

**Brunswick Harbor Modifications Study, Glynn County, GA**

**Draft Integrated Feasibility Report and Environmental Assessment**

**Cost Engineering Appendix**

**U.S. ARMY CORPS OF ENGINEERS  
SAVANNAH DISTRICT  
100 WEST OGLETHORPE AVENUE  
SAVANNAH, GEORGIA 31401**



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**Attachments**

Attachment 1 – Total Project Cost Worksheets

Attachment 2 – MCACES Summary Sheets

Attachment 3 – Project Schedule

## 1.0 Project Description

This report presents the U.S. Army Corps of Engineers (USACE), Savannah District (CESAS), plan to examine harbor modifications to reduce transportation cost inefficiencies experienced by the largest ship type (roll-on/roll-off) utilizing Brunswick Harbor. The purpose of the study is to investigate existing conditions in the Brunswick Harbor and propose modifications with the purpose of contributing to national economic development while protecting the nation's environment and considering improved safety for navigating vessels. This estimate is in the alternatives phase. The project is in Brunswick, Georgia in Glynn County.

The Port of Brunswick, GA is the largest auto-port in the U.S. Last year, over 629,000 combined auto/machinery units moved through the port for import or export (GPA, 2019). The Brunswick Harbor Channel is a 36' deep (MLLW) by 400' wide channel. The channel was designed in the 1990s for a Roll-on/Roll-off (Ro/Ro) design vessel with dimensions of 660 feet long and 106 feet wide. Today, longer and wider vessels use the channel. This study was authorized under Section 1207 of the Water Resources Development Act (WRDA) 2016 and appropriations were received in FY2019 to begin the study. A Feasibility Cost-Sharing Agreement was executed in April 2019.

A similar study was performed in 2008 which included similar measures to the study being performed today. ROM estimates were generated for the PDT escalating the costs from the 2008 study using CWCCIS. Current costs will be provided for the study alternatives per USACE and other applicable regulations.

Alternatives generated by the study include combinations of four different dredging scenarios involving four areas and potentially two different disposal sites. The sites all include deepening and/or widening of the existing navigation channel. The areas include the following:

- Cedar Hammock Range Bend Widener
- Turning Basin
- Sidney Lanier Bridge
- St. Simon's Sound Channel Widener

Disposal sites include the following:

- Andrews Island
- Bird Island

All baseline costs are calculated using the existing Andrews Island as a disposal area. The navigation channel has historically been maintained using a suction cutter head dredge with materials being disposed of on Andrews Island. No sunk costs have been expended as the project is not yet authorized. All first costs assume budget year 2020.

See Section 5.6 of the main report for the anticipated cost share of the project.

### 1.1 Alternative 1: No Action Alternative

The No Action Alternative is analyzed as the future without-project conditions for comparison with the action alternatives. Taking no action would mean continuing

standard operations at Brunswick Harbor with no improvements to the Federal navigation channel. All physical conditions at the time of this analysis are assumed to remain. The new berth at Colonel’s Island and terminal expansion are included in the No Action Alternative. The No Action Alternative assumes one way RO/RO traffic within Brunswick Harbor, however vessels do occasionally meet in two locations – the St. Simons Sound and the Colonels Island Turning Basin. Vessels rarely meet in the turning basin as conditions must be ideal for the maneuver to take place and both pilots must agree to it. Meetings in the St. Simons Sound occur outside of the federal channel. The No Action Alternative also assumes O&M dredging would occur within the Federal navigation channel at authorized depths (-36 MLLW + 2’ Allowable Over Depth).

### 1.2 Alternative 2: Bend Widener

Alternative 2 would expand the Cedar Hammock Range bend widener located between stations 20+300 to 23+300. The bend widener would be expanded by a maximum of 321 feet on the north side and at a length of approximately 2,700 feet. Approximately 205,000 cubic yards of material would need to be dredged to expand the bend widener. Most of the dredged material would be placed in the Andrews Island Dredged Material Management Facility. Beneficial use of a portion of material from the bend widener is being considered for placement on the existing Bird Island to address erosion concerns.

**Table 1 – Alternative 2 – Total Project Cost Summary**

Brunswick Harbor Modification Study - ALT 2						
Bend Widener						
CWBS	Feature	Construction	Contingency	Total	First Cost	Total Cost
09	Channels and Canals	\$5,424	\$1,844	\$7,268	\$7,268	\$8,571
18	Cultural Resource Preservation	\$562	\$191	\$753	\$753	\$915
	SubTotal	\$5,986	\$2,035	\$8,021	\$8,021	\$9,485
01	Lands and Damages	\$13	\$3	\$16	\$16	\$17
30	Preconstruction Engineering and Design	\$542	\$184	\$726	\$726	\$850
31	Construction Management	\$509	\$173	\$682	\$682	\$850
	Total	\$7,050	\$2,396	\$9,445	\$9,445	\$11,191

  

Brunswick Harbor Modification Study - ALT 2 w O&M						
Bend Widener and Turning Basin Expansion						
CWBS	Feature	Construction	Contingency	Total	First Cost	Total Cost
09	Channels and Canals	\$6,056	\$2,059	\$8,115	\$8,115	\$10,361
18	Cultural Resource Preservation	\$562	\$191	\$753	\$753	\$915
	SubTotal	\$6,618	\$2,250	\$8,868	\$8,868	\$11,275
01	Lands and Damages	\$13	\$3	\$16	\$16	\$17
30	Preconstruction Engineering and Design	\$599	\$204	\$803	\$803	\$1,050
31	Construction Management	\$564	\$192	\$682	\$756	\$1,050
	Total	\$7,794	\$2,649	\$10,442	\$10,442	\$13,381

### 1.3 Alternative 3: Turning Basin Expansion

Alternative 3 would include expanding the existing turning basin at the Colonel’s Island facility along approximately 3,200 feet increasing the width by a maximum of 395 feet

along South Brunswick River from stations 0+900 to 5+300. The turning basin expansion would require approximately 346,000 cubic yards of dredged material to be removed. All of the dredged material would be placed in the Andrews Island Dredged Material Management Facility.

**Table 2 – Alternative 3 – Total Project Cost Summary**

Brunswick Harbor Modification Study - ALT 3						
Turning Basin						
CWBS	Feature	Construction	Contingency	Total	First Cost	Total Cost
09	Channels and Canals	\$4,800	\$1,632	\$6,432	\$6,432	\$7,585
18	Cultural Resource Preservation	\$562	\$191	\$753	\$753	\$915
	SubTotal	\$5,362	\$1,823	\$7,185	\$7,185	\$8,499
01	Lands and Damages	\$13	\$3	\$16	\$16	\$17
30	Preconstruction Engineering and Design	\$486	\$165	\$651	\$651	\$762
31	Construction Management	\$455	\$155	\$610	\$610	\$762
	Total	\$6,316	\$2,146	\$8,462	\$8,462	\$10,028

Brunswick Harbor Modification Study - ALT 3 w O&M						
Bend Widener and Turning Basin Expansion						
CWBS	Feature	Construction	Contingency	Total	First Cost	Total Cost
09	Channels and Canals	\$11,666	\$3,966	\$15,632	\$15,632	\$27,033
18	Cultural Resource Preservation	\$562	\$191	\$753	\$753	\$915
	SubTotal	\$12,228	\$4,158	\$16,385	\$16,385	\$27,947
01	Lands and Damages	\$13	\$3	\$16	\$16	\$17
30	Preconstruction Engineering and Design	\$1,106	\$376	\$1,482	\$1,482	\$2,936
31	Construction Management	\$1,038	\$353	\$610	\$1,391	\$2,936
	Total	\$14,384	\$4,890	\$19,274	\$19,274	\$33,765

#### 1.4 Alternative 4: Meeting Area West of Sidney Lanier Bridge

Alternative 4 would create a RO/RO vessel meeting area upstream of the Sidney Lanier Bridge to the turning basin at the Colonel's Island facility (a distance of approximately 8,700 feet). This part of the Federal Navigation Channel is currently 400 feet wide. The Federal channel would be expanded by approximately 200 feet on both the north and south side of the channel to create a new channel width of 800 feet from stations 34+200 to 43+200. The meeting area would require dredging of approximately 800,000 cubic yards of material. All of the dredged material would be placed in the Andrews Island Dredged Material Management Facility.

**Table 3 - Alternative 4 - Total Project Cost Summary**

Sidney Lane Channel Widener						
CWBS	Feature	Construction	Contingency	Total	First Cost	Total Cost
09	Channels and Canals	\$12,493	\$4,248	\$16,741	\$16,741	\$19,740
18	Cultural Resource Preservation	\$562	\$191	\$753	\$753	\$915
	SubTotal	\$13,055	\$4,439	\$17,494	\$17,494	\$20,655
01	Lands and Damages	\$13	\$3	\$16	\$16	\$17
30	Preconstruction Engineering and Design	\$1,173	\$399	\$1,572	\$1,572	\$1,840
31	Construction Management	\$1,110	\$377	\$1,487	\$1,487	\$1,840
	Total	\$15,351	\$5,218	\$20,569	\$20,569	\$24,342

### 1.5 Alternative 5: Meeting Area at St. Simon's Sound

Alternative 5 would create a RO/RO vessel meeting area located at St. Simon's Sound near the entrance channel to Brunswick Harbor. Since this area is naturally deep water, no dredging would be required. Creating a meeting area at St. Simon's Sound would re-locate the north toe of the existing channel approximately 800 feet to the north from stations -6+800 to 4+300. Alternative 4 would expand the Federal channel at St. Simon's Sound by 800 feet north of the existing channel along a length of approximately 10,000 feet. The existing channel centerline would not change.

**Table 4 - Alternative 5 - Total Project Cost Summary**

		St. Simons Meeting Area				
CWBS	Feature	Construction	Contingency	Total	First Cost	Total Cost
09	Channels and Canals	\$0	\$0	\$0	\$0	\$0
18	Cultural Resource Preservation	\$562	\$191	\$753	\$753	\$915
	SubTotal	\$562	\$191	\$753	\$753	\$915
01	Lands and Damages	\$13	\$3	\$16	\$16	\$17
30	Preconstruction Engineering and Design	\$50	\$17	\$67	\$67	\$78
31	Construction Management	\$47	\$16	\$63	\$63	\$78
	Total	\$672	\$227	\$899	\$899	\$1,087

### 1.6 Alternative 6: Bend Widener and Turning Basin Expansion

Alternative 6 is a combination of the bend widener and the turning basin expansion. Alternative 6 includes the 205,000 cubic yards of material at the bend widener and the 346,000 cubic yards of material at the turning basin expansion for a total of approximately 551,000 cubic yards of material. Disposal options are the same as Alternatives 2 and 3.

**Table 5 - Alternative 6 – Total Project Cost Summary**

Brunswick Harbor Modification Study - ALT 6						
Alternative 6, BW + TB						
CWBS	Feature	Construction	Contingency	Total	First Cost	Total Cost
09	Channels and Canals	\$8,113	\$2,758	\$10,871	\$10,871	\$12,819
18	Cultural Resource Preservation	\$1,001	\$340	\$1,341	\$1,341	\$1,629
	SubTotal	\$9,114	\$3,099	\$12,213	\$12,213	\$14,449
01	Lands and Damages	\$13	\$3	\$16	\$16	\$17
30	Preconstruction Engineering and Design	\$822	\$279	\$1,101	\$1,101	\$1,289
31	Construction Management	\$775	\$264	\$1,039	\$1,039	\$1,289
	Total	\$10,724	\$3,645	\$14,368	\$14,368	\$17,032

Brunswick Harbor Modification Study - ALT 6 w O&M						
Bend Widener and Turning Basin Expansion						
CWBS	Feature	Construction	Contingency	Total	First Cost	Total Cost
09	Channels and Canals	\$15,611	\$5,308	\$20,919	\$20,919	\$34,058
18	Cultural Resource Preservation	\$1,001	\$340	\$1,341	\$1,341	\$1,629
	SubTotal	\$16,612	\$5,648	\$22,260	\$22,260	\$35,687
01	Lands and Damages	\$13	\$3	\$16	\$16	\$17
30	Preconstruction Engineering and Design	\$1,499	\$510	\$2,009	\$2,009	\$3,663
31	Construction Management	\$1,413	\$480	\$1,039	\$1,893	\$3,663
	Total	\$19,537	\$6,641	\$26,178	\$26,178	\$42,958

### 1.7 Alternative 7: Bend Widener, Turning Basin Expansion, and Meeting Area West of Sidney Lanier Bridge

Alternative 7 is a combination of the bend widener, turning basin expansion, and meeting area west of the Sidney Lanier Bridge. Alternative 7 includes the 205,000 cubic yards of material at the bend widener, 346,000 cubic yards at the turning basin expansion, and 800,000 cubic yards at the meeting area west of the Sidney Lanier Bridge for a total of approximately 1,352,000 cubic yards of dredged material. Disposal options are the same as Alternatives 2 and 3.

**Table 6 - Alternative 7 - Total Project Cost Summary**

Brunswick Harbor Modification Study - ALT 7						
Bend Widener, Turning Basin Expansion, and Meeting Area West of Sidney Lanier Bridge						
CWBS	Feature	Construction	Contingency	Total	First Cost	Total Cost
09	Channels and Canals	\$19,006	\$6,462	\$25,468	\$25,468	\$30,032
18	Cultural Resource Preservation	\$1,262	\$429	\$1,691	\$1,691	\$2,054
	SubTotal	\$20,268	\$6,891	\$27,159	\$27,159	\$32,086
01	Lands and Damages	\$13	\$3	\$16	\$16	\$17
30	Preconstruction Engineering and Design	\$1,826	\$621	\$2,447	\$2,447	\$2,865
31	Construction Management	\$1,723	\$586	\$2,309	\$2,309	\$2,865
	Total	\$23,830	\$8,101	\$31,930	\$31,930	\$37,807

Brunswick Harbor Modification Study - ALT 7 w O&M						
Bend Widener, Turning Basin Expansion, and Meeting Area West of Sidney Lanier Bridge						
CWBS	Feature	Construction	Contingency	Total	First Cost	Total Cost
09	Channels and Canals	\$26,504	\$9,011	\$35,515	\$35,515	\$51,270
18	Cultural Resource Preservation	\$1,262	\$429	\$1,691	\$1,691	\$2,054
	SubTotal	\$27,766	\$9,440	\$37,206	\$37,206	\$53,324
01	Lands and Damages	\$13	\$3	\$16	\$16	\$17
30	Preconstruction Engineering and Design	\$2,503	\$851	\$3,354	\$3,354	\$5,238
31	Construction Management	\$2,361	\$803	\$2,309	\$3,164	\$5,238
	Total	\$32,643	\$11,097	\$43,740	\$43,740	\$63,733



### 1.8 Alternative 8: Bend Widener, Turning Basin Expansion, and Meeting Area at St. Simon’s Sound

Alternative 8 is a combination of the bend widener, turning basin expansion, and meeting area at St. Simon’s Sound. Alternative 8 includes the 205,000 cubic yards of material at the bend widener, 346,000 cubic yards at the turning basin expansion, and 0 cubic yards at the meeting area at St. Simon’s Sound for a total of approximately 551,000 cubic yards of dredged material. Disposal options are the same as Alternatives 2 and 3.

**Table 7 - Alternative 8 - Total Project Cost Summary**

Brunswick Harbor Modification Study - ALT 8						
Bend Widener, Turning Basin Expansion, and Meeting Area at St. Simon’s Sound						
CWBS	Feature	Construction	Contingency	Total	First Cost	Total Cost
09	Channels and Canals	\$8,453	\$2,874	\$11,327	\$11,327	\$13,357
18	Cultural Resource Preservation	\$1,262	\$429	\$1,691	\$1,691	\$2,054
	SubTotal	\$9,715	\$3,303	\$13,018	\$13,018	\$15,411
01	Lands and Damages	\$13	\$3	\$16	\$16	\$17
30	Preconstruction Engineering and Design	\$875	\$298	\$1,173	\$1,173	\$1,373
31	Construction Management	\$825	\$281	\$1,106	\$1,106	\$1,373
	Total	\$11,428	\$3,884	\$15,312	\$15,312	\$18,160

Brunswick Harbor Modification Study - ALT 8 w O&M						
Bend Widener, Turning Basin Expansion, and Meeting Area at St. Simon’s Sound						
CWBS	Feature	Construction	Contingency	Total	First Cost	Total Cost
09	Channels and Canals	\$15,951	\$5,423	\$21,374	\$21,374	\$34,595
18	Cultural Resource Preservation	\$1,262	\$429	\$1,691	\$1,691	\$2,054
	SubTotal	\$17,213	\$5,852	\$23,065	\$23,065	\$36,649
01	Lands and Damages	\$13	\$3	\$16	\$16	\$17
30	Preconstruction Engineering and Design	\$1,552	\$528	\$2,080	\$2,080	\$3,746
31	Construction Management	\$1,463	\$497	\$1,106	\$1,960	\$3,746
	Total	\$20,241	\$6,881	\$27,121	\$27,121	\$44,086

### 1.9 Alternative 9: Bend Widener, Turning Basin Expansion, Meeting Area West of Sidney Lanier Bridge and Meeting Area at St. Simon’s Sound

Alternative 9 includes the 551,000 cubic yards of dredging to occur at the bend widener and turning basin plus creation of a RO/RO vessel meeting area upstream of the Sidney Lanier Bridge to the turning basin at the Colonel’s Island facility and creation of a meeting area at St. Simon’s Sound, as described in the previous alternatives. The total dredging amount for Alternative 5 is approximately 1,352,000 cubic yards. Disposal options are the same as Alternatives 2 and 3.

**Table 8 - Alternative 9 - Total Project Cost Summary**

Brunswick Harbor Modification Study - ALT 9						
Bend Widener, Turning Basin Expansion, Meeting Area West of Sidney Lanier Bridge and Meeting Area at St. Simon's Sound						
CWBS	Feature	Construction	Contingency	Total	First Cost	Total Cost
09	Channels and Canals	\$19,006	\$6,462	\$25,468	\$25,468	\$30,032
18	Cultural Resource Preservation	\$1,323	\$450	\$1,773	\$1,773	\$2,153
	SubTotal	\$20,329	\$6,912	\$27,241	\$27,241	\$32,185
01	Lands and Damages	\$13	\$3	\$16	\$16	\$17
30	Preconstruction Engineering and Design	\$1,832	\$623	\$2,455	\$2,455	\$2,874
31	Construction Management	\$1,728	\$588	\$2,316	\$2,316	\$2,874
	Total	\$23,902	\$8,125	\$32,027	\$32,027	\$37,924

  

Brunswick Harbor Modification Study - ALT 9 w O&M						
Bend Widener, Turning Basin Expansion, Meeting Area West of Sidney Lanier Bridge and Meeting Area at St. Simon's Sound						
CWBS	Feature	Construction	Contingency	Total	First Cost	Total Cost
09	Channels and Canals	\$26,504	\$9,011	\$35,515	\$35,515	\$51,270
18	Cultural Resource Preservation	\$1,323	\$450	\$1,773	\$1,773	\$2,153
	SubTotal	\$27,827	\$9,461	\$37,288	\$37,288	\$53,423
01	Lands and Damages	\$13	\$3	\$16	\$16	\$17
30	Preconstruction Engineering and Design	\$2,509	\$853	\$3,362	\$3,362	\$5,248
31	Construction Management	\$2,366	\$804	\$2,316	\$3,170	\$5,248
	Total	\$32,715	\$11,122	\$43,836	\$43,836	\$63,850

## 2.0 Basis of Estimate

### 2.1 Basis of Design

The level of design developed for this report is approximately 15%. Given this level of design, the estimate falls into a Class 4 category per ER 1110-2-1302. In general, costs were derived using corollary data from similar projects completed recently and scaled up or down to the projected design. For the corollary cost data, recent projects in close geographic proximity with similar scope were used when possible to give the most reasonable similar costs. Refer to the Engineering Design Appendix for further details on the basis of design and plan drawings.

### 2.2 Basis of Quantities

- a) The quantity takeoffs were developed by the technical team. Composition of dredged materials were approximated from a singular cross section provided by the Geotechnical Engineer and are assumed to be representative of the entire area to be dredged. See the Geotechnical Engineering Report for more information. As additional information is obtained pertaining to the composition of the dredged material, the estimate will be refined.
- b) Estimated new work quantities were calculated for each individual navigational feature using Autodesk Civil 3d. The quantities for each navigational feature were calculated to -36 ft MLLW and -38 ft MLLW using the June/July 2019 bathymetric

data. -36 ft MLLW represents the current authorized project depth and -38 ft MLLW represents the allowable overdepth during dredging.

**Table 9 – Quantities from Engineering Appendix**

*Estimated Dredging Quantities per Navigational Feature*

Navigational Feature	Depth (ft MLLW)	Cut (CY)
Bend Widener	-38	205,159
Turning Basin 1	-38	458,087
Turning Basin 2	-38	693,488
Turning Basin 3	-38	623,948
Turning Basin 4	-38	346,462
Sidney Lanier Meeting Area	-38	800,074
St. Simon's Sound Meeting Area	-38	0

**3.0 Estimate**

The design was refined and a cost estimate was developed for each alternative. First Cost includes all costs in FY2020 dollars, Total Project Cost includes escalation to the mid-point of construction and contingency.

**3.1 General Assumptions**

- a) No (hard) rock excavation is included. Sections indicate “weathered limestone”. Assume that this can be dredged using the same dredging equipment. No blasting is included.
- b) All dredged material is assumed to be disposed of on Andrews Island. An alternative disposal site for beneficial use is Bird Island.
- c) Operations and maintenance costs are assumed to be directly related to surface area of navigation areas. That is, the incremental increase in cost for O&M costs is parametrically related to existing costs, based on surface area (square feet of navigation channel).
- d) Water from effluent filter cells will be discharged into the waterway. No additional treatment is needed.
- e) No environmental mitigation is included.
- f) Contractor staging area is assumed to be at area TBD. This is the same area that will be used for annual maintenance dredging.
- g) Quantities include two (2) feet for allowance dredging of over-dig for non-pay is included for all dredged areas and alternates.

- h) Dredging areas are computed from plans utilizing software. A dredging prism was not provided. Bank heights were calculated (approximated) using dredging volumes and surface areas.
- i) Pipeline distances are approximated using Google Earth images. Pipelines are measured from the middle of the dredged area.
- j) Material composition provided by Geotechnical Engineering. Compositions are as follows:

**Table 10 – Material Composition**

Location	Dredge Volume	Surface Area	1,200 GR/L	1,300 GR/L	1,400 GR/L	1,700 GR/L	1,900 GR/L	2,000 GR/L	2,000 GR/L	2,300 GR/L	2,400 GR/L	2,000 GR/L
			Mud&Silt	Mud&Silt	Mud&Silt	Loose Sand	Loose Sand	Comp Sand	Stiff Clay	Comp Shell	Soft Rock	Blast Rock
Bend Widener	205,159 CY	564,881 SF	23.2%	0.0%	7.7%	3.1%	6.5%	17.6%	8.0%	0.0%	33.7%	0
Turning Basin	346,462 CY	530,096 SF	5.7%	2.5%	3.4%	30.7%	26.4%	8.4%	10.1%	0.0%	12.8%	0.0%
Channel Widener (Sidney Lanier)	800,074 CY	2,361,796 SF	2.6%	0.0%	1.9%	25.1%	15.0%	4.9%	21.0%	0.0%	29.6%	0.0%
St. Simon's Sound Meeting Area	0 CY	100,000 SF	100.0%									

#### 4.0 Construction Schedule

A formal construction schedule was not developed for the project. The estimate assumes that dredged materials financial resources and other commodities will be available as needed to complete the project efficiently. Since field office overhead is estimated as a percentage of the construction cost, the duration will not have an impact on the estimates. However, the duration does have an impact on the estimates once escalation is applied.

#### 5.0 Risk Assessment

An abbreviated risk analysis (ARA) was performed for the project. A contingency was developed for each major construction feature. A weighted average was calculated for each estimate using these contingencies.

#### 6.0 Real Estate Costs

Real estate costs were provided by the PDT and are included in the estimate.

#### 7.0 References

U.S. Army Corps of Engineers, 1993, *Engineering and Design Cost Engineering Policy and General Requirements, Engineering Regulation 1110-1-1300*, Department of the Army, Washington D.C., 26 March 1993.

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