviews and updates due to delays in starting the project for lack of funding.	Marginal	Possible	1
EX-13	Planning, Engineering, & Design	<ul> <li>Potential for severe adverse weather?</li> <li>Political influences, lack of support, obstacles?</li> <li>Unanticipated inflations in fuel, key materials?</li> <li>Potential for market volatility impacting competition, pricing?</li> <li>Funding Constraints</li> </ul>	The project is located a bit inland so severe adverse weather should not be an issue. The inflation of fuel and key materials is always a possibility. At this stage there is no reason to believe there will be out of the ordinary market volatility that would affect competition and pricing as this is not a mega-project requiring large or specialty assets. The users of the GIWW fully support improving these crossings as does the NFS. The Inland Users Water Board does not have this project ranked for immediate construction, even if an approved Chief's Report and funding become available. This could cause increased reviews and updates due to delays in starting the project for lack of funding.	Marginal	Likely	N/A
EX-14	Construction Management	no concern	S&A is linked to construction items and cost, but most external risks would not make the project take longer once started.	Negligible	Possible	N/A

Project (less than \$40M): Colorado River Locks
Project Development Stage/Alternative: Feasibility (Alternatives)

Risk Category: Moderate Risk: Typical Project Construction Type

Alternative: Alt 2b - Gate Rehab and guidewall Ro

Meeting Date: 10/4/2017

Total Estimated Construction Contract Cost = \$ 43,703,084

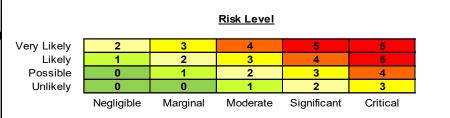
<u>CWWBS</u>	Feature of Work	<u>Esti</u>	mated Cost	% Contingency	<u>\$ C</u>	Contingency	<u>Total</u>
01 LANDS AND DAMAGES	Real Estate	\$	16,000	20.0%	\$	3,200 \$	19,200
1 02 RELOCATIONS	Relocations	\$	-	0%	\$	- \$	-
2 06 FISH AND WILDLIFE FACILITIES	Mitigation	\$	-	0%	\$	- \$	-
3 15 FLOODWAY CONTROL AND DIVERSION STRUCTURES	Mob/Demob	\$	1,942,497	13%	\$	252,318 \$	2,194,815
4 15 FLOODWAY CONTROL AND DIVERSION STRUCTURES	Foundation	\$	9,659,340	55%	\$	5,296,686 \$	14,956,026
5 15 FLOODWAY CONTROL AND DIVERSION STRUCTURES	sector gate	\$	12,953,560	45%	\$	5,776,521 \$	18,730,081
6 15 FLOODWAY CONTROL AND DIVERSION STRUCTURES	structural concrete	\$	5,670,810	57%	\$	3,233,061 \$	8,903,871
7 15 FLOODWAY CONTROL AND DIVERSION STRUCTURES	misc metals	\$	387,315	19%	\$	74,015 \$	461,329.62
8 15 FLOODWAY CONTROL AND DIVERSION STRUCTURES	mechanical	\$	3,312,359	35%	\$	1,144,229 \$	4,456,588.13
9 15 FLOODWAY CONTROL AND DIVERSION STRUCTURES	electrical	\$	4,794,125	42%	\$	1,994,097 \$	6,788,222.27
10 15 FLOODWAY CONTROL AND DIVERSION STRUCTURES	guide wall	\$	3,964,898	23%	\$	927,977 \$	4,892,875.22
11 15 FLOODWAY CONTROL AND DIVERSION STRUCTURES	demolition	\$	1,018,180	25%	\$	257,005 \$	1,275,184.56
12 All Other	Remaining Construction Items	\$	-	0.0% 0%	\$	- \$	-
13 30 PLANNING, ENGINEERING, AND DESIGN	Planning, Engineering, & Design	\$	-	0%	\$	- \$	-
14 31 CONSTRUCTION MANAGEMENT	Construction Management	\$	-	0%	\$	- \$	-
XX FIXED DOLLAR RISK ADD (EQUALLY DISPERSED TO ALL, MU	ST INCLUDE JUSTIFICATION SEE BELOW)				\$	-	

Totals					
Real Estate \$	16,000	20%	\$	3,200	\$ 19,200.00
Total Construction Estimate \$	43,703,084	43%	\$	18,955,909	\$ 62,658,993
Total Planning, Engineering & Design \$	-	0%	\$	-	\$ -
Total Construction Management \$	-	0%	\$	-	\$ -
Total Excluding Real Estate \$	43,703,084	43%	\$	18,955,909	\$ 62,658,993
		Ва	se	50%	80%
Confidence Level	\$43,7	03k	\$55,077k	\$62,659k	

\* 50% based on base is at 5% CL.

# Colorado River Locks Alt 2b - Gate Rehab and guidewall Rep

Feasibility (Alternatives)
Abbreviated Risk Analysis **Meeting Date:** 4-Oct-17



			PDT Discussions & Conclusions			
Risk Element	Feature of Work	Concerns	(Include logic & justification for choice of Likelihood & Impact)	Impact	Likelihood	Risk Level
Project Ma	nagement & Scope Growth			Maximum Proje	ct Growth	75%
PS-1	Relocations	Are there any Relocations in area?	Lisa MThere are no railroads or utilities that will be impacted for the project. There are currently no HTRW concerns for the area. There is potentially a pipeline that runs near Colorado under the current channel so we'll want to be mindful of that. This alternative is only for Rehab of the existing structure.	Negligible	Unlikely	0
PS-2	Mitigation	Is mitigation required?	No, this alternative only for Rehab of the existing structure.	Negligible	Unlikely	0
PS-3	Mob/Demob	potential for scope growth, added features?	standard type work	Negligible	Possible	0
PS-4	Foundation	potential for scope growth, added features?	This item is for the pile foundation for the 2 new chamber guidewalls and replacement of part of the riverside gate channel inlet sheetpile walls and adding UHMW panel facing. Scope could grow to include additional sections of the sheetpile inlet walls.	Significant	Possible	3
PS-5	sector gate	potential for scope growth, added features?	Based on similar existing scopes for rehab of the existing structures that is done periodincally and cost used should be representative of processes required. Do we really know what is out there? Considering this is an alternative to totally replacing the structures, the scope could grow to replace things not typically done under a periodic rehab. Note - there are other items on the bid schedule that replace additional items.	Moderate	Likely	3
PS-6	structural concrete	potential for scope growth, added features?	This item is for the concrete portion of the new lock chamber guidewalls. Runs length of chamber. Do not anticipate any ncrease in scope.	Marginal	Unlikely	0
PS-7	misc metals	potential for scope growth, added features?	This item is for miscellaneous metals for the the new guidewall. Do not anticipate any significant increase in scope.	Negligible	Possible	0
PS-8	mechanical	potential for scope growth, added features?	current scope assumes replacing all existing mechanical with typical mechanical used by MVN. Also includes replacing the machinery building with a new pre-fab.	Marginal	Possible	1
PS-9	electrical	potential for scope growth, added features?	current scope assumes replacing existing electrical. Scope of "existing" not defined specifically. Scope could grow.	Moderate	Possible	2
PS-10	guide wall	potential for scope growth, added features?	This item is for the timber fenders on the new guidewalls. Do not anticipate any significant increase in scope.	Marginal	Possible	1
PS-11	demolition	potential for scope growth, added features?	This item includes removal of all the existing timber lock chamber guidewalls. Do not anticipate any significant increase in scope.	Negligible	Possible	0
PS-12	Remaining Construction Items			Negligible	Unlikely	0

PS-13	Planning, Engineering, & Design	potential for scope growth, added features?	added features and changes to scope would require additional PED	Marginal	Possible	N/A
PS-14	Construction Management		added features and changes to scope would require additional S&A	Marginal	Possible	N/A
Acquisitio	n Strategy			Maximum Proje	ct Growth	30%
AS-1	Relocations	none identified	none identified	Negligible	Unlikely	0
AS-2	Mitigation	none identified	No, this alternative only for Rehab of the existing structure.	Negligible	Unlikely	0
AS-3	Mob/Demob	is there an established acquisition plan?	Acquisition strategy is anticipated to be sealed bid per PM. Cost estimate assumes large business, open competition but includes typical tiering of subcontractors. If projects were to go small business, Best Value, or some type of set-a-aside would increase cost.	Marginal	Likely	2
AS-4	Foundation	is there an established acquisition plan?	Acquisition strategy is anticipated to be sealed bid per PM. Cost estimate assumes large business, open competition but includes typical tiering of subcontractors. If projects were to go small business, Best Value, or some type of set-a-aside would increase cost.	Marginal	Likely	2
AS-5	sector gate	is there an established acquisition plan?	Acquisition strategy is anticipated to be sealed bid per PM. Cost estimate assumes large business, open competition but includes typical tiering of subcontractors. If projects were to go small business, Best Value, or some type of set-a-aside would increase cost.	Marginal	Likely	2
AS-6	structural concrete	is there an established acquisition plan?	Acquisition strategy is anticipated to be sealed bid per PM. Cost estimate assumes large business, open competition but includes typical tiering of subcontractors. If projects were to go small business, Best Value, or some type of set-a-aside would increase cost.	Marginal	Likely	2
AS-7	misc metals	is there an established acquisition plan?	Acquisition strategy is anticipated to be sealed bid per PM. Cost estimate assumes large business, open competition but includes typical tiering of subcontractors. If projects were to go small business, Best Value, or some type of set-a-aside would increase cost.	Marginal	Likely	2
AS-8	mechanical	is there an established acquisition plan?	Acquisition strategy is anticipated to be sealed bid per PM. Cost estimate assumes large business, open competition but includes typical tiering of subcontractors. If projects were to go small business, Best Value, or some type of set-a-aside would increase cost.	Marginal	Likely	2
AS-9	electrical	is there an established acquisition plan?	Acquisition strategy is anticipated to be sealed bid per PM. Cost estimate assumes large business, open competition but includes typical tiering of subcontractors. If projects were to go small business, Best Value, or some type of set-a-aside would increase cost.	Marginal	Likely	2
AS-10	guide wall	is there an established acquisition plan?	Acquisition strategy is anticipated to be sealed bid per PM. Cost estimate assumes large business, open competition but includes typical tiering of subcontractors. If projects were to go small business, Best Value, or some type of set-a-aside would increase cost.	Marginal	Likely	2
AS-11	demolition	is there an established acquisition plan?	Acquisition strategy is anticipated to be sealed bid per PM. Cost estimate assumes large business, open competition but includes typical tiering of subcontractors. If projects were to go small business, Best Value, or some type of set-a-aside would increase cost.	Marginal	Likely	2

					1	
AS-12	Remaining Construction Items			Marginal	Likely	2
AS-13	Planning, Engineering, & Design			Marginal	Unlikely	N/A
AS-14	Construction Management	is there an established acquisition plan?	Acquisition strategy is anticipated to be sealed bid per PM. Cost estimate assumes large business, open competition but includes typical tiering of subcontractors. If projects were to go small business, Best Value, or some type of set-a-aside would increase cost.	Marginal	Likely	N/A
Construct	tion Elements			Maximum Proje	ct Growth	25%
CON-1	Relocations	none identified	none identified	Negligible	Unlikely	0
CE-2	Mitigation			Negligible	Unlikely	0
CE-3	Mob/Demob	High risk or complex construction elements, site access, in-water? Unique construction methods? Special mobilization?	typical construction, no special concerns. Access by land and water.	Negligible	Possible	0
CE-4	Foundation	High risk or complex construction elements, site access, in-water? Special equipment or subcontractors needed? Potential for construction modification and claims?	should be typical construction. assumes commonly used equipment and processes. There is potential for modifications and claims based on unknown site conditions.	Marginal	Likely	2
CE-5	sector gate	Accelerated schedule or harsh weather schedule? Special equipment or subcontractors needed? Potential for construction modification and claims?	Based on similar existing scopes for rehab of the existing structures that is done periodically and cost used should be representative of processes required Since the existing facilities are old, actual site conditions and construction may be different than expected. Potential for modifications and claims exists.	Marginal	Likely	2
CE-6	structural concrete	High risk or complex construction elements, site access, in-water? Unique construction methods? Special equipment or subcontractors needed? Potential for construction modification and claims?	typical work and design takes this into account, but might be a slightly higher risk portion of work since working over water. Slightly unique base slab forming required since over water. No special equipment or contractors needed. There is potential for modifications and claims.	Moderate	Likely	3
CE-7	misc metals	High risk or complex construction elements, site access, in-water? Unique construction methods? Special equipment or subcontractors needed? Potential for construction modification and claims?	typical construction, no special concerns. Access by land and water. No special contractors or equipment required. Potential for modifications and claims.	Negligible	Possible	0
CE-8	mechanical	High risk or complex construction elements, site access, in-water? Unique construction methods? Special equipment or subcontractors needed? Potential for construction modification and claims?	typical work and design taken into account. There is potential for modifications and claims based on unknown site conditions.	Marginal	Likely	2
CE-9	electrical	High risk or complex construction elements, site access, in-water? Unique construction methods? Special equipment or subcontractors needed? Potential for construction modification and claims?	should be typical construction. assumes commonly used equipment and processes. There is potential for modifications and claims based on unknown site conditions.	Marginal	Likely	2
CE-10	guide wall	no special concern	should be typical construction. assumes commonly used equipment and processes. There is low potential for modifications and claims.	Negligible	Possible	0
CE-11	demolition	High risk or complex construction elements, site access, in-water? Unique construction methods? Special equipment or subcontractors needed? Potential for construction modification and claims?	typical construction, no special concerns. One site accessible by both land and water, 1 site accessible by water only. No special contractors or equipment required. Potential for modifications and claims.	Marginal	Possible	1
CE-12	Remaining Construction Items			Negligible	Unlikely	0
CE-13	Planning, Engineering, & Design		modifications and claims would cause increased PED costs	Negligible	Likely	N/A

CE-14	Construction Management		modifications and claims would cause increased CM costs	Marginal	Likely	N/A
Specialty C	onstruction or Fabrication			Maximum Projec	ct Growth	65%
SC-1	Relocations	none identified	none identified	Negligible	Unlikely	0
SC-2	Mitigation	no concern		Negligible	Unlikely	0
SC-3	Mob/Demob	Atypical construction elements, unusual material or equipment manufactured or installed?  Confidence in constructibility or methodology?	typical construction, little or no concern	Negligible	Possible	0
SC-4	Foundation	Atypical construction elements, unusual material or equipment manufactured or installed?  Confidence in constructibility or methodology?	typical construction, little or no concern	Negligible	Unlikely	0
SC-5	sector gate	Atypical construction elements, unusual material or equipment manufactured or installed?  Confidence in constructibility or methodology?	should be typical construction and cost used should be representative of processes required. But since it is a retrofit there is a chance something special could be required.	Marginal	Possible	1
SC-6	structural concrete	Atypical construction elements, unusual material or equipment manufactured or installed?  Confidence in constructibility or methodology?	generally typical construction, however construction is over water and there is a unique forming method for the base slab.	Moderate	Likely	3
SC-7	misc metals	Atypical construction elements, unusual material or equipment manufactured or installed?  Confidence in constructibility or methodology?	should be typical construction	Negligible	Unlikely	0
SC-8	mechanical	Atypical construction elements, unusual material or equipment manufactured or installed?  Confidence in constructibility or methodology?	should be typical construction but you are trying to retrofit an existing facility and could require specialty construction to make it work. Currently assumes commonly used equipment and processes.	Moderate	Possible	2
SC-9	electrical	Atypical construction elements, unusual material or equipment manufactured or installed?  Confidence in constructibility or methodology?	should be typical construction but you are trying to retrofit an existing facility and could require specialty techniques. currently assumes commonly used equipment and processes.	Moderate	Possible	2
SC-10	guide wall	Atypical construction elements, unusual material or equipment manufactured or installed?  Confidence in constructibility or methodology?	should be typical construction	Negligible	Possible	0
SC-11	demolition	Atypical construction elements, unusual material or equipment manufactured or installed?  Confidence in constructibility or methodology?	should be typical construction	Marginal	Possible	1
SC-12	Remaining Construction Items			Negligible	Unlikely	0
SC-13	Planning, Engineering, & Design			Negligible	Unlikely	N/A
SC-14	Construction Management			Negligible	Unlikely	N/A
Technical I	Design & Quantities			Maximum Projec	ct Growth	30%
T-1	Relocations	none identified	unknown	Negligible	Unlikely	0
T-2	Mitigation		No, this alternative only for Rehab of the existing structure.	Negligible	Unlikely	0
T-3	Mob/Demob	no concern	no concern	Negligible	Possible	0

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Approximate mention-page all tools are unique. I placed and provided companies on a manufacture and the second companies of the page and accompanies. The page and accompanies of the page and accompanies of the page and accompanies. Approximate mention-page and accompanies. Approxim	T-4	Foundation	Appropriate methods applied to calculate quantities? Sufficient investigations to develop quantities?	sheetpile wall design - could be variations when site specific conditions applied. Geotech conditions have not been evaluated and could cause changes to	Moderate	Likely	3
The contract connects of the contract of the contract of particles and the contract of particles of the contract of particles of the contract	T-5	sector gate	Appropriate methods applied to calculate quantities? Sufficient investigations to develop quantities?	periodincally. Details of exact work required unknown. Since the existing facilities are old, actual site conditions and construction may be different than	Moderate	Possible	2
Agrees in membra by glight for excluded and filling of control of	T-6	structural concrete	Appropriate methods applied to calculate quantities? Sufficient investigations to develop quantities?		Moderate	Likely	3
Appropriate methods agried to according quantities? Software recommend  Appropriate methods agried to according quantities? Configuration (appropriate)  Level of configuration (appropriate)  Appropriate methods agried to according quantities? Appropriate methods agried to according agried to according agried to according agried to according agried to according agried to according	T-7	misc metals	Appropriate methods applied to calculate quantities? Sufficient investigations to develop quantities?		Marginal	Possible	1
Appropriate methods applied to calculating quantities? Outling control credit upplied? Outling control credit upplied? Outling control credit upplied? Outling control credit upplied? Outling control credit upplied? Outling control credit upplied? Appropriate methods applied to control credit upplied? Appropriate methods applied to control credit upplied? Appropriate methods applied to control credit upplied? Outling control credit upplied upplied? Outling control credit upplied upplied upplied? Outling control credit upplied upp	T-8	mechanical	Appropriate methods applied to calculate quantities? Sufficient investigations to develop quantities?		Moderate	Possible	2
Appropriate methods applied to calculate quantities? Sufficient investigations to dreade quantities? Coally control check applied? Appropriate methods applied to calculate quantities? Appropriate methods applied to calculate quantities? Appropriate methods applied to calculate quantities? Sufficient investigations to dreade quantities? Sufficient investigations during PED and additional registering will be continued to draing PED and additional registering will be continued to draing PED and additional registering will be continued to draing PED and additional registering will be continued to draing PED and additional registering will be continued to draing PED and additional registering will be continued to draing PED and additional registering will be continued to draing PED and additional registering will be continued to draing PED and additional registering will be continued to draing PED and additional registering will be continued to draing PED and additional registering will be continued to draing PED and additional	T-9	electrical	Appropriate methods applied to calculate quantities? Sufficient investigations to develop quantities?		Significant	Possible	3
Appropriate methods applied to calculate quantities? Sufficient investigations to develop quantities? Qualify control check applied?  T-12 Remaining Construction items  T-13 Planning, Engineering, & Design  T-14 Construction Management  Construction  Management  Construction  Managem	T-10	guide wall	Appropriate methods applied to calculate quantities? Sufficient investigations to develop quantities?	Based on similar / typical MVN project designs.	Moderate	Possible	2
T-12  Planning. Engineering, & Design  Further data will be obtained during PED and additional engineering will be done  further data will be obtained during PED and additional engineering will be done  Construction Management  Construction Management  Construction Management  Cost Estimate Assumptions  Maximum Project Growth  N/A   EST-1  Relocations  None identified  No, this alternative only for Rehab of the existing structure.  Negligible  Unlikely  O  Regligible  Unlikely  O  EST-2  Mob/Demob  no concern  Assumptions related to prime and subcontractor markupe/assignments? Assumptions regarding crew, productivity, overtime? Site accessibility, transport delays, congestion? Overtise of Cost Book, king sum, allowances? Lack confidence on critical cost items?  In confidence on critical cost items?  In confidence on critical cost items?  In confidence on critical cost items?  In confidence on critical cost items?  In construction anticipated and appropriate mobi/demob included in cost estimate includes typical prime and subcontractor tiering. All items have detailed crews and related productivity and overtime. Typical construction features. Existing conditions may not be as originally planned/buill and different techniques cool be needed. Juriar R Currently there are no restrictions that limit construction. There may be some scheduling necessary to maintain traffic since the option does not have a bytess channed.	T-11	demolition	Appropriate methods applied to calculate quantities? Sufficient investigations to develop quantities?		Moderate	Possible	2
T-13 Planning, Engineering, & Design  Construction Management  Construction Management  Construction Management  Construction Management  Cost Estimate Assumptions  Maximum Project Growth  35%  EST-1 Relocations  Miligation  Miligation  Miligation  Mob/Demob  No, this alternative only for Rehab of the existing structure.  Negligible  Unlikely  No, this alternative only for Rehab of the existing structure.  Negligible  Unlikely  O  No, this alternative only for Rehab of the existing structure.  Negligible  Unlikely  O  Assumptions related to prime and subcontractor markups/assignments? Assumptions regarding crew, productivity, overtime? Site accessibility, transport delays, congestion? Overuse of Cost Book, lump sum, allowances? Lack confidence on critical cost items?  Likely  4  ViA  Likely  N/A  No, this alternative only for Rehab of the existing structure.  Negligible  Unlikely  O  cost estimate includes typical prime and subcontractor tibring. All items have detailed crews and related productivity and overtime. Typical construction features. Existing conditions may not be as originally planned/bull and different techniques could be needed, Jefica R Currently these area or restrictions that limit construction. There may be some scheduling necessary to maintain traffic since this option does not have a bypasse channel.  Significant  Likely  4	T-12	Remaining Construction Items			Negligible	Unlikely	0
T-14  Cost Estimate Assumptions  Relocations  none identified  none identified  none identified  Negligible  Unlikely  O  Mitigation  Mitigation  EST-2  Mob/Demob  no concern  Toundation  Assumptions related to prime and subcontractor markups/assignments? Assumptions regarding crew, productivity, overtime? Site accessibility, transport delays, congestion? Overuse of Cost Book, lump sum, allowances? Lack confidence on critical cost items?  Maximum Project Growth  Negligible  Unlikely  O  Cost estimate includes typical prime and subcontractor tiering. All items have detailed crews and related productivity and overtime. Typical construction features. Existing conditions may not be as originally planned/built and different techniques could be needed. Jerica R Currently there are no restrictions that tilmit construction. There may be some scheduling necessary to maintain traffic since this option does not have a bypass channel.	T-13	Planning, Engineering, & Design			Marginal	Likely	N/A
Relocations none identified no	T-14	Construction Management		changes in designs and assumption could cause longer construction times	Marginal	Likely	N/A
EST-1 Relocations none identified none identified none identified none identified none identified No, this alternative only for Rehab of the existing structure. Negligible Unlikely 0  EST-2 Nob/Demob no concern typical construction anticipated and appropriate mob/demob included in cost estimate. Negligible Possible 0  Assumptions related to prime and subcontractor markups/assignments? Assumptions regarding crew, productivity, overtime? Site accessibility, transport delays, congestion? Overuse of Cost Book, lump sum, allowances? Lack confidence on critical cost items? Significant table included supplied prime and subcontractor tiering. All items have detailed crews and related productivity and overtime. Typical construction features. Existing conditions may not be as originally planned/built and different techniques could be needed. Jerica R Currently there are no restrictions that limit construction. There may be some scheduling necessary to maintain traffic since this option does not have a bypass channel.	Cost Estima	ate Assumptions			Maximum Projec	ct Growth	35%
EST-2  Mob/Demob  no concern  typical construction anticipated and appropriate mob/demob included in cost estimate.  Negligible  Possible  O  cost estimate includes typical prime and subcontractor tiering. All items have detailed crews and related productivity and overtime. Typical construction features. Existing conditions may not be as originally planned/built and different techniques could be needed. Jerica R Currently there are no restrictions that limit construction. There may be some scheduling necessary to maintain traffic since this option does not have a bypass channel.	EST-1	Relocations	none identified	none identified	Negligible	Unlikely	0
EST-3  Assumptions related to prime and subcontractor markups/assignments? Assumptions regarding crew, productivity, overtime? Site accessibility, transport delays, congestion? Overuse of Cost Book, lump sum, allowances? Lack confidence on critical cost items?  Assumptions related to prime and subcontractor tiering. All items have detailed crews and related productivity and overtime. Typical construction features. Existing conditions may not be as originally planned/built and different techniques could be needed. Jerica R Currently there are no restrictions that limit construction. There may be some scheduling necessary to maintain traffic since this option does not have a bypass channel.	EST-2	Mitigation		No, this alternative only for Rehab of the existing structure.	Negligible	Unlikely	0
Assumptions related to prime and subcontractor markups/assignments? Assumptions regarding crew, productivity, overtime?  Site accessibility, transport delays, congestion? Overuse of Cost Book, lump sum, allowances? Lack confidence on critical cost items?  Assumptions related to prime and subcontractor markups/assignments?  detailed crews and related productivity and overtime. Typical construction features. Existing conditions may not be as originally planned/built and different techniques could be needed. Jerica R Currently there are no restrictions that limit construction. There may be some scheduling necessary to maintain traffic since this option does not have a bypass channel.  Significant  Likely	EST-3	Mob/Demob	no concern		Negligible	Possible	0
	EST-4	Foundation	Assumptions regarding crew, productivity, overtime? Site accessibility, transport delays, congestion? Overuse of Cost Book, lump sum, allowances?	detailed crews and related productivity and overtime. Typical construction features. Existing conditions may not be as originally planned/built and different techniques could be needed. Jerica R Currently there are no restrictions that limit construction. There may be some scheduling necessary	Significant	Likely	4

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An employmentation in your work described in which produced in the position of the company of th	FOT 5	sector gate	Assumptions regarding crew, productivity, overtime? Site accessibility, transport delays, congestion? Overuse of Cost Book, lump sum, allowances?	construction features and cost used should be representative of processes required. Existing conditions and required repairs may not be as in past contracts and different techniques could be needed. cost estimate includes	Moderate	Likely	3
Accomption capitally any control of prince of a decomption many passagements?  Control of Control of the Contro	EST-5						
Assumptions regarding core, processing control in account and in account account and in account and in account account and in account account and in account account and in account account and in account account account and in account account account account account and in account	EST-6	structural concrete	Assumptions regarding crew, productivity, overtime? Site accessibility, transport delays, congestion? Overuse of Cost Book, lump sum, allowances?	detailed crews and related productivity and overtime. Typical construction features, however exact design/typical sections not fully developed yet. Slightly unique base slab forming required since over water. Site accessibility by both land and water. Current quotes on most major materials. There may be some schedule necessary to maintain traffic in the		Likely	4
Assumptions regarding core, processing control in account and in account account and in account and in account account and in account account and in account account and in account account and in account account account and in account account account account account and in account							
Assumptions regarding own, productivity, continents of the developed part of the strict for the production from factor factor from the strict from the continents of the strict from the stric	EST-7	misc metals	Assumptions regarding crew, productivity, overtime? Site accessibility, transport delays, congestion? Overuse of Cost Book, lump sum, allowances?	construction features, however exact design/typical sections not developed yet. Cost book items used. Nothing unique about materials and methods. Site	Marginal	Likely	2
Assumptions regarding crow, productively, contented for a formation and content and conten							
Assumptions regarding cree, productivity, overtime?  Site accessibility, transport designs, comparison?  Ownerse of Cost Book, turn part, allowances? Lack confidence on critical cost form?  Assumptions related to prime and subcontractor matisuprecessignments?  Assumptions related to prime and subcontractor testing. All Berns have detailed crees and related productivity and overtime. Typical construction features, Site accessibility, transport designs, congestion?  Ownerse of Cost Book, turn part, allowances?  Livak confidence on official cost femily.  Assumptions regarding cree, productivity, overtime?  Site accessibility, transport designs, and and water. Curred reposes on most major materials. There may be some school document. Typical construction from the end site of this splin docs and related productivity and overtime. Typical construction from the end site of this splin docs and related productivity and overtime. Typical construction features, however costing conditions dynate and subcontractor tering. All Berns have detailed crees and related productivity and overtime. Typical construction features, however costing conditions dynate and subcontractor tering. All Berns have detailed crees and related productivity and overtime. Typical construction features, however costing conditions dynate and subcontractor tering. All Berns have detailed crees and related productivity and overtime. Typical construction features, however costing conditions dynate and subcontractor tering. All Berns have detailed crees and related productivity and overtime. Typical construction features, however costing conditions dynate and subcontractor tering. All Berns have detailed cr	EST-8	mechanical	Assumptions regarding crew, productivity, overtime? Site accessibility, transport delays, congestion? Overuse of Cost Book, lump sum, allowances?	similar work. Typical MVN construction features, however exact design/typical sections not developed yet. Retrofitting existing facility so could have changes.	Moderate	Likely	3
Assumptions regarding cree, productivity, overtime?  Site accessibility, transport designs, comparison?  Ownerse of Cost Book, turn part, allowances? Lack confidence on critical cost form?  Assumptions related to prime and subcontractor matisuprecessignments?  Assumptions related to prime and subcontractor testing. All Berns have detailed crees and related productivity and overtime. Typical construction features, Site accessibility, transport designs, congestion?  Ownerse of Cost Book, turn part, allowances?  Livak confidence on official cost femily.  Assumptions regarding cree, productivity, overtime?  Site accessibility, transport designs, and and water. Curred reposes on most major materials. There may be some school document. Typical construction from the end site of this splin docs and related productivity and overtime. Typical construction from the end site of this splin docs and related productivity and overtime. Typical construction features, however costing conditions dynate and subcontractor tering. All Berns have detailed crees and related productivity and overtime. Typical construction features, however costing conditions dynate and subcontractor tering. All Berns have detailed crees and related productivity and overtime. Typical construction features, however costing conditions dynate and subcontractor tering. All Berns have detailed crees and related productivity and overtime. Typical construction features, however costing conditions dynate and subcontractor tering. All Berns have detailed crees and related productivity and overtime. Typical construction features, however costing conditions dynate and subcontractor tering. All Berns have detailed cr							
Assumptions regarding crew, productivity, overtime? Site accessibility, transport delays, congestion? Overuse of Coat Book, lump sum, allowances? Lack confidence on critical cost Items?  Assumptions related to prime and subcontractor markups/assignments? Assumptions related to prime and subcontractor markups/assignments? Assumptions related to prime and subcontractor markups/assignments? Assumptions related to prime and subcontractor markups/assignments? Assumptions related to prime and subcontractor markups/assignments? Assumptions related to prime and subcontractor markups/assignments? Assumptions related to prime and subcontractor markups/assignments? Assumptions related to prime and subcontractor trieng. All items have detailed crews and related productivity and overtime. Typical construction features, however existing conditions/typical sections of guideval not available. Site accessibility by both land and water. Typical construction features, between existing conditions/typical sections of guideval not available. Site accessibility by both land and water. Typical construction features have detailed crews and related productivity and overtime. Typical construction features have detailed crews and related productivity and overtime. Typical construction features have detailed crews and related productivity and overtime. Typical construction features have detailed crews and related productivity and overtime. Typical construction features have detailed crews and related productivity and overtime. Typical construction features have detailed crews and related productivity and overtime. Typical construction features have detailed crews and related productivity and overtime. Typical construction features have detailed crews and related productivity and overtime. Typical construction features have detailed crews and related productivity and overtime. Typical construction features have detailed crews and related productivity and overtime. Typical construction features have detailed crews and related productivity an	EST-9	electrical	Assumptions regarding crew, productivity, overtime? Site accessibility, transport delays, congestion? Overuse of Cost Book, lump sum, allowances?	work. Typical MVN construction features, however exact design/typical sections not developed yet. Retrofitting existing facility so could have changes.		Likely	3
Assumptions regarding crew, productivity, overtime? Site accessibility, transport delays, congestion? Overuse of Cost Book, tump sum, allowances? Lack confidence on critical cost items?  EST-11 demolition  Remaining Construction Items  Planning, Engineering, & Design  no concern  Planning, Engineering, & Design  no concern  Site accessibility, transport delays, congestion? Lack confidence on critical cost items?  Assumptions regarding? Cost Book, tump sum, allowances? Lack confidence on critical cost items?  Negligible  Unlikely  Planning, Engineering, & Design  no concern  Since S&A is directly linked to construction items and cost, this item would have similar risk to construction items.  Maximum Project Growth  Likely  Negligible  Unlikely  Negligible  Unlikely	EST-10	guide wall	Assumptions regarding crew, productivity, overtime? Site accessibility, transport delays, congestion? Overuse of Cost Book, lump sum, allowances?	detailed crews and related productivity and overtime. Typical construction features. Site accessibility by both land and water. Current quotes on most major materials. There may be some schedule necessary to maintain traffic		Likely	2
Assumptions regarding crew, productivity, overtime? Site accessibility, transport delays, congestion? Overuse of Cost Book, tump sum, allowances? Lack confidence on critical cost items?  EST-11 demolition  EST-12 Planning, Engineering, & Design  no concern  Planning, Engineering, & Design  no concern  Site accessability, transport delays, congestion? Lack confidence on critical cost items?  Assumptions regarding? Cost Book, tump sum, allowances? Lack confidence on critical cost items?  Negligible  Unlikely  Planning, Engineering, & Design  no concern  Since S&A is directly linked to construction items and cost, this item would have similar risk to construction items.  Marginal  Likely  Negligible  Negligible  Unlikely  Negligible  Unlikely  Negligible  Unlikely	23 ; 10						
Remaining Construction Items  Planning, Engineering, & Design  no concern  Construction Management  no concern  since S&A is directly linked to construction items and cost, this item would have similar risk to construction items.  Marginal  Likely  External Project Risks  Maximum Project Growth  Negligible  Unlikely  Negligible  Unlikely  Negligible  Unlikely	FST-11	demolition	Assumptions regarding crew, productivity, overtime? Site accessibility, transport delays, congestion? Overuse of Cost Book, lump sum, allowances?	detailed crews and related productivity and overtime. Typical construction features, however existing conditions/typical sections of guidewall not available. Site accessibility by both land and water. There may be some		Likely	2
Planning, Engineering, & Design no concern  EST-13  Planning, Engineering, & Design no concern  Construction Management no concern  since S&A is directly linked to construction items and cost, this item would have similar risk to construction items.  Marginal Possible  Narginal Likely  Narginal Likely  Negligible Unlikely		Remaining Construction Items			Negligible	Unlikely	0
EST-13  Construction Management  no concern  since S&A is directly linked to construction items and cost, this item would have similar risk to construction items.  Marginal  Likely  Negligible  Unlikely  Unlikely	EST-12						
EST-14 Construction Management no concern have similar risk to construction items.  External Project Risks  Maximum Project Growth  Negligible Unlikely	EST-13	Planning, Engineering, & Design	no concern		Marginal	Possible	N/A
Negligible Unlikely	EST-14	Construction Management	no concern		Marginal	Likely	N/A
	External Project Risks					ct Growth	40%
	FX-1	Relocations	none identified	none identified	Negligible	Unlikely	0
EX-2 Mitigation no concern No, this alternative only for Rehab of the existing structure. Negligible Unlikely		Mitigation	no concern	No, this alternative only for Rehab of the existing structure.	Negligible	Unlikely	0

EX-3	Mob/Demob	<ul> <li>Potential for severe adverse weather?</li> <li>Political influences, lack of support, obstacles?</li> <li>Unanticipated inflations in fuel, key materials?</li> <li>Potential for market volatility impacting competition, pricing?</li> <li>Funding Constraints</li> </ul>	The project is located a bit inland so severe adverse weather should not be an issue. The inflation of fuel and key materials is always a possibility and fuel is a cost driver for the mob/demob but would probably have a marginal impact. The users of the GIWW fully support improving these crossings as does the NFS. The Inland Users Water Board does not have this project ranked for immediate construction, even if an approved Chief's Report and funding become available.	Marginal	Possible	1
EX-4	Foundation	<ul> <li>Potential for severe adverse weather?</li> <li>Political influences, lack of support, obstacles?</li> <li>Unanticipated inflations in fuel, key materials?</li> <li>Potential for market volatility impacting competition, pricing?</li> <li>Funding Constraints</li> </ul>	The project is located a bit inland so severe adverse weather should not be an issue. The inflation of fuel and key materials is always a possibility, however it is not a large cost driver for this item and will not place a large demand on the supply. The users of the GIWW fully support improving these crossings as does the NFS. The Inland Users Water Board does not have this project ranked for immediate construction, even if an approved Chief's Report and funding become available.	Marginal	Possible	1
EX-5	sector gate	<ul> <li>Potential for severe adverse weather?</li> <li>Political influences, lack of support, obstacles?</li> <li>Unanticipated inflations in fuel, key materials?</li> <li>Potential for market volatility impacting competition, pricing?</li> <li>Funding Constraints</li> </ul>	The project is located a bit inland so severe adverse weather should not be an issue. The inflation of fuel and key materials is always a possibility, however it is not a large cost driver for this item and will not place a large demand on the supply. The users of the GIWW fully support improving these crossings as does the NFS. The Inland Users Water Board does not have this project ranked for immediate construction, even if an approved Chief's Report and funding become available.	Marginal	Possible	1
EX-6	structural concrete	<ul> <li>Potential for severe adverse weather?</li> <li>Political influences, lack of support, obstacles?</li> <li>Unanticipated inflations in fuel, key materials?</li> <li>Potential for market volatility impacting competition, pricing?</li> <li>Funding Constraints</li> </ul>	The project is located a bit inland so severe adverse weather should not be an issue. The inflation of fuel and key materials is always a possibility, however it is not a large cost driver for this item and will not place a large demand on the supply. The users of the GIWW fully support improving these crossings as does the NFS. The Inland Users Water Board does not have this project ranked for immediate construction, even if an approved Chief's Report and funding become available.	Marginal	Possible	1
EX-7	misc metals	<ul> <li>Potential for severe adverse weather?</li> <li>Political influences, lack of support, obstacles?</li> <li>Unanticipated inflations in fuel, key materials?</li> <li>Potential for market volatility impacting competition, pricing?</li> <li>Funding Constraints</li> </ul>	The project is located a bit inland so severe adverse weather should not be an issue. The inflation of fuel and key materials is always a possibility, however it is not a large cost driver for this item and will not place a large demand on the supply. The users of the GIWW fully support improving these crossings as does the NFS. The Inland Users Water Board does not have this project ranked for immediate construction, even if an approved Chief's Report and funding become available.	Marginal	Possible	1
EX-8	mechanical	<ul> <li>Potential for severe adverse weather?</li> <li>Political influences, lack of support, obstacles?</li> <li>Unanticipated inflations in fuel, key materials?</li> <li>Potential for market volatility impacting competition, pricing?</li> <li>Funding Constraints</li> </ul>	The project is located a bit inland so severe adverse weather should not be an issue. The inflation of fuel and key materials is always a possibility, however it is not a large cost driver for this item and will not place a large demand on the supply. The users of the GIWW fully support improving these crossings as does the NFS. The Inland Users Water Board does not have this project ranked for immediate construction, even if an approved Chief's Report and funding become available.	Negligible	Possible	0
EX-9	electrical	<ul> <li>Potential for severe adverse weather?</li> <li>Political influences, lack of support, obstacles?</li> <li>Unanticipated inflations in fuel, key materials?</li> <li>Potential for market volatility impacting competition, pricing?</li> <li>Funding Constraints</li> </ul>	The project is located a bit inland so severe adverse weather should not be an issue. The inflation of fuel and key materials is always a possibility, however it is not a large cost driver for this item and will not place a large demand on the supply. The users of the GIWW fully support improving these crossings as does the NFS. The Inland Users Water Board does not have this project ranked for immediate construction, even if an approved Chief's Report and funding become available.	Negligible	Possible	0

EX-10	guide wall	Potential for severe adverse weather? Political influences, lack of support, obstacles? Unanticipated inflations in fuel, key materials? Potential for market volatility impacting competition, pricing? Funding Constraints	The project is located a bit inland so severe adverse weather should not be an issue. The inflation of fuel and key materials is always a possibility, however it is not a large cost driver for this item and will not place a large demand on the supply. The users of the GIWW fully support improving these crossings as does the NFS. The Inland Users Water Board does not have this project ranked for immediate construction, even if an approved Chief's Report and funding become available.	Marginal	Possible	1
EX-11	demolition	<ul> <li>Potential for severe adverse weather?</li> <li>Political influences, lack of support, obstacles?</li> <li>Unanticipated inflations in fuel, key materials?</li> <li>Potential for market volatility impacting competition, pricing?</li> <li>Funding Constraints</li> </ul>	The project is located a bit inland so severe adverse weather should not be an issue. The inflation of fuel and key materials is always a possibility, however it is not a large cost driver for this item and will not place a large demand on the supply. The users of the GIWW fully support improving these crossings as does the NFS. The Inland Users Water Board does not have this project ranked for immediate construction, even if an approved Chief's Report and funding become available.	Marginal	Possible	1
EX-12	Remaining Construction Items	<ul> <li>Potential for severe adverse weather?</li> <li>Political influences, lack of support, obstacles?</li> <li>Unanticipated inflations in fuel, key materials?</li> <li>Potential for market volatility impacting competition, pricing?</li> <li>Funding Constraints</li> </ul>	The project is located a bit inland so severe adverse weather should not be an issue. The inflation of fuel and key materials is always a possibility, however it is not a large cost driver for this item and will not place a large demand on the supply. The users of the GIWW fully support improving these crossings as does the NFS. The Inland Users Water Board does not have this project ranked for immediate construction, even if an approved Chief's Report and funding become available.	Marginal	Possible	1
EX-13	Planning, Engineering, & Design	<ul> <li>Potential for severe adverse weather?</li> <li>Political influences, lack of support, obstacles?</li> <li>Unanticipated inflations in fuel, key materials?</li> <li>Potential for market volatility impacting competition, pricing?</li> <li>Funding Constraints</li> </ul>	The project is located a bit inland so severe adverse weather should not be an issue. The inflation of fuel and key materials is always a possibility. At this stage there is no reason to believe there will be out of the ordinary market volatility that would affect competition and pricing as this is not a mega-project requiring large or specialty assets. The users of the GIWW fully support improving these crossings as does the NFS. The Inland Users Water Board does not have this project ranked for immediate construction, even if an approved Chief's Report and funding become available. This could cause increased reviews and updates due to delays in starting the project for lack of funding.	Marginal	Possible	N/A
EX-14	Construction Management	no concern	S&A is linked to construction items and cost, but most external risks would not make the project take longer once started.	Negligible	Possible	N/A

Project (less than \$40M): Colorado River Locks
Project Development Stage/Alternative: Feasibility (Alternatives)

Risk Category: Moderate Risk: Typical Project Construction Type

Meeting Date: 10/4/2017

Alternative: Alt 2b1 - Gate Rehab and NO guidew

Total Estimated Construction Contract Cost = \$ 25,207,361

<u>CWWBS</u>	<u>Feature of Work</u>	<u>Esti</u>	mated Cost	% Contingency	<u>\$ C</u>	Contingency	<u>Total</u>
01 LANDS AND DAMAGES	Real Estate	\$	16,000	20.0%	\$	3,200 \$	19,200
1 02 RELOCATIONS	Relocations	\$	-	0%	\$	- \$	-
2 06 FISH AND WILDLIFE FACILITIES	Mitigation	\$		0%	\$	- \$	-
3 15 FLOODWAY CONTROL AND DIVERSION STRUCTURES	Mob/Demob	\$	776,999	13%	\$	100,927 \$	877,926
4 15 FLOODWAY CONTROL AND DIVERSION STRUCTURES	Foundation	\$	3,370,319	55%	\$	1,848,110 \$	5,218,429
5 15 FLOODWAY CONTROL AND DIVERSION STRUCTURES	sector gate	\$	12,953,559	45%	\$	5,776,521 \$	18,730,080
6 15 FLOODWAY CONTROL AND DIVERSION STRUCTURES		\$	-	0%	\$	- \$	-
7 15 FLOODWAY CONTROL AND DIVERSION STRUCTURES		\$	<u>-</u>	0%	\$	- \$	<u>-</u>
8 15 FLOODWAY CONTROL AND DIVERSION STRUCTURES	mechanical	\$	3,312,359	35%	\$	1,144,229 \$	4,456,588.13
9 15 FLOODWAY CONTROL AND DIVERSION STRUCTURES	electrical	\$	4,794,125	42%	\$	1,994,097 \$	6,788,222.27
10 15 FLOODWAY CONTROL AND DIVERSION STRUCTURES		\$	-	0%	\$	- \$	_
11 15 FLOODWAY CONTROL AND DIVERSION STRUCTURES		\$	-	0%	\$	- \$	-
12 All Other	Remaining Construction Items	\$	-	0.0% 0%	\$	- \$	-
13 30 PLANNING, ENGINEERING, AND DESIGN	Planning, Engineering, & Design	\$	-	0%	\$	- \$	-
14 31 CONSTRUCTION MANAGEMENT	Construction Management	\$	-	0%	\$	- \$	-
XX FIXED DOLLAR RISK ADD (EQUALLY DISPERSED TO ALL, MU	IST INCLUDE JUSTIFICATION SEE BELOW)				\$	_	

Totals						
Real Estate	\$	16,000	20%		\$ 3,200	\$ 19,200.00
Total Construction Estimate	\$	25,207,361	43%		\$ 10,863,884	\$ 36,071,245
Total Planning, Engineering & Design	\$	-	0%		\$ -	\$ -
Total Construction Management	\$	-	0%		\$ -	\$ -
Total Excluding Real Estate	\$	25,207,361	43%		\$ 10,863,884	\$ 36,071,245
				Base	50%	80%
Confidence L	evel F	Range Estimate (\$000's)	\$2	5,207k	\$31,725k	\$36,071k

\* 50% based on base is at 5% CL.

# Colorado River Locks Alt 2b1 - Gate Rehab and NO guidewal

Feasibility (Alternatives)
Abbreviated Risk Analysis **Meeting Date:** 4-Oct-17



Risk Element	Feature of Work	Concerns	PDT Discussions & Conclusions (Include logic & justification for choice of Likelihood &	Impact	Likelihood	Risk Level
	- Catalo Cr Holl		Impact)	parot		141014 <b>2</b> 0101
Project Ma	nagement & Scope Growth			Maximum Proje	ct Growth	75%
PS-1	Relocations	Are there any Relocations in area?	Lisa MThere are no railroads or utilities that will be impacted for the project. There are currently no HTRW concerns for the area. There is potentially a pipeline that runs near Colorado under the current channel so we'll want to be mindful of that. This alternative is only for Rehab of the existing structure.	Negligible	Unlikely	0
PS-2	Mitigation	Is mitigation required?	No, this alternative only for Rehab of the existing structure.	Negligible	Unlikely	0
PS-3	Mob/Demob	potential for scope growth, added features?	standard type work	Negligible	Possible	0
PS-4	Foundation	potential for scope growth, added features?	This item is for the replacement of part of the riverside gate channel inlet sheetpile walls and adding UHMW panel facing. Scope could grow to include additional sections of the sheetpile inlet walls.	Significant	Possible	3
PS-5	sector gate	potential for scope growth, added features?	Based on similar existing scopes for rehab of the existing structures that is done periodincally and cost used should be representative of processes required. Do we really know what is out there? Considering this is an alternative to totally replacing the structures, the scope could grow to replace things not typically done under a periodic rehab. Note - there are other items on the bid schedule that replace additional items.		Likely	3
PS-6	0			Negligible	Unlikely	0
PS-7	0			Negligible	Unlikely	0
PS-8	mechanical	potential for scope growth, added features?	current scope assumes replacing all existing mechanical with typical mechanical used by MVN. Also includes replacing the machinery building with a new pre-fab.	Marginal	Possible	1
PS-9	electrical	potential for scope growth, added features?	current scope assumes replacing existing electrical. Scope of "existing" not defined specifically. Scope could grow.	Moderate	Possible	2
PS-10	0			Negligible	Unlikely	0
PS-11	0			Negligible	Unlikely	0
PS-12	Remaining Construction Items			Negligible	Unlikely	0

PS-13	Planning, Engineering, & Design	potential for scope growth, added features?	added features and changes to scope would require additional PED	Marginal	Possible	N/A
PS-14	Construction Management		added features and changes to scope would require additional S&A	Marginal	Possible	N/A
Acquisitio	on Strategy			Maximum Project Growth		30%
AS-1	Relocations	none identified	none identified	Negligible	Unlikely	0
AS-2	Mitigation	none identified	No, this alternative only for Rehab of the existing structure.	Negligible	Unlikely	0
AS-3	Mob/Demob	is there an established acquisition plan?	Acquisition strategy is anticipated to be sealed bid per PM. Cost estimate assumes large business, open competition but includes typical tiering of subcontractors. If projects were to go small business, Best Value, or some type of set-a-aside would increase cost.	Marginal	Likely	2
AS-4	Foundation	is there an established acquisition plan?	Acquisition strategy is anticipated to be sealed bid per PM. Cost estimate assumes large business, open competition but includes typical tiering of subcontractors. If projects were to go small business, Best Value, or some type of set-a-aside would increase cost.	Marginal	Likely	2
AS-5	sector gate	is there an established acquisition plan?	Acquisition strategy is anticipated to be sealed bid per PM. Cost estimate assumes large business, open competition but includes typical tiering of subcontractors. If projects were to go small business, Best Value, or some type of set-a-aside would increase cost.	Marginal	Likely	2
AS-6	0			Negligible	Unlikely	0
AS-7	0			Negligible	Unlikely	0
AS-8	mechanical	is there an established acquisition plan?	Acquisition strategy is anticipated to be sealed bid per PM. Cost estimate assumes large business, open competition but includes typical tiering of subcontractors. If projects were to go small business, Best Value, or some type of set-a-aside would increase cost.	Marginal	Likely	2
AS-9	electrical	is there an established acquisition plan?	Acquisition strategy is anticipated to be sealed bid per PM. Cost estimate assumes large business, open competition but includes typical tiering of subcontractors. If projects were to go small business, Best Value, or some type of set-a-aside would increase cost.	Marginal	Likely	2
AS-10	0			Negligible	Unlikely	0
AS-11	0			Negligible	Unlikely	0

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AS-12	Remaining Construction Items			Marginal	Likely	2
AS-13	Planning, Engineering, & Design			Marginal	Unlikely	N/A
AS-14	Construction Management	is there an established acquisition plan?	Acquisition strategy is anticipated to be sealed bid per PM. Cost estimate assumes large business, open competition but includes typical tiering of subcontractors. If projects were to go small business, Best Value, or some type of set-a-aside would increase cost.	Marginal	Likely	N/A
Construct	ion Elements			Maximum Proje	ect Growth	25%
CON-1	Relocations	none identified	none identified	Negligible	Unlikely	0
CE-2	Mitigation		No, this alternative only for Rehab of the existing structure.	Negligible	Unlikely	0
CE-3	Mob/Demob	High risk or complex construction elements, site access, in-water? Unique construction methods? Special mobilization?	typical construction, no special concerns. Access by land and water.	Negligible	Possible	0
CE-4	Foundation	High risk or complex construction elements, site access, in-water? Special equipment or subcontractors needed? Potential for construction modification and claims?	should be typical construction. assumes commonly used equipment and processes. There is potential for modifications and claims based on unknown site conditions.	Marginal	Likely	2
CE-5	sector gate	Accelerated schedule or harsh weather schedule? Special equipment or subcontractors needed? Potential for construction modification and claims?	Based on similar existing scopes for rehab of the existing structures that is done periodically and cost used should be representative of processes required. Since the existing facilities are old, actual site conditions and construction may be different than expected. Potential for modifications and claims exists.	Marginal	Likely	2
CE-6	0			Negligible	Unlikely	0
CE-7	0			Negligible	Unlikely	0
CE-8	mechanical	High risk or complex construction elements, site access, in-water? Unique construction methods? Special equipment or subcontractors needed? Potential for construction modification and claims?	typical work and design taken into account. There is potential for modifications and claims based on unknown site conditions.	Marginal	Likely	2
CE-9	electrical	High risk or complex construction elements, site access, in-water? Unique construction methods? Special equipment or subcontractors needed? Potential for construction modification and claims?	should be typical construction. assumes commonly used equipment and processes. There is potential for modifications and claims based on unknown site conditions.	Marginal	Likely	2
CE-10	0			Negligible	Unlikely	0
CE-11	0			Negligible	Unlikely	0
CE-12	Remaining Construction Items			Negligible	Unlikely	0
CE-13	Planning, Engineering, & Design		modifications and claims would cause increased PED costs	Negligible	Likely	N/A
CE-14	Construction Management		modifications and claims would cause increased CM costs	Marginal	Likely	N/A

cialty (	Construction or Fabrication			Maximum Proje	ct Growth	65
SC-1	Relocations	none identified	none identified	Negligible	Unlikely	
SC-2	Mitigation	no concern	No, this alternative only for Rehab of the existing structure.	Negligible	Unlikely	
SC-3	Mob/Demob	Atypical construction elements, unusual material or equipment manufactured or installed?  Confidence in constructibility or methodology?	typical construction, little or no concern	Negligible	Possible	
SC-4	Foundation	Atypical construction elements, unusual material or equipment manufactured or installed?  Confidence in constructibility or methodology?	typical construction, little or no concern	Negligible	Unlikely	
SC-5	sector gate	Atypical construction elements, unusual material or equipment manufactured or installed?  Confidence in constructibility or methodology?	should be typical construction and cost used should be representative of processes required. But since it is a retrofit there is a chance something special could be required.	Marginal	Possible	
SC-6	0			Negligible	Unlikely	
SC-7	0			Negligible	Unlikely	
SC-8	mechanical	Atypical construction elements, unusual material or equipment manufactured or installed?  Confidence in constructibility or methodology?	should be typical construction but you are trying to retrofit an existing facility and could require specialty construction to make it work. Currently assumes commonly used equipment and processes.	Moderate	Possible	
SC-9	electrical	Atypical construction elements, unusual material or equipment manufactured or installed?  Confidence in constructibility or methodology?	should be typical construction but you are trying to retrofit an existing facility and could require specialty techniques. currently assumes commonly used equipment and processes.	Moderate	Possible	:
SC-10	0			Negligible	Unlikely	
SC-11	0			Negligible	Unlikely	
SC-12	Remaining Construction Items			Negligible	Unlikely	
SC-13	Planning, Engineering, & Design			Negligible	Unlikely	N
6C-14	Construction Management			Negligible	Unlikely	N
hnical	Design & Quantities			Maximum Project Growth		30
T-1	Relocations	none identified	unknown	Negligible	Unlikely	
T-2	Mitigation		No, this alternative only for Rehab of the existing structure.	Negligible	Unlikely	
	Mob/Demob	no concern	no concern	Negligible	Possible	

Foundation	Level of confidence based on design and assumptions? Appropriate methods applied to calculate quantities? Sufficient investigations to develop quantities? Quality control check applied?	Qtys based on existing inlet sheetpile wall design - could be variations when site specific conditions applied. Geotech conditions have not been evaluated and could cause changes to existing assumptions/qtys on pilings.	Moderate	Likely	3
sector gate	Level of confidence based on design and assumptions? Appropriate methods applied to calculate quantities? Sufficient investigations to develop quantities? Quality control check applied?	Based on similar scopes for rehab of the existing structures that is done periodincally. Details of exact work required unknown. Since the existing facilities are old, actual site conditions and construction may be different than expected.	Moderate	Possible	2
0			Negligible	Unlikely	0
0			Negligible	Unlikely	0
mechanical	Level of confidence based on design and assumptions? Appropriate methods applied to calculate quantities? Sufficient investigations to develop quantities? Quality control check applied?	Based on similar / typical MVN project designs, however exact details not developed yet. Retrofitting existing facility so could have changes.	Moderate	Possible	2
electrical	Level of confidence based on design and assumptions? Appropriate methods applied to calculate quantities? Sufficient investigations to develop quantities? Quality control check applied?	Based on similar / typical MVN project designs, however exact details not developed yet. Retrofitting existing facility so could have changes.	Significant	Possible	3
0			Negligible	Unlikely	0
0			Negligible	Unlikely	0
Remaining Construction Items			Negligible	Unlikely	0
Planning, Engineering, & Design		further data will be obtained during PED and additional engineering will be done	Marginal	Likely	N/A
Construction Management		changes in designs and assumption could cause longer construction times	Marginal	Likely	N/A
ate Assumptions			Maximum Proje	ct Growth	35%
Relocations	none identified	none identified	Negligible	Unlikely	0
Mitigation		No, this alternative only for Rehab of the existing structure.	Negligible	Unlikely	0
Mob/Demob	no concern	typical construction anticipated and appropriate mob/demob included in cost estimate.	Negligible	Possible	0
Foundation	Assumptions related to prime and subcontractor markups/assignments? Assumptions regarding crew, productivity, overtime? Site accessibility, transport delays, congestion? Overuse of Cost Book, lump sum, allowances? Lack confidence on critical cost items?	cost estimate includes typical prime and subcontractor tiering. All items have detailed crews and related productivity and overtime. Typical construction features. Existing conditions may not be as originally planned/built and different techniques could be needed. Jerica R Currently there are no restrictions that limit construction. There may be some scheduling necessary to maintain traffic since this option does not have a bypass channel.	Significant	Likely	4
	sector gate  0 mechanical electrical electrical  0 Remaining Construction Items Planning, Engineering, & Design Construction Management ate Assumptions Relocations Mitigation Mob/Demob	Foundation  Appropriate methods applied to calculate quantities? Quality control check applied?  Level of confidence based on design and assumptions? Appropriate methods applied to calculate quantities? Quality control check applied?  Level of confidence based on design and assumptions? Appropriate methods applied to calculate quantities? Quality control check applied?  Level of confidence based on design and assumptions? Appropriate methods applied to calculate quantities? Sufficient investigations to develop quantities? Sufficient investigations to develop quantities? Sufficient investigations to develop quantities? Appropriate methods applied to calculate quantities? Sufficient investigations to develop quantities? Quality control check applied?  Level of confidence based on design and assumptions? Appropriate methods applied to calculate quantities? Sufficient investigations to develop quantities? Quality control check applied?  Development of the development of t	appropries monotos applicito is classation quantities?  Builty cellulor direct deliveration deli	Appropriate institution and analyses of the country and the control of the country country in supplies and the country of the	Accordance melation agent in considering personal and appropriated control and appropriate control and appropriate control and appropriate control

EST-5	sector gate	Assumptions related to prime and subcontractor markups/assignments? Assumptions regarding crew, productivity, overtime? Site accessibility, transport delays, congestion? Overuse of Cost Book, lump sum, allowances? Lack confidence on critical cost items?	Cost used for this item is average of bids from recent similar work. Typical construction features and cost used should be representative of processes required. Existing conditions and required repairs may not be as in past contracts and different techniques could be needed. cost estimate includes typical prime and subcontractor tiering.	Moderate	Likely	3
EST-6	0			Negligible	Unlikely	0
EST-7	0			Negligible	Unlikely	0
EST-8		Assumptions related to prime and subcontractor markups/assignments? Assumptions regarding crew, productivity, overtime? Site accessibility, transport delays, congestion? Overuse of Cost Book, lump sum, allowances? Lack confidence on critical cost items?	Cost used for this item developed by mechanical engineer based on recent similar work. Typical MVN construction features, however exact design/typical sections not developed yet. Retrofitting existing facility so could have changes. One site accessibility by both land and water, 1 site accessible by water only.	Moderate	Likely	3
EST-9	electrical	Overuse of Cost Book, lump sum, allowances?  Lack confidence on critical cost items?	Cost used for this item developed by electrical engineer based on recent similar work. Typical MVN construction features, however exact design/typical sections not developed yet. Retrofitting existing facility so could have changes. One site accessibility by both land and water, 1 site accessible by water only.	Moderate	Likely	3
EST-10	0			Negligible	Unlikely	0
EST-11	0			Negligible	Unlikely	0
EST-12	Remaining Construction Items			Negligible	Unlikely	0
EST-13	Planning, Engineering, & Design	no concern		Marginal	Possible	N/A
EST-14	Construction Management	no concern	since S&A is directly linked to construction items and cost, this item would have similar risk to construction items.	Marginal	Likely	N/A
External Pr	<u>roject Risks</u>		I	Maximum Projec	ct Growth	40%
EX-1	Relocations	none identified	none identified	Negligible	Unlikely	0
EX-2	Mitigation	no concern	No, this alternative only for Rehab of the existing structure.	Negligible	Unlikely	0

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EX-3	Mob/Demob	<ul> <li>Potential for severe adverse weather?</li> <li>Political influences, lack of support, obstacles?</li> <li>Unanticipated inflations in fuel, key materials?</li> <li>Potential for market volatility impacting competition, pricing?</li> <li>Funding Constraints</li> </ul>	The project is located a bit inland so severe adverse weather should not be an issue. The inflation of fuel and key materials is always a possibility and fuel is a cost driver for the mob/demob but would probably have a marginal impact. The users of the GIWW fully support improving these crossings as does the NFS. The Inland Users Water Board does not have this project ranked for immediate construction, even if an approved Chief's Report and funding become available.	Marginal	Possible	1
EX-4	Foundation	<ul> <li>Potential for severe adverse weather?</li> <li>Political influences, lack of support, obstacles?</li> <li>Unanticipated inflations in fuel, key materials?</li> <li>Potential for market volatility impacting competition, pricing?</li> <li>Funding Constraints</li> </ul>	The project is located a bit inland so severe adverse weather should not be an issue. The inflation of fuel and key materials is always a possibility, however it is not a large cost driver for this item and will not place a large demand on the supply. The users of the GIWW fully support improving these crossings as does the NFS. The Inland Users Water Board does not have this project ranked for immediate construction, even if an approved Chief's Report and funding become available.	Marginal	Possible	1
EX-5	sector gate	<ul> <li>Potential for severe adverse weather?</li> <li>Political influences, lack of support, obstacles?</li> <li>Unanticipated inflations in fuel, key materials?</li> <li>Potential for market volatility impacting competition, pricing?</li> <li>Funding Constraints</li> </ul>	The project is located a bit inland so severe adverse weather should not be an issue. The inflation of fuel and key materials is always a possibility, however it is not a large cost driver for this item and will not place a large demand on the supply. The users of the GIWW fully support improving these crossings as does the NFS. The Inland Users Water Board does not have this project ranked for immediate construction, even if an approved Chief's Report and funding become available.	Marginal	Possible	1
EX-6	0			Negligible	Unlikely	0
EX-7	0			Negligible	Unlikely	0
EX-8	mechanical	<ul> <li>Potential for severe adverse weather?</li> <li>Political influences, lack of support, obstacles?</li> <li>Unanticipated inflations in fuel, key materials?</li> <li>Potential for market volatility impacting competition, pricing?</li> <li>Funding Constraints</li> </ul>	The project is located a bit inland so severe adverse weather should not be an issue. The inflation of fuel and key materials is always a possibility, however it is not a large cost driver for this item and will not place a large demand on the supply. The users of the GIWW fully support improving these crossings as does the NFS. The Inland Users Water Board does not have this project ranked for immediate construction, even if an approved Chief's Report and funding become available.	Negligible	Possible	0
EX-9	electrical	<ul> <li>Potential for severe adverse weather?</li> <li>Political influences, lack of support, obstacles?</li> <li>Unanticipated inflations in fuel, key materials?</li> <li>Potential for market volatility impacting competition, pricing?</li> <li>Funding Constraints</li> </ul>	The project is located a bit inland so severe adverse weather should not be an issue. The inflation of fuel and key materials is always a possibility, however it is not a large cost driver for this item and will not place a large demand on the supply. The users of the GIWW fully support improving these crossings as does the NFS. The Inland Users Water Board does not have this project ranked for immediate construction, even if an approved Chief's Report and funding become available.	Negligible	Possible	0

EX-10	0			Negligible	Unlikely	0
EX-11	0			Negligible	Unlikely	0
EX-12	Remaining Construction Items	<ul> <li>Potential for severe adverse weather?</li> <li>Political influences, lack of support, obstacles?</li> <li>Unanticipated inflations in fuel, key materials?</li> <li>Potential for market volatility impacting competition, pricing?</li> <li>Funding Constraints</li> </ul>	The project is located a bit inland so severe adverse weather should not be an issue. The inflation of fuel and key materials is always a possibility, however it is not a large cost driver for this item and will not place a large demand on the supply. The users of the GIWW fully support improving these crossings as does the NFS. The Inland Users Water Board does not have this project ranked for immediate construction, even if an approved Chief's Report and funding become available.	Marginal	Possible	1
EX-13	Planning, Engineering, & Design	<ul> <li>Potential for severe adverse weather?</li> <li>Political influences, lack of support, obstacles?</li> <li>Unanticipated inflations in fuel, key materials?</li> <li>Potential for market volatility impacting competition, pricing?</li> <li>Funding Constraints</li> </ul>	The project is located a bit inland so severe adverse weather should not be an issue. The inflation of fuel and key materials is always a possibility. At this stage there is no reason to believe there will be out of the ordinary market volatility that would affect competition and pricing as this is not a mega-project requiring large or specialty assets. The users of the GIWW fully support improving these crossings as does the NFS. The Inland Users Water Board does not have this project ranked for immediate construction, even if an approved Chief's Report and funding become available. This could cause increased reviews and updates due to delays in starting the project for lack of funding.	Marginal	Possible	N/A
EX-14	Construction Management	no concern	S&A is linked to construction items and cost, but most external risks would not make the project take longer once started.	Negligible	Possible	N/A

Project (less than \$40M): Colorado River Locks
Project Development Stage/Alternative: Feasibility (Alternatives)

Risk Category: Moderate Risk: Typical Project Construction Type

Meeting Date: 10/4/2017

Alternative: Alt 3 - CRL Open Channel

Total Estimated Construction Contract Cost = \$ 11,157,845

<u>CWWBS</u>	<u>Feature of Work</u>	<u>Esti</u>	mated Cost	% Contingency	<u>\$ C</u>	Contingency	<u>Total</u>
01 LANDS AND DAMAGES	Real Estate	\$	16,000	20.0%	\$	3,200 \$	19,200
1 02 RELOCATIONS	Relocations	\$	-	0%	\$	- \$	-
2 06 FISH AND WILDLIFE FACILITIES	Mitigation	\$	35,000	27%	\$	9,455 \$	44,455
3 09 01 CHANNELS	Mob/Demob	\$	2,973,831	20%	\$	596,079 \$	3,569,910
4 09 01 CHANNELS	Clearing and Grubbing	\$	52,095	34%	\$	17,739 \$	69,834
5 09 01 CHANNELS	Bypass Channel Stone Removal	\$	59,549	34%	\$	20,277 \$	79,826
6 09 01 CHANNELS	Bypass Channel dredging	\$	2,778,583	36%	\$	1,004,774 \$	3,783,357
7 09 01 CHANNELS	Lock Chamber Stone removal	\$	147,713	34%	\$	50,299 \$	198,011.58
8 09 01 CHANNELS	New Channel dredging	\$	1,700,715	36%	\$	615,002 \$	2,315,716.88
9 09 01 CHANNELS	Demolition	\$	3,410,359	77%	\$	2,617,223 \$	6,027,581.69
10 09 01 CHANNELS		\$		0%	\$	- \$	
11 09 01 CHANNELS		\$		0%	\$	- \$	<u>-</u>
12 All Other	Remaining Construction Items	\$	-	0.0% 0%	\$	- \$	-
13 30 PLANNING, ENGINEERING, AND DESIGN	Planning, Engineering, & Design	\$	-	0%	\$	- \$	-
14 31 CONSTRUCTION MANAGEMENT	Construction Management	\$	-	0%	\$	- \$	-
XX FIXED DOLLAR RISK ADD (EQUALLY DISPERSED T	O ALL, MUST INCLUDE JUSTIFICATION SEE BELOW)				\$	-	

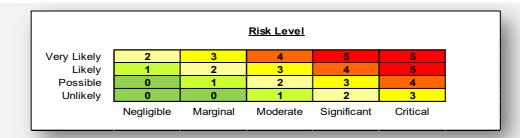
Totals						
Real E	state \$	16,000	20%	\$	3,200	\$ 19,200.00
Total Construction Estir	mate \$	11,157,845	44%	\$	4,930,848	\$ 16,088,693
Total Planning, Engineering & De	esign \$	-	0%	\$	-	\$ -
Total Construction Manager	ment \$	-	0%	\$	-	\$ -
Total Excluding Real Es	state \$	11,157,845	44%	\$	4,930,848	\$ 16,088,693
•				Base	50%	80%
Confider	nce Level	Range Estimate (\$000's	\$1 <sup>-</sup>	1,158k	\$14,117k	\$16,089k

\* 50% based on base is at 5% CL.

### Colorado River Locks Alt 3 - CRL Open Channel

Feasibility (Alternatives)
Abbreviated Risk Analysis

Meeting Date: 4-Oct-17



Risk Element	Feature of Work	Concerns	PDT Discussions & Conclusions (Include logic & justification for choice of Likelihood & Impact)	Impact	Likelihood	Risk Level
Project Ma	nagement & Scope Growth			Maximum Proje	75%	
PS-1	Relocations	Are there any Relocations in area?	Lisa MThere are no railroads or utilities that will be impacted for the project. There are some existing roads in the area but they dead end at the existing projects. There are currently no HTRW concerns for the area. There is a pipeline that runs near Colorado I believe under the current channel so we'll want to be mindful that that.	Marginal	Possible	1
PS-2	Mitigation	Is mitigation required?	yes. assumptions include the footprint of disturbance would be mitigated for each alternative. Not included in the estimate is the annualization of habitat improvements over the 50 year period of analysis. Taking into account the maturation of the mitigation area over time, the mitigation costs would be a conservative estimate of mitigation requirements. To compare the alternatives, we took the wetland habitat impact estimates and multiplied them by \$/acre to estimate mitigation costs for each alternative. it appears that there are no active mitigation banks that cover coastal marsh mitigation in the BRFG or CRL areas. So currently, mitigation banks are not likely an option.	Marginal	Possible	1
PS-3	Mob/Demob	potential for scope growth, added features?	standard type work	Negligible	Possible	0
PS-4	Clearing and Grubbing	potential for scope growth, added features?	standard type work.	Marginal	Possible	1
PS-5	Bypass Channel Stone Removal	potential for scope growth, added features?	standard type work.	Marginal	Possible	1

PS-6	Bypass Channel dredging	potential for scope growth, added features?	standard type work.	Marginal	Possible	1
PS-7	Lock Chamber Stone removal	potential for scope growth, added features?	standard type work however exisitng conditions could be different than assumed.	Marginal	Possible	1
PS-8	New Channel dredging	potential for scope growth, added features?	standard type work.	Marginal	Possible	1
PS-9	Demolition	potential for scope growth, added features?	assumes only removing vertical walls for the approach walls (GIWW side) and partial Sector Gate Monoliths. Includes the south side of the locks only; the other half stays behind. The base slab on these stay too. Additionally the gates will be removed and the approach sheet pile wall on the river side. NOT the whole existing concrete structure. Could complete structure removal be required? Do we really know what is out there?	Critical	Possible	4
PS-10	0			Negligible	Unlikely	0
PS-11	0			Negligible	Unlikely	0
PS-12	Remaining Construction Items			Negligible	Unlikely	0
PS-13	Planning, Engineering, & Design	potential for scope growth, added features?	added features and changes to scope would require additional PED	Moderate	Possible	N/A
PS-14	Construction Management		added features and changes to scope would require additional S&A	Moderate	Possible	N/A

<u>Acquisition</u>	n Strategy			Maximum Project Growth		30%
AS-1	Relocations	none identified	none identified	Moderate	Possible	2
AS-2	Mitigation	unknown	it appears that there are no active mitigation banks that cover coastal marsh mitigation in the BRFG or CRL areas. So currently, mitigation banks are not likely an option.	Significant	Possible	3
AS-3	Mob/Demob	is there an established acquisition plan?	Acquisition strategy is anticipated to be sealed bid per PM. Cost estimate assumes large business, open competition but includes typical tiering of subcontractors. If projects were to go small business, Best Value, or some type of set-a-aside would increase cost.	Marginal	Likely	2
AS-4	Clearing and Grubbing	is there an established acquisition plan?	Acquisition strategy is anticipated to be sealed bid per PM. Cost estimate assumes large business, open competition but includes typical tiering of subcontractors. If projects were to go small business, Best Value, or some type of set-a-aside would increase cost.	Marginal	Likely	2
AS-5	Bypass Channel Stone Removal	is there an established acquisition plan?	Acquisition strategy is anticipated to be sealed bid per PM. Cost estimate assumes large business, open competition but includes typical tiering of subcontractors. If projects were to go small business, Best Value, or some type of set-a-aside would increase cost.	Marginal	Likely	2
AS-6	Bypass Channel dredging	is there an established acquisition plan?	Acquisition strategy is anticipated to be sealed bid per PM. Cost estimate assumes large business, open competition but includes typical tiering of subcontractors. If projects were to go small business, Best Value, or some type of set-a-aside would increase cost.	Marginal	Likely	2
AS-7	Lock Chamber Stone removal	is there an established acquisition plan?	Acquisition strategy is anticipated to be sealed bid per PM. Cost estimate assumes large business, open competition but includes typical tiering of subcontractors. If projects were to go small business, Best Value, or some type of set-a-aside would increase cost.	Marginal	Likely	2
AS-8	New Channel dredging	is there an established acquisition plan?	Acquisition strategy is anticipated to be sealed bid per PM. Cost estimate assumes large business, open competition but includes typical tiering of subcontractors. If projects were to go small business, Best Value, or some type of set-a-aside would increase cost.	Marginal	Likely	2

AS-9	Demolition	is there an established acquisition plan?	Acquisition strategy is anticipated to be sealed bid per PM. Cost estimate assumes large business, open competition but includes typical tiering of subcontractors. If projects were to go small business, Best Value, or some type of set-a-aside would increase cost.	Marginal	Likely	2
AS-10	0			Negligible	Unlikely	0
AS-11	0			Negligible	Unlikely	0
AS-12	Remaining Construction Items			Marginal	Likely	2
AS-13	Planning, Engineering, & Design			Marginal	Unlikely	N/A
AS-14	Construction Management	is there an established acquisition plan?	Acquisition strategy is anticipated to be sealed bid per PM. Cost estimate assumes large business, open competition but includes typical tiering of subcontractors. If projects were to go small business, Best Value, or some type of set-a-aside would increase cost.	Marginal	Likely	N/A

Construction	on Elements			Maximum Projec	ct Growth	25%
CON-1	Relocations	none identified	none identified	Negligible	Unlikely	0
CE-2	Mitigation		it appears that there are no active mitigation banks that cover coastal marsh mitigation in the BRFG or CRL areas. So currently, mitigation banks are not likely an option.	Marginal	Possible	1
CE-3	Mob/Demob	High risk or complex construction elements, site access, in-water? Unique construction methods? Special mobilization?	typical construction, no special concerns. Access by land and water.	Negligible	Possible	0
CE-4	Clearing and Grubbing	High risk or complex construction elements, site access, in-water? Special equipment or subcontractors needed? Potential for construction modification and claims?	typical construction, no special concerns. Access by land and water. actual site conditions may be different than expected -partially covered in design/quantities also. Potential for modifications and claims exists.	Marginal	Possible	1
CE-5	Bypass Channel Stone Removal	Accelerated schedule or harsh weather schedule? Special equipment or subcontractors needed? Potential for construction modification and claims?	Interior work so harsh weather should not be a factor. Typical work, nothing special required however actual site conditions could be different than assumed - covered in design/quantities also. Potential for modifications and claims exists.	Marginal	Possible	1
CE-6	Bypass Channel dredging	High risk or complex construction elements, site access, in-water? Special equipment or subcontractors needed? Potential for construction modification and claims?	Item is new channel excavation. Interior work, so harsh weather should not be a factor. Typical work, nothing special required. Potential for modifications and claims exists.	Marginal	Possible	1
CE-7	Lock Chamber Stone removal	High risk or complex construction elements, site access, in-water? Special equipment or subcontractors needed? Potential for construction modification and claims?	Interior work so harsh weather should not be a factor. Typical work, nothing special required however actual site conditions could be different than assumed - covered in design/quantities also. Potential for modifications and claims exists.	Marginal	Possible	1
CE-8	New Channel dredging	High risk or complex construction elements, site access, in-water? Special equipment or subcontractors needed? Potential for construction modification and claims?	Item is new channel excavation. Interior work, so harsh weather should not be a factor. Typical work, nothing special required. Potential for modifications and claims exists.	Marginal	Possible	1
CE-9	Demolition	High risk or complex construction elements, site access, in-water? Special equipment or subcontractors needed? Potential for construction modification and claims?	Interior work so harsh weather should not be a factor. Typical work, but are working on or near water. Since the existing facilities are old, actual site conditions could be different. Potential for modifications and claims exists.	Marginal	Likely	2
CE-10	0			Negligible	Unlikely	0

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CE-11	0			Negligible	Unlikely	0
CE-12	Remaining Construction Items			Negligible	Unlikely	0
CE-13	Planning, Engineering, & Design		modifications and claims would cause increased PED costs	Negligible	Likely	N/A
CE-14	Construction Management		modifications and claims would cause increased CM costs	Marginal	Likely	N/A
Specialty C	onstruction or Fabrication			Maximum Proje	ct Growth	65%
SC-1	Relocations	none identified	none identified	Marginal	Possible	1
SC-2	Mitigation	no concern		Negligible	Possible	0
SC-3	Mob/Demob	Atypical construction elements, unusual material or equipment manufactured or installed?  Confidence in constructibility or methodology?	typical construction, little or no concern	Negligible	Possible	0
SC-4	Clearing and Grubbing	Atypical construction elements, unusual material or equipment manufactured or installed?  Confidence in constructibility or methodology?	should be typical construction with low concern.	Negligible	Unlikely	0
SC-5	Bypass Channel Stone Removal	Atypical construction elements, unusual material or equipment manufactured or installed?  Confidence in constructibility or methodology?	should be typical construction with low concern.	Negligible	Unlikely	0
SC-6	Bypass Channel dredging	Atypical construction elements, unusual material or equipment manufactured or installed?  Confidence in constructibility or methodology?	should be typical construction with low concern.	Negligible	Unlikely	0
SC-7	Lock Chamber Stone removal	Atypical construction elements, unusual material or equipment manufactured or installed?  Confidence in constructibility or methodology?	should be typical construction with low concern.	Negligible	Unlikely	0
SC-8	New Channel dredging	Atypical construction elements, unusual material or equipment manufactured or installed?  Confidence in constructibility or methodology?	should be typical construction with low concern.	Negligible	Unlikely	0

SC-9	Demolition	Atypical construction elements, unusual material or equipment manufactured or installed?  Confidence in constructibility or methodology?	should be typical construction with little concern. However, since the existing facilities are old, actual site conditions and construction may be different than expected and require special techniques over and above what is included in cost estimate.	Moderate	Possible	2
SC-10	0			Negligible	Unlikely	0
SC-11	0			Negligible	Possible	0
SC-12	Remaining Construction Items			Negligible	Unlikely	0
SC-13	Planning, Engineering, & Design			Negligible	Possible	N/A
SC-14	Construction Management			Negligible	Possible	N/A

Technical l	Design & Quantities			Maximum Project Growth		30%
T-1	Relocations	none identified	unknown	Negligible	Unlikely	0
T-2	Mitigation		assumptions include the footprint of disturbance would be mitigated for each alternative. it appears that there are no active mitigation banks that cover coastal marsh mitigation in the BRFG or CRL areas. So currently, mitigation banks are not likely an option. Unit costs provided by RTS. Based on average of costs per acre of similar mitigation in the area.	Moderate	Possible	2
T-3	Mob/Demob	no concern	no concern	Negligible	Possible	0
T-4	Clearing and Grubbing	Level of confidence based on design and assumptions? Appropriate methods applied to calculate quantities? Sufficient investigations to develop quantities? Quality control check applied?	based on limited information available. Do not have land surface/ ground surveys of area.	Moderate	Likely	3
T-5	Bypass Channel Stone Removal	Level of confidence based on design and assumptions? Appropriate methods applied to calculate quantities? Sufficient investigations to develop quantities? Quality control check applied?	rock quantities assumed. Do not have land surface/ ground surveys of area.	Moderate	Likely	3
T-6	Bypass Channel dredging	Level of confidence based on design and assumptions? Appropriate methods applied to calculate quantities? Sufficient investigations to develop quantities? Quality control check applied?	Excavation and fill quantities based on limited information available. Do not have land surface/ ground surveys of area. Channel designs follow existing channel parameters.		Likely	3
T-7	Lock Chamber Stone removal	Level of confidence based on design and assumptions? Appropriate methods applied to calculate quantities? Sufficient investigations to develop quantities? Quality control check applied?	rock quantities assumed. Do not have land surface/ ground surveys of area.	Moderate	Likely	3
T-8	New Channel dredging	Level of confidence based on design and assumptions? Appropriate methods applied to calculate quantities? Sufficient investigations to develop quantities? Quality control check applied?	Excavation and fill quantities based on limited information available. Do not have land surface/ ground surveys of area. Channel designs follow existing channel parameters.		Likely	3
T-9	Demolition	Level of confidence based on design and assumptions? Appropriate methods applied to calculate quantities? Sufficient investigations to develop quantities? Quality control check applied?	demolition information based on original plans. Existing conditions may not be as originally planned/built. Assumes only removing vertical walls for the approach walls (GIWW side) and partial Sector Gate Monoliths. Includes the south side of the locks only; the other half stays behind. The base slab on these stay too. Additionally the gates will be removed and the approach sheet pile wall on the river side. NOT removing the whole concrete structrure. Does include removal of mechanical and electrical.	Significant	Possible	3

T-10	0		Negligible	Unlikely	0
T-11	0		Negligible	Unlikely	0
T-12	Remaining Construction Items		Moderate	Possible	2
T-13	Planning, Engineering, & Design	further data will be obtained during PED and additional engineering will be done	Marginal	Likely	N/A
T-14	Construction Management	changes in designs and assumption could cause longer construction times	Marginal	Likely	N/A

Cost Estima	ate Assumptions			Maximum Projec	ct Growth	35%
EST-1	Relocations	none identified	none identified	Negligible	Unlikely	0
EST-2	Mitigation		it appears that there are no active mitigation banks that cover coastal marsh mitigation in the BRFG or CRL areas. So currently, mitigation banks are not likely an option. Unit costs provided by RTS. Based on average of costs per acre of similar mitigation in the area.	Moderate	Possible	2
EST-3	Mob/Demob	no concern	typical construction anticipated and appropriate mob/demob included in cost estimate.	Negligible	Possible	0
EST-4	Clearing and Grubbing	Assumptions related to prime and subcontractor markups/assignments? Assumptions regarding crew, productivity, overtime? Site accessibility, transport delays, congestion? Overuse of Cost Book, lump sum, allowances? Lack confidence on critical cost items?	cost estimate includes typical prime and subcontractor tiering. All items have detailed crews and related productivity and overtime. Typical construction features.	Marginal	Possible	1
EST-5	Bypass Channel Stone Removal	Assumptions related to prime and subcontractor markups/assignments? Assumptions regarding crew, productivity, overtime? Site accessibility, transport delays, congestion? Overuse of Cost Book, lump sum, allowances? Lack confidence on critical cost items?	cost estimate includes typical prime and subcontractor tiering. All items have detailed crews and related productivity and overtime. Typical construction features. There are no restrictions that limit construction.	Marginal	Possible	1
EST-6	Bypass Channel dredging	Assumptions related to prime and subcontractor markups/assignments? Assumptions regarding crew, productivity, overtime? Site accessibility, transport delays, congestion? Overuse of Cost Book, lump sum, allowances? Lack confidence on critical cost items?	cost estimate includes typical prime and subcontractor tiering. All items have detailed crews and related productivity and overtime. Typical construction features. Dredging unit costs developed in CEDEP, however no geotech available and some virgin cut. There are no restrictions that limit construction.	Moderate	Possible	2
EST-7	Lock Chamber Stone removal	Assumptions related to prime and subcontractor markups/assignments? Assumptions regarding crew, productivity, overtime? Site accessibility, transport delays, congestion? Overuse of Cost Book, lump sum, allowances? Lack confidence on critical cost items?	cost estimate includes typical prime and subcontractor tiering. All items have detailed crews and related productivity and overtime. Typical construction features. There are no restrictions that limit construction.	Marginal	Possible	1

EST-8	New Channel dredging	Assumptions related to prime and subcontractor markups/assignments? Assumptions regarding crew, productivity, overtime? Site accessibility, transport delays, congestion? Overuse of Cost Book, lump sum, allowances? Lack confidence on critical cost items?	cost estimate includes typical prime and subcontractor tiering. All items have detailed crews and related productivity and overtime. Typical construction features. Dredging unit costs developed in CEDEP, however no geotech available and some virgin cut. There are no restrictions that limit construction.	Moderate	Possible	2
EST-9	Demolition	Assumptions related to prime and subcontractor markups/assignments? Assumptions regarding crew, productivity, overtime? Site accessibility, transport delays, congestion? Overuse of Cost Book, lump sum, allowances? Lack confidence on critical cost items?	cost estimate includes typical prime and subcontractor tiering. All items have detailed crews and related productivity and overtime. Typical construction features however demolition information based on original plans. Existing conditions may not be as originally planned/built and could require different techniques or production. There are no restrictions that limit construction.	Moderate	Likely	3
EST-10	0			Negligible	Unlikely	0
EST-11	0			Negligible	Unlikely	0
EST-12	Remaining Construction Items			Marginal	Likely	2
EST-13	Planning, Engineering, & Design	no concern		Marginal	Possible	N/A
EST-14	Construction Management	no concern	since S&A is directly linked to construction items and cost, this item would have similar risk to construction items.	Marginal	Likely	N/A

External Pr	roject Risks			Maximum Proje	ct Growth	40%
EX-1	Relocations	none identified	none identified	Negligible	Unlikely	0
EX-2	Mitigation	no concern	no concern	Negligible	Unlikely	0
EX-3	Mob/Demob	Potential for severe adverse weather? Political influences, lack of support, obstacles? Unanticipated inflations in fuel, key materials? Potential for market volatility impacting competition, pricing? Funding Constraints	The project is located a bit inland so severe adverse weather should not be an issue. The inflation of fuel and key materials is always a possibility and fuel is a cost driver for the mob/demob but would probably have a marginal impact. At this stage there is no reason to believe there will be out of the ordinary market volatility that would affect competition and pricing as this is not a mega-project requiring large or specialty assets. The users of the GIWW fully support improving these crossings as does the NFS.  Currently there is a lack of support for an open channel system (at least with those represented at the meetings), due to concerns for increased sedimentation downstream. The Inland Users Water Board does not have this project ranked for immediate construction, even if an approved Chief's Report and funding become available.	Moderate	Likely	3
EX-4	Clearing and Grubbing	Potential for severe adverse weather? Political influences, lack of support, obstacles? Unanticipated inflations in fuel, key materials? Potential for market volatility impacting competition, pricing? Funding Constraints	The project is located a bit inland so severe adverse weather should not be an issue. The inflation of fuel and key materials is always a possibility, however it is not a large cost driver for this item and will not place a large demand on the supply. At this stage there is no reason to believe there will be out of the ordinary market volatility that would affect competition and pricing as this is not a mega-project requiring large or specialty assets. The users of the GIWW fully support improving these crossings as does the NFS. Currently there is a lack of support for an open channel system (at least with those represented at the meetings), due to concerns for increased sedimentation downstream. The Inland Users Water Board does not have this project ranked for immediate construction, even if an approved Chief's Report and funding become available.	Moderate	Likely	3
EX-5	Bypass Channel Stone Removal	<ul> <li>Potential for severe adverse weather?</li> <li>Political influences, lack of support, obstacles?</li> <li>Unanticipated inflations in fuel, key materials?</li> <li>Potential for market volatility impacting competition, pricing?</li> <li>Funding Constraints</li> </ul>	The project is located a bit inland so severe adverse weather should not be an issue. The inflation of fuel and key materials is always a possibility, however it is not a large cost driver for this item and will not place a large demand on the supply. At this stage there is no reason to believe there will be out of the ordinary market volatility that would affect competition and pricing as this is not a mega-project requiring large or specialty assets. The users of the GIWW fully support improving these crossings as does the NFS. Currently there is a lack of support for an open channel system (at least with those represented at the meetings), due to concerns for increased sedimentation downstream. The Inland Users Water Board does not have this project ranked for immediate construction, even if an approved Chief's Report and funding become available.	Moderate	Likely	3

EX-6	Bypass Channel dredging	<ul> <li>Potential for severe adverse weather?</li> <li>Political influences, lack of support, obstacles?</li> <li>Unanticipated inflations in fuel, key materials?</li> <li>Potential for market volatility impacting competition, pricing?</li> <li>Funding Constraints</li> </ul>	The project is located a bit inland so severe adverse weather should not be an issue. The inflation of fuel and key materials is always a possibility and fuel is a cost driver for the dredging and would increase the cost. The users of the GIWW fully support improving these crossings as does the NFS. Currently there is a lack of support for an open channel system (at least with those represented at the meetings), due to concerns for increased sedimentation downstream. The Inland Users Water Board does not have this project ranked for immediate construction, even if an approved Chief's Report and funding become available.	Moderate	Likely	3
EX-7	Lock Chamber Stone removal	<ul> <li>Potential for severe adverse weather?</li> <li>Political influences, lack of support, obstacles?</li> <li>Unanticipated inflations in fuel, key materials?</li> <li>Potential for market volatility impacting competition, pricing?</li> <li>Funding Constraints</li> </ul>	The project is located a bit inland so severe adverse weather should not be an issue. The inflation of fuel and key materials is always a possibility, however it is not a large cost driver for this item and will not place a large demand on the supply. At this stage there is no reason to believe there will be out of the ordinary market volatility that would affect competition and pricing as this is not a mega-project requiring large or specialty assets. The users of the GIWW fully support improving these crossings as does the NFS. Currently there is a lack of support for an open channel system (at least with those represented at the meetings), due to concerns for increased sedimentation downstream. The Inland Users Water Board does not have this project ranked for immediate construction, even if an approved Chief's Report and funding become available.	Moderate	Likely	3
EX-8	New Channel dredging	Potential for severe adverse weather? Political influences, lack of support, obstacles? Unanticipated inflations in fuel, key materials? Potential for market volatility impacting competition, pricing? Funding Constraints	The project is located a bit inland so severe adverse weather should not be an issue. The inflation of fuel and key materials is always a possibility and fuel is a cost driver for the dredging and would increase the cost. At this stage there is no reason to believe there will be out of the ordinary market volatility that would affect competition and pricing as this is not a megaproject requiring large or specialty assets. The users of the GIWW fully support improving these crossings as does the NFS. Currently there is a lack of support for an open channel system (at least with those represented at the meetings), due to concerns for increased sedimentation downstream. The Inland Users Water Board does not have this project ranked for immediate construction, even if an approved Chief's Report and funding become available.	Moderate	Likely	3

EX-9	Demolition	<ul> <li>Potential for severe adverse weather?</li> <li>Political influences, lack of support, obstacles?</li> <li>Unanticipated inflations in fuel, key materials?</li> <li>Potential for market volatility impacting competition, pricing?</li> <li>Funding Constraints</li> </ul>	The project is located a bit inland so severe adverse weather should not be an issue. The inflation of fuel and key materials is always a possibility, however it is not a large cost driver for this item and will not place a large demand on the supply. At this stage there is no reason to believe there will be out of the ordinary market volatility that would affect competition and pricing as this is not a mega-project requiring large or specialty assets. The users of the GIWW fully support improving these crossings as does the NFS. Currently there is a lack of support for an open channel system (at least with those represented at the meetings), due to concerns for increased sedimentation downstream. The Inland Users Water Board does not have this project ranked for immediate construction, even if an approved Chief's Report and funding become available.	Moderate	Likely	3
EX-10	0			Negligible	Unlikely	0
EX-11	0			Negligible	Unlikely	0

EX-12	Remaining Construction Items	<ul> <li>Potential for severe adverse weather?</li> <li>Political influences, lack of support, obstacles?</li> <li>Unanticipated inflations in fuel, key materials?</li> <li>Potential for market volatility impacting competition, pricing?</li> <li>Funding Constraints</li> </ul>	The project is located a bit inland so severe adverse weather should not be an issue. The inflation of fuel and key materials is always a possibility, however it is not a large cost driver for this item and will not place a large demand on the supply. At this stage there is no reason to believe there will be out of the ordinary market volatility that would affect competition and pricing as this is not a mega-project requiring large or specialty assets. The users of the GIWW fully support improving these crossings as does the NFS. Currently there is a lack of support for an open channel system (at least with those represented at the meetings), due to concerns for increased sedimentation downstream. The Inland Users Water Board does not have this project ranked for immediate construction, even if an approved Chief's Report and funding become available. This could cause increased reviews and updates due to delays in starting the project for lack of funding.	Moderate	Likely	3
EX-13	Planning, Engineering, & Design	<ul> <li>Potential for severe adverse weather?</li> <li>Political influences, lack of support, obstacles?</li> <li>Unanticipated inflations in fuel, key materials?</li> <li>Potential for market volatility impacting competition, pricing?</li> <li>Funding Constraints</li> </ul>	The project is located a bit inland so severe adverse weather should not be an issue. The inflation of fuel and key materials is always a possibility. At this stage there is no reason to believe there will be out of the ordinary market volatility that would affect competition and pricing as this is not a mega-project requiring large or specialty assets. The users of the GIWW fully support improving these crossings as does the NFS. Currently there is a lack of support for an open channel system (at least with those represented at the meetings), due to concerns for increased sedimentation downstream. The Inland Users Water Board does not have this project ranked for immediate construction, even if an approved Chief's Report and funding become available. This could cause increased reviews and updates due to delays in starting the project for lack of funding.	Moderate	Likely	N/A
EX-14	Construction Management	no concern	S&A is linked to construction items and cost, but most external risks would not make the project take longer once started.	Moderate	Likely	N/A

Project (less than \$40M): Colorado River Locks
Project Development Stage/Alternative: Feasibility (Alternatives)

Risk Category: Moderate Risk: Typical Project Construction Type

Alternative: Alt 4b.1 Hybrid - Inland Gate Rehab a

(prev Alt 2a Hybrid)

Meeting Date: 10/4/2017

Total Estimated Construction Contract Cost = \$ 18,671,109

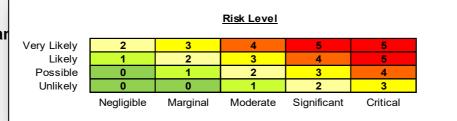
<u>CWWBS</u>	Feature of Work	<u>Estir</u>	mated Cost	% Contingency	<u>\$ C</u>	Contingency	<u>Total</u>
01 LANDS AND DAMAGES	Real Estate	\$	16,000	20.0%	\$	3,200 \$	19,200
1 02 RELOCATIONS	Relocations	\$	-	0%	\$	- \$	-
2 06 FISH AND WILDLIFE FACILITIES	Mitigation	\$	-	0%	\$	- \$	-
3 15 FLOODWAY CONTROL AND DIVERSION STRUCTURES	Mob/Demob	\$	647,499	13%	\$	84,106 \$	731,605
4 15 FLOODWAY CONTROL AND DIVERSION STRUCTURES	channel work	\$	672,093	27%	\$	181,443 \$	853,536
5 15 FLOODWAY CONTROL AND DIVERSION STRUCTURES	sector gate	\$	8,419,814	45%	\$	3,754,739 \$	12,174,553
6 15 FLOODWAY CONTROL AND DIVERSION STRUCTURES		\$	-	0%	\$	- \$	-
7 15 FLOODWAY CONTROL AND DIVERSION STRUCTURES		\$	-	0%	\$	- \$	-
8 15 FLOODWAY CONTROL AND DIVERSION STRUCTURES	mechanical	\$	1,777,446	35%	\$	614,005 \$	2,391,451.15
9 15 FLOODWAY CONTROL AND DIVERSION STRUCTURES	electrical	\$	3,654,527	42%	\$	1,520,086 \$	5,174,613.00
10 15 FLOODWAY CONTROL AND DIVERSION STRUCTURES		\$	_	0%	\$	- \$	-
11 15 FLOODWAY CONTROL AND DIVERSION STRUCTURES	demolition	\$	3,499,730	73%	\$	2,566,636 \$	6,066,366.29
12 All Other	Remaining Construction Items	\$	-	0.0% 0%	\$	- \$	-
13 30 PLANNING, ENGINEERING, AND DESIGN	Planning, Engineering, & Design	\$	-	0%	\$	- \$	-
14 31 CONSTRUCTION MANAGEMENT	Construction Management	\$	_	0%	\$	- \$	-
XX FIXED DOLLAR RISK ADD (EQUALLY DISPERSED TO ALL, MU	IST INCLUDE JUSTIFICATION SEE BELOW)				\$	-	

Totals							
Real Estate	\$	16,000	20%		\$	3,200	\$ 19,200.00
Total Construction Estimate	\$	18,671,109	47%		\$	8,721,015	\$ 27,392,124
Total Planning, Engineering & Design	\$	-	0%		\$	-	\$ -
Total Construction Management	: \$	-	0%		\$	-	\$ -
Total Excluding Real Estate	\$	18,671,109	47%		\$	8,721,015	\$ 27,392,124
		_		Base		50%	80%
Confidence L	_evel	Range Estimate (\$000's)	\$18	8,671k	<u>-</u>	\$23,904k	\$27,392k

\* 50% based on base is at 5% CL.

### Colorado River Locks Alt 4b.1 Hybrid - Inland Gate Rehab ar

Feasibility (Alternatives)
Abbreviated Risk Analysis **Meeting Date:** 4-Oct-17



Risk Element	Feature of Work	Concerns	PDT Discussions & Conclusions (Include logic & justification for choice of Likelihood & Impact)	Impact	Likelihood	Risk Level
Project Ma	nagement & Scope Growth			Maximum Proje	ct Growth	75%
PS-1	Relocations	Are there any Relocations in area?	Lisa MThere are no railroads or utilities that will be impacted for the project. There are currently no HTRW concerns for the area. There is potentially a pipeline that runs near Colorado under the current channel so we'll want to be mindful of that. This alternative is only for Rehab of the existing structure.	Negligible	Unlikely	0
PS-2	Mitigation	Is mitigation required?	No, this alternative only for Rehab of the existing structure.	Negligible	Unlikely	0
PS-3	Mob/Demob	potential for scope growth, added features?	standard type work	Negligible	Possible	0
PS-4	channel work	potential for scope growth, added features?	This item is only for the small channel area where the existing structure is removed and restores to exisitng channel dimensions.	Marginal	Possible	1
PS-5	sector gate	potential for scope growth, added features?	Based on similar existing scopes for rehab of the existing structures that is done periodincally and cost used should be representative of processes required. Do we really know what is out there? Considering this is an alternative to totally replacing the structures, the scope could grow to replace things not typically done under a periodic rehab. Note - there are other items on the bid schedule that replace additional items.	Moderate	Likely	3
PS-6	0			Negligible	Unlikely	0
PS-7	0			Negligible	Unlikely	0
PS-8	mechanical	potential for scope growth, added features?	current scope assumes replacing all existing mechanical with typical mechanical used by MVN. Also includes replacing the machinery building with a new pre-fab.	Marginal	Possible	1
PS-9	electrical	potential for scope growth, added features?	current scope assumes replacing existing electrical. Scope of "existing" not defined specifically. Scope could grow.	Moderate	Possible	2
PS-10	0			Negligible	Unlikely	0

PS-11	demolition	potential for scope growth, added features?	This item includes removal of all the existing timber lock chamber guidewalls and the riverside gate structure. only removing vertical walls of Sector Gate Monoliths, the base slab stays. Additionally the gates will be removed and the approach sheet pile walls will be removed. Could complete structure removal be required? Do we really know what is out there? Bypass channel currently not ncluded in this alternative.	Critical	Possible	4
PS-12	Remaining Construction Items			Negligible	Unlikely	0
PS-13	Planning, Engineering, & Design	potential for scope growth, added features?	added features and changes to scope would require additional PED	Negligible	Unlikely	N/A
PS-14	Construction Management		added features and changes to scope would require additional S&A	Negligible	Unlikely	N/A
<b>Acquisitio</b>	n Strategy			Maximum Proje	ct Growth	30%
AS-1	Relocations	none identified	none identified	Negligible	Unlikely	0
AS-2	Mitigation	none identified	No, this alternative only for Rehab of the existing structure.	Negligible	Unlikely	0
AS-3	Mob/Demob	is there an established acquisition plan?	Acquisition strategy is anticipated to be sealed bid per PM. Cost estimate assumes large business, open competition but includes typical tiering of subcontractors. If projects were to go small business, Best Value, or some type of set-a-aside would increase cost.	Marginal	Likely	2
AS-4	channel work	is there an established acquisition plan?	Acquisition strategy is anticipated to be sealed bid per PM. Cost estimate assumes large business, open competition but includes typical tiering of subcontractors. If projects were to go small business, Best Value, or some type of set-a-aside would increase cost.	Marginal	Likely	2
AS-5	sector gate	is there an established acquisition plan?	Acquisition strategy is anticipated to be sealed bid per PM. Cost estimate assumes large business, open competition but includes typical tiering of subcontractors. If projects were to go small business, Best Value, or some type of set-a-aside would increase cost.	Marginal	Likely	2
AS-6	0			Negligible	Unlikely	0
AS-7	0			Negligible	Unlikely	0
AS-8	mechanical	is there an established acquisition plan?	Acquisition strategy is anticipated to be sealed bid per PM. Cost estimate assumes large business, open competition but includes typical tiering of subcontractors. If projects were to go small business, Best Value, or some type of set-a-aside would increase cost.	Marginal	Likely	2
AS-9	electrical	is there an established acquisition plan?	Acquisition strategy is anticipated to be sealed bid per PM. Cost estimate assumes large business, open competition but includes typical tiering of subcontractors. If projects were to go small business, Best Value, or some type of set-a-aside would increase cost.	Marginal	Likely	2

AS-10	0			Negligible	Unlikely	0
AS-11	demolition	is there an established acquisition plan?	Acquisition strategy is anticipated to be sealed bid per PM. Cost estimate assumes large business, open competition but includes typical tiering of subcontractors. If projects were to go small business, Best Value, or some type of set-a-aside would increase cost.	Marginal	Likely	2
AS-12	Remaining Construction Items			Marginal	Likely	2
AS-13	Planning, Engineering, & Design			Negligible	Unlikely	N/A
AS-14	Construction Management	is there an established acquisition plan?	Acquisition strategy is anticipated to be sealed bid per PM. Cost estimate assumes large business, open competition but includes typical tiering of subcontractors. If projects were to go small business, Best Value, or some type of set-a-aside would increase cost.	Negligible	Unlikely	N/A
Constructi	on Elements			Maximum Proje	ct Growth	25%
CON-1	Relocations	none identified	none identified	Negligible	Unlikely	0
CE-2	Mitigation			Negligible	Unlikely	0
CE-3	Mob/Demob	High risk or complex construction elements, site access, in-water? Unique construction methods? Special mobilization?	typical construction, no special concerns. Access by land and water.	Negligible	Possible	0
CE-4	channel work	High risk or complex construction elements, site access, in-water? Special equipment or subcontractors needed? Potential for construction modification and claims?	should be typical construction. assumes commonly used equipment and processes. There is potential for modifications and claims based on unknown site conditions.	Marginal	Possible	1
CE-5	sector gate	Accelerated schedule or harsh weather schedule? Special equipment or subcontractors needed? Potential for construction modification and claims?	Based on similar existing scopes for rehab of the existing structures that is done periodically and cost used should be representative of processes required. Since the existing facilities are old, actual site conditions and construction may be different than expected. Potential for modifications and claims exists.	Marginal	Likely	2
CE-6	0			Negligible	Unlikely	0
CE-7	0			Negligible	Unlikely	0
CE-8	mechanical	High risk or complex construction elements, site access, in-water? Unique construction methods? Special equipment or subcontractors needed? Potential for construction modification and claims?	typical work and design taken into account. There is potential for modifications and claims based on unknown site conditions.	Marginal	Likely	2
CE-9	electrical	High risk or complex construction elements, site access, in-water? Unique construction methods? Special equipment or subcontractors needed? Potential for construction modification and claims?	should be typical construction. assumes commonly used equipment and processes. There is potential for modifications and claims based on unknown site conditions.	Marginal	Likely	2
CE-10	0			Negligible	Possible	0

		T	T	1	<u> </u>	
CE-11	demolition	High risk or complex construction elements, site access, in-water? Unique construction methods? Special equipment or subcontractors needed? Potential for construction modification and claims?	Typical work, but are working on or near water. Since the existing facilities are old, actual site conditions could be different. Potential for modifications and claims exists One site accessible by both land and water, 1 site accessible by water only. No special contractors or equipment required.	Moderate	Possible	2
CE-12	Remaining Construction Items			Negligible	Unlikely	0
CE-13	Planning, Engineering, & Design		modifications and claims would cause increased PED costs	Negligible	Unlikely	N/A
CE-14	Construction Management		modifications and claims would cause increased CM costs	Negligible	Unlikely	N/A
Specialty	Construction or Fabrication			Maximum Proje	ct Growth	65%
SC-1	Relocations	none identified	none identified	Negligible	Unlikely	0
SC-2	Mitigation	no concern		Negligible	Unlikely	0
SC-3	Mob/Demob	Atypical construction elements, unusual material or equipment manufactured or installed?  Confidence in constructibility or methodology?	typical construction, little or no concern	Negligible	Possible	0
SC-4	channel work	Atypical construction elements, unusual material or equipment manufactured or installed?  Confidence in constructibility or methodology?	typical construction, little or no concern	Negligible	Unlikely	0
SC-5	sector gate	Atypical construction elements, unusual material or equipment manufactured or installed?  Confidence in constructibility or methodology?	should be typical construction and cost used should be representative of processes required. But since it is a retrofit there is a chance something special could be required.	Marginal	Possible	1
SC-6	0			Marginal	Possible	1
SC-7	0			Negligible	Unlikely	0
SC-8	mechanical	Atypical construction elements, unusual material or equipment manufactured or installed?  Confidence in constructibility or methodology?	should be typical construction but you are trying to retrofit an existing facility and could require specialty construction to make it work. Currently assumes commonly used equipment and processes.	Moderate	Possible	2
SC-9	electrical	Atypical construction elements, unusual material or equipment manufactured or installed?  Confidence in constructibility or methodology?	should be typical construction but you are trying to retrofit an existing facility and could require specialty techniques. currently assumes commonly used equipment and processes.	Moderate	Possible	2
SC-10	0			Negligible	Possible	0
SC-11	demolition	Atypical construction elements, unusual material or equipment manufactured or installed?  Confidence in constructibility or methodology?	should be typical construction with little concern. However, since the existing facilities are old, actual site conditions and construction may be different than expected and require special techniques over and above what is included in cost estimate.	Marginal	Possible	1
SC-12	Remaining Construction Items			Negligible	Unlikely	0
SC-13	Planning, Engineering, & Design			Negligible	Unlikely	N/A
SC-14	Construction Management			Negligible	Unlikely	N/A

<u>chnical</u>	Design & Quantities			Maximum Proje	ect Growth	30%	
T-1	Relocations	none identified	unknown	Negligible	Unlikely	0	
T-2	Mitigation		No, this alternative only for Rehab of the existing structure.	Negligible	Unlikely	0	
T-3	Mob/Demob	no concern	no concern	Negligible	Possible	0	
T-4	channel work	Level of confidence based on design and assumptions? Appropriate methods applied to calculate quantities? Sufficient investigations to develop quantities? Quality control check applied?	Excavation quantities based on limited information available. Do not have land surface/ ground surveys of area. Channel designs follow existing channel parameters.	Moderate	Likely	3	
T-5	sector gate	Level of confidence based on design and assumptions? Appropriate methods applied to calculate quantities? Sufficient investigations to develop quantities? Quality control check applied?	Based on similar scopes for rehab of the existing structures that is done periodincally. Details of exact work required unknown. Since the existing facilities are old, actual site conditions and construction may be different than expected.	Moderate	Possible	2	
T-6	0			Negligible	Unlikely	0	
T-7	0			Negligible	Unlikely	0	
T-8	mechanical	Level of confidence based on design and assumptions? Appropriate methods applied to calculate quantities? Sufficient investigations to develop quantities? Quality control check applied?	Based on similar / typical MVN project designs, however exact details not developed yet. Retrofitting existing facility so could have changes.	Moderate	Possible	2	
T-9	electrical	Level of confidence based on design and assumptions? Appropriate methods applied to calculate quantities? Sufficient investigations to develop quantities? Quality control check applied?	Based on similar / typical MVN project designs, however exact details not developed yet. Retrofitting existing facility so could have changes.	Significant	Possible	3	
T-10	0			Negligible	Unlikely	0	
T-11	demolition	Level of confidence based on design and assumptions? Appropriate methods applied to calculate quantities? Sufficient investigations to develop quantities? Quality control check applied?	demolition information based on original plans. Existing conditions may not be as originally planned/built. Assumes removing approach sheetpile walls and Sector Gate vertical concrete walls. The base slab will remain. Additionally the gates will be removed. Does include removal of mechanical, electrical, and exisiting timber guidewall.	Significant	Possible	3	
T-12	Remaining Construction Items			Negligible	Unlikely	0	
T-13	Planning, Engineering, & Design		further data will be obtained during PED and additional engineering will be done	Negligible	Unlikely	N/	
T-14	Construction Management		changes in designs and assumption could cause longer construction times	Negligible	Unlikely	N/	
	nate Assumptions			Maximum Proje	ect Growth	35	
						0	

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EST-2	Mitigation		No, this alternative only for Rehab of the existing structure.	Negligible	Unlikely	0
EST-3	Mob/Demob	no concern	typical construction anticipated and appropriate mob/demob included in cost estimate.	Negligible	Possible	0
EST-4	channel work	Assumptions related to prime and subcontractor markups/assignments? Assumptions regarding crew, productivity, overtime? Site accessibility, transport delays, congestion? Overuse of Cost Book, lump sum, allowances? Lack confidence on critical cost items?	cost estimate includes typical prime and subcontractor tiering. All items have detailed crews and related productivity and overtime. Typical construction features. Depending on final required disposal plan could change method and increase cost.	Marginal	Possible	1
EST-5	sector gate	Assumptions related to prime and subcontractor markups/assignments? Assumptions regarding crew, productivity, overtime? Site accessibility, transport delays, congestion? Overuse of Cost Book, lump sum, allowances? Lack confidence on critical cost items?	Cost used for this item is average of bids from recent similar work for the 2 locks. This alternative only rehabing 1/2 of each lock; attempted to prorate average of bids - could be different. Typical construction features and cost used should be representative of processes required. Existing conditions and required repairs may not be as in past contracts and different techniques could be needed. cost estimate includes typical prime and subcontractor tiering.	Moderate	Likely	3
EST-6	0			Negligible	Unlikely	0
EST-7	0			Negligible	Unlikely	0
EST-8		Assumptions related to prime and subcontractor markups/assignments? Assumptions regarding crew, productivity, overtime? Site accessibility, transport delays, congestion? Overuse of Cost Book, lump sum, allowances? Lack confidence on critical cost items?	Cost used for this item developed by mechanical engineer based on recent similar work. Typical MVN construction features, however exact design/typical sections not developed yet. Retrofitting existing facility so could have changes. One site accessibility by both land and water, 1 site accessible by water only.	Moderate	Likely	3
EST-9	electrical	Assumptions related to prime and subcontractor markups/assignments? Assumptions regarding crew, productivity, overtime? Site accessibility, transport delays, congestion? Overuse of Cost Book, lump sum, allowances? Lack confidence on critical cost items?	Cost used for this item developed by electrical engineer based on recent similar work. Typical MVN construction features, however exact design/typical sections not developed yet. Retrofitting existing facility so could have changes. One site accessible by both land and water, 1 site accessible by water only.	Moderate	Likely	3
EST-10	0			Negligible	Unlikely	0
EST-11	demolition	Assumptions related to prime and subcontractor markups/assignments? Assumptions regarding crew, productivity, overtime? Site accessibility, transport delays, congestion? Overuse of Cost Book, lump sum, allowances? Lack confidence on critical cost items?	cost estimate includes typical prime and subcontractor tiering. Items have detailed crews and related productivity and overtime. Typical construction, however existing conditions/typical sections not available so could affect method assumed. One site accessible by both land and water, 1 site accessible by water only. There may be some schedule necessary to maintain traffic in the area as no bypass channel is included in this alternative.	Significant	Likely	4

			, ·			
EST-12	Remaining Construction Items			Negligible	Unlikely	0
EST-13	Planning, Engineering, & Design	no concern		Negligible	Unlikely	N/A
EST-14	Construction Management	no concern	since S&A is directly linked to construction items and cost, this item would have similar risk to construction items.	Negligible	Unlikely	N/A
	roject Risks			Maximum Proje	ct Growth	40%
				Negligible	Unlikely	0
EX-1	Relocations	none identified	none identified	Negligible	Offlikely	0
EX-2	Mitigation	no concern	No, this alternative only for Rehab of the existing structure.	Negligible	Unlikely	0
EX-3	Mob/Demob	<ul> <li>Potential for severe adverse weather?</li> <li>Political influences, lack of support, obstacles?</li> <li>Unanticipated inflations in fuel, key materials?</li> <li>Potential for market volatility impacting competition, pricing?</li> <li>Funding Constraints</li> </ul>	The project is located a bit inland so severe adverse weather should not be an issue. The inflation of fuel and key materials is always a possibility and fuel is a cost driver for the mob/demob but would probably have a marginal impact. The users of the GIWW fully support improving these crossings as does the NFS. The Inland Users Water Board does not have this project ranked for immediate construction, even if an approved Chief's Report and funding become available.	Marginal	Possible	1
EX-4	channel work	Potential for severe adverse weather? Political influences, lack of support, obstacles? Unanticipated inflations in fuel, key materials? Potential for market volatility impacting competition, pricing? Funding Constraints	The project is located a bit inland so severe adverse weather should not be an issue. The inflation of fuel and key materials is always a possibility, however it is not a large cost driver for this item and will not place a large demand on the supply. The users of the GIWW fully support improving these crossings as does the NFS. The Inland Users Water Board does not have this project ranked for immediate construction, even if an approved Chief's Report and funding become available.	Marginal	Possible	1
EX-5	sector gate	Unanticipated inflations in fuel, key materials?     Potential for market volatility impacting competition, pricing?	The project is located a bit inland so severe adverse weather should not be an issue. The inflation of fuel and key materials is always a possibility, however it is not a large cost driver for this item and will not place a large demand on the supply. The users of the GIWW fully support improving these crossings as does the NFS. The Inland Users Water Board does not have this project ranked for immediate construction, even if an approved Chief's Report and funding become available.	Marginal	Possible	1
EX-6	0			Negligible	Unlikely	0
EX-7	0			Negligible	Unlikely	0

EX-8	mechanical	<ul> <li>Potential for severe adverse weather?</li> <li>Political influences, lack of support, obstacles?</li> <li>Unanticipated inflations in fuel, key materials?</li> <li>Potential for market volatility impacting competition, pricing?</li> <li>Funding Constraints</li> </ul>	The project is located a bit inland so severe adverse weather should not be an issue. The inflation of fuel and key materials is always a possibility, however it is not a large cost driver for this item and will not place a large demand on the supply. The users of the GIWW fully support improving these crossings as does the NFS. The Inland Users Water Board does not have this project ranked for immediate construction, even if an approved Chief's Report and funding become available.	Negligible	Possible	0
EX-9	electrical	<ul> <li>Potential for severe adverse weather?</li> <li>Political influences, lack of support, obstacles?</li> <li>Unanticipated inflations in fuel, key materials?</li> <li>Potential for market volatility impacting competition, pricing?</li> <li>Funding Constraints</li> </ul>	The project is located a bit inland so severe adverse weather should not be an issue. The inflation of fuel and key materials is always a possibility, however it is not a large cost driver for this item and will not place a large demand on the supply. The users of the GIWW fully support improving these crossings as does the NFS. The Inland Users Water Board does not have this project ranked for immediate construction, even if an approved Chief's Report and funding become available.	Negligible	Possible	0
EX-10	0			Negligible	Unlikely	0
EX-11	demolition	<ul> <li>Potential for severe adverse weather?</li> <li>Political influences, lack of support, obstacles?</li> <li>Unanticipated inflations in fuel, key materials?</li> <li>Potential for market volatility impacting competition, pricing?</li> <li>Funding Constraints</li> </ul>	The project is located a bit inland so severe adverse weather should not be an issue. The inflation of fuel and key materials is always a possibility, however it is not a large cost driver for this item and will not place a large demand on the supply. The users of the GIWW fully support improving these crossings as does the NFS. The Inland Users Water Board does not have this project ranked for immediate construction, even if an approved Chief's Report and funding become available.	Negligible	Possible	0
EX-12	Remaining Construction Items	<ul> <li>Potential for severe adverse weather?</li> <li>Political influences, lack of support, obstacles?</li> <li>Unanticipated inflations in fuel, key materials?</li> <li>Potential for market volatility impacting competition, pricing?</li> <li>Funding Constraints</li> </ul>	The project is located a bit inland so severe adverse weather should not be an issue. The inflation of fuel and key materials is always a possibility, however it is not a large cost driver for this item and will not place a large demand on the supply. The users of the GIWW fully support improving these crossings as does the NFS. The Inland Users Water Board does not have this project ranked for immediate construction, even if an approved Chief's Report and funding become available.	Negligible	Unlikely	0
EX-13	Planning, Engineering, & Design	Potential for severe adverse weather? Political influences, lack of support, obstacles? Unanticipated inflations in fuel, key materials? Potential for market volatility impacting competition, pricing? Funding Constraints	The project is located a bit inland so severe adverse weather should not be an issue. The inflation of fuel and key materials is always a possibility. At this stage there is no reason to believe there will be out of the ordinary market volatility that would affect competition and pricing as this is not a mega-project requiring large or specialty assets. The users of the GIWW fully support improving these crossings as does the NFS. The Inland Users Water Board does not have this project ranked for immediate construction, even if an approved Chief's Report and funding become available. This could cause increased reviews and updates due to delays in starting the project for lack of funding.	Negligible	Unlikely	N/A
EX-14	Construction Management	no concern	S&A is linked to construction items and cost, but most external risks would not make the project take longer once started.	Negligible	Possible	N/A