

Hickory Cove Marsh Restoration And Living Shoreline

Bridge City, TX

WRDA 2016 Section 1122
Beneficial Use of Dredged Material
Appendix D: Cost



U.S. Army Corps of Engineers

Southwest Division

Galveston District

Cost Summary

This MII ver 4.4 estimate was developed for the Section 1122 Study for Hickory Cove Marsh. The marsh is located within Hickory Cove Bay and is located adjacent to the Sabine River and the northern end of Sabine Lake. The primary focus of the study is 677.31 acres of marsh to be restored from open water to freshwater marsh habitat. The study was conducted under the authority of Section 1122 of the Water Resources Development Act (WRDA) of 2016 and requires USACE to pursue pilot demonstrations of the beneficial use of dredged material.

This estimate was prepared using the latest Unit Price Books and labor rates for fiscal year 2022 (October 2021). The MII was developed using the work breakdown structure. The midpoint date of each account code was used to develop the fully funded costs. The estimate was prepared in accordance with ER 1110-2-1302. The estimates were based on standard operating practices for the Galveston District which assumed conventional contracting practices of large business IFB's.

An Abbreviated (Informal) Risk Analysis (ARA) was developed with the participation of the PDT. The results were used to develop the project contingencies. The contingencies along with the estimates were input into the Total Project Cost Summary Sheet (TPCS). The costs were escalated in accordance with the Engineering Regulation and EM 1110-2-1304 to mid-point of construction.

Initially four alternatives were considered. The alternatives were as follows:

No Action (Federal Standard): Since there is no DMMP in effect, the base plan was identified as the most recent, and therefore most likely future placement site for dredge material in the absence of a BU effort. The most recent dredging of the SNWW was an emergency action in 2012 and used Placement areas 29A and 29 B for material disposal. To establish the incremental cost, the PDT assessed the cost of disposal from this dredge cycle at Placement areas 29 A/B. Hickory Cove Marsh was designated to be the Federal Standard with continued placement of dredge material into placement areas 29A/B.

Alternative 1c: Restoring marsh to a target elevation using dredged material and restoring existing breached containment levee.

Alternative 2: In addition to Alternative 1, includes construction of a 14,623 LF detached breakwater to armor the shoreline along the SNWW/GIWW.

Alternative 3: This alternative takes Alternative 2 and plants a living shoreline on the exterior side of the containment levee. Southwest Division (SWD) directed the Project Delivery Team to go with alternative 3.

The result of the Class 4 estimate is listed in Table 1 below.

Table 1
Summary of Preliminary Cost w/ Contingency
By Code of Account
FY 2022 Price Level

Code of Accounts	Federal Standard PA 29A/B- 1.3MCY	Alt 1c - 1.35MCY	Alt 2 - 1.35 MCY + Breakwater	Alt 3 - 1.35 MCY + Living Shoreline+ Breakwater
NON-FEDERAL COSTS				
01 Lands and Damages	33,803	106,152	106,152	161,000
Total Non-Fed	33,803	106,152	106,152	161,000
FEDERAL COSTS				
01 Lands and Damages	7,125	21,375	21,375	36,000
06 Fish & Wildlife Facilitates		2,257,000	2,257,000	2,257,000
06 Living shoreline				2,442,000
10 Breakwater and Seawall			19,468,000	19,468,000
12 PA work	19,584,500			
12 Dredging	16,820,479	10,906,000	10,906,000	10,906,000
30 Planning, E&D	3,775,196	1,365,003	3,383,835	3,637,070
31 Const Mngt	2,912,398	1,053,040	2,610,480	2,805,840
Total Fed	\$ 43,099,698	\$ 15,602,418	\$ 38,646,690	\$ 41,551,910
TOTAL PROJECT COST:	\$ 43,133,501	\$ 15,708,570	\$ 38,752,842	\$ 41,712,910
TOTAL PROJ CST (rounded)	\$ 43,134,000	\$ 15,709,000	\$ 38,753,000	\$ 41,713,000

ACCOUNT CODE 01 - LANDS AND DAMAGES: The Galveston District Real Estate Division developed costs for Lands and Damages.

ACCOUNT CODE 06 – FISH AND WILDLIFE FACILITIES: Water Resource Section of the Hydraulics & Hydrology Branch provided all the quantities associate with this account. The cost was based on similar work done by the district. There are two separate items under this account. The first item is marsh creation which includes moving the dredge pipeline around to create the marsh, training berm, returning at later date, and input a circulation channel. The second item is the creation of the living shoreline. This involves planting 217,000 plants along the exterior of containment levee.

ACCOUNT CODE 10 – BREAKWATER AND SEAWALL: Water Resource Section of the Hydraulics & Hydrology Branch provided all the quantities associate with this account. Costs in this account code include all labor, equipment, and material costs to procure and install blanket stone, riprap, and geotextile. It was assumed the contractor would need to dredge an access channel to place the riprap. The cost was based on similar work done by the district

ACCOUNT CODE 12 – NAVIGATION PORTS AND HARBORS: The Water Resource Section of the Hydraulics & Hydrology Branch in conjunction with Operation Division provided the quantities associate with this account. The dredging will only occur with a maintenance dredge contract. It was assumed that a 24" pipeline dredging would dredge material from Sabine River and place it into the marsh. The dredging will only occur if there was a maintenance dredge contract occurring at the time. The dredging cost was developed using CEDEP and based on standard operating practices for the Galveston District.

ACCOUNT CODE 30 – PLANNING, ENGINEERING AND DESIGN: The cost for this account code was developed using a percentage of the construction work and in coordination with the PM/PDT.

ACCOUNT CODE 31 - CONSTRUCTION MANAGEMENT: Costs for this account code was developed using a percentage of the construction work and in coordination with the PM/PDT.

Sect 1122 - Hickory Cove Marsh, Texas on the Sabine River

Section 1122 of the Water Resources Development Act (WRDA) 2016 directs the USACE to establish a pilot program to carry out 10 projects for the beneficial use of dredged material. NOTE: the costs for work breakdown Accounts 01,30, and 31 were developed and found in the TPCS only to prevent errors. The escalation percentage is developed from the construction schedule and included in the TPCS. Contingences were developed in the Risk Analysis and were included in the TPCS, Due to the breakout of Federal and Non-Federal Sponsor costs rounding errors do occur, but they tally correctly.

Estimated by USACE SWG EC PS
Designed by USACE SWG EC
Prepared by Jackie Lockhart

Preparation Date 10/25/2021
Effective Date of Pricing 10/25/2021
Estimated Construction Time 840 Days

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Description	Page
Project Cost Summary Report	1
005 Selected Plan	1
005-05 Federal	1
005-05-06 Fish and Wildlife Facilities	1
005-05-10 Breakwaters and Seawalls	1
005-05-12 Navigation Ports and Harbors	1

<u>Description</u>	<u>Quantity</u>	<u>UOM</u>	<u>DirectCost</u>	<u>ProjectCost</u>
Project Cost Summary Report			25,033,125	26,799,866
005 Selected Plan	1.00	EA	25,033,125	26,799,866
005-05 Federal	1.00	EA	25,033,125	26,799,866
005-05-06 Fish and Wildlife Facilities	1.00	EA	3,298,214	3,586,734
005-05-10 Breakwaters and Seawalls	1.00	EA	13,382,815	14,861,035
005-05-12 Navigation Ports and Harbors	1.00	EA	8,352,097	8,352,097

Abbreviated Risk Analysis

Hickory Cove Marsh Alternative Formulation

Meeting Date: 17-Jun-20

PDT Members

Note: PDT involvement is commensurate with project size and involvement.

Represents	Name
Project Management:	Rueben Trevino
Planner:	Carrie McCabe
Environmental:	Jeff Pinsky
	Lorrie Taylor
Real Estate:	Nichole Schlund
OP Manager	Belynda Kinman
	Thomas West
Engineering & Design:	Molly Ross
Technical Lead:	Paul Hamilton
Cost Engineering:	Jackie Lockhart
Scheduler	Teri Conley
Program Analysis	Alvin Garcia

Meeting Date: Updated - 7/19/21

Project Management:	Gretchen Brown
Planner:	Carrie McCabe
Environmental:	Melinda Fisher
Real Estate:	Nichole Schlund
OP Manager	Belynda Kinman
Engineering & Design:	Molly Ross
Cost Engineering:	Jackie Lockhart

Abbreviated Risk Analysis

Project (less than \$40M): **Hickory Cove Marsh**
 Project Development Stage/Alternative: **Alternative Formulation**
 Risk Category: **Low Risk: Typical Construction, Simple**

Alternative:

Meeting Date: 7/19/2021

Total Estimated Construction Contract Cost = **\$ 30,000**

	<u>CWWBS</u>	<u>Feature of Work</u>	<u>Estimated Cost</u>	<u>% Contingency</u>	<u>\$ Contingency</u>	<u>Total</u>	
	01 LANDS AND DAMAGES	Real Estate	\$ -	0%	\$ -	\$ -	
1	06 FISH AND WILDLIFE FACILITIES	Marsh Creation	\$ 10,000	27%	\$ 2,676	\$ 12,676	
2	12 NAVIGATION, PORTS AND HARBORS	Dredging	\$ 10,000	31%	\$ 3,054	\$ 13,054	
3	10 BREAKWATERS AND SEAWALLS	Breakwater	\$ 10,000	35%	\$ 3,549	\$ 13,549	
4				0%	\$ -	\$ -	
5				0%	\$ -	\$ -	
6				0%	\$ -	\$ -	
8				0%	\$ -	\$ -	
9				0%	\$ -	\$ -	
10				0%	\$ -	\$ -	
11				0%	\$ -	\$ -	
12	All Other	Remaining Construction Items	\$ -	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, MUST INCLUDE JUSTIFICATION SEE BELOW)					\$ -	

Totals						
	Real Estate	\$	-	0%	\$	\$ -
	Total Construction Estimate	\$	30,000	31%	\$	9,280
	Total Planning, Engineering & Design	\$	-	0%	\$	-
	Total Construction Management	\$	-	0%	\$	-
	Total Excluding Real Estate	\$	30,000	31%	\$	9,280

Confidence Level Range Estimate (\$000's)	Base	50%	80%
	\$30k	\$35k	\$39k

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

Hickory Cove Marsh

Alternative Formulation

Abbreviated Risk Analysis

Meeting Date: 19-Jul-21

		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

Use/ View	Risk Element	Feature of Work	Concerns	PDT Discussions & Conclusions (Include logic & justification for choice of Likelihood & Impact)	Impact	Likelihood	Risk Level
Project Management & Scope Growth							40%
Yes	PS-1	Marsh Creation	Potential for scope growth, added features?	There is some potential scope growth if additional marsh cells are created due to increase funding is available. A discrete event like Hurricane Harvey could cause more sediment material to become available.	Negligible	Possible	0
Yes	PS-2	Dredging	Potential for scope growth, added features? Funding difficulties?	A discrete event like Hurricane Harvey could cause more sediment material to become available. Sabine River has not been dredge for O&M since 2009. Emergency dredging last occurred in 2012. There is no requirement to dredge to full depth. The District is trying to get material from Neches River, but is uncertain if Congress will fund the dredging.	Marginal	Possible	1
Yes	PS-3	Breakwater	Potential for scope growth, added features? Funding difficulties?	There is no expectation that the height or the length of the breakwater will change. Similar breakwater has been built in the area. Will need to verify Geotech during P&S. Funding uncertainty due to the pilot program and need to seek other sources.	Marginal	Possible	1
Acquisition Strategy							30%
Yes	AS-1	Marsh Creation	8A or Small Business	Cost concerns for reduced productivity of SBA or 8a Contractor. Small contractor likely.	Negligible	Possible	0
Yes	AS-2	Dredging	Contracting plan firmly established	Large 30" Pipeline Dredge was assumed for cost estimate due to pump length. Small business capability is unlikely, use of large contractor is expected.	Negligible	Likely	1
Yes	AS-3	Breakwater	Contracting plan firmly established/8a or Small Business	PDT assumed this would be one contract. If Duck Unlimited, (the study partner), does not a line with our funding needs it might require multiple contracts.	Marginal	Possible	1
Construction Elements							15%
Yes	CON-1	Marsh Creation	• Special equipment or subcontractors needed?	Access maybe restricted to water, which could increase mob & demob cost.	Marginal	Possible	1
Yes	CE-2	Dredging	• Potential for construction modification and claims?	There is always a potential for construction modifications and claim. This work uses standard construction methods used in the Galveston District.	Marginal	Possible	1
Yes	CE-3	Breakwater	• High risk or complex construction elements, site access, in-water? • Potential for construction modification and claims?	Access is by water There is always a potential for construction modifications and claim. This work uses standard construction methods used in the Galveston District.	Marginal	Possible	1
Specialty Construction or Fabrication							50%
Yes	SC-1	Marsh Creation	High risk or complex construction elements, site access, in-water?	Environmental success standpoint is tied to getting target elevation, which required moving the dredge pipe a lot so you don't have high or low spots. That can be difficult to achieve if you're working in really soft material	Marginal	Possible	1
Yes	SC-2	Dredging	Confidence in constructability and methodology?	This portion of work does not have any specialty equipment. It is very standard construction.	Negligible	Unlikely	0
Yes	SC-3	Breakwater	Confidence in constructability and methodology?	This portion of work does not have any specialty equipment. It is very standard construction.	Negligible	Unlikely	0

Technical Design & Quantities						Maximum Project Growth		20%
Yes	T-1	Marsh Creation	Possibility for increased quantities due to loss, waste, or subsidence? Sufficient investigations to develop quantities?	Possible subsidence of marsh with more material required to meet desired marsh elevation. Starting marsh elevation is possible to have some error involved. Additional data sources may be available for later milestones to validate initial assumption. More Geotech analysis will not occur until design and implementation. Unknow if timing of funding may change dredging requirements.	Marginal	Possible	1	
Yes	T-2	Dredging	Sufficient investigations to develop quantities.	Feasibility level investigations have been performed, and additional investigations will be conducted during PED.	Marginal	Possible	1	
Yes	T-3	Breakwater	• Possibility for increased quantities due to loss, waste, or subsidence?	Additional investigations will occur in PED to verify breakwater design plans against geotechnical conditions. If subsidence is expected to occur, quantities may increase.	Moderate	Unlikely	1	
Cost Estimate Assumptions						Maximum Project Growth		25%
Yes	EST-1	Marsh Creation	• Site accessibility, transport delays, congestion?	Current assumption is that access will be by boat.	Negligible	Possible	0	
Yes	EST-2	Dredging	Assumptions regarding crew, productivity, overtime?	Cost estimate was consistent with level of design performed. Use of historical data & parametric estimating is acceptable for early study milestones, but costs could increase with later refinement. However, use of CEDEP for dredging helps to reduce impact of under estimating costs.	Marginal	Possible	1	
Yes	EST-3	Breakwater	• Assumptions regarding crew, productivity, overtime?	Cost estimate was consistent with level of design performed. Use of historical data & parametric estimating is acceptable for early study milestones. Likelihood of cost increase is not likely, and any increases would have moderate impact.	Moderate	Unlikely	1	
External Project Risks						Maximum Project Growth		20%
Yes	EX-1	Marsh Creation	• Funding Constraints	This is a pilot study, therefore there is more certainty that the district will get the funding. Because of this funding has been preliminarily approved. Nothing has been set aside.	Significant	Possible	3	
Yes	EX-2	Dredging	• Funding Constraints	Uncertainty on when and if funding for dredging will be appropriated.	Significant	Possible	3	
Yes	EX-3	Breakwater	Funding Constraints	This is a pilot study, therefore there is more certainty that the district will get the funding. Even though the funding has been preliminarily approved, nothing has been set aside. If insufficient funding is provided then it would be dependent on outside sources to implement.	Significant	Likely	4	

**** TOTAL PROJECT COST SUMMARY ****

PROJECT: **Hickory Cove Marsh Section 1122 Beneficial Use Pilot Study Bidge City, Texas**
 PROJECT NO: **479586**
 LOCATION: **Sabine River, Texas**

DISTRICT: **Galveston District**

PREPARED: **10/25/2021**

POC: **CHIEF, COST ENGINEERING, Martin Regner, P.E. , C.C**

This Estimate reflects the scope and schedule in report; Report Name and date

Civil Works Work Breakdown Structure		ESTIMATED COST				PROJECT FIRST COST (Constant Dollar Basis)					TOTAL PROJECT COST (FULLY FUNDED)				
WBS NUMBER	Civil Works Feature & Sub-Feature Description	COST (\$K)	CNTG (\$K)	CNTG (%)	TOTAL (\$K)	ESC (%)	COST (\$K)	CNTG (\$K)	REMAINING COST (\$K)	Program Year (Budget EC):	TOTAL FIRST COST (\$K)	ESC (%)	COST (\$K)	CNTG (\$K)	FULL (\$K)
										2022					
											1-Oct- 21				
											1-Oct-21				
06	FISH & WILDLIFE FACILITIES	\$3,587	\$1,112	31%	\$4,699		\$3,587	\$1,112	\$4,699		\$4,699	8.5%	\$3,893	\$1,207	\$5,100
10	BREAKWATER & SEAWALLS	\$14,861	\$4,607	31%	\$19,468		\$14,861	\$4,607	\$19,468		\$19,468	10.5%	\$16,424	\$5,091	\$21,515
12	NAVIGATION PORTS & HARBORS	\$8,325	\$2,581	31%	\$10,906		\$8,325	\$2,581	\$10,906		\$10,906	12.9%	\$9,397	\$2,913	\$12,310
CONSTRUCTION ESTIMATE TOTALS:		\$26,773	\$8,300		\$35,073		\$26,773	\$8,300	\$35,073		\$35,073	11.0%	\$29,714	\$9,211	\$38,925
01	LANDS AND DAMAGES	\$129	\$32	25%	\$161		\$129	\$32	\$161		\$161	5.2%	\$136	\$34	\$170
30	PLANNING, ENGINEERING & DESIGN	\$2,965	\$917	31%	\$3,882		\$2,965	\$917	\$3,882		\$3,882	5.6%	\$3,130	\$968	\$4,098
31	CONSTRUCTION MANAGEMENT	\$1,981	\$614	31%	\$2,595	0.0%	\$1,981	\$614	\$2,595		\$2,595	7.7%	\$2,133	\$661	\$2,795
PROJECT COST TOTALS:		\$31,848	\$9,863	31%	\$41,711		\$31,848	\$9,863	\$41,711		\$41,711	10.3%	\$35,112	\$10,875	\$45,987

CHIEF, COST ENGINEERING, Martin Regner, P.E. , C.C.E.

ESTIMATED TOTAL PROJECT COST: \$45,987

PROJECT MANAGER, Grechen Brown

CHIEF, REAL ESTATE, Timothy Nelson

CHIEF, PLANNING, Andrea Catanzaro

CHIEF, ENGINEERING, Willie Joe Honza, P.E.

CHIEF, OPERATIONS, Chris C. Frabota

CHIEF, CONSTRUCTION, Don Carelock, P.E.

CHIEF, CONTRACTING, Shamekia Chapman

CHIEF, PM-PB, Nicholas Laskowski , P.G., PWS

CHIEF, DPM, Byron D. Williams, P.E.

**** TOTAL PROJECT COST SUMMARY ****

**** CONTRACT COST SUMMARY ****

PROJECT: Hickory Cove Marsh Section 1122 Beneficial Use Pilot Study Bidge City, Texas
 LOCATION: Sabine River, Texas
 This Estimate reflects the scope and schedule in report; Report Name and date

DISTRICT: Galveston District
 POC: CHIEF, COST ENGINEERING, Martin Regner, P.E. , C.C.E.
 PREPARED: 10/25/2021

WBS Structure		ESTIMATED COST				PROJECT FIRST COST (Constant Dollar Basis)				TOTAL PROJECT COST (FULLY FUNDED)				
		Estimate Prepared: 9-Sep-21		Estimate Price Level: 1-Oct-21		Program Year (Budget EC): 2022		Effective Price Level Date: 1-Oct-21						
WBS NUMBER	Civil Works Feature & Sub-Feature Description	COST (\$K)	CNTG (\$K)	RISK BASED		ESC (%)	COST (\$K)	CNTG (\$K)	TOTAL (\$K)	Mid-Point Date	ESC (%)	COST (\$K)	CNTG (\$K)	FULL (\$K)
				CNTG (%)	TOTAL (\$K)									
A	B	C	D	E	F	G	H	I	J	P	L	M	N	O
06	Living Shoreline FISH & WILDLIFE FACILITIES	\$1,864	\$578	31.0%	\$2,442		\$1,864	\$578	\$2,442	2025Q3	9.2%	\$2,035	\$631	\$2,666
06	Marsh Creation FISH & WILDLIFE FACILITIES	\$1,723	\$534	31.0%	\$2,257		\$1,723	\$534	\$2,257	2025Q1	7.8%	\$1,858	\$576	\$2,434
10	BREAKWATER & SEAWALLS	\$14,861	\$4,607	31.0%	\$19,468		\$14,861	\$4,607	\$19,468	2026Q1	10.5%	\$16,424	\$5,091	\$21,515
12	NAVIGATION PORTS & HARBORS	\$8,325	\$2,581	31.0%	\$10,906		\$8,325	\$2,581	\$10,906	2025Q1	12.9%	\$9,397	\$2,913	\$12,310
CONSTRUCTION ESTIMATE TOTALS:		\$26,773	\$8,300	31.0%	\$35,073		\$26,773	\$8,300	\$35,073			\$29,714	\$9,211	\$38,925
01	LANDS AND DAMAGES	\$129	\$32	25.0%	\$161		\$129	\$32	\$161	2024Q1	5.2%	\$136	\$34	\$170
30	PLANNING, ENGINEERING & DESIGN													
0.8%	Project Management	\$214	\$66	31.0%	\$280		\$214	\$66	\$280	2024Q1	5.1%	\$225	\$70	\$295
1.2%	Planning & Environmental Compliance	\$321	\$100	31.0%	\$421		\$321	\$100	\$421	2024Q1	5.1%	\$337	\$105	\$442
4.0%	Engineering & Design	\$1,063	\$330	31.0%	\$1,393		\$1,063	\$330	\$1,393	2024Q1	5.1%	\$1,117	\$346	\$1,463
0.8%	Reviews, ATRs, IEPRs, VE	\$214	\$66	31.0%	\$280		\$214	\$66	\$280	2024Q1	5.1%	\$225	\$70	\$295
0.5%	Life Cycle Updates (cost, schedule, risks)	\$134	\$42	31.0%	\$176		\$134	\$42	\$176	2024Q1	5.1%	\$141	\$44	\$184
0.4%	Contracting & Reprographics	\$107	\$33	31.0%	\$140		\$107	\$33	\$140	2025Q1	7.7%	\$115	\$36	\$151
1.2%	Engineering During Construction	\$321	\$100	31.0%	\$421		\$321	\$100	\$421	2025Q1	7.7%	\$346	\$107	\$453
0.3%	Planning During Construction	\$80	\$25	31.0%	\$105		\$80	\$25	\$105	2024Q1	5.1%	\$84	\$26	\$110
1.2%	Adaptive Management & Monitoring	\$321	\$100	31.0%	\$421		\$321	\$100	\$421	2024Q2	5.7%	\$339	\$105	\$445
0.6%	Project Operations	\$161	\$50	31.0%	\$211		\$161	\$50	\$211	2024Q2	5.7%	\$170	\$53	\$223
	Real Estate In-House Labor	\$29	\$7	25.0%	\$36		\$29	\$7	\$36	2024Q2	5.7%	\$31	\$8	\$38
						\$3,635								
31	CONSTRUCTION MANAGEMENT													
5.0%	Construction Management	\$1,339	\$415	31.0%	\$1,754		\$1,339	\$415	\$1,754	2025Q1	7.7%	\$1,442	\$447	\$1,889
1.2%	Project Operation:	\$321	\$100	31.0%	\$421		\$321	\$100	\$421	2025Q1	7.7%	\$346	\$107	\$453
1.2%	Project Management	\$321	\$100	31.0%	\$421		\$321	\$100	\$421	2025Q1	7.7%	\$346	\$107	\$453
CONTRACT COST TOTALS:		\$31,848	\$9,863		\$41,711		\$31,848	\$9,863	\$41,711			\$35,112	\$10,875	\$45,987

\$2,806