

**PUBLIC NOTICE**  
**Savannah District, Corps of Engineers**

**SUBJECT:** Request for Comments on the Savannah Harbor Expansion Project Formulation of Alternatives

**TO WHOM IT MAY CONCERN:**

Notice of the following is hereby given:

a. Pursuant to the National Environmental Policy Act of 1969, notice is hereby given that the US Army Corps of Engineers, Savannah District, proposes alternatives to be considered during evaluation of the Savannah Harbor Expansion Project, Chatham County, Georgia, and Jasper County, South Carolina.

b. The attached document is an Executive Summary of a report written for the Savannah Harbor Expansion Project on the Formulation of Alternatives for the project. The purpose the investigation was to perform two of the first three steps in the Federal water resources planning process. Those steps are to (1) identify any problems and opportunities, and (2) formulate alternative plans. The navigation problems being experienced are identified to clarify the issues that the study is intending to address. Opportunities to improve other natural or water resources situations in the study area are identified to enhance conditions in the area if a navigation improvement project is constructed. Potential methods of solving the navigation problems are identified and examined. Both structural and non-structural means are considered. Management measures that show potential for addressing navigation problem or opportunity are evaluated based on technical, economic, and environmental considerations.

c. The entire report can be obtained either by writing the Savannah District at the following address: US Army Corps of Engineers, Savannah District, Project Management, Attention:  
Mr. Thomas A. Garrett (PM-CM), Post Office Box 889, Savannah, Georgia 31402-0889, by calling Mr. Garrett at (912)652-5172, or by writing to the following email address: thomas.a.garrett@sas02.usace.army.mil. The Report and Executive Summary can also be found on the Savannah District website at: <http://www.sas.usace.army.mil>.

d. Written statements regarding the report will be received at the Savannah District Office until

**12 O’CLOCK NOON, June 6, 2005.**

**Comment Period:** Anyone wishing to comment to the Corps on this proposed action should submit comments no later than the end of the comment period shown in this

notice, in writing, to the District Engineer, US Army Corps of Engineers, Savannah District, Attention:  
Mr. Thomas A. Garrett, Post Office Box 889, 100 West Oglethorpe Avenue, Savannah, Georgia 31402-0889, or by e-mailing the comments to the following address:  
thomas.a.garrett@sas02.usace.army.mil.

**Point of Contact:** If there are any questions concerning this Public Notice, please contact  
Mr. Thomas A. (Alan) Garrett, Project Manager, at (912)652-5172.

William G. Bailey  
Acting Chief, Planning Division

Enclosure

## **SAVANNAH HARBOR EXPANSION PROJECT**

### **Formulation of Alternatives**

#### **Executive Summary**

##### **PURPOSE**

The purpose of this investigation was to perform two of the first three steps in the Federal water resources planning process. Those steps are to (1) identify any problems and opportunities, and (2) formulate alternative plans. The navigation problems being experienced are identified to clarify the issues that the study is intending to address. Opportunities to improve other natural or water resources situations in the study area are identified to enhance conditions in the area if a navigation improvement project is constructed. Potential methods of solving the navigation problems are identified and examined. Both structural and non-structural means are considered. Management measures that show potential for addressing navigation problem or opportunity are evaluated based on technical, economic, and environmental considerations. The evaluations are conducted in accordance with criteria established Economic and Environmental Principles and Guidelines for Water and Related Land Resources Implementation Studies (U.S. Water Resources Council, 1983) and the policies and procedures established by ER 1105-2-100, Planning Guidance Notebook, 22 Apr 2000.

## **PROBLEMS AND OPPORTUNITIES**

The current Savannah Harbor Navigation Project has an authorized project depth of 42 feet Mean Low Water (MLW) in the inner harbor, 42 feet MLW in the entrance channel (Stations 0+000 to -14+000B), and 44 feet MLW in the remainder of the entrance channel (Stations -14+000B to -60+000B); the current channel width is 600 ft across the bar to the entrance channel, 500 ft from the entrance channel to Kings Island Turning Basin, 400 ft from the Kings Island Turning Basin to the Argyle Island Turning Basin, and 200 ft from the Argyle Turning Basin to the upstream limit of the authorized project. Savannah Harbor was last deepened in 1993/1994. Since that time container traffic has greatly exceeded projections. The world fleet is increasing in size and the newer, larger vessels are expected to call at the Port of Savannah. The Georgia Ports Authority believes that increased channel depths are necessary to accommodate the increasing drafts of these larger vessels. The following Problems and Opportunities were identified during the early phases of the planning process.

### **Problems**

1. Existing shippers are experiencing increased/ inflated operations costs due to light loading and tidal delays.
2. Light loading and tidal delays will increase as present harbor users increase their annual tonnage and as larger, more efficient ships replace older, smaller ones.
3. Existing ships are experiencing problems associated with turning capabilities and overall maneuverability in certain reaches of the inner harbor.
4. The severity of problems associated with turning capabilities and overall maneuverability in certain reaches of the inner harbor will increase as vessel size increases.

### **Opportunities**

1. Beneficial placement of new work sediments (Tybee Island and other locations).
2. Development of new upper harbor disposal area with new work material.
3. Reduce O&M annual dredging costs.
4. Enhance the natural resources in the project area.
5. Advance the understanding of the natural resources in the project area
6. Contribute to the preservation of historically significant resources in the project area
7. Contribute to other agencies environmental decision making resources through development of state of the art modeling tools.
8. Reduce constraints of harbor pilot operating practices.
9. Identify the accumulated environmental impacts from past harbor development and operation. When consistent with the USACE authorities and policies, include appropriate actions in the plan alternatives.

## PLAN FORMULATION

The four planning objectives listed below were identified as ways to solve the navigation problems identified above. Both non-structural and structural measures were identified and evaluated to determine if they could effectively meet each of these goals.

- Decrease costs that result from tidal delays associated with container vessels entering and leaving Savannah Harbor over the period 2010 through 2050.
- Decrease costs that result from light-loading associated with container vessels entering and leaving Savannah Harbor over the period 2010 through 2050.
- Decrease costs that result from maneuverability problems associated with container vessels entering and leaving Savannah Harbor over the period 2010 through 2050.
- Decrease costs that result from operational constraints associated with container vessels entering and leaving Savannah Harbor over the period 2010 through 2050.

The non-structural measures consisted of reducing underkeel clearance, modifying Garden City Terminal, improving traffic management practices, and improving aids to navigation. The structural measures consisted deepening the existing navigation channel, deepening the navigation channel only to the location of a new container terminal, straightening the channel, constructing bend wideners, developing meeting/passing areas, constructing a regional port, and developing an offshore transshipment facility.

## EVALUATION OF MANAGEMENT MEASURES

Management measures are the building blocks of alternative plans and are categorized as structural and nonstructural. Equal consideration must be given to these categories of measures during the planning process. An alternative plan is a set of one or more management measures functioning together to address one or more planning objectives.

### Non-Structural

#### *Reducing Underkeel Clearance.*

This measure had the potential to reduce the light loading and tidal delays currently experienced by commercial vessels calling at Savannah by allowing vessels to transit through the harbor with less water under their keel. If this measure were implemented, vessel transits could occur through the harbor over a wider portion of the tidal cycle and, therefore, vessels movements would be more efficient. This increased efficiency would reduce transportation costs for commercial navigation through Savannah Harbor with consequent National Economic Development (NED) benefits.

A Port Users Workgroup, assembled in 1996, consisting of representatives of the Savannah Pilots Association, Georgia Ports Authority, shippers, terminal operators, towing companies, other maritime industry professionals, the Corps, USCG, and other Federal agencies developed the *Port of Savannah Minimal Underkeel Clearance Guidelines for Minimum Underkeel Clearances*. The guidelines were adopted by parties to the Workgroup as a minimum operational standard for vessels transiting Savannah Harbor. The guidelines assume that at low water (LW), vessels with good maneuverability would have a 38-foot operating draft in the 42-foot channel. This translates to a 4-foot underkeel clearance requirement.

Savannah Pilots consider the Savannah underkeel guidelines to be the minimal underkeel clearance necessary to safely navigate Savannah Harbor and fully expect that the current underkeel clearance guideline will prevail throughout the period of analysis. They believe receipt of real-time environmental data, such as information on channel depths or wind speed, would not allow them to relax their underkeel clearance guidelines.

These underkeel guidelines are consistent with other deep draft ports in the United States. Specifically the ports of New York - New Jersey, Delaware River, Norfolk – Hampton, and Los Angeles – Long Beach.

At this time there is no potential for reduced underkeel clearance to address navigation problems and opportunities in Savannah Harbor. The underkeel clearance currently stipulated by the guidelines does not offer any opportunity for reduction when vessel squat is included in the clearance calculation.

***Modifying Garden City Terminal.***

The purpose of this alternative was to increase the efficiency of Garden City Terminal and, therefore, decrease the turn-around time for vessels calling at the terminal. Given the growth forecasts for containers moving through Savannah Harbor during the period of analysis, a decreased vessel turn-around time could potentially reduce congestion and increase throughput in the port when compared to the without-project conditions.

Potential expansions in the throughput capacity of the Garden City Terminal are summarized in the following table. This table suggests that proposed terminal improvements could increase the throughput capacity from 1,750,000 TEU to 3,850,000 TEU.

<b>PLANNED MEASURES TO AUGMENT CAPACITY OF GARDEN CITY TERMINAL</b>		
<b>Improvements</b>	<b>Capacity Augmentation (TEUs)</b>	<b>Year</b>
Current Throughput Capacity	1,750,000	2003
Increase Storage Utilization to 5,500 TEU per acre per year, Including: realigning stacks, improved pavement, increasing stack heights and densities	+ 1,000,000	Ongoing

Bring new berth (CB-8) on line	+ 440,000	2007
Incorporation of Anhydrous Ammonia Property at CB-7	+ 75,000	2008
Off-Site Storage of Long-Dwell Empties	+ 200,000	2015/2019
Incorporation of Garden City Triangle Property	+ 385,000	2015/2019
	<b>Total</b>	<b>3,850,000</b>

GPA has stated that it will continue to upgrade its facilities when needed to ensure sufficient capacity exists and landside facilities do not restrict the volume of cargo movements. Further advancement of these capacity movements would not be cost-effective. Therefore, they were not deemed to be effective as a means to improve cost-effectiveness of moving cargo through the harbor. Since GPA has committed to implement these capacity improvements when needed, they will be considered as part of the Without Project condition.

***Vessel Traffic Coordination.***

The movement of vessels within the harbor system is coordinated by the Harbor Pilots. The Pilots indicated that expanding existing technology or providing any new technology would not help them to a meaningful extent to coordinate vessel movement within the harbor. Therefore, this management measure will not be considered further in this study.

***Aids to Navigation.***

Additional navigation aid improvements such as buoys and/or navigation markers were examined as ways to increase the efficiency of vessel transits through the harbor. The Pilots Association indicated that modifications to the existing configuration of navigation aids in the harbor would not help vessel transits to a meaningful extent. Therefore, this management measure will not be considered further in this study.

**Structural**

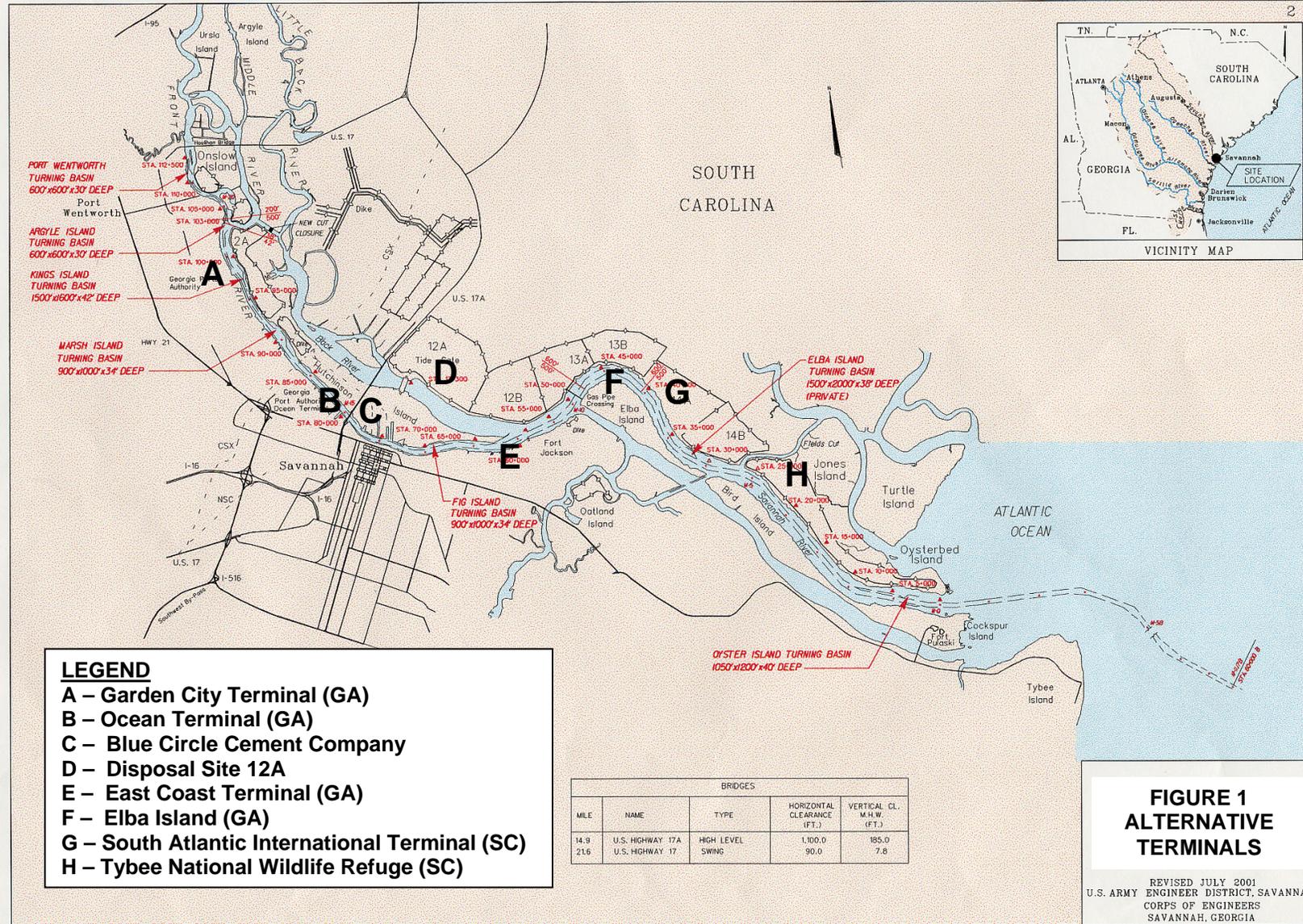
***Alternative Terminal Sites***

**Scope:** The Savannah Harbor Expansion Project’s Tier I Selected Plan consisted of deepening to 48-feet mean low water (MLW) from the Garden City Terminal to the sea. The purpose for evaluating alternative terminal locations is to determine whether locating a terminal closer to the ocean than GPA’s Garden City Terminal would reduce the total economic and environmental costs. To address the identified navigation problems, channel deepening would only be implemented as far as the single terminal that would serve the deeper vessels.

Inherent in this concept is that no matter where the terminal serving the deeper-draft vessels was located, Savannah Harbor would have: (1) channel dimensions sufficient to

accommodate fully loaded Post-Panamax (those with a beam greater than 106-feet) container ships, and (2) throughput capacity sufficient to accommodate the anticipated growth in the volume of containers that is expected over the period of analysis.

Several alternative terminal locations were identified. These included sites on both sides of the Savannah River, as well as two located in nearby harbors. The following sites in Georgia were considered: Garden City Terminal (as a basis for comparisons), Ocean Terminal, East Coast Terminal, the Elba Island site, the Blue Circle site, and GPA property in Brunswick. The following sites in South Carolina were considered: Disposal Area 12A, Disposal Sites 14A/B, Tybee National Wildlife Refuge, and Port Royal. It should be noted that when we talk of the East Coast Terminal site and the Blue Circle site we are talking about a representative site located in that area, not the actual site. The alternative terminal sites considered in the Savannah area are shown on the following map.



**FIGURE 1  
ALTERNATIVE  
TERMINALS**

REVISED JULY 2001  
U.S. ARMY ENGINEER DISTRICT, SAVANNAH  
CORPS OF ENGINEERS  
SAVANNAH, GEORGIA

**Environmental Considerations:** A number of environmental issues will be considered during the development of the GRRR/EIS. However, at this point in the plan formulation process, the study team believes that the following critical impacts have the potential to result in substantial mitigation costs to a proposed project:

- Direct impacts to wetlands along the river from construction activities.
- Secondary impacts to wetlands resulting from changes in salinity, particularly wetlands located near the Savannah National Wildlife Refuge.
- Impacts to the endangered shortnose sturgeon from changes in salinity and dissolved oxygen.
- Impacts to striped bass spawning and nursery habitat from changes in salinity and other factors.
- Impacts to the City of Savannah’s industrial water intake from changes in chloride levels.
- Impacts to dissolved oxygen levels.
- Effects of increasing traffic volumes through the city.

The scope of impacts expected to occur to these resources were considered in examining the feasibility of the alternative terminal locations.

Tier I studies estimated the extent of impacts expected on the critical resources described above if the navigation channel were deepened to the Garden City Terminal. Using that data, impacts were estimated, based on a percentage, for the other alternative terminal sites based on their distance from the Garden city Terminal site as shown in the following table. The result was that fewer direct impacts are expected as the extent of the construction is limited to lower portions of the harbor.

<b>EXPECTED PERCENTAGE OF MITIGATION NECESSARY FOR ALTERNATIVE TERMINAL SITES WHEN COMPARED TO GARDEN CITY TERMINAL</b>								
<b>Impact Category</b>	<b>Garden City Terminal</b>	<b>Ocean Terminal</b>	<b>Blue Circle Site</b>	<b>Disposal Area 12A</b>	<b>East Coast Terminal</b>	<b>Elba Island</b>	<b>Disposal Site 14A/14B</b>	<b>Tybee NWR</b>
<b>Chlorides at City’s Industrial Water Intake</b>	100	75	70	0	0	0	0	0
<b>Dissolved Oxygen</b>	100	75	70	20	20	0	0	0
<b>Cultural/Historic</b>	100	100	100	100	100	0	0	0
<b>Direct Construction Impacts</b>	100	75	70	65	55	30	25	10
<b>Secondary Wetland Impacts</b>	100	75	70	25	0	0	0	0
<b>Shortnose Sturgeon Habitat</b>	100	75	70	20	20	0	0	0
<b>Striped Bass Habitat</b>	100	100	100	0	0	0	0	0

The estimated impacts did not include some effects that would occur with specific alternative terminal site locations. In the three sites considered that would be located within existing confined sediment disposal facilities (CDF) the storage capacity lost by the placement of a terminal within the CDF would need to be restored to keep the government whole. The loss of 375 acres (required for the standard terminal footprint) from the disposal facility would require the development of the same sized sediment storage facility, at roughly the same location along the river, and at roughly the same distance from the navigation channel. Based on the extent of existing development along the river, no large tracts of undeveloped land appear to meet these requirements on the Georgia side. Therefore, the analysis assumed that land to replace the lost sediment storage capacity would be made available by extending the existing CDFs out into the marshes that lie along the northern side of those CDFs. This would result in impacts to an additional 375 acres of saltmarsh. The costs to mitigate for those losses are included in the evaluation of the alternate terminal locations (as an initial construction cost) at the same rate as for similar losses resulting from other projects.

The costs to mitigate for environmental impacts were included in the assessment of each alternate terminal location. The costs of increasing traffic volumes through the City were not quantified, however, the effects of such impacts were discussed in a qualitative manner.

**Analytical Assumptions:** The assumptions that the study team used when putting together the analysis of the alternative terminal sites are listed below. They encompass the features and facilities required of alternative terminals, how joint terminal operations will work, the benefits of channel deepening, construction versus operating costs, and maintenance dredging requirements.

- **Features and Facilities at Alternative Terminals.** It was determined that in order to address the navigation problems in Savannah Harbor, an alternative terminal would need sufficient capacity to handle the volume of containers anticipated to be carried on depth-constrained container ships (i.e., those container ships that would require more depth than currently provided by the 42-foot navigation channel). These ships are typically post-Panamax-class vessels that are consistent with the Design Vessel used in the Tier II GRR/EIS: the *Susan Maersk*, a 6,600 TEU post-Panamax class container ship launched in 1997 (beam: 140 feet, length overall 1,138 feet; design draft: 47.6 feet).

In Tier I, the volume of containers anticipated to be carried on depth-constrained vessels during the period of analysis was approximately 500,000 TEUs. Since detailed Tier II economic studies are still underway, this evaluation of alternate terminals will use the best information available – that a terminal would need to handle 500,000 TEU's per year.

Based on coordination between Savannah District (Engineering Division) and GPA it was concluded that a new container terminal would not be economically

viable with only a 500,000 TEU capacity. Instead, it would need to be larger to achieve economies of scale in facility development, equipment purchase, and terminal operations. To achieve economies of scale, a mix of facilities and equipment that would represent the minimum features for a new state-of-the-art container facility to be an effective and efficient terminal were developed. This mix of facilities and equipment, consistent with industry standards, would provide approximately 1.5 million TEU throughput capacity.

- **Joint Terminal Operations.** For analysis purposes it was assumed that a new terminal would not eliminate the need for the continued operation of the Garden City Terminal. Instead, the new facility would supplement container-handling capacity to help meet the growth in future demand. For this analysis, it was assumed that the new terminal(s) would handle depth-constrained container vessels, and that the Garden City Terminal would handle container ships that were not depth-constrained. It is also assumed that the new terminal would not result in underutilization of Garden City facilities and that costs of such inefficiencies would not be incurred.
- **Benefits of Channel Deepening.** This investigation assumed that channel deepening to either a new container terminal or to the Garden City Terminal would result in equivalent NED marine transportation benefits by reducing or eliminating transportation costs associated with tidal delays and light loading of vessels constrained by current channel depths. The assumption is that each terminal would be able to handle the same volume of cargo and process it at roughly the same rate. The differences between the alternatives primarily consists of site development costs, dredging costs, and environmental mitigation costs (Table 6 in main report).
- **Construction Costs vs. Operating Costs.** For the screening of alternative terminal locations, the emphasis was on construction costs. It was assumed that the operations and maintenance costs would be the same between all of the sites, since the terminals would have similar facilities and equipment.
- **Maintenance Dredging.** According to the Tier I analysis, channel deepening in Savannah Harbor should not generate significant additional maintenance dredging requirements when compared to the Without Project conditions.

As stated above, facility costs, dredging costs, and mitigation costs were developed for each alternate terminal. Site demolition, site improvement, and equipment costs were included as part of the facility development costs. Examples of the types of data collected are shown in the following two tables. The first contains the facility costs, while the second contains the costs for dredging and mitigation.

<b>ESTIMATED COSTS OF FACILITY DEVELOPMENT</b>				
<b>Site Demolition</b>				
Asphalt pavement	822,800	sy	\$3	\$2,864,951
Building Demo (assume 18' high buildings)	42,168,568	cf	\$0.21	\$8,730,371
Building foundation removal	60,069	cy	\$65	\$3,900,515
Railroad track removal, ties and track	15,000	lf	\$8.0	\$120,692
<b>Site Improvement</b>				
Container Parking area	140	ac		
Heavy Duty Pavement for container traffic	140	ac	\$300,000	\$42,000,000
Dock Requirement	2,500	lf	\$21,300	\$53,250,000
110 lb Railroad track w/ wooden ties and ballast		lf	\$78	\$0
110 lb Railroad track w/ concrete ties in container yard	5,000	lf	\$182	\$908,131
Administration Building	10,000	sf	\$168	\$1,675,102
storage building	20,000	sf	\$10	\$198,565
<b>Equipment</b>				
72-95 Ton Cranes	6	ea	\$6,500,000	\$39,000,000
Rubber tire gantries	7	ea	\$1,300,000	\$9,100,000
Five High loaded top lifts (87,000 lbs)	10	ea	\$350,000	\$3,500,000
Seven High empty stackers ((15,000 lbs)	2	ea	\$200,000	\$400,000
Jockey Trucks	20	ea	\$39,120	\$782,400
Flatbed Trucks	6	ea	\$28,980	\$173,880
Contingency	25%			\$41,651,152
			Subtotal	\$208,255,758
E&D / S&A	20%			\$41,651,152
			TOTAL=	\$249,906,910

<b>ESTIMATED COSTS OF CHANNEL DEEPENING (48 FEET MLW) TO PROPOSED TERMINAL</b>				
Mobilization				\$2,683,845
Dredging				
All Ranges	30,462,920	cy	\$3.87	\$138,371,911
Dredging/Excavation of turning basin				\$26,275,430
Berth Dredging	150,000	cy	\$4.84	\$725,625
Disposal Area Site Work and Erosion Control				\$19,075,000
	Contingency	25%		\$35,263,938
	E&D / S&A	20%		\$35,263,938
	Subtotal			\$211,583,630
Debris Removal		75%	\$2,449,764	\$1,837,323
Aids to Navigation		75%	\$871,691	\$653,768
Chloride Mitigation - relocate water intake		75%	\$49,450,000	\$37,087,500
Dissolved Oxygen Mitigation		75%	\$25,800,000	\$19,350,000
Cultural/Historic Mitigation		100%	\$15,424,449	\$15,424,449
Lands, Easements, Relocations, Rights-of-Way		75%	\$2,349,198	\$1,761,898
Channel Modification Mitigation		75%	\$260,000	\$195,000
Salinity Intrusion on Wetlands (722 ac)		75%	\$18,772,000	\$14,079,000
Shortnose Sturgeon Mitigation		75%	\$1,375,500	\$1,031,625
Striped Bass Impact Avoidance		100%	\$2,000,000	\$2,000,000
				TOTAL \$305,004,194

The type data in the previous two tables was collected for each alternative site. This data was then consolidated as shown in the following table.

<b>Alternative Terminals</b>	<b>Facility Costs</b>	<b>Mitigation Costs</b>	<b>Dredging Costs</b>	<b>Total Costs</b>
Garden City Terminal	\$0.00	\$113,100,000.00	\$213,600,000.00	\$326,700,000.00
Ocean Terminal	\$249,900,000.00	\$89,200,000.00	\$211,600,000.00	\$550,700,000.00
Blue Circle Site	\$361,100,000.00	\$83,000,000.00	\$207,000,000.00	\$651,100,000.00
Disposal Site 12A	\$334,400,000.00	\$25,800,000.00	\$162,700,000.00	\$522,900,000.00
East Coast Terminal	\$370,400,000.00	\$23,600,000.00	\$178,900,000.00	\$572,900,000.00
Elba Island	\$285,400,000.00	\$1,400,000.00	\$136,500,000.00	\$423,300,000.00
Disposal Site 14A/14B	\$357,400,000.00	\$1,400,000.00	\$125,600,000.00	\$484,400,000.00
Tybee NWR	\$384,900,000.00	\$1,600,000.00	\$79,100,000.00	\$465,600,000.00
Colonel's Island, Brunswick	\$292,600,000.00	\$0.00	\$137,500,000.00	\$430,100,000.00

The full report contains a section on each alternate terminal site. These sections are broken into sections describing the site profile and assessment, the cost of modifying an already developed terminal or the cost to construct the facility, a discussion of the sites effect on landside transportation, dredging costs for deepening the channel up to the site including mitigation costs listed under environmental considerations, other considerations, and an overall assessment of the site.

**Evaluation of proposed alternative terminal sites:** Costs for facility development, environmental mitigation, and dredging were estimated for each site. All sites were then screened based on the four categories defined below. Of these categories, the first two were considered most problems.

**(1) Safety/social problems:** Location of a terminal at this site would expose it to dangers above those encountered in the daily operation of a terminal. The development of a terminal at this location would cause major problems due to land use conflicts.

**(2) Transportation problems:** Location of a terminal is at this site would negatively affect traffic patterns within the City of Savannah according to the Savannah East-West Corridor Feasibility Study.

**(3) Environmental problems:** Location of a terminal at this site would cause secondary environmental impacts above and beyond those already being considered as part of the environmental mitigation problems. This raises a question of efficiency versus environmental acceptability.

**(4) Economic cost of infrastructure:** The location of a terminal at a greenfield site, as opposed to one that already pre-exists, requires that the site be developed from scratch. This increases the cost of this alternative due to the need to develop basic infrastructure (roads, electricity, water and sewage, etc.).

The screening process involved two steps based on the top two major problem areas. The results of this screening are summarized below:

- The Elba Island and Blue Circle sites were eliminated in the first screening due to major safety/social problems. The Elba Island site is within the blast zone of the Southern Energy LNG facility, as well as being located on a bend in the river where safe passing of vessels could not be assured. Development of the Blue Circle site would require relocation of a road and loss of a portion of golf course.

- The Ocean Terminal, the East Coast Terminal and the Colonel’s Island sites were screened out in the second round due to transportation problems. The selection of sites located east of the City of Savannah - East Coast Terminal and Elba Island Site, would require that rail and truck traffic pass through the center of the City on its way to the inland sites served by the Port. As stated in the *Savannah East-West Corridor Feasibility Study*, completed in 2002, none of the major roads in their present condition could support this additional volume of truck traffic.
- Of the remaining sites, Disposal Site 12A and Disposal Site 14A/14B are located entirely on dredged sediment placement sites, while the Tybee National Wildlife Refuge site is located half on a sediment placement site and half in a National Wildlife Refuge. These sites were carried forward for further consideration since there wasn’t a major safety hazard at any of these sites, nor was there a major impact to transportation in the City of Savannah. While these sites made it to the next level, there are still several questions that need to be answered such as whether the soils at these sites could support a container terminal and the environmental impacts brought about by the requirement for replacement of lost sediment storage capacity.

This screening resulted in the original group of eight alternative terminal locations being narrowed down to a group of three sites. Those remaining sites were further evaluated as to the extent to which each of them met the four criteria contained in the Principles and Guidelines (P&G) for alternative plans. Those criteria are described below using the definitions contained in P&G:

- **Completeness** – The extent to which a given alternative plan provides and accounts for all necessary investments or other actions to ensure the realization of the planned effects. This may require relating the plans to other types of public and private plans if the other plans are crucial to realization of the contributions to the objective.
- **Effectiveness** – The extent to which an alternative plan alleviates the specific problems and achieves the specified opportunities.
- **Efficiency** – The extent to which an alternative plan is the most cost effective means of alleviating the specified problems and realizing the specified opportunities, consistent with protecting the Nation’s environment.
- **Acceptability** – The workability and viability of the alternative plan with respect to acceptance by State and local entities and the public and compatibility with existing laws, regulations, and public policies.

**Summary.** The following table summarizes the extent to which the remaining alternative terminal sites met the P&G criteria for alternative plans. All four sites met the P&G criteria for Completeness and Effectiveness; however, the DA 12A, DA 14A/B, and Tybee NWR sites did not meet the criteria for Efficiency or Acceptability. They all missed the criteria for efficiency because of the costs to build a terminal and to bring in the necessary transportation requirements, and the increased impact to the environment

with the requirement to provide replacement sediment storage capacity when the surrounding area is saltmarsh. As far the acceptability criteria, DA 12A and DA 14A/B were unacceptable in view of the environmental and transportation costs and the fact that they were both owned by GADOT and leased to the Corps. Tybee NWR was unacceptable for the same reasons and it is also a National Wildlife Refuge.

<b>Evaluation of Alternative Terminal Sites</b>				
<b>Site</b>	<b>Completeness</b>	<b>Effectiveness</b>	<b>Efficiency</b>	<b>Acceptability</b>
Garden City	Yes	Yes	Yes	Yes
DA 12A	Yes	Yes	No	No
DA 14A/14B	Yes	Yes	No	No
Tybee NWR	Yes	Yes	No	No

**Conclusion.** Only the Garden City Terminal site met all of the P&G criteria for alternative plans. Based on this evaluation, the study team rated the remaining sites on their potential for development as a deep-draft container terminal. The Garden City Terminal was the only one that received a ranking of HIGH. The three remaining sites received a MEDIUM ranking. The extent to which the sites could meet the established Federal criteria for an alternative plan was heavily considered in this assessment.

The final four sites, those judged to have either a MEDIUM or HIGH potential as a terminal were then compared based only on economic considerations. As indicated in the following table, the cost to develop the Garden City Terminal was the lowest. The cost of the next most economically efficient alternative to the Garden City Terminal was 43 percent higher. Therefore, it was determined that only the lowest cost site -- Garden City Terminal -- would be considered in the detailed evaluations.

<b>Evaluation of Final Alternative Terminal Sites</b>				
<b>Site</b>	<b>Initial Construction Costs</b>	<b>Mitigation Cost</b>	<b>Total Cost</b>	<b>Incremental Cost (Percentage)</b>
Garden City Terminal	\$213,600,000	\$113,100,000	\$326,700,000	
Tybee NWR	\$464,000,000	\$1,600,000	\$465,600,000	43
DA 14A/14B	\$483,000,000	\$1,400,000	\$484,400,000	48
DA 12A	\$497,100,000	\$25,800,000	\$522,900,000	53

**Sensitivity Tests.** The sensitivity of the costs of the final four terminal locations and the decisions between them was then evaluated. Two factors were considered: (1) the cost of wetland mitigation, and (2) the cost of ocean disposal rather than replacing lost sediment storage capacity within the CDFs.

To assess whether the cost used for wetland mitigation were influential in identifying the least cost site for the terminal, we examined the effects of a \$100,000 per acre mitigation costs, rather than the \$20,000 per acre used in the evaluation. This is a 500 percent

increase in mitigation costs. Although the cost difference between the four final sites was narrowed, the sites still differed in cost by at least 23 percent. Therefore, we concluded that the ranking of the sites is not sensitive to the cost of mitigation.

In the same manner, we examined the effects of assuming sediments that would have been deposited in the CDFs used for a terminal would instead be transported to the ocean. We used the approved Ocean Dredged Material Disposal Sites (ODMDS) as the alternate placement area, since that site has already been approved to receive sediments from the harbor. This examination found that annual dredging costs would increase \$3 to 11 million, depending on the site. Over the 50-year period of analysis, those costs represent higher capitalized costs ranging from \$51 to 183 million. Those costs greatly exceed the \$7 to 33 million cost to expand the CDF to reestablish its sediment storage capacity.

### ***Straightening of the River.***

Straightening the river is a structural alternative which could reduce vessel transit times, thereby reducing vessel operating costs. The Harbor Pilots did not identify any portion of the channel where straightening would markedly reduce their transit times. Additionally, Savannah District design staff did not identify a specific area that imposes an undue degree of difficulty in vessel handling necessitating a major straightening of the river. Therefore, this minor modification will not be included as a component of the final channel designs.

### ***Meeting/Passing Areas.***

The current design of the Savannah Harbor navigation channel (500-foot minimum width) does not provide sufficient width to accommodate two-way traffic of post-Panamax vessels at any time in the tidal cycle. Adding the width of those large vessels and the required clearance produces a minimum required channel width of 514 feet (50+132+150+132+50). The addition of an appropriately sized passing area (a widening of the navigation channel to 600 feet for approximately 6,000 feet) would allow two post-Panamax vessels meeting in the area to pass, as well as the passing of a post-Panamax and Panamax vessel. This additional width would allow the navigation channel to provide the same level of service for the larger vessels that it provides with the fleet that presently calls on the Harbor.

Design trends for the World fleet show a continued growth in the size of individual container vessels over time. The increase in the proportion of these larger vessels in the world fleet and the probability of some of these larger vessels calling on Savannah in the future suggests the need to examine a mid-harbor passing area.

After consulting with the Harbor Pilots and reviewing two potential sites in the middle of the harbor, the study team decided to locate a meeting/passing area near Old Fort Jackson. The study team believes that a meeting/passing area would not address a sufficient amount of future navigation problems to justify its construction as a stand-

alone harbor improvement. However it would be beneficial and will therefore be included as a component of an alternative is a more comprehensive solution to the harbor's identified future navigation problems.

### ***Bend Wideners.***

Larger vessels require a wider turning radius to transit a channel at a given speed. When vessels call at Savannah that are larger than what the channel was designed to accommodate, those vessels must move through the channel at slower speeds to maintain adequate safety. Constructing bend wideners would allow those larger vessels to move through the harbor at faster speeds, thereby increasing the efficiency of their transits. Ship Simulation studies performed using the Design Vessel *Susan Maersk* (a 6,600 TEU, post-Panamax class container ship with a beam of 140 feet, a length overall 1,138 feet, and a design draft of 47.6 feet), identified nine areas where bend wideners will be needed to allow that sized vessel to transit the harbor efficiently. The study team believes that these bend wideners would not address a sufficient amount of the future navigation problems to justify their construction as a stand-alone harbor improvement. However, they would be beneficial and will therefore be included as a component of an alternative in a more comprehensive solution to the harbor's identified future navigation problems.

## **Summarization Of Management Measures.**

Modifications to the **underkeel clearances** used in the harbor will not be pursued as a means of increasing vessel transit efficiency. The Harbor Pilots do not believe they could operate safely with less clearance, and the guidelines used by the Pilots comply with channel design and safety criteria.

GPA regularly **improves the landside facilities** at the Garden City Terminal, increasing its container throughput capacity. The Ports Authority has several improvements in various stages of planning and indicates it will continue to add to the capacity of that facility as the traffic levels increase. This will be carried in the GRR as part of the Without Project Condition.

Based on the assessment of the **alternate terminal locations**, the Garden City Terminal is the location that results in the lowest total economic and environmental cost to which a channel deepening should be considered. Other alternative terminals would result in higher total economic and environmental costs.

The entrance channel is the only place in the harbor wide enough to accommodate the passing of post-Panamax vessels. A **meeting/passing area** should be pursued in mid-harbor to address the effects that ships the size of the Tier II design vessel will have on vessel movements in the interior portion of Savannah Harbor. When post-Panamax vessels call on Savannah regularly, they will have an adverse effect on the movement of other vessels transiting the harbor. That effect will be more pronounced with the

effective narrowing of the proposed deeper channel. A meeting/passing area located in the area near the junction of Front and Back Rivers will be included as a component of the final channel designs.

The Ship Simulation Study indicated the need to include **bend wideners** to accommodate the larger vessel. Nine bend wideners have been identified as being needed for safe transit of the design vessel and will be included as features of the final channel designs.

No new **navigation aids** were deemed effective at increasing the efficiency of vessel transits through the harbor. Therefore, this minor modification will not be included as a component of the final channel designs.

Neither **vessel traffic coordination**, nor major **river straightening** were found to be needed, so they will not be included in the final channel design.

No channel modifications features were identified as being needed at this time to enhance **Homeland Security**. Therefore, the final channel design will not contain any features to enhance Homeland Security.

All vessels presently calling at the Garden City Terminal use the Kings Island Turning Basin. It is the largest **turning basin** in the harbor and is located at the upstream end of the Garden City Terminal. It is the only turning basin that can accommodate the design vessel for the present 42-foot channel. This turning basin will need to be deepened to accommodate the larger vessels using the deeper navigation channel. To safely serve vessels the size of the Tier II design vessel, the turning basin will have to be expanded to 1,600 feet long by 1,600 feet wide. This expansion and deepening will be included in the final channel design.

An analysis of the project's **advance maintenance** features will be conducted during the detailed studies to determine the effects of a deeper channel on the sedimentation in the river. The need for advance maintenance will be reexamined to minimize annual dredging costs with a deepened channel.

If the navigation channel is deepened without an accompanying deepening of the **Sediment Basin**, that sediment trapping area may not collect as much sediment as currently occurs. Detailed studies will include a more in-depth analysis of the effects of a higher perched basin. Any expected increases in yearly channel maintenance costs will be included in the economic analysis of the proposed alternatives.

## **DEVELOPMENT OF DETAILED PLANS**

Using the information developed in the plan formulation process, the study team developed the following plans upon which it will conduct detailed analyses:

## **Plan A - No Action.**

In this plan, no improvements would be made to the existing Savannah Harbor Federal Navigation Project. The navigation channel would remain at its presently authorized 42-foot depth in the inner harbor and 44-foot depth in the entrance channel. This plan will serve as the basis for comparison of the expected project impacts.

## **Plan B – Channel Deepening**

This plan will include several levels of harbor deepening so that an incremental analysis can be performed, as well as an overall determination of the justification of each proposed level of improvement.. The analyses will first be conducted on the following plans:

Plan B-44	A 2-foot channel deepening
Plan B-46	A 4-foot channel deepening
Plan B-48	A 6-foot channel deepening

A final interim depth will then be analyzed to allow identification of the NED plan, assuming the benefits peak before reaching the 48-foot depth. That plan will tentatively be identified as Plan B-4X.

The detailed channel deepening plans will have the following components:

- **Channel Length:** From the ocean to Station 103+500, plus an upstream transition.
- **Channel Width:** Maintain existing side slopes. The bottom width for a 48-foot channel would be 450-feet.
- **Channel Depth:** Channel depth will be looked at in 2-foot increments to 48-feet.
  - Plan B-44
  - Plan B-46
  - Plan B-48
  - Plan B-4X – One interim depth
- **Berth(s):** Container Berth 7 and Container Berth 8.
- **Turning Basins:** Deepen and enlarge Kings Island Turning Basin to 1,600-feet x 1,600-feet.
- **Bend Wideners:** Use the nine bend wideners identified in the Ship Simulation Study. Two locations have wideners on both sides of the river.
- **Meeting/Passing Area:** One 600-foot wide by 6,000-foot long area located near Old Fort Jackson.