ENGINEERING APPENDIX A APPENDIX 6

QUANTITIES – ALTERNATIVE ANALYSIS

US Army Corps. of Engineers. New Orleans District!	Brazos River Floodgates Feasibility Study Alternative 2a - Major Rehab Existing Structure Quantities Estimate	Designed By Checked By 14-Sep-2017	
Number	Number Description		
		Quantity	Unit
1	Mob & Demob	LUMPSUM	LS
2	Major Rehabilitation (Quantities are for Existing West and East Gates)		
	Existing Sector Gates (2 sector gates, 4 leafs)		
	1. 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		
	1. Raise Operator Building with New Foundation	2	LS
4	Modify (Raise) Gate Machinery Pits		
	Raise Exist. West and East Gate Machinery Pits 4 feet higher		
	1. Raise Machinery Pit with New Foundation	4	LS
5	Channel Maintenance Structure		
5	Add Channel Maintenance Structure to help with navigation		
	1. Install a Dolphin Alignment Structure at the River Side for Each Gate	2	LS
6	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	SF
	Total =	23,940	SF
	Rub Face UHMW Panels Mounted to Steel Plate Attached to Exist. Sheet Pile Fac	<u> </u>	
	1. West Gate Rub Face UHMW Panel (2 3/4" thick)	13,680	QE
	2. East Gate Rub Face UHMW Panel (2 3/4" thick)	10,260	
	Total =	23,940	
	1. West Gate Steel Plate (5/8" thick)	13,680	
	2. East Gate Steel Plate (5/8" thick) Total =	10,260 23,940	
		23,940	31
7	Mechanical		
	1. Replace All Operating Machinery for Each Gate	2	LS
8	Electrical		
	1. Replace All Electrical Equipment for Each Gate	2	LS
		1	I

		with - wiajor there		Jugales (inclu	ues repair/re	spiacement of uarna	geu componei	na		
		RO - Raise/Reloo	cate Gate O	perator Buildir	ngs					
MP - Modify (Raise) Gate Machinery Pit Location										
	MG - Modify Guidewalls									
		CS - Channel Ma	aintenance S	tructures						
	Note: The	most recent BRF	G rehabilita	tion contract	(W912HY1	1C0009) was for \$9	.6M, lasted 6	ye		
		Existing Gate:								
	Ea	ach gate (lb) = 364	,500	(2 leafs)						
	Ead	ch gate (ton) = 182	.3	(2 leafs)						
٦	Two gates re	moved (ton) = 365		(4 leafs)						
		nce is the specific le	ocation to th		en down.	grid. The length of r	ub face below	is		
	West Gate		400		East Gate	Northwest	210			
	West Gale	Northeast	400 360	\backslash	Easi Gale	Northeast	360			
		Southwest	430	\backslash		Southwest	220			
		Southeast	430 330	\backslash		Southeast	350			
	Tot	al length (ft) =	1,520	\backslash	То	otal length (ft) =	1,140			
				\	4					
		Guide Wall Rub	Face Area	(ft2)	All Walls To	otal length (ft) =	2,660			
		West Gate	13,680							
		East Gate	10,260							
	Tot	al Area (ft2) =	23,940							
	Ultra Hi	igh Moleculai	Weight	Polyethyle	ene (UHN	(W-PE)				

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

APPLICATION	t (mm)	W* (mm)	BOLT
Light duty	30	3-5	M16
Medium duty	40	7 – 10	
	50	10 - 15	M16 – M20
	60	15 - 19	
Heavy duty	70	18 - 25	M24 – M30
	80	22 - 32	
Fortune data	90	25 - 36	M30 - M36
Extreme duty	100	28 - 40	M30 - M36
 Where allowances are t due to fixing detail. Small service life for minimal ex 	increases in facing thic	ar allowance may vary kness can greatly extend	[Units: mm]

TYPICAL DIMENSIONS



250 - 350 45 - 80 300 - 450 5-10 Steel n and the second s



45 - 80



Dimensions will depend on pad thickness and application.

LARGE PADS VS SMALL PADS



Larger pads are usually more robust but smaller pads are easier and cheaper to replace.

The standard color is black, but UHMW-PE is available in many other colours if required.

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)

years and was completed in mid-2017.

vertical guide for steel plate attachment to sheet / sheet attached to 5/8" thick steel plate. UHMW is the same as the lengths of guide wall above,

		14-Sep-2017	
umber		Quantity	Τ
1	Mob & Demob	LUMPSUM	
2	Demolition (Quantities are for existing West and East Gates)		t
	Existing Sector Gates (2 sector gates, 4 leafs)	365	ł
	Remove and Salvage Sector Gate (2 gates, 4 leafs, east & west channel) Remove and Dispose Gate Foundation (2 gates)	15 310	
	3. Remove and Dispose Timber Piles (2 gates)	1,970	Ī
	Guide Walls		+
	Remove and Salvage Guide Walls (8 walls, east & west channel)	4,324	ł
			I
3	Excavation and Fill		ł
3	Move Gates Farther Back in Existing Channel		+
	Excavation		I
	Excavate Existing West Gate Channel Excavate Existing East Gate Channel	268,700	ł
	2. Excavate Existing East Gate Channel 3. Excavate West Bypass Channel	181,800 863,200	l
	4. Excavate East Bypass Channel Excavation Total =	888,800 2,202,500	ł
	Fill		Τ
	T. Fill Existing Channel to Create Vessel Channel, West Gate Section 2. Fill Existing Channel to Create Vessel Channel, East Gate	188,300 201,000	
	2. Hill Existing Channel to Create Vessel Channel, East Gate	201,000	ŀ
	Fill Total =	389,300	I
	Riprap (3' Thick Layer)	8,000	ł
			ļ
4	Cofferdam (Cofferdam placed around sector gates, 2 gates, 2 dams) 1. Excavation	35 600	$\frac{1}{1}$
	2. Sand and Fill	35,600	
	3. Waler System - WF Members	440	
	4. Sheet Piles - AZ 38-700N	105,280	
	5. Internal Bracing (Struts) - 24° Dia. X 0.625° Thk. 6. King Post Piling (Piles 30° Dia. X 0.625° Thk.)	4,600	
	7. Support Piling 24" Dia. X 0.625" Thk.	4,200	t
	8. Misc. Steel	10	4
	9. Temporary Dewatering System 10. Removal of Cofferdam	2	+
			T
5	Concrete Structure and Gate (Quantities are for 2 sector gates, 4 leafs) Sector Gate Monolifi		
5	Sector Gate Monolith 1. Sand and Gravel Bedding	3,400	
5	Sector Gate Monolith 1. Sand and Gravel Bedding	9.000	T
5	Sector Gate Monolith 1. Sand and Gravel Bedding 2. Tremic Concrete - Seal Slab 3. Reinforced Concrete Base Slab 4. Reinforced Concrete Monolith		
5	Sector Gate Monolith 1. Sand and Gravel Badding 2. Tremite Concrete - Seal Slab 3. Reinforced Concrete Base Slab 4. Reinforced Concrete Monolith E. Areinforced Concrete Monolith	9,000 17,800 8,000	
5	Sector Gate Mondifi 1. Sand and Gravel Bedding 2. Treme Concrete - Seal Stab 3. Reinforced Concrete Base Stab 4. Reinforced Concrete Monolith 5. Plings 5. Plings a. Plings - Vertical Spiral Plaes - 30' Dia. X 0.625' Thk. b. Plings- Reture Spiral Plaes - 30' Dia. X 0.625' Thk.	9,000 17,800 8,000 40,200 44,838	
5	Sector Gate Monolith 1. Sand and Gravel Bedding 2. Tremie Concrete - Seal Slab 3. Reinforced Concrete Base Slab 4. Reinforced Concrete Monolith 5. Plings: a. Plings: - Ventical Spiral Piles - 30° Dia. X 0.625° Thk. b. Plings: - Batter Spiral Piles - 30° Dia. X 0.625° Thk. b. Tension Concention	9,000 17,800 8,000 40,200 44,838 550	
5	Sector Cate Mondifi 1. Sand and Carval Bedding 2. Tremite Concrete - Seal Stab 3. Reinforced Concrete Base Stab 4. Reinforced Concrete Monolith 5. Pilings: B. Pilings: Vertical Spiral Piles - 30' Dia. X 0.625' Thk. 6. Tension Connection 7. Builhoad Stock Schallers 7. Builhoad Stock Schallers 7. Builhoad Stock Schallers	9,000 17,800 8,000 40,200 44,838 550 200	
5	Sector Gate Monolith 1. Sand and Gravel Bedding 2. Tremie Concrete - Seal Slab 3. Reinforced Concrete Base Slab 4. Reinforced Concrete Monolith 5. Plings: a. Plings: - Ventical Spiral Piles - 30° Dia. X 0.625° Thk. b. Plings: - Batter Spiral Piles - 30° Dia. X 0.625° Thk. b. Tension Concention	9,000 17,800 8,000 40,200 44,838 550	
5	Sector Gate Monolifi 1. Sand and Gravel Bedding 2. Tremite Concrete - Seal State 3. Reinforced Concrete Bane State 4. Reinforced Concrete Bane State 4. Reinforced Concrete Bane State 5. Primas. b. Primage: Batter Spraf Pites - 30° Dia. X 0.825° Thk. b. Primage: Batter Spraf Pites - 30° Dia. X 0.825° Thk. c. Terreinor Concrete Spraf Pites - 30° Dia. X 0.825° Thk. 6. Terreinor Concretion 7. Buithwast Stots - Statinless Steel w/Ladders (Embedded in Monolifit) 8. Ladder Stots - Statinless Steel w/Ladders (Embedded in Monolifit)	9,000 17,800 8,000 40,200 44,838 550 200	
5	Sector Gate Mondith 1. Sand and Gravel Bedding 2. Treme Concrete - Seal Slab 3. Reinforced Concrete Base Slab 4. Reinforced Concrete Mane Slab 5. Plinas: a. Plings - Ventical Spraf Ples - 30° Dia. X 0.625° Thk. b. Plings - Batter Spraf Ples - 30° Dia. X 0.625° Thk. 6. Tension Connection 7. Builthead Store Statives State wSeals (Embedded in Monolith) 8. Ladder Slots - Stativess Stel w/Ladders (Embedded in Monolith) Sector Gate	9,000 17,800 8,000 40,200 44,838 550 200	
5	Sector Gate Monolith 1. Sand and Gravel Bedding 2. Treme Concrete - Seal Stab 3. Reinforced Concrete Base Stab 4. Reinforced Concrete Manosith 5. Pillings 4. Reinforced Concrete Manosith 5. Pillings 4. Reinforced Spiral Piles - 30° Dia: X 0.625° Thk. 5. Pillings 5. Builthead Stote - Stabilities State w/Seals (Embedded in Monolith) 7. Builthead Stote - Stabilities Stele w/Ladders (Embedded in Monolith) 5. Sector Gates 1. Sector Gates 1. Sector Gates 2. Puteles and Himse Kfinn nost)	9,000 17,800 8,000 40,200 44,838 550 200 100 1,136	
5	Sector Gate Monolifi 1. Sand and Gravel Bedding 2. Tremite Concrete Jeas Blab 3. Reinforced Concrete Basis Blab 4. Reinforced Concrete Basis Blab 4. Reinforced Concrete Basis Blab 5. Polings - Batter Spira Plike - 307 Dia. X 0 625 °T hk. b. Pilings - Batter Spira Plike - 307 Dia. X 0 625 °T hk. c. Formation Concrete Street W-Seals (Embedded in Monolifii) 7. Builthead Stots - Stainless Street w-Seals (Embedded in Monolifii) 8. Ladder Stots - Stainless Street w-Seals (Embedded in Monolifii) 8. Ladder Stots - Stainless Street w-Seals (Embedded in Monolifii) 8. Ladder Stots - Stainless Street w-Seals (Embedded in Monolifii) 2. Polites and Empered (King post) 2. Polites and Empered (King post) 2. Polites and Empered (King post) 4. Geter Satis, Sate Bearing Striftees and Gate Track	9,000 17,800 8,000 44,838 550 200 100 1,136 2,360 2,360 2,360 2,360 2,360 2,360 2,360 2,360 2,360 2,360 2,360 2,360 2,360 2,360 2,360 2,360 2,360 2,360 2,0000 2,000 2,0000 2,000 2,000 2,	
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6	Sector Gate Monolifi 1. Sand and Gravel Bedding 2. Trenite Concrete Jesel Blab 3. Reinforced Concrete Base Blab 4. Reinforced Concrete Base Blab 4. Reinforced Concrete Base Blab 5. Alfings - Base Black 5. Alfings - Base Black 5. Catabox 5. Ca	9,000 17,800 8,000 40,200 40,200 200 100 1,136 2,260 2,2 2,260 2,2 2,260 2,2 2,260 2,2 2,2 2,2 2,2 2,2 2,2 2,2 2,2 2,2 2,	
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DEMOLITIO	N	
Existing Gate	8:	
Each gate (lb) =	364,500	(2 leafs
Each gate (ton) =	182.3	(2 leafs
ates removed (ton) =	365	(4 leafs)

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

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

985 Piles per rate

	Guide Wall	Anchor Wall	
Vall 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.

Placament Areas No. 88 and 89 are the closest to the Brazos Floodqates 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'

Perimeter of cofferdam (ft) = 752

Two ga

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 wilb eretoucid in length and will be less expensive. The temporary cofferdam wilb ensulate between the permanent guide walls, and then dewatered in order to perform the monolith and sector gate construction work in the dry.

Extension Contendaming in a hard of weight is embedded and half he height is above mutiline, extenses these pilo length of 70 feet. Extenses the length of King poet piling to be ambedded 40 feet and 55 feet. Extenses the langth of King poet piling are included. The length as interacted as a poet pilong are required. The length as indexed as a poet pilong are required. The length as indexed as a poet pilong are required. The length as indexed as a poet pilong are required. The length as indexed as a poet pilong are required. The lengths and quantity estimated above is a rough estimate and may change based on gester/hincal conditions. Gester/hincal conditions have not been evaluated, propose used owell points for devatering 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) help support the lateral loads on the cofferdam. Typically the internal bracing (struts) would well to the targer diameter piles (king support line) are as anticipated to the set and target diameter support. Some smaller diameter support piles are as anticipated to the equival to help support piles are as anticipated to the 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 Si Foundation = 116' x 260		, 46.5' x 110' Sector Gate	+	Pile Lengths (ft) Vertical = 169 Batter = 178	Sector Gate Weight (ton) = 537 No of vertical piles = 134 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 vertical piles =
 268
 Vertical piles =

 No of batter piles =
 282
 Batter piles =

Batter pile length (ft) = 159 3v:1h

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 62 b/bt3 (pd), HNC 67 pd, and SGOP 48 pd. The average weight per enclosed volume for these projects is 5.9 pd. The estimated weight of the new Brazos sector gate leaf based on this similar project average of 5.9 pd for the projects is 5.9 pd. the stimated weight of the new Brazos sector gate leafs) is 588 tons. HNC refers to the inner Harbon Navigation Canal project. The top of the gates will match the top of the wall existion of 16.00 NAVDB8 with matches the Colorado River Locks, which were resently 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 areach end of montilihi, total of 10 units to perform maintenance on a sector gate. Each bulkhead weights 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 balal deak was of approximately 16.060 square feet in order to bate 10.bulkhead steed 2 high. The required toprim or the platform would be for bulkheads. The act plan configuration of the storage platform would be too the to LSACE would like to storage interance the bulkheads. Configuration would be 64 feet wide for 255 feet and 33 feet wide for 130 feet. Typical pile lengths are 88 feet for the maintenance bulkhead storage blatform.

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 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.



22	Brazos River Floodgates Feasibility Study	Designed By	JK
23 Array Carps	Alternative 3a - Move Gates Farther Back in Exist. Channel	Checked By	GK
Nue Winese Ballant	Quantities Estimate	14-Sep-2017	
Number	Number Description		
		Quantity	Uni
	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)	10,260	SF
	Total =	23,940	SF
	1. 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
			-
			I

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.

	3a at New Location Farther Back in Existing Channel				
New Guide Wa	I Lengths (ft)	New Guide V	Vall Area (st)	New Guide Wa	II Hardware (ton)
 North 	760	North	63,840	North	143
South	760	South	63,840	South	143
North	570	North	47,880	North	107
South	570	South	47,880	South	107
otal length (ft) =	2,660	Total 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 34° thick UHMW sheet attached to 5/8° thick steel plate. UHMW attached to steel plate with 1° dismeter bolts with 1° 1° too 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 Northeast Southwest 400 360 430 East Gate Northwest Northeast 210 360 220 Southwest Southeast Total length (ft) = 330 Southeast 350 1,140 1,520 Total length (ft) = Guide Wall Rub Face Area (ft2) West Gate 13,680 East Gate 10,260 Total Area (ft2) = 23,940 All Walls Total length (ft) = 2,660

n av		W* (seed)	8017	
		3-5	MSE	
	40	7 - 20	W10 - W20	
alian skily	60	20 - 35	838-920	1000
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Ultra High Molecular Weight Polyethylene (UHMW-PE)

CHANNEL EX	CAVATION			
	Location	Area (ft2)	Volume (yd3)	
	West channel north	169,830	113,300 >	268,700
Exist.channel excavated	West channel south	232,990	155,400 🖌	
to open channel	East channel north	85,120	56,800 >	181,800
	East channel south	187,500	125,000	
	West bypass	1,294,800	863,200	
	East bypass	1,333,100	888,800	
	Sum =	3,303,340 ft	2 2,202,500 yd3	Average depth of excavation used = 18 ft

FILL EXISTING CHANNEL

West Gate North South East Gate North South Total length (ft) =

	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

H	Brazos River Floodgates Feasibility Study	Designed By	JK
US Army Corps of Engineers。	Alternative 3a.1: 3a East + Open Exist. Channel West	Checked By	GK
New Orleans District	Quantities Estimate	11-Oct-2017	
Number	Number Description		
Number		Quantity	Unit
1	Mob & Demob	LUMPSUM	LS
2	Demolition (Quantities are for existing West and East Gates)		
	Existing Sector Gates (2 sector gates, 4 leafs)		
	1. Remove and Salvage Sector Gate (2 gates, 4 leafs, east & west channel)		TON
	2. Remove and Dispose Gate Foundation (2 gates)	15,310	
	3. Remove and Dispose Timber Piles (2 gates)	1,970	EA
	Guide Walls		
	1. Remove and Salvage Guide Walls (8 walls, east & west channel)	4,324	TON
-			
3	Excavation and Fill		
Ť	Move Gates Farther Back in Existing Channel		
	Excavation		
	1. Excavate Existing West Gate Channel	268,700	CY
	2. Excavate Existing East Gate Channel	181,800	
	3. Excavate West Bypass Channel	431,600	
	4. Excavate East Bypass Channel	888,800	-
	Excavation Total =	1,770,900	CY
	Fill		
	1. Fill Existing Channel to Create Vessel Channel, West 2. Fill Existing Channel to Create Vessel Channel, East Gate	201,000	CY
	2. Fill Existing Channel to Create Vessel Channel, East Gate Fill Total =	201,000	
		201,000	
4	Cofferdam (Cofferdam placed around sector gates, 1 gate, 1 dam)		
· ·	1. Excavation	17,800	CY
	2. Sand and Fill	6,300	
	3. Waler System - WF Members	220	
	4. Sheet Piles - AZ 38-700N	52,640	
		2,300	
	5. Internal Bracing (Struts) - 24" Dia. X 0.625" Thk. 6. King Post Piling (Piles 30" Dia. X 0.625" Thk.)	2.300	ILF
	7 Support Piling 24" Dia X 0.625" Thk	1,700	LF
	7. Support Piling 24" Dia. X 0.625" Thk. 8. Misc. Steel	1,700 2,100	LF LF
	8. Misc. Steel	1,700 2,100 5	LF LF TN
	8. Misc. Steel 9. Temporary Dewatering System	1,700 2,100 5 1	LF LF TN LS
	8. Misc. Steel	1,700 2,100 5 1	LF LF TN
	8. Misc. Steel 9. Temporary Dewatering System	1,700 2,100 5 1	LF LF TN LS
	8. Misc. Steel 9. Temporary Dewatering System	1,700 2,100 5 1	LF LF TN LS
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	8. Misc. Steel 9. Temporary Dewatering System	1,700 2,100 5 1	LF LF TN LS
	8. Misc. Steel 9. Temporary Dewatering System	1,700 2,100 5 1	LF LF TN LS
5	8. Misc. Steel 9. Temporary Dewatering System 10. Removal of Cofferdam	1,700 2,100 5 1	LF LF TN LS
5	8. Misc. Steel 9. Temporary Dewatering System	1,700 2,100 5 1	LF LF TN LS
5	8. Misc. Steel 9. Temporary Dewatering System 10. Removal of Cofferdam Concrete Structure and Gate (Quantities are for 1 sector gate, 2 leafs) Sector Gate Monolith	1,700 2,100 5 1 1	LF TN LS LS
5	8. Misc. Steel 9. Temporary Dewatering System 10. Removal of Cofferdam Concrete Structure and Gate (Quantities are for 1 sector gate, 2 leafs) Sector Gate Monolith 1. Sand and Gravel Bedding	1,700 2,100 5 1 1	LF LF TN LS LS CY
	8. Misc. Steel 9. Temporary Dewatering System 10. Removal of Cofferdam Concrete Structure and Gate (Quantities are for 1 sector gate, 2 leafs) Sector Gate Monolith	1,700 2,100 5 1 1 	LF LF TN LS LS CY
5	8. Misc. Steel 9. Temporary Dewatering System 10. Removal of Cofferdam Concrete Structure and Gate (Quantities are for 1 sector gate, 2 leafs) Sector Gate Monolith 1. Sand and Gravel Bedding 2. Tremie Concrete - Seal Slab	1,700 2,100 5 1 1	LF LF TN LS LS CY CY
	8. Misc. Steel 9. Temporary Dewatering System 10. Removal of Cofferdam Concrete Structure and Gate (Quantities are for 1 sector gate, 2 leafs) Sector Gate Monolith 1. Sand and Gravel Bedding 2. Tremie Concrete - Seal Slab 3. Reinforced Concrete Base Slab 4. Reinforced Concrete Monolith 5. Pilings:	1,700 2,100 5 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	LF LF TN LS LS CY CY CY CY
	8. Misc. Steel 9. Temporary Dewatering System 10. Removal of Cofferdam Concrete Structure and Gate (Quantities are for 1 sector gate, 2 leafs) Sector Gate Monolith 1. Sand and Gravel Bedding 2. Tremie Concrete - Seal Slab 3. Reinforced Concrete Base Slab 4. Reinforced Concrete Monolith 5. Pilings: a. Pilings - Vertical Spiral Piles - 30" Dia. X 0.625" Thk.	1,700 2,100 5 1 1 1 1 1 1,700 4,500 8,900 4,000 20,100	LF LF LS LS CY CY CY CY LF
	8. Misc. Steel 9. Temporary Dewatering System 10. Removal of Cofferdam Concrete Structure and Gate (Quantities are for 1 sector gate, 2 leafs) Sector Gate Monolith 1. Sand and Gravel Bedding 2. Tremie Concrete - Seal Slab 3. Reinforced Concrete Base Slab 4. Reinforced 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.	1,700 2,100 5 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	LF TN LS LS CY CY CY CY LF LF
	 8. Misc. Steel 9. Temporary Dewatering System 10. Removal of Cofferdam 11. Sand and Gravel Bedding 12. Tremie Concrete - Seal Slab 13. Reinforced Concrete Base Slab 14. Reinforced Concrete Base Slab 14. Reinforced Concrete Monolith 15. Pilings: a. Pilings - Vertical Spiral Piles - 30" Dia. X 0.625" Thk. b. Pilings - Batter Spiral Piles - 30" Dia. X 0.625" Thk. 	1,700 2,100 5 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	LF LS LS CY CY CY CY CY LF LF EA
	8. Misc. Steel 9. Temporary Dewatering System 10. Removal of Cofferdam Concrete Structure and Gate (Quantities are for 1 sector gate, 2 leafs) Sector Gate Monolith 1. Sand and Gravel Bedding 2. Tremie Concrete - Seal Slab 3. Reinforced Concrete Base Slab 4. Reinforced 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.	1,700 2,100 5 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	LF LS LS CY CY CY CY CY LF LF EA

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) = 7.655Foundation, wing walls, approach aprons Contract Bid Documents used 25 feet timber pile length for bidding purposes.

985 Piles per gate

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

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

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

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 = $116' \times 260'$ *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 Batter = 178

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
		3v:1h	

<= Enter vertical value, batter will be calculated

Sector Gate Weight (ton) = 537 No of vertical piles = 134 No of batter piles = 141

	Sector Gate		
	1. Sector Gates	568	_
	2. Pintles and Hinges (King post)		LS
	3. Sector Gate Protection Fenders	1,180	
	4. Gate Seals, Seal Bearing Surfaces and Gate Track		L
	5. Cathodic Protection	1	LS
			-
0	Maintenana Develaring Orator		
6	Maintenance Dewatering System Sector Gate Dewatering System (Maintenance Bulkhead)		
		633	-
	1. Maintenance Bulkhead	033	
	2. Maintenance Bulkhead Storage Platform		
	a. Steel Framing	294	Т
	b. Piling Supports		
	1. Pilings - 36" Dia. X 0.625" Thk.	2,816	LI
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		S
	2. West Gate South Guide Wall		S
	3. East Gate North Guide Wall	47,880	s
	4. East Gate South Guide Wall	47,880	s
	Total =	95,760	_
		00,100	
	Guide Wall Hardware		
	Total Guide Wall Hardware (All walls)	214	T
	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	s
	2. East Gate Rub Face UHMW Panel (2 3/4" thick)	10,260	s
	Total =	10,260	-
		10,200	13
		-	-
	1. West Gate Steel Plate (5/8" thick)		S
	2. East Gate Steel Plate (5/8" thick)	10,260	-
	Total =	10,260	S
8	Mechanical		1
	1. Rack and Pinion System	1	L
		·	
9	Electrical	1	L
			1
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		I	1

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.

	Existing East Guid	de Wall Lengths (ft)	Exist.Guide Wal	I Take Off Weight			Sheet Pile Area Breakou ns B5, B6, B7, B8	t
W	all section B5	487	PZ 35 sheet pile	3,796,100				
	B6	408	Anchor bar	170,470				
	B7	257	Waler	140,990	Hardware weig	ht per foot (lb	/ft)	
	B8	257	Wall contact	29,196	375			
Tota	al length (ft) =	1,409	Pile cap	114,870				
			Tangent wall plate	42,385				
			Fender plate	29,661				
			Total Steel Weight (lb) =	4,323,700				
	Existing Weig	ght per Linear Foot of	Sheet Pile Guide Wall (lb/ft) =	3,069			face sheet length (56 sf r anchor sheet.	per linear foot)
	For Alternative 3	a at New Location F	arther Back in Existing Channe	el				
	New Guide Wall	Lengths (ft)			<u>New Guide W</u>	all Area (sf)	New Guide Wa	II Hardware (ton)
West Gate	North	0			North	0	North	0
	South	0			South	0	South	0
East Gate	North	570			North	47,880	North	107
	South	570			South	47,880	South	107
Tota	al length (ft) =	1,140			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	\backslash	East Gate	Northwest	210
	Northeast	0	\backslash		Northeast	360
	Southwest	0	0 Southwest		220	
	Southeast	0	0 Southeast		350	
Tota	al length (ft) =	. 0	\backslash	, To	otal length (ft) =	1,140

Guide Wall Rub Face Area (ft2)

Ultra High Molecular Weight Polyethylene (UHMW-PE) West Gate 0 WEAR ALLOWANCES East Gate 10,260 APPLICAT Light duty BOLT Total Area (ft2) = 10,260 3 - 5 7 - 10 10 - 15 15 - 19 18 - 25 22 - 32 25 - 36 28 - 40 M16 Medium duty M16 – M20 60 Heavy duty 70 M24 – M30 IF 1 90 100 M30 – M36 Extreme duty * Where allowances are typica due to fixing detail. Small incr [Units: mm] ance may vary an greatly exten TYPICAL DIMENSIONS Dimensions will depend on pad thickness and application. 45 - 80 * * * * 45 - 80 45 - 80 300 - 450 -5 - 10 . . --(Units: . ---Timber fixing Open structure + --Stee -ap t ≈ 30–150 ۰ ۰ --+ ato . --CHANNEL EXCAVATION -٠ . άΦ Area (ft2) Volume (yd3) Location + --++ West channel north 169,830 113,300 268,700 Exist.channel excavated 232,990 155,400 LARGE PADS VS SMALL PADS West channel south 0 to open channel East channel north 85,120 56,800 181,800 0 0 0 000 Larger pads are usually more robust but smaller pads are easier and cheaper to replace. East channel south 187,500 125,000 000 West bypass 647,400 431,600 ~ 000 East bypass 1,333,100 888,800 The standard color is black, but UHMW-PE is available in many other colours if required. Sum = 2,655,940 ft2 1,770,900 yd3

FILL EXISTING CHANNEL

	Location	Area (ft2)		Volume (yd3)	
For new gate locations	West channel	0		0		
	East channel	301,370		201,000	_	
	Sum =	301,370	ft2	201,000	yd3	Average dept

Average depth of excavation used = 18 ft

pth of fill used = 18 ft

ini (Brazos River Floodgates Feasibility Study	Designed By JK	
US Anny Corps of Engineers	Alternative 9a - Open Channel on Alignment C without Gates	Checked By GK	
New Orleans Deprot	Quantities Estimate	14-Sep-2017	
Number	Number Description	0	_
		Quantity Unit	
1	Mob & Demob	LUMPSUM LS	-
	Demolition (Quantities are for existing West and East Gates)		
	Existing Sector Gates (2 sector gates, 4 leafs)		DEMOLITION Remove only Gates for Alternative 9a
		365 TON	Existing Gate:
	1. Remove and Salvage Sector Gate (2 gates, 4 leafs, east & west channel)		
	2. Existing Gate Foundation and Piles to Remain (2 gates)	0 CY	Each gate (ton) = 182.3 (2 leafs)
2	Excavation and Fill		Two gates removed (ton) = 365 (4 leafs)
	Open Channel on Alignment C, Fill Existing Channels		
	1. Excavate New West Open Channel	908,200 CY	
	2. Excavate New East Open Channel	695,600 CY	
	Excavation Total =	1,603,800 CY	
	1. Fill Existing West Vessel Channel	108,200 CY	
	2. Fill Existing East Vessel Channel	63,400 CY	
	Fill Total =	171,600 CY	
3	Electrical Site Electrical	115	
	Sile Electrical	1 L3	
	Real Estate Acquisition and Relocation for Alignment C		
	Real Estate Acquisition and Relocation for Alignment C		
			-
			-
			-
			CHANNEL EXCAVATION CADD channel excavation overlaid with aerial image of existing channel outline
			Alignment C through existing barge facility. West channel currently not being used, East channel is occupied, West requires
			The area is partially excavated. more excavation (subtract less)
			Location Area (ft2)
			Existing channel areas: West channel 353,525 Use 75% of area for depth of excavation 265,144 Subtract this area from CADD value
			(Barge facility) East channel 550,000 Use 90% of area for depth of excavation 495,000 (Area already excavated)
			Location Area (ft2) Location Area (ft2) Volume (yd3)
			Channel excavation West channel 1,627,310 Channel Excavation West channel 1,362,166 908,200 required from CADD East channe 1,538,370 East channel 1,043,370 695,600
<u> </u>			Image: Summer 1,550,576 East channer 1,550,576 East channer 1,550,576 East channer 1,550,576 Sum = 2,405,536 ft2 1,603,800 yd3
-			
			Average depth of excavation used = 18 ft
			FILL EXISTING CHANNEL
L			Location Area (ft2) Volume (yd3)
<u> </u>			At existing gates West channel 162,260 108,200
			East channel 95,090 63,400 Sum = 257,350 ft2 171,600 yd3 Average depth of fill used = 18 ft
L		I	

Corps	Brazos River Floodgates Feasibility Study Alternative 9b - New Gates on Alignment C w/o Sediment Contrc	Designed By Checked By	
nginaars , mana (habrut)	Quantities Estimate	14-Sep-2017	
		14-3ep-2017	
umber	Number Description	Quantity	
1	Mob & Demob	LUMPSUM	
2	Demolition (Quantities are for existing West and East Gates)		
	Existing Sector Gates (2 sector gates, 4 leafs)		
	1. Remove and Salvage Sector Gate (2 gates, 4 leafs, east & west channel)	365	
	2. Remove and Dispose Gate Foundation (2 gates)	15,310	
	3. Remove and Dispose Timber Piles (2 gates)	1,970	ΕA
		L	
	Guide Walls		
	 Remove and Salvage Guide Walls (8 walls, east & west channel) 	4,324	тс
3	Excavation and Fill	L	
	New Gates on Alignment C		
	1. New West Channel Excavation	697,900	
	2. New East Channel Excavation	476,500	
	Excavation Total =	1,174,400	CΥ
	1. Fill for New Gate Location, West Gate	98,700	СУ
	2. Fill for New Gate Location, East Gate	88,200	
	3. Fill Existing West Vessel Channel	108,200	CY
	4. Fill Existing East Vessel Channel	63,400	
	Fill Total =	358,500	СУ
		0.000	TC
	Riprap (3' Thick Layer)	8,000	IC
			-
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	ΤN
	4. Sheet Piles - AZ 38-700N	105,280	SF
	5. Internal Bracing (Struts) - 24" Dia. X 0.625" Thk.	4,600	LF
	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	ΤN
	9. Temporary Dewatering System	2	LS
	10. Removal of Cofferdam	2	LS
			-
5	Concrete Structure and Gate (Quantities are for 2 sector gates, 4 leafs)		
	Sector Gate Monolith		
	1. Sand and Gravel Bedding	3,400	
	2. Tremie Concrete - Seal Slab	9,000	
	3. Reinforced Concrete Base Slab		
	4. Reinforced Concrete Monolith	8,000	CY
	5. Pilings:	10.000	
	 a. Pilings - Vertical Spiral Piles - 30" Dia. X 0.625" Thk. b. Pilings - Batter Spiral Piles - 30" Dia. X 0.625" Thk. 	40,200 44,838	
	6. Tension Connection	44,030	
	7. Bulkhead Slots - Stainless Steel w/Seals (Embedded in Monolith)	200	
	8. Ladder Slots - Stainless Steel w/Ladders (Embedded in Monolith)	100	LF
	Sector Gate		
	1. Sector Gates	1,136	
	2. Pintles and Hinges(King post)		LS
	3. Sector Gate Protection Fenders 4. Gate Seals, Seal Bearing Surfaces and Gate Track	2,360	
	5. Cathodic Protection	2	
		Z	

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. 94

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 closes to the Brazos Floodgates and they were reported to have combined remaining capacity of approximately 3.8 million cubic yards. Based on SGCP* Gut Side Sector Gate, 46.5'x 110' Sector Gate

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

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.

Brazos Sector Gate 31' x 125' 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 length sand 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 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.

ased on SGCP Gulf Side Sector Gate, 46.5' x 110' Sector Gate oundation = 116' x 260'			e	Pile Lengths (ft) Vertical = 169 Batter = 178	Sector Gate Weight (ton) = 537 No of vertical piles = 134 No of batter piles = 141
Brazos Sector Gate 3	1' × 125' (2	rates (leafe)			
Diazos Sector Gate S	I A 123 (2	gales, 4 leais			
No of vertical piles =	268		150	<= Enter vertical val	ue, 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 lb/ft3 (pcl), IHNC 6.7 pcl, 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.

14	Brazos River Floodgates Feasibility Study	Designed By	JK
Anny Corps	Alternative 9b - New Gates on Alignment C w/o Sediment Contro	Checked By	GK
Orbana Dabrett	Quantities Estimate	14-Sep-2017	
lumber	Number Description		
amber		Quantity	Unit
	Sector Gate Dewatering System (Maintenance Bulkhead)		
	1. Maintenance Bulkhead	633	ΤN
	2. 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		
	1. West Gate North Guide Wall	63,840	
	2. West Gate South Guide Wall	63,840	SF
	3. East Gate North Guide Wall	47,880	
	4. East Gate South Guide Wall	47,880	SF
	Total =	223,440	SF
	Guide Wall Hardware		
	Total Guide Wall Hardware (All walls)	499	ΤN
	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)	10,260	SF
	Total =	23,940	SF
	1. 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
-		-	<u> </u>

Ultra High Molecular Weight Polyethylene (UHMW-PE)

7-10

10 - 15 15 - 19

18-25

22 - 32

25 - 36

28-40

100

* Where allowances are typical values, actual wear allowance may very due to long detail. Small increases in facing thekeess can greatly exten-service life for minimal extra cost.

M16-M20

M24 - M30

MRG - MRG

45-80

250 - 350 45-80

300-450

5-10

Open structure

(Linix mm)

Dimensions will depend on pad

Timber fixing

1=30-150

1

thickness and application

WEAR ALLOWANCES

TYPICAL DIMENSIONS

+ + + +

+

+ + +

+ + + +

+ +

+ + + + + + + + LARGE PADS VS SMALL PADS

+ + +

APPLICAT

Modium duty

Heavy duty

Extreme duty

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.



de Wall Hardware (ton) 143 143

107

107

499

New Guide Wa	all Lengths (ft)	New Guide Wa	all Area (sf)	New Guide
North	760	North	63,840	North
South	760	South	63,840	South
North	570	North	47,880	North
South	570	South	47,880	South
al Length (ft) =	2,660	Total Area (sf) =	223,440	Total Weight (ton) =

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	400	\	East Gate	Northwest	210
	Northeast	360	$\langle \rangle$		Northeast	360
	Southwest	430			Southwest	220
	Southeast	330	$\langle \rangle$		Southeast	350
Tota	al length (ft) =	1,520	```	Tota	l length (ft) =	1,140
	Guide Wall F	Rub Face Area (1	ft2) Al	I Walls Tota	l length (ft) =	2,660
	West Gate	13,680				
	East Gate	10,260				
Tot	al Area (ft2) =	23,940				



CHANNEL EXCAVATION

West Gate

East Gate

Total Length (ft) =

US Anny Corps. of Englishers.	Brazos River Floodgates Feasibility Study Iternative 9b - New Gates on Alignment C w/o Sediment Contro Quantities Estimate		JK GK
Number	Number Description	14-Sep-2017 Quantity	Unit
	UHMW-PE is available in many other colours if required.		

Alignment C throu	ugh existing barge faci	lity.	West channel currently not being used	d, East chann	el is occupied, West requires
The area is partia	lly excavated.		more excavation (subtract less)		
	Location	Area (ft2)	×	Area (ft2)	
Exist. channel are	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)
Channel excavation	on West channel	1,312,000	Channel Excavation West channel	1,046,800	697,900
required from CA	DD East channel	1,209,700	East channel	714,700	476,500
ſ	West channel north	169,830	West channel north	169,830	113,300 > 268,700
Exist.channel excavated	West channel south	232,990	West channel south	232,990	لے 155,400
to open channel ≺	East channel north	85,120	East channel north	85,120	56,800 > 181,800
(Alignment A)	East channel south	187,500	East channel south	187,500	125,000
			Sum =	2,436,940	ft2 1,624,900 yd3

Average depth of excavation used = 18 ft

FILL FOR NEW GATE LOCATIONS

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

£.	Brazos River Floodgates Feasibility Study	Designed By	J
uny Corps	Alternative 9c - New Gates on Alignment C w/ Sediment Control	Checked By	G
inhuana (habrut)	Quantities Estimate	14-Sep-2017	
umber	Number Description	0	
1	Mob & Demob	Quantity LUMPSUM	LS
-	MOD & Deniob	LUIVIFSUIVI	LO
2	Demolition (Quantities are for existing West and East Gates)		
	Existing Sector Gates (2 sector gates, 4 leafs)		
	1. Remove and Salvage Sector Gate (2 gates, 4 leafs, east & west channel)	365	
	2. Remove and Dispose Gate Foundation (2 gates)	15,310	
	3. Remove and Dispose Timber Piles (2 gates)	1,970	ΕA
	Guide Walls		
	1. Remove and Salvage Guide Walls (8 walls, east & west channel)	4,324	то
3	Excavation and Fill		
	New Gates on Alignment C		
	1. New West Channel Excavation	697,900	
	2. New East Channel Excavation 3. Excavate Existing West Gate Channel	476,500 268,700	
	Excavate Existing west Gate Channel Excavation Total =	1,443,100	CY
	Execution Four-	1,110,100	
	1. Fill for New Gate Location, West Gate	98,700	CY
	2. Fill for New Gate Location, East Gate	88,200	
	3. Fill Existing East Vessel Channel	63,400	
	Fill Total =	250,300	CY
	Direct (0) Thisk (avera)	0.000	то
	Riprap (3' Thick Layer)	8,000	10
			1
4	Cofferdam (Cofferdam placed around sector gates, 2 gates, 2 dams)		
	1. Excavation	35,600	
	2. Sand and Fill	12,600	CY
	3. Waler System - WF Members	440	ΤN
	4. Sheet Piles - AZ 38-700N	105,280	SF
	Internal Bracing (Struts) - 24" Dia. X 0.625" Thk.	4,600	LF
	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		TN
	9. Temporary Dewatering System 10. Removal of Cofferdam	2	LS LS
	10. Kentoval of Conerdam	2	1.5
5	Concrete Structure and Gate (Quantities are for 2 sector gates, 4 leafs)		-
0	Sector Gate Monolith		
	1. Sand and Gravel Bedding	3,400	CY
	2. Tremie Concrete - Seal Slab	9,000	CY
	3. Reinforced Concrete Base Slab	17,800	CY
	4. Reinforced Concrete Monolith	8,000	CY
	5. Pilings:		
	 a. Pilings - Vertical Spiral Piles - 30" Dia. X 0.625" Thk. b. Pilings - Batter Spiral Piles - 30" Dia. X 0.625" Thk. 	40,200 44,838	LF
	6. Tension Connection	44,838	
	7. Bulkhead Slots - Stainless Steel w/Seals (Embedded in Monolith)	200	
	8. Ladder Slots - Stainless Steel w/Ladders (Embedded in Monolith)	100	
			L
	Sector Gate		
	1. Sector Gates	1,136	TN
	2. Pintles and Hinges(King post) 3. Sector Gate Protection Fenders	2,360	LS LF
	4. Gate Seals, Seal Bearing Surfaces and Gate Track	2,360	
	5. Cathodic Protection	2	LS
			1
			<u> </u>

DEMOLITION

Two

Existing Gate:	
Each gate (lb) = 364,500	(2 leafs)
Each gate (ton) = 182.3	(2 leafs)
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

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

	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
DO	12 19/	6 496	10.670

SEE BOTTOM OF SPREADSHEET FOR EXCAVATION AND FILL QUANTITIES

108 462

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 99 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 SCCP* GuIf 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 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 length 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 diameter support piles are also anticipated to be required to help vertically support and reduce the unbraced length of the internal bracing (struts).

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.

Foundation = 116' x 2		r Gate, 46.5' x 110' Sector Gate	→ Pile Lengths (ft) Vertical = 169 Batter = 178	Sector Gate Weight (ton) = 537 No of vertical piles = 134 No of batter piles = 141
Brazos Sector Gate 3	1' x 125' (2	gates, 4 leafs)		
Brazos Sector Gate 3 No of vertical piles =	1' x 125' (2 268	gates, 4 leafs) Vertical pile length (ft) = 15	50 <= Enter vertical val	ue, 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 lb/ft3 (pcl), IHNC 6.7 pcl, and SGCP 4.8 pcl. The average weight per enclosed volume for these projects is 5.9 pcl. 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 588 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.

£	Brazos River Floodgates Feasibility Study	Designed By	JK
uny Corps	Alternative 9c - New Gates on Alignment C w/ Sediment Control		GK
rikana (habruti)	Quantities Estimate	14-Sep-2017	
umber	Number Description	Quantity	Uni
	Sector Gate Dewatering System (Maintenance Bulkhead)		
	1. Maintenance Bulkhead	633	ΤN
	2. 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		
	1. West Gate North Guide Wall	63.840	SE
	2. West Gate North 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	ΤN
	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	
	2. East Gate Rub Face UHMW Panel (2 3/4" thick)	10,260	SF
	Total =	23,940	SF
	1. 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	1. 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	23,940	
	Sheetpile - PZ-22, 52.75' length Concrete Base Slab	3,323 816	
	Concrete Base Slab	965	
	Sluice Gates (Rodney Hunt with Stem and Gear Box)		EA
	Hand Rail, 2" Standard Aluminum Pipe	-	LBS
	Bulkheads (4)		TON
	Rip Rap	6,000	
	1 1 ⁻ 1	0,000	
	Tie-in Sheetpile - PZ-35, 60' length	3,600	
	Tie-in Embankment	2,000	CY
	Earth Dewatering Dam		-
	10' Crown, 1:3 Side Slopes		
	Sand Core	3,426	
	2' Clay Cap	1,158	CY
			-

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

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	9c, New Gates on Alignment C with Sediment Control				
	New Guide Wa	III Lengths (ft)	New Guide Wa	all Area (sf)	New Guide Wa	Il Hardware (ton)
t Gate	North	760	North	63,840	North	143
	South	760	South	63,840	South	143
Gate	North	570	North	47,880	North	107
	South	570	South	47,880	South	107
Tota	Length (ft) =	2,660	Total 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 UHIW panels and steel plate estimated at 9 feet tall. 2 3/4 thick UHIW 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.

	G	uide Wall Rub F	ace Lengths	(ft)		
West Gate	Northwest	400	East	Gate	Northwest	210
	Northeast	360	\backslash		Northeast	360
	Southwest	430	$\langle \rangle$		Southwest	220
	Southeast	330			Southeast	350
Tota	al length (ft) =	1,520		Total	length (ft) =	1,140
	Guide Wall Ru	ib Face Area (ft	2) All Wall	s Total	length (ft) =	2,660
	West Gate East Gate	13,680 10,260				
Tota	al Area (ft2) =	23,940				

Ultra High Molecular Weight Polyethylene (UHMW-PE) W

EAR ALLOWANCES	EAR	ALLO	WAN	ICES
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APPLICATION	E (mens)	W* (mm)	BOLT	
Light duty	30	2-5	M16	20 C
	40	7-10		
Modium duty	50	10 - 15	M16 - M20	and the second s
	60	15 - 19		i LLLL '
Heavy duty	70	18 - 25	M24 - M30	1223
	80	22 - 32	-	t Id N
Extreme duty	90	25 - 36	M30 - M36	

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

West Gate

East Gate

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)



	CIVIL CONSTRUCTION COST ESTIMATE - ROM		SHEET	1 OF 1	
PROJECT:	CRL, OPEN CHANNEL			AUG 2017	
			BY: Grey EST BY:		
ITEM	DESCRIPTION	COMBO QUANTITY	UNIT	UNIT COST	AMOUNT
	BLH -DRY Enhancement (99 AC)				
1.	MOB AND DEMOB	1	ЈОВ	\$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	СҮ	\$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	СҮ	\$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 walls, sector gate walls, sector gate removal, interior guidewall, and	20,184 50,000 50' Sheet pile	CY SF	\$0.00 \$0.00	\$0.00 \$0.00
	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%	1		\$0.00 \$0.00
	SUBTOTAL (CONSTRUCTION + E&D + S&A):				\$0.00
	CONTINGENCIES	25	%		\$0.00
	TOTAL COST :				\$0.00

US Army Corps of Engineers _© New Orleans District	Colorado Locks Rehab Estimate Matagorda, Texas Gate Rehab and Guidewall Replacement	Designed By Checked By	JMR DPL
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
	Sector Cata		
3	Sector Gate Replacement Plates (ASTM A-572, Grade 50)	2,400	LBS
	Sand Blast and Paint 8 Gates	87,600	SF
		87,000	5F
	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
	Marine Hawara Madala		
5	Miscellaneous Metals		
	Guidewall (Chamber)	C 490	
	3/4" SST Anchor Rod, with 2 Nuts and Washers, 18"	6,480 216	EA
	1" SST Anchor Rod, with 2 Nuts and Washers, 18" 3/8" SST Corner Plate, 6" Radius, 1'-0" top to bottom, with 2 L #5 studs 2'-0" OC		EA LF
		1,800 36	EA
	Mooring Bollard 8"x12" Reinforced Marine Composite Timber	16,200	LF
		10,200	LI
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)

8	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

US Army Corps of Engineers _o New Orleans District	Colorado Locks Rehab Estimate Matagorda, Texas Riverside Gate Removal Alternative 4b.1	Designed By Checked By	JMR DPL
Number	Number Description		
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	50,930	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