

FEASIBILITY REPORT
AND
ENVIRONMENTAL IMPACT
STATEMENT

COASTAL STORM DAMAGE
REDUCTION PROJECT

SURF CITY AND NORTH TOPSAIL BEACH
NORTH CAROLINA

Appendix M

Real Estate

Contents

REAL ESTATE SUMMARY

SECTION 1. GENERAL

1.1	Guidance	
1.1.1	Engineer Regulations.....	2
1.1.2	Engineer Circulars.....	2
1.1.3	United State Code.....	2
1.1.4	Code of Federal Regulations	2

SECTION 2. THE REAL ESTATE REPORT

2.1	Statement of Purpose	3
2.2	Study Authority.....	3
2.3	Project Location	3
2.4	Project Description.....	5
2.5	Real Estate Requirements.....	9
2.6	Utility/Facility Relocation.....	15
2.7	Existing Projects.....	15
2.8	Environmental Impacts	15
2.9	Hazardous, Toxic, and Radioactive Waste (HTRW)	15
2.10	Project Sponsor Responsibilities and Capabilities	15
2.11	Government Owned Property	16
2.12	Historical Significance.....	16
2.13	Mineral Rights	16
2.14	Public Law 91-646, Relocation Assistance Benefits.....	17
2.15	Attitude of Property Owners.....	17
2.16	Acquisition Schedule	17
2.17	Estates for Proposed Project	17
2.18	Real Estate Estimate	18
2.19	Chart of Accounts	21
	Exhibits	23

SECTION 1. GENERAL

1.1. Guidance

1.1.1 *Engineer Regulations*

1. ER 405-1-12, Chapter 5 - Acquisition, 5 September 1978, Draft Revision, 9 June 2003
2. ER 405-1-12, Chapter 6 - Relocation Assistance Program, 23 March 1979, Draft Revision, 2 May 2003
3. ER 405-1-12, Chapter 12 - Real Estate Roles and Responsibilities for Civil Works: Cost Shared and Full Federal Projects, 1 May 1998, Draft Revision, 8 March 2003

1.1.2 *Engineer Circulars*

1. EC 405-1-11, Real Estate Acquisition, 30 December 2003

1.1.3 *United States Code*

1. 42 USC, Chapter 61 - Uniform Relocation Assistance and Real Property Acquisition Policies for Federal and Federally Assisted Programs

1.1.4 *Code of Federal Regulations*

1. Code of Federal Regulations, Title 49, Part 24 - Uniform Relocation Assistance and Real Property Acquisition for Federal and Federally-Assisted Programs

SECTION 2. THE REAL ESTATE REPORT

2.1 Statement of Purpose

This report is tentative in nature and is to be used for planning purposes only. The report is written based on specific data from Wilmington District and the tax assessor's office in Edgecombe County, North Carolina. There may be modifications to the plans that occur during Planning, Engineering and Design (PED) phase, thus changing the final acquisition area(s) and/or administrative and land cost. The Real Estate Appendix is intended to support the General Feasibility Report for the subject project. The author of this report has viewed the Project areas. This report pertains specifically to the Towns of Surf City and North Topsail Beach who are the non-Federal sponsors for the project.

2.2 Study Authority

Surf City and North Topsail Beach is a coastal storm damage reduction project. The project is authorized by the following resolutions:

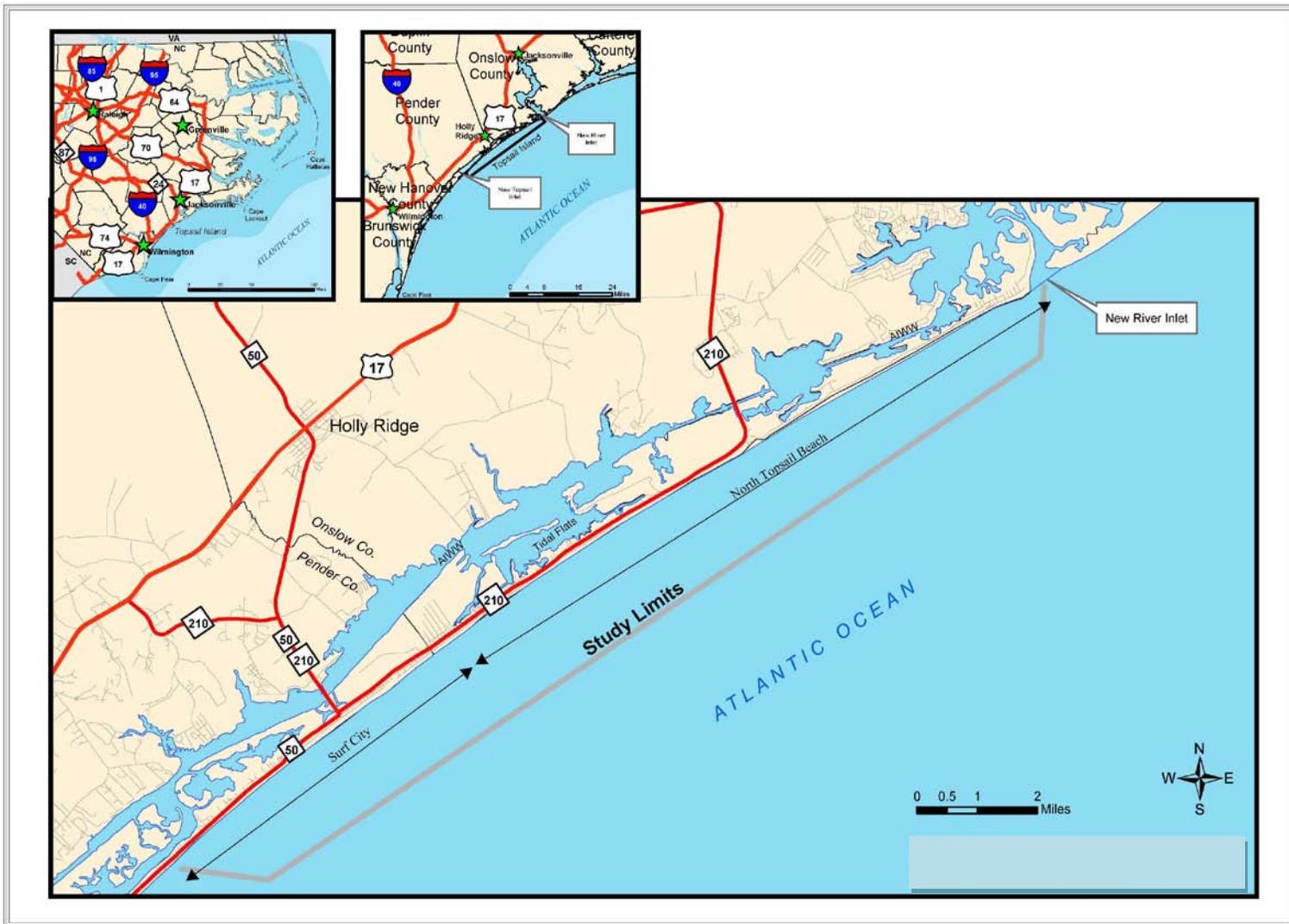
“Resolved by the Committee on Transportation and Infrastructure of the United States House of Representatives, That the Secretary of the Army is requested to review the report of the Chief of Engineers on West Onslow Beach and New River Inlet, North

Carolina, published as House Document 393, 102nd Congress, 2nd session, dated September 23, 1992, and other pertinent reports, to determine whether any modifications of the recommendations contained therein are advisable at the present time in the interest of shore protection and related purposes for Surf City, North Carolina; (Resolution Docket 2617, Surf City, North Carolina, adopted February 16, 2000)

“Resolved by the Committee on Transportation and Infrastructure of the United States House of Representatives, That the Secretary of the Army is requested to review the report of the Chief of Engineers on West Onslow Beach and New River Inlet, North Carolina, published as House Document 393, 102nd Congress, 2nd session, dated September 23, 1992, and other pertinent reports, to determine whether any modifications of the recommendations contained therein are advisable at the present time in the interest of shore protection and related purposes for North Topsail Beach, North Carolina; (Resolution Docket 2629, North Topsail Beach, North Carolina, adopted April 11, 2000).

2.3 Project Location

Surf City, located in Onslow and Pender Counties, and North Topsail Beach, located in Onslow County, North Carolina, are on a barrier island located between New River Inlet to the north and New Topsail Inlet to the south. The barrier island is approximately 22 miles in length, with the Atlantic Ocean to the east and Topsail Sound, Stump Sound, Alligator Bay, Chadwick Bay, and the Atlantic Intracoastal Waterway to the west. From north to south, the communities of North Topsail beach (12 miles of ocean shoreline), Surf city (5.5 miles of ocean shoreline) and Topsail Beach (4.5 miles of ocean shoreline) are located on Topsail Island. Surf City was incorporated in 1949, and has a population of approximately 1,500 year round residents. North Topsail Beach was incorporated in 1990, and has a population of approximately 844 year round residents. A seasonal influx of tourists increases the population to thousands in the summer months. Each town has a fishing pier. A vicinity map of Topsail Island is at Figure 2.3-1 which also shows the study limits.



1
2

Figure 2.3-1. Project Vicinity/Location and Study Limits Map

2.4 Project Description

An array of plans were formulated and considered for the project. This Real Estate Appendix will focus on the recommended National Economic Development (NED) Plan, which is the 1550. A typical profile is shown for Surf City and for North Topsail Beach at Figure 2.4-2 and Figure 2.4-3. In concept, the project will consist of the construction and maintenance of a berm and dune system that will tie into the existing dunes and vegetation line. The 1550 plan is a beachfill plan with a 25-foot wide dune at elevation 15 feet National Geodetic Vertical Datum (NGVD), fronted by a 50-foot wide berm at elevation 7 feet NGVD. The project begins in Surf City with reach 26 and extends through the majority of reach 78 in North Topsail Beach. The total project is approximately 52,150 feet or 9.88 miles in length. Frequency of maintenance is estimated to be every four years. The constructed berm, will serve two primary purposes: as a stockpile of sand on the beach to serve as sacrificial material to reduce the erosion of the high ground beach during storm events and to provide storm damage reduction to beachfront structures by moving the point of erosion seaward, away from the structures.

Twenty offshore borrow areas have been identified as sources of sand for the project. They are shown at Figure 2.4-4. Detailed discussion on the borrow areas is found in the Geotechnical Analysis and in the Sand Compatibility Analysis. Some of the areas are within State waters which by definition are within three nautical miles of the shore, and some of the areas are outside the three nautical mile zone that defines the boundary. For those offshore borrow sites that are in the Outer Continental Shelf (OCS), a Memorandum of Agreement between the U. S. Army Corps of Engineers and Minerals Management Service (MMS) is necessary, and a noncompetitive lease between the sponsor and MMS must be negotiated. The OCS is a zone that generally extends from 3 nautical miles seaward of the coastal State boundaries out to 200 nautical miles. Any required permitting to borrow from sources within the OCS will be addressed during the National Environmental Policy Act (NEPA) and Environmental Impact Statement (EIS) process.

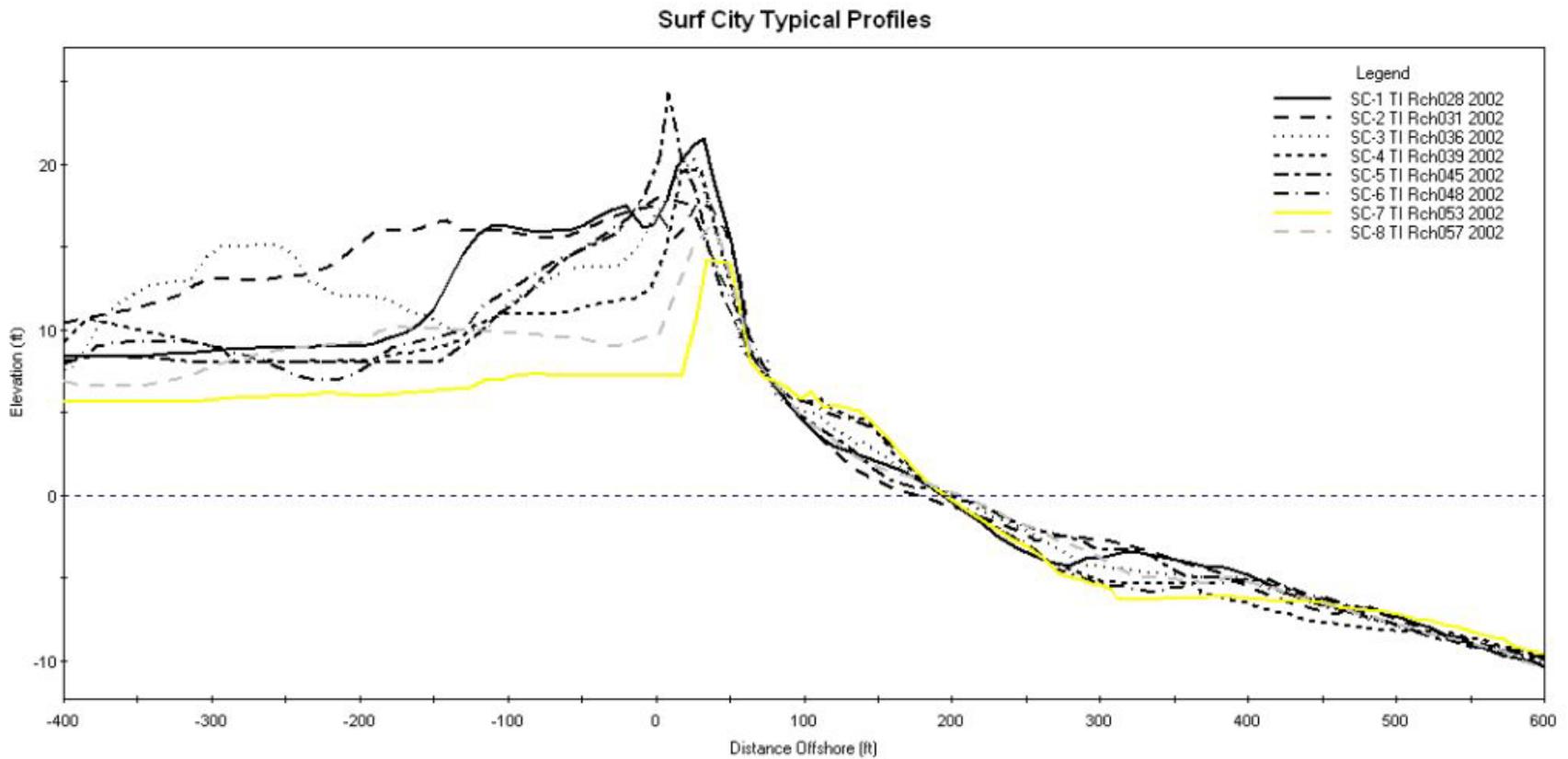


Figure 2.4.2 Surf City Typical Profile

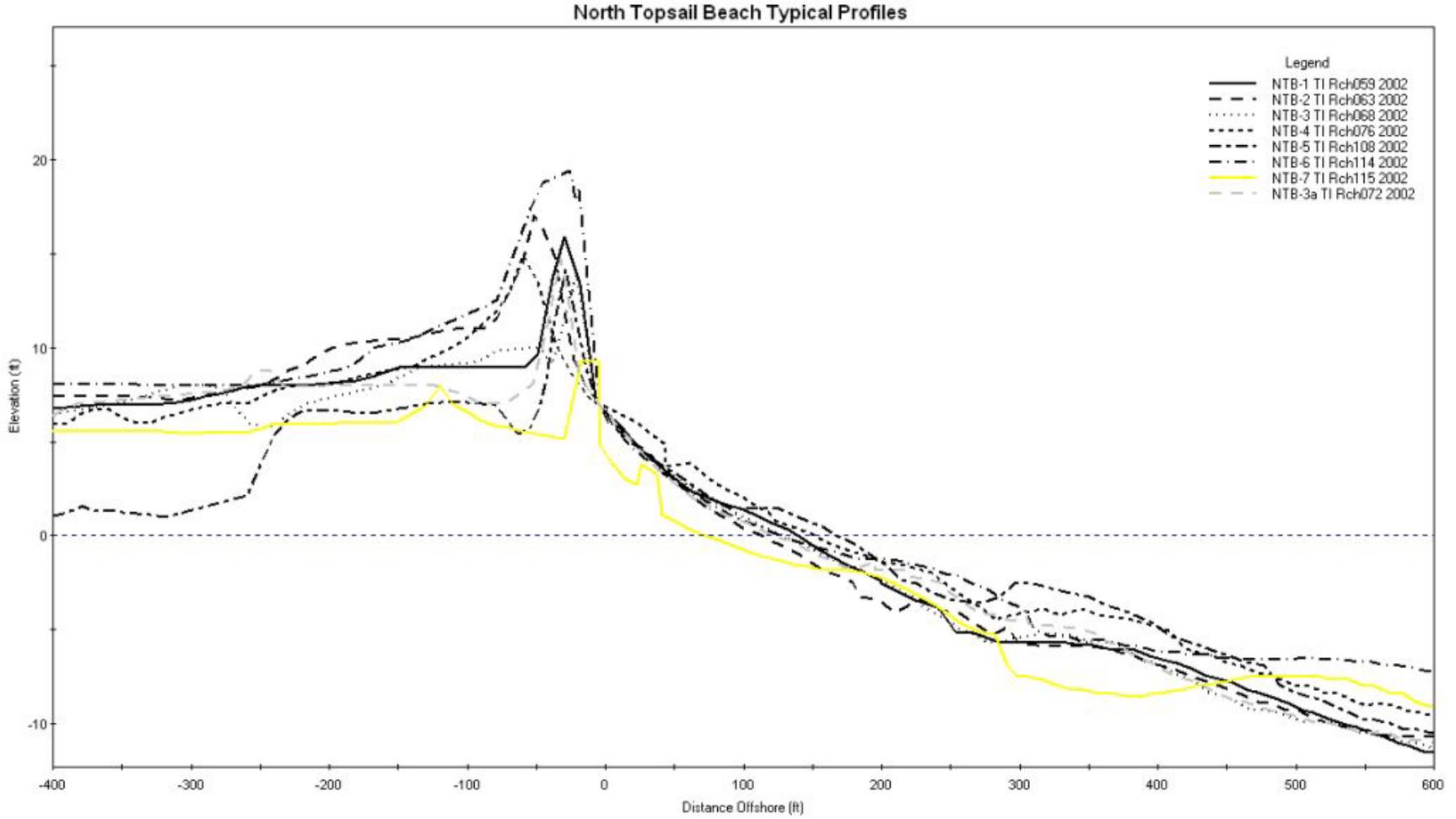


Figure 2.4-3 North Topsail Beach Typical Profile

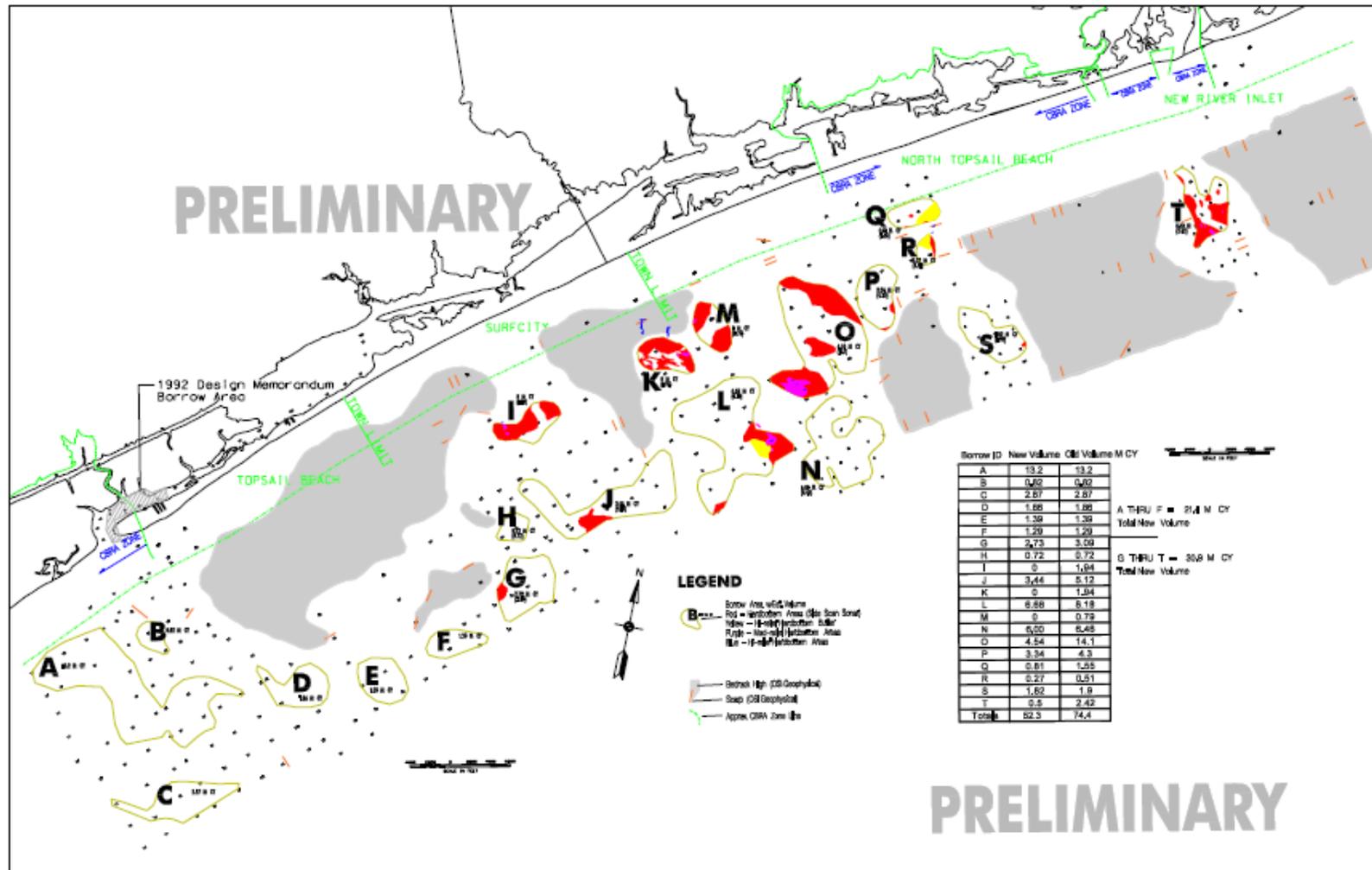


Figure 2.4-4 Offshore Borrow Areas

2.5 Real Estate Requirements

The requirements for lands, easements, rights-of-way and relocations, and disposal/borrow areas (LERRD's) include the right to construct a dune and berm system along the shoreline of Surf City and North Topsail Beach northward to reach 78. The Coastal Barrier Resources Act (CBRA) protects numerous zones along the North Topsail Beach shoreline. A CBRA zone begins at the northern part of reach 78 and the project will stop at that point. Privately owned properties included in the Project are considered to be in fee simple ownership. Included within the project limits are single family residential units, multi family and condominium units, and commercial properties, including the fishing piers. Exercise of Navigation Servitude is not applicable to the subject project as the focus of the project is for storm damage rather than for commerce related purposes and there is no nexus to navigation.

According to the project maps, and on the ground examination, one structure in Surf City, and two structures in North Topsail Beach may possibly be impacted by the project. There is precedence for allowing part of a structure to remain in the project foot print. However, based on ground inspection, it appears that the structures will impact the integrity of the proposed dune system and will need to be acquired. Based on data found in public records, these structures appear to be seasonal residences or possibly rental units, so if the lands must be purchased the project will not displace owners from permanent residences. This will have to be confirmed. The value of the land and improvements to be acquired at Surf City is estimated at \$594,078 and the value of land and improvements to be acquired at North Topsail is estimated at \$701,410.

Figure 2.5-1 shows a typical reach of oceanfront where structures are present. Widths of lots vary within the project, but an average lot width is estimated to be 50 feet. The average distance from the landward toe of the existing dune to the existing Mean High Water (MHW) line is 60 feet. Based on a ground examination, it appears that there will be no adverse impact to the upland portion of ownership. Improvements other than those noted above in the proposed easement area are walkways, beach access crossovers and the fishing piers. Private landowners have the option to remove their walkways to the beach prior to the start of project construction if they so desire in an effort to avoid damage to the walkways during construction. However, after construction of the project, the landowner would have to obtain a permit from the local authority to replace the walkway. It is noted that any walkway that may be damaged during construction would most probably be at least partially located within the proposed easement area. Within the easement area we have the right to remove any structures if necessary that may impact construction of the project. While every effort will be made to avoid damage to an existing walkway, no guarantee can be made that no damage will occur. Should damage occur to a walkway, a landowner is not entitled to any compensation for such damage and repair to a walkway is not considered to be a creditable item. The Storm Damage Reduction Easement does allow owners to build and maintain walkover structures subject to sponsor approval. It is noted that walkovers constructed by landowners after project construction may be subject to impact by subsequent nourishment events.

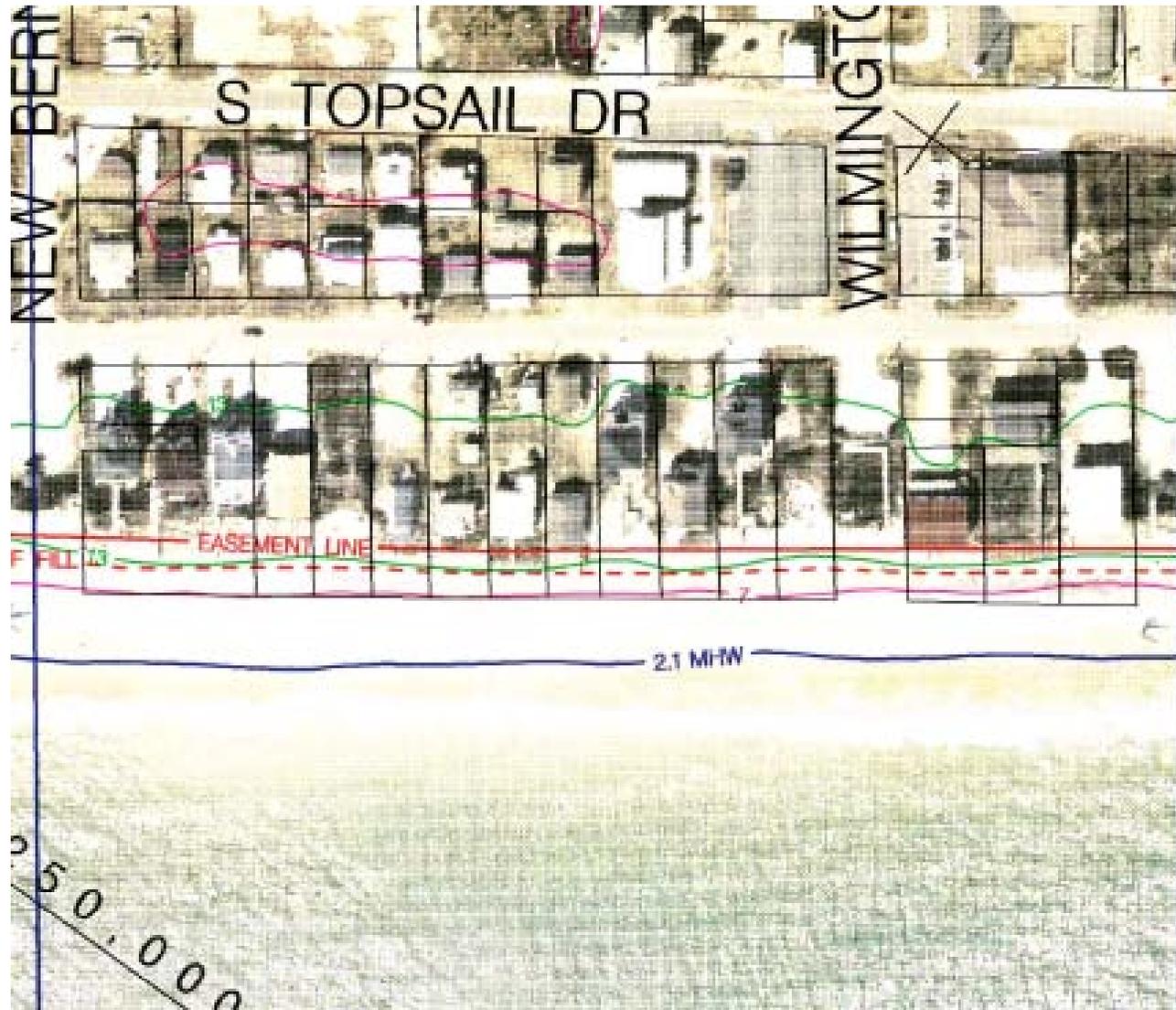


Figure 2.5-1 Typical Reach

Several parcels have been identified in North Topsail Beach as being available for use as staging areas. Some are owned by the town and an oceanfront parcel owned by the County may be available for use as well. These parcels are identified on Figure 2.5-2. Specific parcels have yet to be identified for Surf City, but the Town is aware that it will have to provide a site. If the Town does not provide a site owned by the Town, the Town will have to obtain a staging area site from a private landowner. Final site selection will be determined based on needs of the contractor. For planning purposes, an average cost of \$29,000 was estimated as being a fair rental for staging/work area use for a period of 18 months to 2 years. The Federal rules of valuation were applied in determining value. It is possible that a proper valuation under the Federal rules may conclude that the benefits do not fully offset the value of the easement. Due to environmental windows, Temporary Work Area Easements will be necessary over 3.5 construction periods for purposes of project construction and for mobilization and de-mobilization of equipment.

Additionally, it is estimated that 501 Perpetual Beach Storm Damage Reduction Easements will be acquired within the Surf City portion of the project and 327 Perpetual Beach Storm Damage Reduction Easements will be acquired within the North Topsail Beach portion of the project for a total number of 828 easements to be acquired for the project. When final plans and specs are completed and the ground survey is completed, a definitive decision will be made if the three ownerships will have to be acquired. If not, this will increase the number of easements by three. All lands lying below MHW are lands of the State, and easements are not required to place fill below MHW. General procedure is to obtain a letter permit from the North Carolina Department of Administration State Property Office for those lands below MHW.

In summary, approximately 71.83 acres will be required in Perpetual Storm Damage Reduction Easements and approximately $2 \pm$ acres will be required for Temporary Work Area Easements for staging areas. Approximately 0.41 acres may be acquired in fee simple.

Surf City and North Topsail Beach both have condemnation authority. Also NC law makes provision for towns to acquire and perform maintenance on real estate interests outside their boundaries for certain reasons. (North Carolina General Statutes (NCGS) 40A-3(b1) "Local Public Condemnors – Modified Provision for Certain Localities. – For the public use or benefit, the governing body of each municipality or county shall possess the power of eminent domain and may acquire by purchase, gift or condemnation any property or interest therein, either inside or outside its boundaries, for the following purposes. (10) Engaging in or participating with other governmental entities in acquiring, constructing, reconstructing, extending, or otherwise building or improving beach erosion control or flood and hurricane protection works, including but not limited to, the acquisition of any property that may be required as a source for beach renourishment.")) As a point of interest, in October 2004, local governments of Topsail Island joined together to form the Topsail Island Shoreline Protection Commission. The participants are the Towns of North Topsail Beach, Surf City, and Topsail Beach, and the Counties of Pender and Onslow. The purpose of the Commission is to establish cooperation among the members to plan and implement programs and projects directed toward the preservation and maintenance of the ocean beaches. The Topsail Island Shoreline Protection Commission is noted in this report to show the strong desire of the members to work in unison to protect and preserve Topsail Island.

There are no easements for public water or power located within the proposed Project area. Surf City, North Topsail Beach and the State of North Carolina have lands located within the project boundaries. The Town interests include the ends of roads, maintained by the Town, which extend to the ocean, Coastal Area Management Act (CAMA) access points and beachfront properties maintained for public use. The State of North Carolina lands include the ends of dedicated roads and lands located below the mean high water line.



Figure 2.5-2. Potential Staging Areas in North Topsail Beach

An assumption is made that the town interests include all road ends within the project area, so street ends and public access points are not included in the estimated number of easements required for the project. According to the tax maps and verbal information from the towns, Surf City has 30 public access points, 25 of which are at street ends within the project limits, and North Topsail Beach has 29 public access points with 24 of those being at street ends in the project limits. In the event that it is determined that a road end or public access should be privately owned, an easement would have to be obtained thus increasing the estimated number of easements.

Access to the Project will be by public roads and rights of way. There are sufficient access areas along the beach at the ends of public streets and at public access areas for contractors to move pipe and construction equipment onto the beach. All staging and placement of pipe is expected to be within public areas or acquired easements. Permits and/or consent agreements for sand removal from borrow areas will be from appropriate state and/or federal agencies.

There are two piers, Surf City Ocean Pier (Surf City) and Seaview Fishing Pier (North Topsail), located within the study area. Only the Surf City Ocean Pier is within the limits that will receive fill. Pictures of the Surf City Ocean Pier are at Figures 2.5-3 and 2.5-4. Historically, in prior projects in North and South Carolina, fishing piers and their associated buildings have not been acquired, regardless of their location in relation to project lines. The primary reason is the significant economic impact that it would have on the community. Traditionally easements are acquired up to the face of the structures and beneath the pier. For purposes of this report, it is assumed that neither the pier nor appurtenances will be acquired. No values have been estimated for these structures. Some pier support cross-bracing may need to be removed to facilitate equipment shaping the beachfill and to improve longshore pedestrian access after construction.



Figure 2.5-3. - Surf City Ocean Pier



Figure 2.5-3 - Surf City Ocean Pier

Acquisition of lands under the proposed Perpetual Beach Storm Damage Reduction Easement will be along the existing dune system. In the absence of such a system, such as in areas of high erosion, the property has already been damaged by nature. No damages will likely result from the construction of the proposed dune and berm in conjunction with this project. Improvements (other than the Surf City Ocean Pier and the three structures mentioned as possibly being impacted) within the project include walkover structures that allow beach access from private and public property. It is noted in the easement that walkovers will be allowed, once the project is in place. It is common in the area that landowners have private walkovers from residences over the dunes to access the beach. In cases where new walkovers need to be constructed, the owners will have to obtain the necessary approvals from the Towns of Surf City and North Topsail Beach to construct an approved walkover upon completion of the project.

Project maps were used to identify the number of easements that may be required to construct the project. After careful consideration a determination was made to count each parcel within the project limits as a potential easement acquisition. The project maps show parcel lines based on subdivision plats. In randomly pulling deeds on different tax parcels, it is noted that some deeds reference ownership based on reference to a lot and block number as shown on a recorded subdivision plat or an actual metes and bounds description and reference to a particular plat map. They do not specifically state ownership to MHW of the Atlantic Ocean. However, some parcels are indicated on the project maps or tax maps as having lot lines as shown by a subdivision line but the deed references ownership to MHW of the Atlantic Ocean. Without searching title to each oceanfront parcel it cannot be determined who actually owns the property to MHW. In view of this, it seems prudent for planning purposes to assume that an easement may be needed from each property owner in the project. Although this may inflate the real estate acquisition cost, there is the possibility that the actual cost may be lower, but should not exceed the projected cost.

The North Carolina Coastal Area Management Act enacted in 1974 and amended 1 April 1987, designated sensitive environmental areas within its 20-county coastal jurisdiction as Areas of Environmental Concern (AEC). Within an AEC, development must conform to specific regulations, which are designated to promote and protect environmental values as set out in CAMA and in the AEC development regulations. There are four categories of AECs: the estuarine system, the ocean hazard system, public water supplies, and natural and cultural resource areas. All of the properties within the project boundaries will probably fall within the ocean hazard system AEC. The most important requirement of this AEC is that no construction is permitted within 60 feet of the first line of stable natural vegetation. The effect of the 60-foot CAMA (rear) setback coupled with the zoning setback for front yards has effectively rendered some lots undevelopable since the remaining buildable land is too small to permit construction of most structures.

Local sponsors must meet requirements for public access to participate in cost sharing with the Federal Government. Public access must be available every one-half mile, and parking must be within one-quarter mile of any access for which the sponsor desires to take credit. Engineer Regulation 1165-2-130 sets forth the requirements for public access. Surf City and North Topsail Beach currently do not meet this requirement. The sponsors are working toward meeting this requirement and understand that they must provide additional access points/ parking prior to signing the Project Partnership Agreement (PPA) to be eligible for full Federal cost sharing. These areas should be acquired either in fee or perpetual easement. Acquisition of public beach access points that are necessary for compliance in cost sharing is strictly a sponsor responsibility and is not considered a project cost. Accordingly, any cost incurred with the acquisition of public access points is not considered a creditable expense towards project cost.

2.6 Utility/Facility Relocation

There will be no utility relocations.

2.7 Existing Projects

A number of Federal navigation projects are near the study area. They are listed and briefly described at section **1.09 Existing Federal and Non-Federal Projects** in the main Feasibility Report.

2.8 Environmental Impacts

The project is not expected to have adverse environmental impacts.

2.9 Hazardous, Toxic and Radioactive Wastes (HTRW)

There are no documented active or inactive hazardous waste sites on Topsail Island. See Section 8.08.3 in the main Feasibility Report for a full discussion of HTRW.

2.10 Project Sponsor Responsibilities and Capabilities

The Towns of Surf City and North Topsail Beach will be the Project Sponsors (PS). The PS has the responsibility to acquire all real estate interests required for the Project. The PS shall accomplish all alterations and relocations of facilities, structures and improvements determined by the government to be necessary for construction of the Project. The sponsors currently do not have the staff

required for a large number of acquisitions. The sponsors are considering using the services of a contractor to perform the easement acquisitions required for the project. A presentation was made for the sponsors by SAS Real Estate that discussed the real estate acquisition process and set forth requirements for federal projects under P.L. 91-646. The sponsors have been advised of the possible risks of acquiring real estate prior to project approval and authorization of funding.

Title to any acquired real estate will remain vested in the Project Sponsor's name and will not be conveyed to the United States Government. Prior to advertisement of any construction contract, the PS shall furnish to the government an Authorization for Entry for Construction (Exhibit "B") to all lands, easements and rights-of-way, as necessary. The PS will also furnish to the government evidence supporting their legal authority to grant rights-of-way to such lands. Surf City and North Topsail Beach have specific condemnation authority for beach erosion control.

The PS shall comply with applicable provisions of the Uniform Relocation Assistance and Real Property Acquisition Policies Act of 1970, Public Law 91-646, approved

2 January 1971, and amended by Title IV of the Surface Transportation Uniform Relocation Assistance Act of 1987, Public Law 100-17, effective 2 April 1989, in acquiring real estate interests for the Project, and inform all affected persons of applicable benefits, policies, and procedures in connection with said Act(s). Assessments of the Non-Federal Sponsors' Real Estate Acquisition Capability are at (Exhibit C).

The non-Federal sponsor is entitled to receive credit against its share of project costs for the value of lands it provides and the value of the relocations that are required for the project. Generally, for the purpose of determining the amount of credit to be afforded, the value of the LER is the fair market value of the real property interest, plus certain incidental costs of acquiring those interests, that the non-federal sponsor provided for the project as required by the Government. In addition, the specific requirements relating to valuation and crediting contained in the executed PPA for a project must be reviewed and applied. For shore damage reduction projects, lands subject to shore erosion, that are required for project purposes and that must be provided by the non-federal sponsor must be appraised for crediting purposes considering special benefits in accordance with relevant Federal statutes and Department of Justice guidance.

2.11 Government Owned Property

There are no lands owned by the Federal Government within the proposed project.

2.12 Historical Significance

The area is rich in folklore which claims the name, Topsail, originated during the 1700's when pirate ships roamed the coastal waters. Historians explain that marauding pirates hid their ships in the channel behind the island and waited for passing merchant ships loaded with goods. The pirates would pursue and attack the merchants, claiming the cargoes as their own. Eventually the merchants became aware of this infamous hiding place and began to watch for the tops of the pirates' sails showing over the rolling dunes – hence the name Topsail Island. In the 1940's the island was a part of Operation Bumblebee, which was the beginning of the space program for the United States Government. Over 200 rocket launchings took place on the island between 1946 and 1948. Many of the original military structures are still standing today.

2.13 Mineral Rights

There are no known mineral activities within the scope of the proposed project.

2.14 Public Law 91-646, Relocation Assistance Benefits

Public Law 91-646, Uniform Relocation Assistance provides entitlement for various payments associated with federal participation in acquisition of real property. Title II makes provision for relocation expenses for displaced persons. If the proposed dune and berm system is constructed, there is a possibility that three (3) landowners may be impacted. According to public records, the structures appear to be seasonal residences rather than permanent residences. During acquisition phase this of course will have to be confirmed. Based on the assumption that the residences are seasonal, the landowners would not be entitled to replacement housing payments. The only benefit due to the landowners under Public Law 91-646 would be moving expenses for personal property. A landowner may choose a commercial move performed by a professional mover or a self-move that would be performed by the displaced person. The self-move may be based on the Fixed Residential Moving Cost Schedule (based on the number of rooms in the dwelling) or may be an actual cost move that would have to be supported by receipted bills for labor and equipment. If the self-move option is elected, the landowner would assume responsibility for the move. An estimate of \$4,000 for moving costs is made based on the Fixed Residential Moving Cost Schedule, published by the Federal Highway Administration.

2.15 Attitude of Property Owners

The overall attitude of the property owners within the Project area has been favorable toward the proposed project.

2.16 Acquisition Schedule

Provided that a contractor provides real estate services for the sponsor, it is estimated that the real estate acquisition will take approximately 18-24 months after completion of the survey. However, if the project sponsors decide to use their in house staffs to acquire real estate interests required for the project, it is projected that the acquisitions will take at least 36 months. This projection is made with the assumption that if in house employees should perform acquisition, they will be fully dedicated to the acquisition work. The sponsors are considering using the services of a private contractor to perform real estate acquisition. The Project Sponsor, Project Manager and Real Estate Technical Manager will formulate the milestone schedule upon project approval to meet dates for advertisement and award of a construction contract.

2.17 Estates for Proposed Project

The standard Perpetual Beach Storm Damage Reduction Easement will be used for those parcels where easements are required to construct the project. The Temporary Work Area Easement will be used for the staging areas. The Fee Estate will be used for the acquisition of any parcels where dwellings will be impacted by construction of the project. A non-standard estate (NSE) for use in the project if necessary has been approved by the Chief of Real Estate, Savannah District. The NSE and approval memorandum is at Exhibit A.

PERPETUAL BEACH STORM DAMAGE REDUCTION EASEMENT.

A perpetual and assignable easement and right-of-way in, on, over and across (the land described in Schedule A) (Tract No. ___) for use by the (Sponsor), its representatives, agents, contractors, and assigns, to construct; preserve; patrol; operate; maintain; repair; rehabilitate; and replace; a public beach a dune system, and other erosion control and storm damage reduction measures together with appurtenances thereto, including the right to deposit sand; to accomplish any alterations of contours on said land; to construct berms and dunes; to nourish and renourish periodically; to move,

store and remove equipment and supplies; to erect and remove temporary structures; and to perform any other work necessary and incident to the construction, periodic renourishment and maintenance of the **Surf City/North Topsail Beach Coastal Storm Damage Reduction Project**, together with the right of public use and access; to plant vegetation on said dunes and berms; to erect, maintain and remove silt screens and sand fences; to facilitate preservation of dunes and vegetation through the limitation of access to dune areas; to trim, cut, fell, and remove from said land all trees, underbrush, debris, obstructions, and any other vegetation, structures and obstacles within the limits of the easement (except *); reserving, however, to the grantor(s), (his) (her) (its) (their) (heirs), successors and assigns, the right to construct dune overwalk structures in accordance with any applicable Federal, State or local laws or regulations, provided that such structures shall not violate the integrity of the dune in shape, dimension or function, and that prior approval of the plans and specifications for such structures is obtained from the (designated representative of the Project Sponsor) and provided further that such structures are subordinate to the construction, operation, maintenance, repair, rehabilitation and replacement of the project; and further reserving to the grantor(s), (his) (her) (its) (their) (heirs), successors and assigns all such rights and privileges as may be used and enjoyed without interfering with or abridging the rights and easements hereby acquired; subject however to existing easements for public roads and highways, public utilities, railroads and pipelines.

TEMPORARY WORK AREA EASEMENT

A temporary easement and right-of-way in, over and across (the land described in Schedule A) (Tracts Nos. _____, _____, and _____), for a period not to exceed _____, beginning with date possession of the land is granted to the United States, for use by the United States, its representatives, agents, and contractors as a (borrow area) (work area), including the right to (borrow and /or deposit fill, spoil and waste material thereon) (move, store and remove equipment and supplies, and erect and remove temporary structures on the land and to perform any other work necessary and incident to the construction of the **Surf City/North Topsail Beach Coastal Storm Damage Reduction Project**, together with the right to trim, cut, fell and remove therefrom all trees, underbrush, obstructions, and any other vegetation, structures, or obstacles within the limits of the right-of-way; reserving, however, to the landowners, their heirs and assigns, all such rights and privileges as may be used without interfering with or abridging the rights and easement hereby acquired; subject, however, to existing easements for public roads and highways, public utilities, railroads and pipelines.

Fee Estate

The fee simple title to (the and described in Schedule A) (Tracts Nos. _____, _____, and _____), Subject, however, to existing easements for public roads and highways, public utilities, railroads and pipelines.

2.18 Real Estate Estimate

Due to offsetting benefits, the Perpetual Beach Storm Damage Reduction Easements are determined to have a \$0 value. As a matter of policy the Federal Rule of offsetting benefits is applied in determining credit for storm damage reduction projects. The North Carolina Court of Appeals in June 2000, held in NC Department of Transportation V. Rowe, (97-1470-2) that special project benefits may offset compensation due for a taking and that general project benefits may not offset compensation. This interpretation of North Carolina general statutes is consistent with the Federal Rule.

In the valuation of lands for the project, it is assumed that all lots are buildable in the before value. Since the before value and the after value of the lots will remain the same, or possibly increase due to an improved dune structure, the Before Value and the After Value are identical. In the after value, the lands will be subject to a perpetual beach renourishment easement. Though data at other beaches has shown an increase in value of lots once they were protected by a renourishment project, no local data was available which suggests the "After Value" of the land will be higher as a result of this project. There is an indication that the lots would have superior damage reduction from storm damage and, therefore, would not have a lower value.

The estimated real estate costs include land and improvement values, damages, mineral rights, resettlement cost, and federal as well as non-federal administrative costs. The land costs that are listed are due to the projected costs for staging areas. Costs are estimated individually for Surf City (Table 2.18-1) and North Topsail (Table 2.18-2) Beach, and then combined for a total project cost (Table 2.18-3). The administrative costs are based on historical costs of prior projects constructed along the east coast in South Atlantic Division. A 25% contingency is applied to the estimate. All costs are October 2008 price levels and are constant dollar.

Table 2.18- 1. Surf City Project Cost

a. Lands		
1 Ownership - Temporary Work Area Easement (Staging Area) - Estimated		\$ 29,000
1 Ownership - Purchase Fee		\$ 526,500
	subtotal	\$ 555,500
b. Improvements		\$ -
(Residential)		\$ 67,578
(Commercial)		\$ -
c. Mineral Rights		\$ -
d. Damages		\$ -
e. P.L. 91-646 Relocation costs		\$ 1,800
f. Acquisition Cost - Admin (502 ownerships)		\$ 1,706,800
1 parcel in fee, 501 in easement		
Federal	\$ 200,800	
Non-federal	<u>\$1,506,000</u>	
	\$1,706,800	
Sub-Total		\$ 2,331,678
Contingencies (25%)		\$ 582,920
TOTAL		\$ 2,914,598
ROUNDED TO		\$ 2,915,000

Table 2.18-2. North Topsail Beach Project Cost

a. Lands		
1 Ownership - Temporary Work Area Easement (Staging Area) - Estimated		\$ 29,000
2 Ownerships - Fee Purchase		\$ 631,800
	subtotal	\$ 660,800
b. Improvements		\$ -
(Residential) 2 ownerships in Fee		\$ 69,610
(Commercial)		\$ -
c. Mineral Rights		\$ -
d. Damages		\$ -
e. P.L. 91-646 Relocation costs		\$ 2,200
f. Acquisition Cost - Admin (329 ownerships)		\$ 1,118,600
2 parcels in Fee, 327 in easements		
Federal	\$ 131,600	
Non-federal	<u>\$ 987,000</u>	
	\$1,118,600	
Sub-Total		\$ 1,851,210
Contingencies (25%)		\$ 462,803
TOTAL		\$ 2,314,013
ROUNDED TO		\$ 2,314,000

Table 2.18-3. Total Project Cost

a. Lands		
2 Ownerships - Temporary Work Area Easement (Staging Area) - Estimated		\$ 58,000
3 Ownerships - Fee Purchase		\$ 1,158,300
	subtotal	\$ 1,216,300
b. Improvements		\$ -
(Residential) 3 ownerships in Fee		\$ 137,188
(Commercial)		\$ -
c. Mineral Rights		\$ -
d. Damages		\$ -
e. P.L. 91-646 Relocation costs		\$ 4,000
f. Acquisition Cost - Admin (831 ownerships)		\$ 2,825,400
3 parcels in Fee, 828 in easements		
Federal	\$ 332,400	
Non-federal	<u>\$2,493,000</u>	
	\$2,825,400	
Sub- Total		\$ 4,182,888
Contingencies (25%)		\$ 1,045,722
TOTAL		\$ 5,228,610
ROUNDED TO		\$ 5,229,000

2.19 Chart of Accounts

The cost estimate for all Federal and non-Federal real estate activities necessary for implementation of the project after completion of the feasibility study for land acquisition, construction, LERRD, and other items are coded as delineated in the Cost Work Breakdown Structure (CWBS). This real estate cost estimate is then incorporated into the Total Current Working Estimate utilizing the Microcomputer Aided Cost Engineering System (MCACES) and shown in the Chart of Accounts at Table 2.19-1.

Table 2.19-1. Chart of Accounts

01A	PROJECT PLANNING	FEDERAL	NON-FEDERAL	TOTALS
	Other			
	Project Cooperation Agreement	\$	\$	\$
01AX	Contingencies (25%)	\$	\$	\$
	Subtotal	\$	\$	\$
01B	LANDS AND DAMAGES			
01B40	Acquisition Review of PS	\$ 332,400.00	\$	\$ 332,400.00
01B20	Acquisition by PS	\$	\$ 2,493,000.00	\$ 2,493,000.00
01BX	Contingencies (25%)	\$ 83,100.00	\$ 623,250.00	\$ 706,350.00
	Subtotal	\$ 415,500.00	\$ 3,116,250.00	\$ 3,531,750.00
01H	AUDIT			
01H10	Real Estate Audit	\$	\$	\$
01HX	Contingencies (25%)	\$	\$	\$
	Subtotal	\$	\$	\$
01R	REAL ESTATE LAND PAYMENTS			
01R1B	Land Payments by PS PL91-646 Relocation Payment	\$	\$ 1,353,488.00	\$ 1,353,488.00
01R2B	by PS	\$	\$ 4,000.00	\$ 4,000.00
01R2D	Review of PS	\$	\$	\$
01RX	Contingencies (25%)	\$	\$ 339,372.00	\$ 339,372.00
	Subtotal	\$	\$ 1,696,860.00	\$ 1,696,860.00
	TOTALS	\$ 415,500.00	\$ 4,813,110.00	\$ 5,228,610.00
	ROUNDED TO			\$5,229,000.00

Exhibits

Project: Surf City and North Topsail Beach Coastal Storm Damage Reduction Project

Non-Standard Perpetual Beach Storm Damage Reduction Easement Estate

A perpetual and assignable easement and right-of-way in, on, over and across (the land described in Schedule A) (Tract No. ___) for use by the (Sponsor), its representatives, agents, contractors, and assigns, to construct; preserve; patrol; operate; maintain; repair; rehabilitate; and replace; a public beach a dune system, and other erosion control and storm damage reduction measures together with appurtenances thereto, including the right to deposit sand; to accomplish any alterations of contours on said land; to construct berms and dunes; to nourish and renourish periodically; to move, store and remove equipment and supplies; to erect and remove temporary structures; and to perform any other work necessary and incident to the construction, periodic renourishment and maintenance of the **Surf City/North Topsail Beach Coastal Storm Damage Reduction Project**, together with the right of public use and access; to plant vegetation on said dunes and berms; to erect, maintain and remove silt screens and sand fences; to facilitate preservation of dunes and vegetation through the limitation of access to dune areas; to trim, cut, fell, and remove from said land all trees, underbrush, debris, obstructions, and any other vegetation, structures and obstacles within the limits of the easement (except *); reserving, however, to the grantor(s), (his) (her) (its) (their) (heirs), successors and assigns, the right to construct dune overwalk structures in accordance with any applicable Federal, State or local laws or regulations, provided that such structures shall not violate the integrity of the dune in shape, dimension or function, and that prior approval of the plans and specifications for such structures is obtained from the (designated representative of the Project Sponsor) and provided further that such structures are subordinate to the construction, operation, maintenance, repair, rehabilitation and replacement of the project; and further reserving to the grantor(s), (his) (her) (its) (their) (heirs), successors and assigns all such rights and privileges as may be used and enjoyed without interfering with or abridging the rights and easements hereby acquired; subject however to existing easements for public roads and highways, public utilities, railroads and pipelines.

*** the right to remove or demolish the existing fishing pier and appurtenances thereto;**

In accordance with the provisions of paragraph 12-10c. of ER 405-1-12, I approve the use of the above non-standard estate for the Surf City and North Topsail Coastal Storm Damage Reduction project. The estate serves the intended project purpose, substantially conforms with and does not materially deviate from the corresponding standard estate contained in the Real Estate Handbook and does not increase the costs nor potential liability of the Government.

Date: 27 May 2010



Ralph J. Werthmann
Chief, Real Estate, Savannah District

AUTHORIZATION FOR ENTRY FOR CONSTRUCTION

I _____, _____ for the
(Name of accountable official) (Title)

(Sponsor Name) _____, do hereby certify that the _____ (Sponsor Name) has acquired the real property interest required by the Department of the Army, and otherwise is vested with sufficient title and interest in lands to support construction for (Project Name, Specifically identified project features, etc.). Further, I hereby authorize the Department of the Army, its agents, employees and contractors, to enter upon _____
(identify tracts)

to construct (Project Name, Specifically identified project features, etc.) as set forth in the plans and specifications held in the U. S. Army Corps of Engineers' (district, city, state)

WITNESS my signature as _____ for the
(Title)

(Sponsor Name) this __ day of _____, 20_____.

BY: _____
(Name)

(Title)

ATTORNEY'S CERTIFICATE OF AUTHORITY

I, _____, _____ for the
(Name) (Title of legal officer)

(Sponsor Name), certify that _____ has
(Name of accountable official)

authority to grant Authorization for Entry; that said Authorization for Entry is executed by the proper duly authorized officer; and that the Authorization for Entry is in sufficient form to grant the authorization therein stated.

WITNESS my signature as _____ for the
(Title)

(Sponsor Name), this _____ day of _____, 20_____.

BY: _____
(Name)

(Title)

Exhibit B

Assessment of Non-Federal Sponsor's

Real Estate Acquisition Capability Surf City

I. Legal Authority:

- a. Does the sponsor have legal authority to acquire and hold title to real property for project purposes? **Yes**
- b. Does the sponsor have the power to eminent domain for this project? **Yes-Condemnation Authority is granted by legislation with specific provision for improving beach erosion control or flood and hurricane protection works.**
- c. Does the sponsor have "quick-take" authority for this project? **Yes**
- d. Are any of the land/interests in the land required for this project located outside the sponsor's political boundary? **No**
- e. Are any of the lands/interests in land required for the project owned by an entity whose property the sponsor cannot condemn? **No**

II. Human Resource Requirements:

- a. Will the sponsor's in-house staff require training to become familiar with the real estate requirements of Federal projects including P. L. 91-646, as amended? **N/A Sponsor is considering hiring a contractor to perform acquisition of real estate for the project.**
- b. If the answer to II.a. is "yes", has a reasonable plan been developed to provide such training? **N/A sab.**
- c. Does the sponsor's in-house staff have sufficient real estate acquisition experience to meet its responsibilities for the project? **No**
- d. Is the sponsor's projected in-house staffing level sufficient considering its other work load, if any, and the project schedule? **No**
- e. Can the sponsor obtain contractor support, if required in a timely fashion? **Yes**
- f. Will the sponsor likely request USACE assistance in acquiring real estate? **No**

Exhibit C Page 1

Surf City Continued

III. Other Project Variables:

- a. Will the sponsor's staff be located within reasonable proximity to the project site? **Yes**
- b. Has the sponsor approved the project/real estate schedule/milestones? **No – Real Estate Schedule and Milestones will be developed upon project approval as a joint effort among RE, project manager and sponsor.**

IV. Overall Assessment:

- a. Has the sponsor performed satisfactory on other USACE projects? **N/A**
- b. With regard to the project, the sponsor is anticipated to be: **Moderately Capable**

V. Coordination:

- a. Has this assessment been coordinated with the sponsor? **Yes**
- b. Does the sponsor concur with this assessment? **Yes**

Prepared by:



Belinda S. Estabrook
Realty Specialist

Reviewed and approved by:



Ralph J. Werthmann
Chief, Real Estate Division

Exhibit C Page2

Assessment of Non-Federal Sponsor's

Real Estate Acquisition Capability North Topsail Beach

I. Legal Authority:

- a. Does the sponsor have legal authority to acquire and hold title to real property for project purposes? **Yes**
- b. Does the sponsor have the power to eminent domain for this project? **Yes-Condemnation Authority is granted by legislation with specific provision for improving beach erosion control or flood and hurricane protection works.**
- c. Does the sponsor have "quick-take" authority for this project? **Yes**
- d. Are any of the land/interests in the land required for this project located outside the sponsor's political boundary? **No; However, several parcels identified as a potential staging area are owned by the County, but full cooperation is expected from the county.**
- e. Are any of the lands/interests in land required for the project owned by an entity whose property the sponsor cannot condemn? **Yes – The town cannot condemn county owned lands, but as stated above full cooperation with the county is expected**

II. Human Resource Requirements:

- a. Will the sponsor's in-house staff require training to become familiar with the real estate requirements of Federal projects including P. L. 91-646, as amended? **N/A Sponsor is considering hiring a contractor to perform acquisition of real estate for the project.**
- b. If the answer to II.a. is "yes", has a reasonable plan been developed to provide such training? **N/A sab.**
- c. Does the sponsor's in-house staff have sufficient real estate acquisition experience to meet its responsibilities for the project? **No**
- d. Is the sponsor's projected in-house staffing level sufficient considering its other work load, if any, and the project schedule? **No**
- e. Can the sponsor obtain contractor support, if required in a timely fashion? **Yes**
- f. Will the sponsor likely request USACE assistance in acquiring real estate? **No**

Exhibit C Page 3

North Topsail Continued

III. Other Project Variables:

- a. Will the sponsor's staff be located within reasonable proximity to the project site? **Yes**
- b.
- c. Has the sponsor approved the project/real estate schedule/milestones? **No – Real Estate Schedule and Milestones will be developed upon project approval as a joint effort among RE, project manager and sponsor.**

IV. Overall Assessment:

- a. Has the sponsor performed satisfactory on other USACE projects? **N/A**
- b. With regard to the project, the sponsor is anticipated to be: **Moderately Capable**

V. Coordination:

- a. Has this assessment been coordinated with the sponsor? **Yes**
- b. Does the sponsor concur with this assessment? **Yes**

Prepared by:



Belinda S. Estabrook
Realty Specialist

Reviewed and approved by:



Ralph J. Werthmann
Chief, Real Estate Division

Exhibit C Page 4

**Feasibility Report
and
Environmental Impact Statement**

on

Coastal Storm Damage Reduction

**SURF CITY and NORTH TOPSAIL BEACH
NORTH CAROLINA**

Appendix N

Project Costs

Appendix N: Cost Engineering

SURF CITY and NORTH TOPSAIL BEACH NORTH CAROLINA

1. The Cost Engineering Appendix project costs were prepared to identify the Current Working Estimate (CWE) for the National Economic Development (NED) Plan for the Surf City/North Topsail Beach, Feasibility Report – Coastal Storm Damage Reduction.

The NED Plan is the alternative selected plan which has the greatest net benefits. The NED Plan is to construct a sand dune to elevation 15-ft (25-ft top width) and a berm to the ocean at elevation of 7-ft (50-ft wide). The NED plan for SCNT is often referred to as the 15/50 plan. Material for placement on the beach will come from offshore borrow areas. Hopper dredges will excavate material, travel to offshore pump out stations, and pump material on the beach.

2. The TOTAL CURRENT WORKING ESTIMATE (CWE) for Initial Construction of beach nourishment is \$101,495,000, October 2010 pricing (\$123,135,000 with 21 percent contingencies). Initial Construction will take 4 years during the periods (seasons) December 1 thru March 31 using 2-hopper dredges.

Future or subsequent Periodic Nourishments are estimated to average \$28,270,000, OCT 2010 pricing (\$34,207,000 with 21% contingencies). The periodic nourishments are anticipated every six (6) years after Initial Construction. The periodic nourishments will take 1 season using 2 or 3-hopper dredges.

The CWE costs, for construction and non-construction items, were established to be the Baseline Cost Estimate at October 2010 price levels.

3. Baseline CWE's are shown in the attached MCACES (Microcomputer Aided Cost Engineering System) summary sheets. The summary sheets are formatted into a Code of Accounts framework for reporting. The costs included under each Code of Accounts are described below.

The Cost Estimates were prepared under guidance given in the Corps of Engineers Regulation ER 1110-2-1302, CIVIL WORKS COST ENGINEERING and Engineering Instructions, EI 01D010, CONSTRUCTION COST ESTIMATES.

4. CODE OF ACCOUNTS

CODE OF ACCOUNT 01 – LANDS AND DAMAGES: The estimated costs were prepared and furnished by the Real Estate Division, Savannah District as discussed in the Real Estate Appendix.

CODE OF ACCOUNT 17 – BEACH REPLENISHMENT: This account includes project costs for mobilization and demobilization, dredging, beach fill shaping, beach tilling, dune vegetation, and dune walkover structures.

Emphasis was placed on accuracy of dredging costs during evaluation of alternative plans to develop the NED Plan. The location and features of borrow areas in relation to the project, as well as historical production of dredges for similar projects, were used in conjunction with the Corps of Engineers Dredge Estimating Program (CEDEP).

CEDEP considers details of borrow area characteristics, depth of borrow, effective production time, distances from borrow sites, costs of dredge plant ownership, operating and repair, fuel consumption, and other economic adjustments for labor and equipment.

a. For Initial Construction it was determined that offshore Borrow Areas H, J, O, L, and P would be most suitable for hopper dredges to use and place sand on the beach. Therefore, mobilization, demobilization of dredge equipment, pipe and beach fill equipment, as well as, dredging and beach fill average unit costs are based on 2-hopper dredges with pump out stations located offshore about 3,000 feet. The unit price of \$6.93 per cubic yard (\$8.38/cy with contingency) represents the average cost using all borrow areas mentioned above. The average travel distance 1-way to the pump out stations is approximately 3.5 miles for initial construction.

The initial construction time for placement of 11,855,175 cubic yards is estimated to take approximately 16 months based on using 2-hoppers with pump out to the beach. The environmental window for hopper dredges is December 1 through March 31 or about 4 months for this project. Therefore, construction costs include 4 mobs/demobs for 2-hoppers to complete the initial construction which will occur over four years (4-seasons). Additional time for mob/demob and set up pipe on the beach needs to be added for each season. Mobilization is typically estimated at approximately 30 days prior to beginning initial placement and 30 days demobilization of pipe and equipment off the beach, as well as beach tilling.

Two hoppers were considered to be typical of past project equipment availability that would be used for construction. More than 2-hoppers could be used for Initial construction and could reduce construction time. Pipeline suction

cutterhead dredges were considered more expensive for construction, based on multiple borrow areas, shallow borrow depths for pipeline inefficiencies, average pipeline lengths of 4 to 5 miles to reach the beach, and then over 10 miles of beach length to place material. However, the solicitation for construction will not limit the type of equipment to construct the project.

b. For Periodic Nourishments periods 2 thru 6 of 2,642,000 cy, it was determined that hopper dredges with pump out would be the most suitable method to place sand on the beach. This was also based on the borrow area depths and proximity to the beach. A pumpout station located approximately 3,000 feet offshore was assumed. The average travel distance from borrow areas to the pumpout for periodic nourishment is approximately 7 miles. Once the pumpout pipe reaches shore, it was estimated placement would be 3,000 feet in each direction from a tee valve on shore (or 6,000 LF total pump out distance). The unit price of \$7.52 per cubic yard (\$9.10/cy with contingencies) represents the average pumping costs using all borrow areas throughout the life of the project.

The periodic nourishment construction time for placement of 2,642,000 cubic yards is estimated to take approximately one environmental season from December 1 through March 31 in addition to mobilization and set up of pipe/pumpout locations on the beach. Mobilization would be another 30 days and 30 days for demobilization.

c. It should be noted and has been anticipated that the First Periodic Nourishment (or the 6th season following Initial Construction) will not require the full periodic nourishment volume. The first periodic nourishment is anticipated to be approximately 2,000,000 cubic yards. The average unit price of \$7.17/cy (\$8.67/cy with contingencies) is expected and will take only 1-season with 2-hopper dredges.

A final periodic nourishment will require 3,523,000 cubic yards at the average unit price of \$9.70/cy (\$11.75/cy with contingencies).

Beach fill costs are included as part of the hopper dredging unit price. Beach fill consists of shaping the dredged material with dozers to the required cross section while the dredge is pumping material onto the beach.

d. The costs for Beach Tilling were based on historical costs for similar projects. The costs for Dune Vegetation were based on historical pricing and discussions with North Carolina extension services. The price for Dune Walkover Structures was based on detailed cost estimates used for similar structures and historical costs on similar projects.

A contingency was included to represent unanticipated conditions or uncertainties not known at the time the estimate was developed. There is a

better than average level of confidence in the dredge pricing, because of the detailed geotechnical investigations of borrow areas, similarities of other beach nourishment projects, and the historical costs for similar projects. A contingency of 21% was included for ACCOUNT 17 and developed during the Cost/Risk Analysis through the Cost Center of Expertise in Walla Walla, Washington.

CODE OF ACCOUNT 30 – PLANNING, ENGINEERING AND DESIGN: The costs included in this account were furnished by those responsible for performing each activity. This account includes plans and specifications, field investigations and surveys, cost estimates, engineering during construction, environmental monitoring, and project management. A 25% contingency was assigned to ACCOUNT 30.

CODE OF ACCOUNT 31 – CONSTRUCTION MANAGEMENT – This account includes supervision and administration of the contracts by construction management, hydrologic surveys during construction and contracting personnel during construction. A 25% contingency was assigned to ACCOUNT 31.

**SAW – SURF CITY BEACH AND NORTH TOPSAIL BEACH FEASIBILITY REPORT
PRESENTED BY:
USACE- WILMINGTON DISTRICT**

COST ENGINEERING DX TPCS ATR CERTIFICATION

The Walla Walla Cost Dx representatives have provided an adequate Agency Technical Review (ATR) of the 2012 Budget Year and Total Project Cost, studying the project scope, report, cost estimates, schedules, escalation, risk analysis and contingency development in accordance with ER 1110-2-1150 Engineering and Design for Civil Works Projects and ER 1110-2-1302 Civil Works Cost Engineering.

As of 9 November, 2010, the Walla Walla District, Cost Engineering Directory of Expertise (Dx) for Civil Works, certifies the Surf City Beach and North Topsail Feasibility Report presented by USACE Wilmington District. The Cost DX agency technical review (ATR) resulted in the total project cost estimated values of:

First Costs 1 Oct 2012 Price Level:	\$124,986,000
First Costs Fully Funded Amount:	\$135,339,000
O&M Cost 1 Oct 2012 Price Level:	\$208,642,000
O&M Fully Funded Amount:	\$372,471,000

It is the responsibility of the District to correctly reflect these cost values within the Final Report.

11/9/2010
Date



John P. Skarbek
Chief, Cost Engineering
Walla Walla District

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

PROJECT: SURF CITY BEACH AND NORTH TOPSAIL BEACH
LOCATION: NORTH CAROLINA

DISTRICT: WILMINGTON DISTRICT
POC: CHIEF, COST ENGINEERING, Don Carmen

PREPARED: 10/5/2010

This Estimate reflects the scope and schedule in report; FEASIBILITY REPORT DATED NOVEMBER 2010

WBS NUMBER	Feature & Sub-Feature Description	Estimate Prepared: 5-Oct-10		2012		FULLY FUNDED CONSTRUCTION ESTIMATE						
		COST (\$K)	CNTG (\$K)	ESC (%)	COST (\$K)	CNTG (\$K)	TOTAL (\$K)	Spent Thru: 1-Oct-10 (\$K)	L	M	N	O
17	BEACH REPLENISHMENT	\$93,332	\$19,600	21%	\$94,677	\$19,882	\$114,559			\$102,625	\$21,551	\$124,176
	CONSTRUCTION ESTIMATE TOTALS:	\$93,332	19,600		\$94,677	\$19,882	\$114,559			\$102,625	\$21,551	\$124,176
01	LANDS AND DAMAGES	\$4,182	1,046	25%	\$4,242	\$1,061	\$5,303			\$4,350	\$1,087	\$5,437
30	PLANNING, ENGINEERING & DESIGN	\$2,454	614	25%	\$2,527	\$632	\$3,159			\$2,695	\$674	\$3,369
31	CONSTRUCTION MANAGEMENT	\$1,527	382	25%	\$1,573	\$393	\$1,966			\$1,885	\$471	\$2,357
	PROJECT CONSTRUCTION COST TOTALS:	\$101,495	21,640	21%	\$103,019	\$21,968	\$124,986			\$111,555	\$23,784	\$135,339

ESTIMATED FEDERAL FIRST COST: **\$87,970**
ESTIMATED NON-FEDERAL FIRST COST: **\$47,369**
ESTIMATED TOTAL PROJECT COST INITIAL CONSTRUCTION: \$135,339

WBS NUMBER	Feature & Sub-Feature Description	Estimate Prepared: 5-Oct-10		2012		FULLY FUNDED O&M ESTIMATE						
		COST (\$K)	CNTG (\$K)	ESC (%)	COST (\$K)	CNTG (\$K)	TOTAL (\$K)	Spent Thru: 1-Oct-10 (\$K)	L	M	N	O
17	BEACH REPLENISHMENT 2021-2057	\$162,215	\$34,065	21%	\$164,552	\$34,556	\$199,108			\$284,085	\$59,658	\$343,743
	PERIODIC RENOURISHMENT TOTAL:	\$162,215	\$34,065		\$164,552	\$34,556	\$199,108			\$284,085	\$59,658	\$343,743
30	PLANNING, ENGINEERING & DESIGN	\$4,806	\$1,152	25%	\$4,744	\$1,186	\$5,930			\$14,107	\$3,527	\$17,634
31	CONSTRUCTION MANAGEMENT	\$2,800	\$700	25%	\$2,884	\$721	\$3,605			\$8,875	\$2,219	\$11,093
	PROJECT RENOURISHMENT TOTALS:	\$169,621	\$35,917	21%	\$172,180	\$36,463	\$208,642			\$307,067	\$65,403	\$372,471

ESTIMATED FEDERAL O&M COST: **\$242,106**
ESTIMATED NON-FEDERAL O&M COST: **\$130,365**
ESTIMATED TOTAL RENOURISHMENT COSTS 2021-2057: \$372,471

CHIEF, COST ENGINEERING,
PROJECT MANAGER,
CHIEF, REAL ESTATE,

Wed 13 Oct 2010
Eff. Date 10/01/08

U.S. Army Corps of Engineers
PROJECT SCNTIZ: SURFCITY-NTOPSAIL-INITIAL OCT'10 - INITIAL CONSTRUCTION
SURF CITY & NORTH TOPSAIL, NC -INITIAL CONSTRUCT

TIME 15:22:15
TITLE PAGE 1

SURFCITY-NTOPSAIL-INITIAL OCT'10
INITIAL CONSTRUCTION
SUMMARY OF COSTS
CURRENT WORKING ESTIMATE (CWE)
CODE OF ACCOUNTS

Designed By: USACE - WILMINGTON DISTRICT
Estimated By: CESAW-TS-EE

Prepared By: John C. Caldwell
CESAW-TS-EE

Preparation Date: 10/05/10
Effective Date of Pricing: 10/01/10

Sales Tax: 0.00%

This report is not copyrighted, but the information
contained herein is For Official Use Only.

M C A C E S G O L D E D I T I O N
Composer GOLD Software Copyright (c) 1985-1994
by Building Systems Design, Inc.
Release 5.30

LABOR ID: JC2010 EQUIP ID: JC2010

Currency in DOLLARS

CREW ID: JC2010 UPB ID: JC2010

Wed 13 Oct 2010
Eff. Date 10/01/08

U.S. Army Corps of Engineers
PROJECT SCNTIZ: SURFCITY-NTOPSAIL-INITIAL OCT'10 - INITIAL CONSTRUCTION
SURF CITY & NORTH TOPSAIL, NC -INITIAL CONSTRUCT
** PROJECT OWNER SUMMARY - Feature (Rounded to 1000's) **

TIME 15:22:15
SUMMARY PAGE 1

	QUANTY UOM	CONTRACT	CONTINGN	TOTAL COST	UNIT
1 Summary of Initial Construction					
1.01	LANDS AND DAMAGES	4,182,000	1,046,000	5,228,000	
1.17	BEACH REPLENISHMENT - INITIAL	93,331,000	19,600,000	112,931,000	
1.30	PLANNING, ENGINEERING & DESIGN	2,454,000	614,000	3,068,000	
1.31	CONSTRUCTION MANAGEMENT	1,527,000	382,000	1,909,000	
TOTAL Summary of Initial Construction		101,494,000	21,640,000	123,135,000	

LABOR ID: JC2010 EQUIP ID: JC2010
 Wed 13 Oct 2010
 Eff. Date 10/01/08

Currency in DOLLARS
 U.S. Army Corps of Engineers
 PROJECT SCNTIZ: SURFCITY-NTOPSAIL-INITIAL OCT'10 - INITIAL CONSTRUCTION
 SURF CITY & NORTH TOPSAIL, NC -INITIAL CONSTRUCT
 ** PROJECT OWNER SUMMARY - Sub-Feat (Rounded to 1000's) **

CREW ID: JC2010 UPB ID: JC2010
 TIME 15:22:15
 SUMMARY PAGE 2

	QUANTY	UOM	CONTRACT	CONTINGN	TOTAL COST	UNIT

1 Summary of Initial Construction						
1.01 LANDS AND DAMAGES						
1.01. 1			1,216,000	304,000	1,520,000	
1.01. 2			137,000	34,000	171,000	
1.01. 3			4,000	1,000	5,000	
1.01. 4			332,000	83,000	415,000	
1.01. 5			2,493,000	623,000	3,116,000	
TOTAL LANDS AND DAMAGES			4,182,000	1,046,000	5,228,000	
1.17 BEACH REPLENISHMENT - INITIAL						
1.17.01			7,600,000	1,596,000	9,196,000	
1.17.02	1,855,175	CY	82,102,000	17,241,000	99,344,000	8.38
1.17.03	150.00	ACR	113,000	24,000	137,000	911.53
1.17.04	165.00	ACR	1,650,000	347,000	1,997,000	12100
1.17.05	60.00	EA	1,866,000	392,000	2,258,000	37631
TOTAL BEACH REPLENISHMENT - INITIAL			93,331,000	19,600,000	112,931,000	
1.30 PLANNING, ENGINEERING & DESIGN						
1.30. A			1,164,000	291,000	1,455,000	
1.30. B			6,000	2,000	8,000	
1.30. C			60,000	15,000	75,000	
1.30. D			1,176,000	294,000	1,470,000	
1.30. E			40,000	10,000	50,000	
1.30. F			8,000	2,000	10,000	
TOTAL PLANNING, ENGINEERING & DESIGN			2,454,000	614,000	3,068,000	
1.31 CONSTRUCTION MANAGEMENT						
1.31. A			245,000	61,000	306,000	
1.31. B			100,000	25,000	125,000	
1.31. C			80,000	20,000	100,000	
1.31. D			28,000	7,000	35,000	
1.31. E			40,000	10,000	50,000	
1.31. F			1,034,000	259,000	1,293,000	
TOTAL CONSTRUCTION MANAGEMENT			1,527,000	382,000	1,909,000	
TOTAL Summary of Initial Construction			101,494,000	21,640,000	123,135,000	

LABOR ID: JC2010

EQUIP ID: JC2010

Currency in DOLLARS

CREW ID: JC2010

UPB ID: JC2010

Wed 13 Oct 2010

U.S. Army Corps of Engineers

TIME 15:33:53

Eff. Date 10/05/10 PROJECT SCNTP1: SCN TOPSAIL-First PeriodicJUNE10 - 1ST PARTIAL PERIODIC NOURISHMENT
SURF CITY & NORTH TOPSAIL, NC -FIRST PERIODIC

TITLE PAGE 1

SCN TOPSAIL-First PeriodicJUNE10
1ST PARTIAL PERIODIC NOURISHMENT
CONSTRUCTION- SUMMARY OF COSTS
CURRENT WORKING ESTIMATE (CWE)
CODE OF ACCOUNTS

Designed By: USACE - WILMINGTON DISTRICT
Estimated By: CESAW-TS-EE

Prepared By: John C. Caldwell
CESAW-TS-EE

Preparation Date: 10/05/10
Effective Date of Pricing: 10/01/10

Sales Tax: 0.00%

This report is not copyrighted, but the information
contained herein is For Official Use Only.

M C A C E S G O L D E D I T I O N
Composer GOLD Software Copyright (c) 1985-1994
by Building Systems Design, Inc.
Release 5.30

LABOR ID: JC2010

EQUIP ID: JC2010

Currency in DOLLARS

CREW ID: JC2010

UPB ID: JC2010

Wed 13 Oct 2010

U.S. Army Corps of Engineers

TIME 15:33:53

Eff. Date 10/05/10 PROJECT SCNTPL: SCN TOPSAIL-First PeriodicJUNE10 - 1ST PARTIAL PERIODIC NOURISHMENT
SURF CITY & NORTH TOPSAIL, NC -FIRST PERIODIC

SUMMARY PAGE 1

** PROJECT OWNER SUMMARY - Feature (Rounded to 1000's) **

	QUANTITY UOM	CONTRACT	CONTINGN	TOTAL COST UNIT

2	Sum of 1ST Periodic Construction			
2.17	BEACH REPLENISHMENT -PERIODIC	16,152,000	3,392,000	19,543,000
2.30	PLANNING, ENGINEERING & DESIGN	658,000	165,000	823,000
2.31	CONSTRUCTION MANAGEMENT	400,000	100,000	500,000
		-----	-----	-----
TOTAL	Sum of 1ST Periodic Construction	17,210,000	3,656,000	20,866,000

LABOR ID: JC2010

EQUIP ID: JC2010

Currency in DOLLARS

CREW ID: JC2010

UPB ID: JC2010

Wed 13 Oct 2010

U.S. Army Corps of Engineers

TIME 15:33:53

Eff. Date 10/05/10 PROJECT SCNTPL: SCN TOPSAIL-First PeriodicJUNE10 - 1ST PARTIAL PERIODIC NOURISHMENT
SURF CITY & NORTH TOPSAIL, NC -FIRST PERIODIC

SUMMARY PAGE 2

** PROJECT OWNER SUMMARY - Sub-Feat (Rounded to 1000's) **

	QUANTITY	UOM	CONTRACT	CONTINGN	TOTAL COST	UNIT

2	Sum of 1ST Periodic Construction					
2.17	BEACH REPLENISHMENT -PERIODIC					
2.17.01	MOB AND DEMOB					
			1,900,000	399,000	2,299,000	
2.17.02	DREDGING and BEACH PLACEMENT					
	1981665.00	CY	14,202,000	2,982,000	17,184,000	8.67
2.17.03	TILLING					
	66.00	ACR	50,000	10,000	60,000	912

	TOTAL BEACH REPLENISHMENT -PERIODIC		16,152,000	3,392,000	19,543,000	
2.30	PLANNING, ENGINEERING & DESIGN					
2.30. A	ENGINEERING					
			152,000	38,000	190,000	
2.30. B	ENVIRONMENTAL					
			4,000	1,000	5,000	
2.30. C	PROJECT MGT					
			30,000	8,000	38,000	
2.30. D	GEOTECHNICAL INVESTIGATIONS					
			450,000	113,000	563,000	
2.30. E	Procurment-Contracting					
			20,000	5,000	25,000	
2.30. F	Construction Management					
			2,000	1,000	3,000	

	TOTAL PLANNING, ENGINEERING & DESIGN		658,000	165,000	823,000	
2.31	CONSTRUCTION MANAGEMENT					
2.31. A	ENGINEERING					
			28,000	7,000	35,000	
2.31. B	ENVIRONMENTAL					
			40,000	10,000	50,000	
2.31. C	PROJECT MGT					
			40,000	10,000	50,000	
2.31. D	GEOTECHNICAL INVESTIGATIONS					
			13,000	3,000	16,000	
2.31. E	Procurment-Contracting					
			20,000	5,000	25,000	
2.31. F	Construction Management					
			259,000	65,000	324,000	

	TOTAL CONSTRUCTION MANAGEMENT		400,000	100,000	500,000	
	TOTAL Sum of 1ST Periodic Construction		17,210,000	3,656,000	20,866,000	

LABOR ID: JC2010

EQUIP ID: JC2010

Currency in DOLLARS

CREW ID: JC2010

UPB ID: JC2010

Wed 20 Oct 2010

U.S. Army Corps of Engineers

TIME 18:17:29

Eff. Date 10/01/10 PROJECT SCNTPX: SURFCITY & NTOPSAIL,NC PERIOD2-6 - PERIODIC NOURISHMENTS 2 thru 6
SURF CITY & NORTH TOPSAIL, NC -PERIODIC CONSTRUC

TITLE PAGE 1

SURFCITY & NTOPSAIL,NC PERIOD2-6
PERIODIC NOURISHMENTS 2 thru 6
CONSTRUCTION- SUMMARY OF COSTS
CURRENT WORKING ESTIMATE (CWE)
CODE OF ACCOUNTS

Designed By: USACE - WILMINGTON DISTRICT
Estimated By: CESAW-TS-EE

Prepared By: John C. Caldwell
CESAW-TS-EE

Preparation Date: 10/19/10
Effective Date of Pricing: 10/01/10

Sales Tax: 0.00%

This report is not copyrighted, but the information
contained herein is For Official Use Only.

M C A C E S G O L D E D I T I O N
Composer GOLD Software Copyright (c) 1985-1994
by Building Systems Design, Inc.
Release 5.30

LABOR ID: JC2010 EQUIP ID: JC2010

Currency in DOLLARS

CREW ID: JC2010 UPB ID: JC2010

Wed 20 Oct 2010

U.S. Army Corps of Engineers

TIME 18:17:29

Eff. Date 10/01/10 PROJECT SCNTPX: SURFCITY & NTOPSAIL,NC PERIOD2-6 - PERIODIC NOURISHMENTS 2 thru 6
SURF CITY & NORTH TOPSAIL, NC -PERIODIC CONSTRUC
** PROJECT OWNER SUMMARY - Feature (Rounded to 1000's) **

SUMMARY PAGE 1

	QUANTITY	UOM	CONTRACT	CONTINGN	TOTAL COST	UNIT
2 Summary of Periodic Construction						
2.17			21,819,000	4,582,000	26,401,000	
2.30			658,000	165,000	823,000	
2.31			400,000	100,000	500,000	
TOTAL Summary of Periodic Construction			22,878,000	4,847,000	27,724,000	

LABOR ID: JC2010

EQUIP ID: JC2010

Currency in DOLLARS

CREW ID: JC2010

UPB ID: JC2010

Wed 20 Oct 2010

U.S. Army Corps of Engineers

TIME 18:17:29

Eff. Date 10/01/10 PROJECT SCNTPX: SURFCITY & NTOPSAIL,NC PERIOD2-6 - PERIODIC NOURISHMENTS 2 thru 6

SURF CITY & NORTH TOPSAIL, NC -PERIODIC CONSTRUC

SUMMARY PAGE 2

** PROJECT OWNER SUMMARY - Sub-Feat (Rounded to 1000's) **

	QUANTITY	UOM	CONTRACT	CONTINGN	TOTAL COST	UNIT

2	Summary of Periodic Construction					
2.17	BEACH REPLENISHMENT -PERIODIC					
2.17.01	MOB AND DEMOB					
			1,900,000	399,000	2,299,000	
2.17.02	2,642,225.00	CY	19,870,000	4,173,000	24,042,000	9.10
2.17.03	TILLING	66.00 ACR	50,000	10,000	60,000	912
			-----	-----	-----	
	TOTAL BEACH REPLENISHMENT -PERIODIC		21,819,000	4,582,000	26,401,000	
2.30	PLANNING, ENGINEERING & DESIGN					
2.30. A	ENGINEERING					
			152,000	38,000	190,000	
2.30. B	ENVIRONMENTAL					
			4,000	1,000	5,000	
2.30. C	PROJECT MGT					
			30,000	8,000	38,000	
2.30. D	GEOTECHNICAL INVESTIGATIONS					
			450,000	113,000	563,000	
2.30. E	Procurment-Contracting					
			20,000	5,000	25,000	
2.30. F	Construction Management					
			2,000	1,000	3,000	
			-----	-----	-----	
	TOTAL PLANNING, ENGINEERING & DESIGN		658,000	165,000	823,000	
2.31	CONSTRUCTION MANAGEMENT					
2.31. A	ENGINEERING					
			28,000	7,000	35,000	
2.31. B	ENVIRONMENTAL					
			40,000	10,000	50,000	
2.31. C	PROJECT MGT					
			40,000	10,000	50,000	
2.31. D	GEOTECHNICAL INVESTIGATIONS					
			13,000	3,000	16,000	
2.31. E	Procurment-Contracting					
			20,000	5,000	25,000	
2.31. F	Construction Management					
			259,000	65,000	324,000	
			-----	-----	-----	
	TOTAL CONSTRUCTION MANAGEMENT		400,000	100,000	500,000	
			-----	-----	-----	
	TOTAL Summary of Periodic Construction		22,878,000	4,847,000	27,724,000	

LABOR ID: JC2010

EQUIP ID: JC2010

Currency in DOLLARS

CREW ID: JC2010

UPB ID: JC2010

Wed 13 Oct 2010
Eff. Date 10/01/10

U.S. Army Corps of Engineers
PROJECT SCNTPK: SURF CITY & NTOPSAIL, NC PERIOD - 7th PERIODIC NOURISHMENT
SURF CITY & NORTH TOPSAIL, NC -PERIODIC CONSTRUC

TIME 15:56:54
TITLE PAGE 1

SURF CITY & NTOPSAIL, NC PERIOD
7th PERIODIC NOURISHMENT
CONSTRUCTION- SUMMARY OF COSTS
CURRENT WORKING ESTIMATE (CWE)
CODE OF ACCOUNTS

Designed By: USACE - WILMINGTON DISTRICT
Estimated By: CESAW-TS-EE

Prepared By: John C. Caldwell
CESAW-TS-EE

Preparation Date: 10/05/10
Effective Date of Pricing: 10/01/10

Sales Tax: 0.00%

This report is not copyrighted, but the information
contained herein is For Official Use Only.

M C A C E S G O L D E D I T I O N
Composer GOLD Software Copyright (c) 1985-1994
by Building Systems Design, Inc.
Release 5.30

LABOR ID: JC2010 EQUIP ID: JC2010

Currency in DOLLARS

CREW ID: JC2010 UPB ID: JC2010

Wed 13 Oct 2010
Eff. Date 10/01/10

U.S. Army Corps of Engineers
PROJECT SCNTPK: SURF CITY & NTOPSAIL, NC PERIOD - 7th PERIODIC NOURISHMENT
SURF CITY & NORTH TOPSAIL, NC -PERIODIC CONSTRUCT
** PROJECT OWNER SUMMARY - Feature (Rounded to 1000's) **

TIME 15:56:54
SUMMARY PAGE 1

	QUANTITY	UOM	CONTRACT	CONTINGN	TOTAL COST	UNIT
2 Summary of Periodic Construction						
2.17			36,967,000	7,763,000	44,730,000	
2.30			658,000	165,000	823,000	
2.31			400,000	100,000	500,000	
TOTAL Summary of Periodic Construction			38,025,000	8,028,000	46,053,000	

Wed 13 Oct 2010
Eff. Date 10/01/10

U.S. Army Corps of Engineers
PROJECT SCNTPK: SURF CITY & NTOPSAIL, NC PERIOD - 7th PERIODIC NOURISHMENT
SURF CITY & NORTH TOPSAIL, NC -PERIODIC CONSTRUC
** PROJECT OWNER SUMMARY - Sub-Feat (Rounded to 1000's) **

TIME 15:56:54
SUMMARY PAGE 2

	QUANTITY	UOM	CONTRACT	CONTINGN	TOTAL COST	UNIT

2	Summary of Periodic Construction					
2.17	BEACH REPLENISHMENT -PERIODIC					
2.17.01	MOB AND DEMOB					
			2,728,000	573,000	3,301,000	
2.17.02	DREDGING and BEACH PLACEMENT					
	3523000.00	CY	34,173,000	7,176,000	41,349,000	11.74
2.17.03	TILLING					
	87.00	ACR	66,000	14,000	79,000	912
	TOTAL BEACH REPLENISHMENT -PERIODIC		36,967,000	7,763,000	44,730,000	

2.30	PLANNING, ENGINEERING & DESIGN					
2.30. A	ENGINEERING					
			152,000	38,000	190,000	
2.30. B	ENVIRONMENTAL					
			4,000	1,000	5,000	
2.30. C	PROJECT MGT					
			30,000	8,000	38,000	
2.30. D	GEOTECHNICAL INVESTIGATIONS					
			450,000	113,000	563,000	
2.30. E	Procurement-Contracting					
			20,000	5,000	25,000	
2.30. F	Construction Management					
			2,000	1,000	3,000	
	TOTAL PLANNING, ENGINEERING & DESIGN		658,000	165,000	823,000	

2.31	CONSTRUCTION MANAGEMENT					
2.31. A	ENGINEERING					
			28,000	7,000	35,000	
2.31. B	ENVIRONMENTAL					
			40,000	10,000	50,000	
2.31. C	PROJECT MGT					
			40,000	10,000	50,000	
2.31. D	GEOTECHNICAL INVESTIGATIONS					
			13,000	3,000	16,000	
2.31. E	Procurement-Contracting					
			20,000	5,000	25,000	
2.31. F	Construction Management					
			259,000	65,000	324,000	
	TOTAL CONSTRUCTION MANAGEMENT		400,000	100,000	500,000	

	TOTAL Summary of Periodic Construction		38,025,000	8,028,000	46,053,000	

LABOR ID: JC2010

EQUIP ID: JC2010

Currency in DOLLARS

CREW ID: JC2010

UPB ID: JC2010

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

**** CONTRACT COST SUMMARY ****

PROJECT: SURF CITY BEACH AND NORTH TOPSAIL BEACH
 LOCATION: NORTH CAROLINA
 This Estimate reflects the scope and schedule in report; FEASIBILITY REPORT DATED NOVEMBER 2010

DISTRICT: WILMINGTON DISTRICT PREPARED: 10/5/2010
 POC: CHIEF, COST ENGINEERING,

Estimate Prepared: 5-Oct-10 Effective Price Level: 1 OCT 11						Program Year (Budget EC): 2012 Effective Price Level Date: 1 OCT 11				FULLY FUNDED PROJECT ESTIMATE				
WBS NUMBER	Civil Works Feature & Sub-Feature Description	COST (\$K)	CNTG (\$K)	CNTG (%)	TOTAL (\$K)	ESC (%)	COST (\$K)	CNTG (\$K)	TOTAL (\$K)	Mid-Point Date	ESC (%)	COST (\$K)	CNTG (\$K)	FULL (\$K)
A	B	C	D	E	F	G	H	I	J	P	L	M	N	O
	INITIAL CONSTRUCTION YEAR 1 - DEC 2014 til MAR 2015													
17	BEACH REPLENISHMENT	\$ 23,333	\$ 4,900	21%	\$ 28,233	1.4%	\$23,669	\$4,971	\$28,640	2015Q2	5.6%	\$24,994	\$5,249	\$30,243
CONSTRUCTION ESTIMATE TOTALS:		23,333	4,900	21%	28,233		\$23,669	\$4,971	\$28,640			\$24,994	\$5,249	\$30,243
01	LANDS AND DAMAGES	\$ 4,182	\$ 1,046	25%	\$ 5,228	1.4%	\$4,242	\$1,061	\$5,303	2013Q3	2.5%	\$4,350	\$1,087	\$5,437
30	PLANNING, ENGINEERING & DESIGN PLANNING, ENGINEERING & DESIGN	1,854	\$ 464	25%	2,318	1.5%	\$1,881	\$470	\$2,351	2013Q2	2.1%	\$1,920	\$480	\$2,400
31	CONSTRUCTION MANAGEMENT Construction Management	382	\$ 95	25%	477	1.5%	\$387	\$97	\$484	2015Q2	5.4%	\$408	\$102	\$510
CONTRACT COST TOTALS:		29,751	6,504		36,255		\$30,180	\$6,598	\$36,778			\$31,671	\$6,918	\$38,589

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

**** CONTRACT COST SUMMARY ****

PROJECT: SURF CITY BEACH AND NORTH TOPSAIL BEACH
 LOCATION: NORTH CAROLINA
 This Estimate reflects the scope and schedule in report; FEASIBILITY REPORT DATED NOVEMBER 2010

DISTRICT: WILMINGTON DISTRICT
 POC: CHIEF, COST ENGINEERING,
 PREPARED: 10/5/2010

Estimate Prepared: 5-Oct-10 Effective Price Level: 1 OCT 11						Program Year (Budget EC): 2012 Effective Price Level Date: 1 OCT 11				FULLY FUNDED PROJECT ESTIMATE				
WBS NUMBER	Civil Works Feature & Sub-Feature Description	COST (\$K)	CNTG (\$K)	CNTG (%)	TOTAL (\$K)	ESC (%)	COST (\$K)	CNTG (\$K)	TOTAL (\$K)	Mid-Point Date	ESC (%)	COST (\$K)	CNTG (\$K)	FULL (\$K)
A	B	C	D	E	F	G	H	I	J	P	L	M	N	O
	INITIAL CONSTRUCTION YEAR 2 - DEC 2015 til MAR 2016													
17	BEACH REPLENISHMENT	\$ 23,333	\$ 4,900	21%	\$ 28,233	1.4%	\$23,669	\$4,971	\$28,640	2016Q2	7.4%	\$25,419	\$5,338	\$30,757
CONSTRUCTION ESTIMATE TOTALS:		23,333	4,900	21%	28,233		\$23,669	\$4,971	\$28,640			\$25,419	\$5,338	\$30,757
01	LANDS AND DAMAGES	\$ -	\$ -	25%	\$ -									
30	PLANNING, ENGINEERING & DESIGN PLANNING, ENGINEERING & DESIGN	200	\$ 50	25%	250	1.5%	\$203	\$51	\$254	2015Q3	5.8%	\$215	\$54	\$268
31	CONSTRUCTION MANAGEMENT Construction Management	382	\$ 95	25%	477	1.5%	\$387	\$97	\$484	2016Q2	7.0%	\$415	\$104	\$518
CONTRACT COST TOTALS:		23,915	5,045		28,960		\$24,259	\$5,118	\$29,377			\$26,048	\$5,495	\$31,543

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

PROJECT: SURF CITY BEACH AND NORTH TOPSAIL BEACH
 LOCATION: NORTH CAROLINA
 This Estimate reflects the scope and schedule in report; FEASIBILITY REPORT DATED NOVEMBER 2010

DISTRICT: WILMINGTON DISTRICT PREPARED: 10/5/2010
 POC: CHIEF, COST ENGINEERING,

Estimate Prepared: 5-Oct-10 Effective Price Level: 1 OCT 11						Program Year (Budget EC): 2012 Effective Price Level Date: 1 OCT 11				FULLY FUNDED PROJECT ESTIMATE				
WBS NUMBER	Civil Works Feature & Sub-Feature Description	COST (\$K)	CNTG (\$K)	CNTG (%)	TOTAL (\$K)	ESC (%)	COST (\$K)	CNTG (\$K)	TOTAL (\$K)	Mid-Point Date	ESC (%)	COST (\$K)	CNTG (\$K)	FULL (\$K)
A	B	C	D	E	F	G	H	I	J	P	L	M	N	O
	INITIAL CONSTRUCTION YEAR 3 - DEC 2016 til MAR 2017													
17	BEACH REPLENISHMENT	\$ 23,333	\$ 4,900	21%	\$ 28,233	1.4%	\$23,669	\$4,971	\$28,640	2017Q2	9.3%	\$25,873	\$5,433	\$31,307
	CONSTRUCTION ESTIMATE TOTALS:	23,333	4,900	21%	28,233		\$23,669	\$4,971	\$28,640			\$25,873	\$5,433	\$31,307
01	LANDS AND DAMAGES	\$ -	\$ -	25%	\$ -									
30	PLANNING, ENGINEERING & DESIGN PLANNING, ENGINEERING & DESIGN	200	\$ 50	25%	250	1.5%	\$203	\$51	\$254	2016Q3	7.5%	\$218	\$55	\$273
31	CONSTRUCTION MANAGEMENT Construction Management	382	\$ 95	25%	477	1.5%	\$387	\$97	\$484	2017Q2	8.8%	\$421	\$105	\$527
	CONTRACT COST TOTALS:	23,915	5,045		28,960		\$24,259	\$5,118	\$29,377			\$26,513	\$5,593	\$32,106

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

**** CONTRACT COST SUMMARY ****

PROJECT: SURF CITY BEACH AND NORTH TOPSAIL BEACH
 LOCATION: NORTH CAROLINA
 This Estimate reflects the scope and schedule in report; FEASIBILITY REPORT DATED NOVEMBER 2010

DISTRICT: WILMINGTON DISTRICT PREPARED: 10/5/2010
 POC: CHIEF, COST ENGINEERING,

Estimate Prepared: 5-Oct-10 Effective Price Level: 1 OCT 11						Program Year (Budget EC): 2012 Effective Price Level Date: 1 OCT 11				FULLY FUNDED PROJECT ESTIMATE				
WBS NUMBER	Civil Works Feature & Sub-Feature Description	COST (\$K)	CNTG (\$K)	CNTG (%)	TOTAL (\$K)	ESC (%)	COST (\$K)	CNTG (\$K)	TOTAL (\$K)	Mid-Point Date	ESC (%)	COST (\$K)	CNTG (\$K)	FULL (\$K)
A	B	C	D	E	F	G	H	I	J	P	L	M	N	O
	INITIAL CONSTRUCTION YEAR 4 - DEC 2017 til MAR 2018													
17	BEACH REPLENISHMENT	\$ 23,333	\$ 4,900	21%	\$ 28,233	1.4%	\$23,669	\$4,971	\$28,640	2018Q2	11.3%	\$26,339	\$5,531	\$31,870
CONSTRUCTION ESTIMATE TOTALS:		23,333	4,900	21%	28,233		\$23,669	\$4,971	\$28,640			\$26,339	\$5,531	\$31,870
01	LANDS AND DAMAGES	\$ -	\$ -	25%	\$ -									
30	PLANNING, ENGINEERING & DESIGN PLANNING, ENGINEERING & DESIGN	\$200	\$ 50	25%	250	1.5%	\$203	\$51	\$254	2017Q3	9.2%	\$222	\$55	\$277
31	CONSTRUCTION MANAGEMENT Construction Management	\$382	\$ 95	25%	477	1.5%	\$387	\$97	\$484	2018Q2	10.6%	\$428	\$107	\$535
CONTRACT COST TOTALS:		\$23,915	5,045		28,960		\$24,259	\$5,118	\$29,377			\$26,989	\$5,694	\$32,682



**US Army Corps
of Engineers®**

**Hurricane Protection and Beach Erosion Control
Surf City and North Topsail Beach, North Carolina
Feasibility Report and Environmental Impact Statement
Project Cost and Schedule Risk Analysis Report**

Prepared for:

U.S. Army Corps of Engineers,
Wilmington District

Prepared by:

U.S. Army Corps of Engineers
Cost Engineering Directory of Expertise, Walla Walla

November 23, 2010

TABLE OF CONTENTS

EXECUTIVE SUMMARY	ES-1
1. PURPOSE	1
2. BACKGROUND.....	1
3. REPORT SCOPE	1
3.1 Project Scope	1
3.2 USACE Risk Analysis Process	1
4. METHODOLOGY/PROCESS.....	2
4.1 Identify and Assess Risk Factors.....	3
4.2 Quantify Risk Factor Impacts.....	4
4.3 Analyze Cost Estimate Contingency.....	5
5. PROJECT ASSUMPTIONS.....	5
6. RISK ANALYSIS RESULTS	6
6.1 Risk Register	7
6.2 Cost Risk Analysis - Cost Contingency Results.....	7
7. MITIGATION RECOMMENDATIONS	8

APPENDIX

APPENDIX A includes

Detailed Risk Analysis

 Risk Register Summary

 Sensitivity Charts

 Total Project Cost Presentation

 Project Confidence Curves

EXECUTIVE SUMMARY

Under the auspices of the US Army Corps of Engineers (USACE), Wilmington District, this report presents a recommendation for the total project cost and schedule contingencies for the Surf City and North Topsail Beach Feasibility Report and Environmental Impact Statement. In compliance with Engineer Regulation (ER) 1110-2-1302 CIVIL WORKS COST ENGINEERING, dated September 15, 2008, a formal risk analysis study was conducted for the development of contingency on the total project cost. The purpose of this risk analysis study was to establish project contingencies by identifying and measuring the cost and schedule impact of project uncertainties with respect to the estimated total project cost.

Specific to the Surf City and North Topsail Beach project, the most likely project cost is estimated at approximately \$101 Million. Based on the results of the analysis, the Cost Engineering Directory of Expertise for Civil Works (Walla Walla District) recommends a contingency value of \$22 Million, or 21%.

The Project Delivery Team (PDT) conducted a series of brainstorming sessions in February 2009 to identify the risks associated with the project. The expert judgment of estimator and the risk analyst also helped to identify and define the risks. Walla Walla Cost Dx performed risk analysis using the Monte Carol technique, producing the aforementioned contingencies and identifying key risk drivers.

The following table ES-1 portrays the development of contingencies for the project. The contingency is based on an 80% confidence level, as per accepted USACE Civil Works guidance.

Table ES-1. Contingency Development Summary

Most Likely Cost Estimate	\$101,494,800	
Confidence Level	Value (\$\$)	Contingency (%)
5%	\$101,911,908	0.41%
50%	\$115,734,303	14.03%
80%	\$123,033,021	21.22%
95%	\$129,928,279	28.01%

The following table ES-2 portrays the full costs of the recommended alternative based on the anticipated contracts. The costs are intended to address the congressional request of estimates to implement the project. The contingency is based on an 80% confidence level, as per accepted USACE Civil Works guidance.

Table ES-2. Contingency Analysis Table

SURF CITY AND NORTH TOPSAIL BEACH		COST	CNTG	TOTAL
		(\$1,000)	(\$1,000)	(\$1,000)
01	LANDS AND DAMAGES	4,182	1,046	5,228
17	BEACH REPLENISHMENT	93,332	19,600	112,932
30	PLANNING, ENGINEERING AND DESIGN	2,454	614	3,068
31	CONSTRUCTION MANAGEMENT	1,527	382	1,909
TOTAL PROJECT COSTS		101,495	21,640	123,135

Notes:

1) Construction costs include the recommended contingency of 21%. Lands and Damages (01), Planning, Engineering and Design (30), and Construction Management (31) Accounts include contingencies of 25%, as provided by others.

2) Costs exclude O&M and Life Cycle Cost estimates.

KEY FINDINGS/OBSERVATIONS RECOMMENDATIONS

The key cost risk drivers identified through sensitivity analysis are Programmatic Risk EXT-1 (Market Conditions), Contract Risks EST-4 (Two-Dredge Productivity) and EST-3 (Fuel), which together contribute 82 percent of the statistical cost variance. Other notable cost risk drivers are Contract Risks EST-1 (Dredge, Number & Size) and CON-1 (Contract Modifications) which each contribute 5.9 percent to the statistical cost variance.

Recommendations, as detailed within the main report, include the implementation of contingencies, further iterative study of risks throughout the project life-cycle, potential mitigation throughout the PED phase, and proactive monitoring and control of risks identified in this study.

Risk is comprised of cost and schedule risk elements. This analysis considers schedule elements within the cost analysis, as this project is not susceptible to uncaptured escalation nor significant recurring monthly costs. The following tables tabulate the results of the risk analysis currently identified as a 20.75%

Figure ES-1. Cumulative Frequency Chart

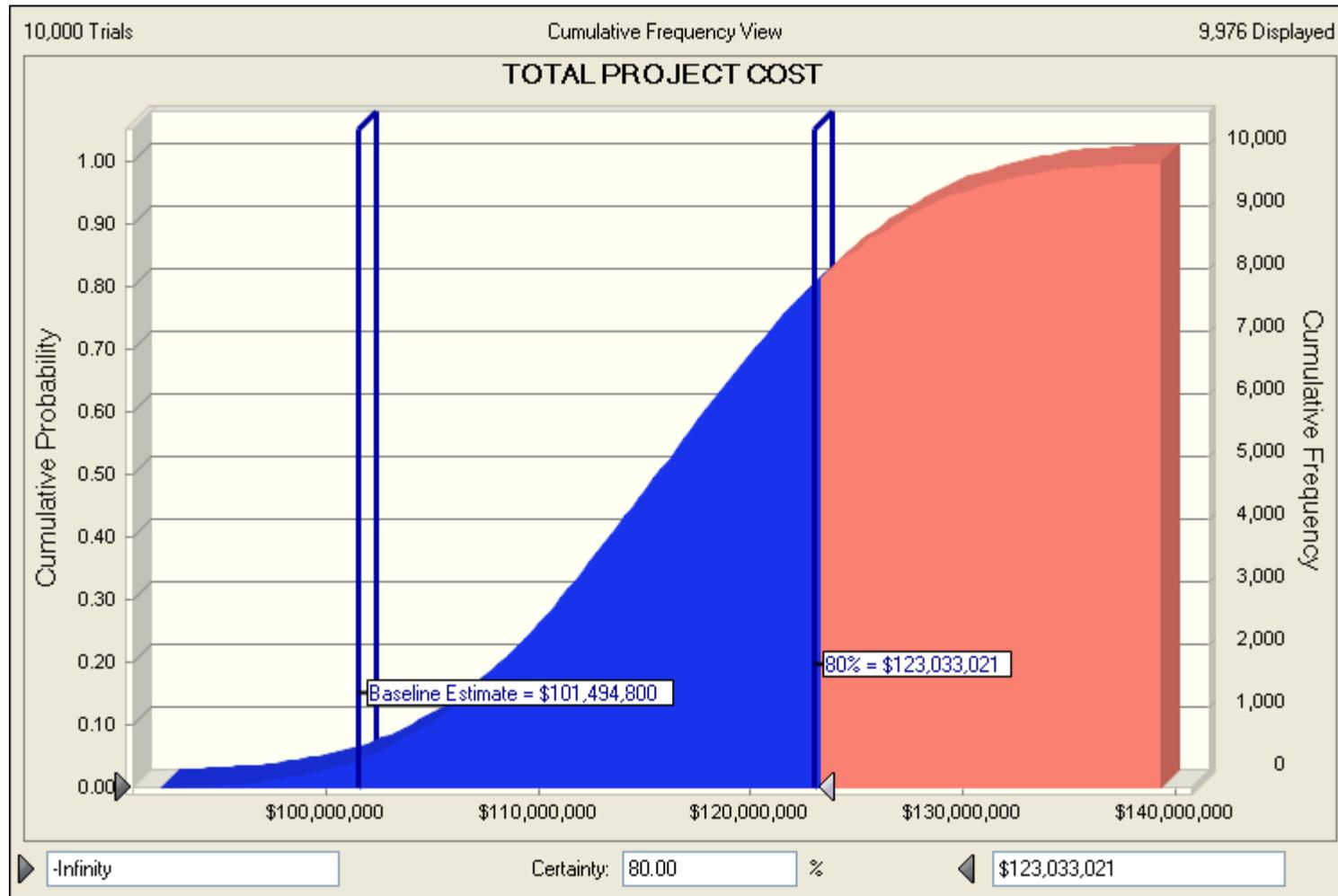
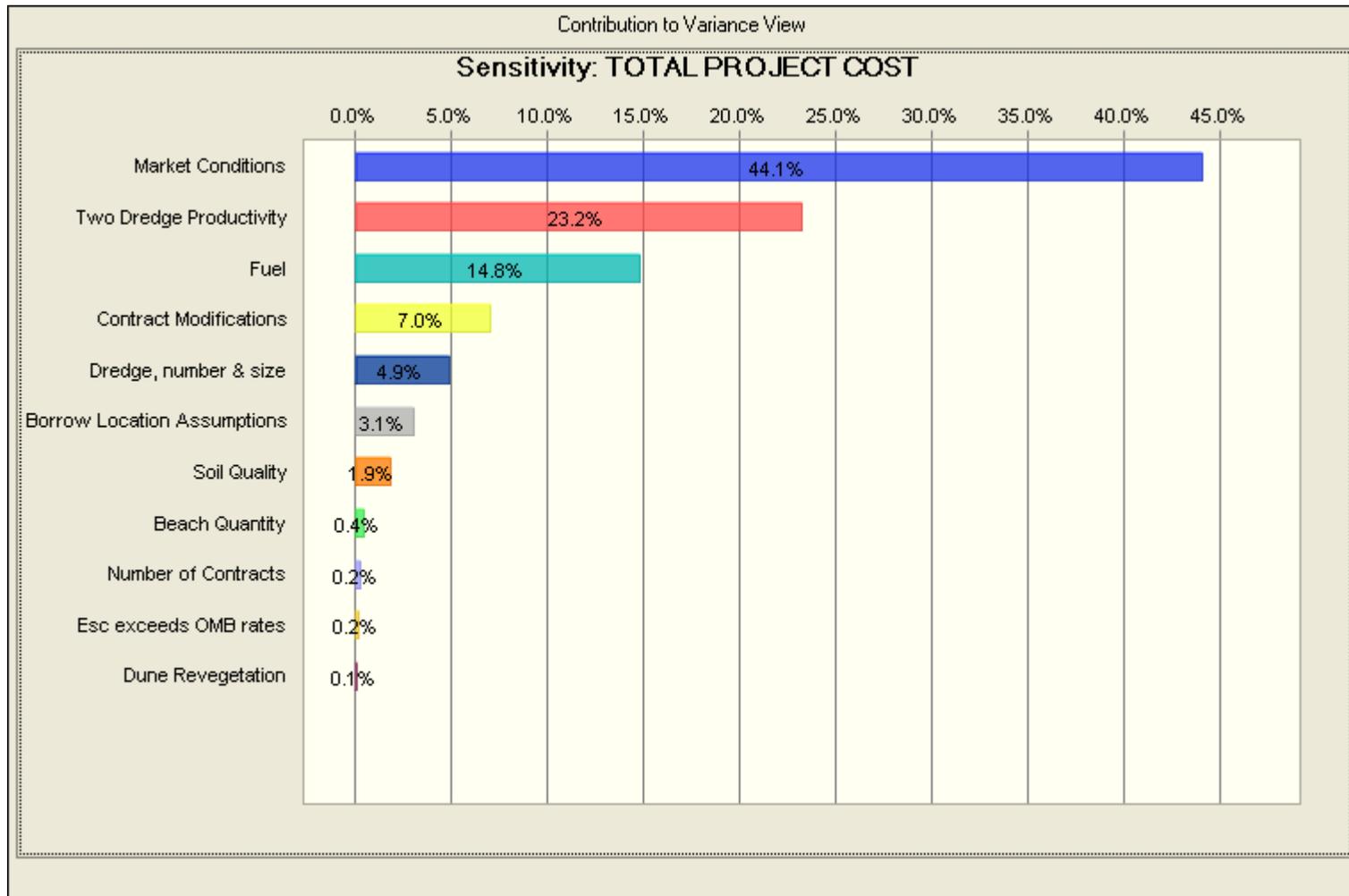


Figure ES-2. Sensitivity Chart



1. PURPOSE

Risk Analysis is based on SURF CITY AND NORTH TOPSAIL BEACH FEASIBILITY REPORT AND ENVIRONMENTAL IMPACT STATEMENT. The purpose for a cost and schedule risk analysis (CSRA) is to briefly present discussion of the studied elements related to cost and schedule with an outcome contingency calculation at the recommended confidence level for both cost and schedule that are measured in terms of dollars. The most common and recommended contingency has been established at 80% confidence.

2. BACKGROUND

The NED Plan is the alternative selected plan which has the greatest net benefits. The NED Plan is to construct a sand dune to elevation 15-ft (25-ft top width) and a berm to the ocean at elevation of 7-ft (50-ft wide). The NED plan for Surf City and North Topsail Beach (SCNT) is often referred to as the 15/50 plan. Material for placement on the beach will come from offshore borrow areas. Hopper dredges will excavate material, travel to offshore pumpout stations, and pump material onto the beach.

3. REPORT SCOPE

The scope of the risk analysis report is to calculate and present the cost and schedule contingencies at the 80 percent confidence level using the risk analysis processes, as mandated by U.S. Army Corps of Engineers (USACE) Engineer Regulation (ER) 1110-2-1150, Engineering and Design for Civil Works, ER 1110-2-1302, Civil Works Cost Engineering, and Engineer Technical Letter 1110-2-573, Construction Cost Estimating Guide for Civil Works. The report presents the contingency results for cost risks for all project features. The study and presentation can include or exclude consideration for operation and maintenance or life cycle costs, depending upon the program or decision document intended for funding.

3.1 Project Scope

The scope of this study addresses the identification of problems, needs, opportunities and potential solutions that are viable from an economic, environmental, and engineering viewpoint

3.2 USACE Risk Analysis Process

The risk analysis process follows the USACE Headquarters requirements as well as the guidance provided by the Cost Engineering Directory of Expertise for Civil Works (Cost Dx). The risk analysis process reflected within the risk analysis report uses probabilistic cost and schedule risk analysis methods within the framework of the Crystal Ball software. The risk analysis results are intended to serve several functions – one being the establishment of reasonable contingencies reflective of an 80 percent confidence level to successfully accomplish the project work within that established contingency amount. Furthermore, the scope of the report includes the identification and

communication of important steps, logic, key assumptions, limitations, and decisions to help ensure that risk analysis results can be appropriately interpreted.

Risk analysis results are also intended to provide project leadership with contingency information for scheduling, budgeting, and project control purposes, as well as provide tools to support decision making and risk management as the project progresses through planning and implementation. To fully recognize its benefits, cost and schedule risk analyses should be considered as an ongoing process conducted concurrent to, and iteratively with, other important project processes such as scope and execution plan development, resource planning, procurement planning, cost estimating, budgeting, and scheduling.

In addition to broadly defined risk analysis standards and recommended practices, the risk analysis is performed to meet the requirements and recommendations of the following documents and sources:

- Cost and Schedule Risk Analysis Process guidance prepared by the USACE Cost Dx.
- Memorandum from Major General Don T. Riley (US Army Director of Civil Works), dated July 3, 2007.
- Engineering and Construction Bulletin issued by James C. Dalton, P.E. (Chief, Engineering and Construction, Directorate of Civil Works), dated September 10, 2007.
- Engineering Regulation ER 1110-2-1150 dated August 31, 1999.
- Engineering Regulation ER 1110-2-1302 dated September 15, 2008.
- Engineering Technical Letter 1110-2-573 dated September 30, 2008.

4. METHODOLOGY/PROCESS

The Cost Dx assembled a team, also relying on local Wilmington District staff to further augment labor, expertise and information gathering. The Cost Dx team consisted of two senior civil cost engineers. The Wilmington staff included cost support from the cost engineer as well as coordination support from project management and the assigned project delivery team (PDT).

The Cost Dx Team facilitated a risk identification and qualitative analysis meeting with the Wilmington PDT via teleconference on February 24, 2009. Several meetings via teleconference were conducted during that time frame to further develop the risk register. The risk identification and qualitative analysis process resulted in recommendations for revisions to the estimate, both for the ATR cost review process and for the inputs to the cost and schedule risk analysis.

The cost risk model was completed and results reported on April 15, 2009.

The risk analysis process for this study is intended to determine the probability of various cost outcomes and quantify the required contingency needed in the cost estimate to achieve any desired level of cost confidence.

In simple terms, contingency is an amount added to an estimate to allow for items, conditions or events for which the occurrence or impact is uncertain and that experience suggests will likely result in additional costs being incurred or additional time being required. The amount of contingency included in project control plans depends, at least in part, on the project leadership's willingness to accept risk of project overruns. The less risk that project leadership is willing to accept the more contingency should be applied in the project control plans. The risk of overrun is expressed, in a probabilistic context, using confidence levels.

The Cost Dx guidance for cost and schedule risk analysis generally focuses on the 80-percent level of confidence (P80) for cost contingency calculation. It should be noted that use of P80 as a decision criteria is a risk averse approach (whereas the use of P50 would be a risk neutral approach, and use of levels less than 50 percent would be risk seeking). Thus, a P80 confidence level results in greater contingency as compared to a P50 confidence level.

The risk analysis process uses *Monte Carlo* techniques to determine probabilities and contingency. The *Monte Carlo* techniques are facilitated computationally by a commercially available risk analysis software package (Crystal Ball) that is an add-in to Microsoft Excel. Cost estimates are packaged into an Excel format and used directly for cost risk analysis purposes. The level of detail recreated in the Excel-format schedule is sufficient for risk analysis purposes that reflect the established risk register, but generally less than that of the native format.

The primary steps, in functional terms, of the risk analysis process are described in the following subsections. Risk analysis results are provided in section 6.

4.1 Identify and Assess Risk Factors

Identifying the risk factors via the PDT is considered a qualitative process that results in establishing a risk register that serves as the document for the quantitative study using the Crystal Ball risk software. Risk factors are events and conditions that may influence or drive uncertainty in project performance. They may be inherent characteristics or conditions of the project or external influences, events, or conditions such as weather or economic conditions. Risk factors may have either favorable or unfavorable impacts on project cost and schedule.

Checklists or historical databases of common risk factors are sometimes used to facilitate risk factor identification. However, key risk factors are often unique to a project and not readily derivable from historical information. Therefore, input from the entire PDT is obtained using creative processes such as brainstorming or other facilitated risk assessment meetings. In practice, a combination of professional judgment from the PDT and empirical data from similar projects is desirable and is considered.

Formal PDT meetings are held for the purposes of identifying and assessing risk factors. The meetings should include capable and qualified representatives from multiple project team disciplines and functions, for example:

- Project/Program managers
- Contracting/acquisition
- Real Estate
- Relocations
- Environmental
- Civil and Coastal Design
- Cost and schedule engineers
- Construction
- Key Sponsors

The initial formal meetings should focus primarily on risk factor identification using brainstorming techniques, but also include some facilitated discussions based on risk factors common to projects of similar scope and geographic location. Subsequent meetings should focus primarily on risk factor assessment and quantification.

Additionally, numerous conference calls and informal meetings are conducted throughout the risk analysis process on an as-needed basis to further facilitate risk factor identification, market analysis, and risk assessment.

4.2 Quantify Risk Factor Impacts

The quantitative impacts of risk factors on project plans are analyzed using a combination of professional judgment, empirical data, and analytical techniques. Risk factor impacts are quantified using probability distributions (density functions), because risk factors are entered into the Crystal Ball software in the form of probability density functions.

Similar to the identification and assessment process, risk factor quantification involves multiple project team disciplines and functions. However, the quantification process relies more extensively on collaboration between cost engineering, designers, and risk analysis team members with lesser inputs from other functions and disciplines.

The following is an example of the PDT quantifying risk factor impacts by using an iterative, consensus-building approach to estimate the elements of each risk factor:

- Maximum possible value for the risk factor.
- Minimum possible value for the risk factor.
- Most likely value (the statistical mode), if applicable.
- Nature of the probability density function used to approximate risk factor uncertainty.
- Mathematical correlations between risk factors.
- Affected cost estimate and schedule elements.

The resulting product from the PDT discussions is captured within a risk register as presented in section 6 for both cost and schedule risk concerns. Note that the risk register records the PDT's risk concerns, discussions related to those concerns, and potential impacts to the current cost and schedule estimates. The concerns and

discussions are meant to support the team's decisions related to event likelihood, impact, and the resulting risk levels for each risk event.

4.3 Analyze Cost Estimate and Schedule Contingency

Contingency is analyzed using the Crystal Ball software, an add-in to the Microsoft Excel format of the cost estimate and schedule. *Monte Carlo* simulations are performed by applying the risk factors (quantified as probability density functions) to the appropriate estimated cost and schedule elements identified by the PDT.

Contingencies are calculated by applying only the moderate and high level risks identified for each option (i.e., low-level risks are typically not considered, but remain within the risk register to serve historical purposes as well as support follow-on risk studies as the project and risks evolve).

For the cost estimate, the contingency is calculated as the difference between the P80 cost forecast and the baseline cost estimate. Each option-specific contingency is then allocated on a civil works feature level based on the dollar-weighted relative risk of each feature as quantified by *Monte Carlo* simulation. Standard deviation is used as the feature-specific measure of risk for contingency allocation purposes. This approach results in a relatively larger portion of all the project feature cost contingency being allocated to features with relatively higher estimated cost uncertainty.

5. PROJECT ASSUMPTIONS

The following data sources and assumptions were used in quantifying the costs associated with the with- and without-project conditions at Surf City and North Topsail Beach.

- a. Two medium size Hopper dredges were used to developed cost estimates using CEDEP. The hopper dredges would dredge material from the borrow areas and haul material to pump out locations approximately 3,000 LF offshore. On the beach, the material would be placed from a wye/tee for 3,000 LF in each direction or a total of 6,000 lf on the beach.
- b. Hopper dredges were assumed because the distance from the borrow areas to the beach averages approximately 3 to 5 miles, and the borrow area contours show relatively shallow depths of sand (bank height is generally less than 5 feet in most cases). It was determined that the conditions above would not be efficient for pipeline cutter head suction dredges. However, pipeline cutter head suction dredges will not be restricted from the competitive bids.
- c. The entire length of the beach to be renourished is approximately 10 miles. Initial nourishment will require 11,500,000 CY and subsequent periodic nourishments will require 1,639,000 CY.
- d. Hopper dredge operations are limited to environmental windows and are only allowed to dredge during the period from December 1 through March 31.

- e. The unit prices are based on historical effective work times for offshore borrow areas with pumping to the beach.
- f. The cost comparisons and risk analyses performed and reflected within this report are based upon design scope and estimates that are considered to be fairly well developed and designed.
- g. The schedule was not analyzed for impact to the total project cost, as this project is not susceptible to uncaptured escalation (local market inflation notably higher than national average) or recurring monthly costs (unavoidable fixed contract costs and/or languishing federal administration costs incurred continuously throughout delay).
- h. The Cost Dx guidance generally focuses on the eighty-percent level of confidence (P80) for cost contingency calculation. For this risk analysis, the eighty-percent level of confidence (P80) was used. It should be noted that the use of P80 as a decision criteria is a moderately risk averse approach, generally resulting in higher cost contingencies. However, the P80 level of confidence also assumes a small degree of risk that the recommended contingencies may be inadequate to completely capture actual project costs.
- i. Only high and moderate risk level impacts, as identified in the risk register, were considered for the purposes of calculating cost contingency. Low level risk impacts should be maintained in project management documentation, and reviewed at each project milestone to determine if they should be placed on the risk “watch list” for further monitoring and evaluation.

6. RISK ANALYSIS RESULTS

The following table tabulates the results of the risk analysis currently identified as a 21.22% contingency amount based on 80% confidence level. The complete list of tables and figures are included within Appendix A.

Table 1. Cost Contingency Summary

Contingency on Base Estimate	80% Confidence Project Cost
Total Construction Cost (Most Likely) ->	\$101,494,800
Construction Cost Contingency Amount ->	\$21,538,221
Total Construction Cost (80% Confidence) ->	\$123,033,021

6.1 Risk Register

A risk register is a tool commonly used in project planning and risk analysis. The actual risk register is provided in Appendix A. The complete risk register includes low level risks, as well as additional information regarding the nature and impacts of each risk.

It is important to note that a risk register can be an effective tool for managing identified risks throughout the project life cycle. As such, it is generally recommended that risk registers be updated as the designs, cost estimates, and schedule are further refined, especially on large projects with extended schedules. Recommended uses of the risk register going forward include:

- Documenting risk mitigation strategies being pursued in response to the identified risks and their assessment in terms of probability and impact.
- Providing project sponsors, stakeholders, and leadership/management with a documented framework from which risk status can be reported in the context of project controls.
- Communicating risk management issues.
- Providing a mechanism for eliciting risk analysis feedback and project control input.
- Identifying risk transfer, elimination, or mitigation actions required for implementation of risk management plans.

6.2 Cost Risk Analysis - Cost Contingency Results

Table 2 provides the construction cost contingencies calculated for the P80 confidence level and rounded to the nearest thousand. The construction cost contingencies for the P50 and P100 confidence levels are also provided for illustrative purposes.

Contingency was quantified as approximately \$22 Million at the P80 confidence level (about 21% of the base cost estimate). For comparison, the cost contingency at the P50 and P100 confidence levels was quantified as 14% and 42% of the baseline cost estimate, respectively.

Table 2. Base Estimate Cost Contingency Summary

Risk Analysis Forecast	Base Estimate	Total Contingency ¹ (\$)	Total Contingency (%)
50% Confidence Level			
Total Project Cost	\$101,495	\$14,240	14.03%
80% Confidence Level			
Total Project Cost	\$101,495	\$21,538	21.22%
100% Confidence Level			
Total Project Cost	\$101,495	\$42,090	41.47%

Notes:

1) Includes cost contingency, but not schedule contingency impacts.

7. MITIGATION RECOMMENDATIONS

Risk Management is an all-encompassing, iterative, and life-cycle process of project management. The Project Management Institute's (PMI) *A Guide to the Project Management Body of Knowledge (PMBOK® Guide), 4th edition*, states that "project risk management includes the processes concerned with conducting risk management

planning, identification, analysis, responses, and monitoring and control on a project.” Risk identification and analysis are processes within the knowledge area of risk management. Its outputs pertinent to this effort include the risk register, risk quantification (risk analysis model), contingency report, and the sensitivity analysis.

The intended use of these outputs is implementation by the project leadership with respect to risk responses (such as mitigation) and risk monitoring and control. In short, the effectiveness of the project risk management effort requires that proactive management of risks does not conclude with the study completed in this report.

The Cost and Schedule Risk Analysis (CSRA) produced by the PDT identifies issues that require the development of subsequent risk response and mitigation plans. This section provides a list of recommendations for continued management of the risks identified and analyzed in this study. Note that this list is not all inclusive and should not substitute a formal risk management and response plan.

1. Key Risk Drivers: The key cost risk drivers identified through sensitivity analysis are Programmatic Risk EXT-1 (Market Conditions), Contract Risks EST-4 (Two-Dredge Productivity) and EST-3 (Fuel), which together contribute 82 percent of the statistical cost variance. Other notable cost risk drivers are Contract Risks EST-1 (Dredge, Number & Size) and CON-1 (Contract Modifications) which each contribute 5.9 percent to the statistical cost variance.

Whereas the developed contingency, itself, is a response to the potential for these risks, these risks warrant consideration of other potential responses and proactive monitoring and control.

- a) Market Conditions: With respect to Market Conditions (Risk EXT-1), Cost Dx recommends continuous monitoring of the price fluctuations and behaviors in the regional dredging industry in the PDT’s ongoing market research. Project leadership should craft the acquisition strategy with relation to the market trends to minimize the impact of the industry contraction and maximize competition on the project.
- b) Two-Dredge Productivity: With respect to two-dredge productivity (Risk EST-4), Cost Dx recommends further research into the likelihood of the use of this model scenario. This research should parallel ongoing market research.
- c) Fuel: With respect to fuel prices (Risk EST-3), Cost Dx recommends proactive market research to identify trends and their effect on the project cost.

2. Risk Management: Cost Dx recommends use of the outputs created during the risk analysis effort as tools in future risk management processes. The risk register should be updated at each major project milestone. The results of the sensitivity analysis may also be used for response planning strategy and development. These tools should be used in conjunction with regular risk review meetings, as discusses in section 6.1.

3. Risk Analysis Updates: Project leadership should review risk items identified in the original risk register and add others, as required, throughout the project life-cycle. Risks should be reviewed for status and reevaluation (using qualitative measure, at a minimum) and placed on risk management watch lists if any risk's likelihood or impact significantly increases. Project leadership should also be mindful of the potential for secondary (new risks created specifically by the response to an original risk) and residual risks (risks that remain and have unintended impact following response).

APPENDIX A

SURF CITY AND NORTH TOPSAIL BEACH, NC - RISK REGISTER



Risk No.	Risk/Opportunity Event (logic by feature, contract, responsibility)	PDT Event Concerns (include all to archive)	PDT Discussions (support the likelihood and impact)	Responsibility/PDC	Project Cost			Project Schedule			COMPLETED BY RISK ANALYST AFTER PDT DISCUSSIONS					Cost Comments	Schedule Comments
					Likelihood*	Impact*	Risk Level*	Likelihood*	Impact*	Risk Level*	Cost Impact (\$)	Variance Distribution (Cost)	Schedule Impact (mo)	Variance Distribution (Schedule)	Correlation to Others (minimize)		
Contract Risks (Internal Risk Items are those that are generated, caused, or controlled within the PDT's sphere of influence.)																	
PROJECT & PROGRAM MGMT																	
PPM-1	Congressional Funding - Feasibility	Adequate Congressional funding to complete the feasibility study.	PM feels that adequate PED funding has been made available to support Feasibility study and report as well as state PED draws.	PM	Very Unlikely	Marginal	Low	Very Unlikely	Marginal	Low	Less Than 1%	Low Risk - Not Studied	Less Than 1%	*Schedule Risks Not Formerly Studied	Project Cost & Schedule		
PPM-2	Congressional Funding - PED	Concern is that the PED Congressional funding is uncertain post feasibility.	Anticipated need of \$1.5-2M to complete PED, but not certain all needed Congressional funding will be made available in a timely manner for FY 2016.	PM	Likely	Negligible	Low	Likely	Marginal	Moderate	Less Than 1%	Low Risk - Not Studied	+12 mo	*Schedule Risks Not Formerly Studied	PPM-3, PPM-8	Project Schedule	Up front authorization and funding delays could impact PED start and consequently the construction start. There is a potential that funding is delayed a year, causing a year loss. Will study PPM-3 separately in time.
PPM-3	Congressional Funding Construction	Concern is that construction funding is incremental per FY and can be impacted by budget delays such as continuing resolutions. We can no longer award a continuing contract.	Based on estimated construction value, the PDT feels it unlikely that total construction will be funded all at once. This could result in additional PED expenses as well as escalation in schedule growth. Some risk mitigation could occur by breaking the project into seasonal contracts, but the Dec-Mar seasonal construction is dependent upon the FY budget appropriation each FY. Delay in budget approval can impact the Dec start. The converse argument is that if authorization has already been received, even if the construction funding is delayed, that funding will add the CMB escalation onto the funding request.	PM and Contracting	Very Likely	Negligible	Low	Very Likely	Marginal	Moderate	Less Than 1%	Low Risk - Not Studied	+24 mo	*Schedule Risks Not Formerly Studied	PPM-2, PPM-8, CA-2	Project Schedule	Construction activities dependent upon receiving the PED funds AND the PED activities prior to construction. The construction could then be delayed more months if construction funding is not all received at the construction start. Since there may be as many as four contracts, we assumed incremental funding that has a potential of one or more years.
PPM-4	Stakeholder funding capability	2 sponsors: Surf City and North Topsail Beach having adequate funding support for their draws.	Sponsors must fund portion of 50% feasibility, 25% PED and 25% initial construction plus 100% real estate acquisition. Breaking construction into 3-4 separate contracts lessens funding risks. Sponsors feel confident that their budget shares are not a critical constraint and that the Federal shares and funding are a greater concern.	Sponsor	Very Unlikely	Negligible	Low	Very Unlikely	Marginal	Low	Less Than 1%	Low Risk - Not Studied	Less Than 1%	*Schedule Risks Not Formerly Studied	Project Cost		
PPM-5	Adequate PDT Resources	Several PDT members scheduled for near term retirement.	The District feels that there is adequate District support and team development for future efforts.	PM	Unlikely	Negligible	Low	Unlikely	Negligible	Low	Less Than 1%	Low Risk - Not Studied	Less Than 1%	*Schedule Risks Not Formerly Studied	Project Schedule		
PPM-6	Sponsor Support	Sponsor support and agreement with the project plan.	Sponsor coordination and support is healthy, alleviated with monthly meetings that include PDT and sponsors.	PM	Unlikely	Negligible	Low	Unlikely	Negligible	Low	Less Than 1%	Low Risk - Not Studied	Less Than 1%	*Schedule Risks Not Formerly Studied	Project Cost & Schedule		
PPM-7	Schedule quality	Concern whether current schedule is realistic, optimistic.	PDT feels the schedule is not overly optimistic and there is adequate time available. The PED is confident of the schedule for PED and construction durations. The construction durations reflect a conservative estimate approach and establish the construction schedule.	PM	Unlikely	Negligible	Low	Unlikely	Negligible	Low	Less Than 1%	Low Risk - Not Studied	Less Than 1%	*Schedule Risks Not Formerly Studied	Project Schedule		
PPM-8	Construction Schedule - 4 years	Construction duration expectation is 4 seasons (1 Dec - 31 Mar) due to Environmental Windows for hopper dredge. The estimate choice for assumed equipment establishes the duration. Opportunities may exist within the contract solicitation package or further estimate study to decrease the schedule and erosion costs.	Historically, 3 dredges have occurred based on market availability as well quantities. The construction estimate assumed 2 medium-sized dredges. Hopper dredge size and number of dredges is commonly established by quantity within the contract. Market study and contract development could result in opportunity.	Estimator	Likely	Marginal	Moderate	Very Likely	Significant	High	SEE EST-1	Uniform	Less Than 1%	*Schedule Risks Not Formerly Studied	EST-1	Contract Cost & Schedule	Direct relationship to EST-1. Model under EST-1.
Contract Acquisition																	
CA-1	Contract Acquisition Strategy	The acquisition strategy could impact the construction cost and schedule.	Work type is not complicated. It is likely that it will be a FFP large business, based on historical and small business does not have capability. The contract packages will consider the estimate schedule projections related to productivity.	PM/KD	Unlikely	Negligible	Low	Unlikely	Negligible	Low	Less Than 1%	Low Risk - Not Studied	Less Than 1%	*Schedule Risks Not Formerly Studied	Contract Cost & Schedule		
CA-2	Number of Contracts	Possibility of single or multiple contracts.	Multiple contracts are likely, which would reduce risks related to bid competition and funding availability. However, multiple contracts will result in more PED and Contracting efforts.	PM/KD	Likely	Marginal	Moderate	Likely	Negligible	Low	WC = \$300K/contract for 3 contracts	Uniform	Less Than 1%	*Schedule Risks Not Formerly Studied	PPM-3, PPM-8	Contract Cost	Schedule risk is low because PED work can be performed concurrently with construction contracts.
Technical																	
T-1	Soil Quality	Concern that the quality soil may be insufficient in quantity to construct project because soil characteristics is not complete. State has few, more stringent, criteria related to material soils.	This potential problem is more likely to occur in the long term, unlikely in the short term but dependent upon further study, 20% soil characterization is complete. Further study is significant, but scheduled for PED phase and the initial contracts have adequate borrow sources available. Greater risk is in the out years because the current activities would simply result in a local borrow source.	PM/Geotech	Unlikely	Marginal	High	Likely	Significant	High	\$5,474,000 MORE	Triangular	NOT SIGNIFICANT	*Schedule Risks Not Formerly Studied	T-2	Contract Cost & Schedule	MOST LIKELY: Estimate assumes 18% losses from borrow area to the beach fill based on geotech studies. BEST CASE: Assume Most Likely. WORSE CASE: 25% losses total OR 7% INCREASE IN QUANTITY. Schedule risk is low because PED work can be performed concurrently with construction contracts.
T-2	Beach Quantity	Scope definition is excellent, but quantities can change over time due to beach erosion during the PED phase and geotechnical overfill ratios. Additionally funding delays may increase quantities.	Contract quantities are currently established by dredged borrow assumptions related to quantity and overfill rates for payment, based on borrow surveys underwater. Storms can change profile bottom, but PDT feels the borrow sources are outside the storm impact zone. Borrow surveys must occur prior to establish the q's. Surveys can result in claims and floods, but further beach erosion could also increase the borrow needs. Also could be more quantity due to funding delays.	Coastal/Geotech	Likely	Significant	High	Likely	Significant	High	\$3,704,000 MORE	Triangular	NOT SIGNIFICANT	*Schedule Risks Not Formerly Studied	T-1	Contract Cost & Schedule	MOST LIKELY: Estimate assumes funding for FY 13 and subsequent erosion until FY 13. BEST CASE: Assume same as Most Likely. WORSE CASE: \$1,500 cy erosion each year beyond scheduled year FY 13. Assume 4 years delay or about 400,000 cy. Schedule risk is low because EACH additional season would be approx 4 days outside window which is very little risk.
T-3	Non-Compatible Soil	Concern that non-satisfactory soil is brought upon beach.	Plan is to monitor during dredging process. Mitigation would require contractor removal. Hopper dredge and screening possible before beach placement. PED stage with added borings would better clarify. Must determine if the estimates include any monitoring costs and potential disposal.	Geotech	Unlikely	Marginal	Low	Unlikely	Marginal	Low	Less Than 1%	Low Risk - Not Studied	Less Than 1%	*Schedule Risks Not Formerly Studied	Contract Cost & Schedule		
T-4	Hard Bottom Encounter	Hard bottoms may be uncovered later in out years.	Sand bottom may be covering hard bottoms, leaving a risk in the borrow quantity available at each site. It could damage the hopper dredge. Risk is increased in the out years, because in the near term the dredge can simply relocate. Better classification should occur during PED phase with better surveys.	Geotech	Unlikely	Marginal	Low	Unlikely	Marginal	Low	Less Than 1%	Low Risk - Not Studied	Less Than 1%	*Schedule Risks Not Formerly Studied	Contract Cost & Schedule		
Real Estate																	
RE-1	Acquire real estate	Concern that RE cannot acquire real estate timely to support the construction contracts.	Historically, a good track record and indications are minor.	RE	Unlikely	Negligible	Low	Unlikely	Negligible	Low	Less Than 1%	Low Risk - Not Studied	Less Than 1%	*Schedule Risks Not Formerly Studied	Project Schedule		
RE-2	Real Estate Estimate	Real Estate estimate may cause cost impact.	Historical information is good. The estimate currently includes a 20% contingency. This should be re-evaluated when the risk analysis outcomes.	RE	Unlikely	Negligible	Low	Unlikely	Negligible	Low	Less Than 1%	Low Risk - Not Studied	Less Than 1%	*Schedule Risks Not Formerly Studied	Project Cost		

Environmental																				
ENV-1	Encouraging small arms	HTRW - Historically, the borrow area was part of a local WWII Anti-aircraft training center. Small arms firing off shore may result in encountering some small arms material.	In 1994 USACE surveyed beach only. Off shore not surveyed. There is potential of encountering from dredging and placement onto beach. Beach monitoring will be required. Mitigation will be required if encountered.	Environmental	Unlikely	Negligible	Low	Unlikely	Negligible	Low	Less Than 1%	Low Risk - Not Studied	Less Than 1%	*Schedule Risks Not Formerly Studied	Contract Cost					
ENV-2	Sea Turtle Site Take	Hopper dredge may impact sea turtle location.	Winter work window is based on sea turtle concern. Risk is minimized, but such an encounter may shut down work activity for a period, resulting in delays and lost time costs.	Environmental	Unlikely	Marginal	Low	Unlikely	Marginal	Low	Less Than 1%	Low Risk - Not Studied	Less Than 1%	*Schedule Risks Not Formerly Studied	Contract Cost & Schedule					
ENV-3	SAD Turtle Incidental Take	Other projects encountering sea turtles	Other SAD impacts or "takes" can impact this project. Time frame shut down could occur (possibly time based in days).	Environmental	Unlikely	Marginal	Low	Unlikely	Marginal	Low	Less Than 1%	Low Risk - Not Studied	Less Than 1%	*Schedule Risks Not Formerly Studied	Contract Cost & Schedule					
ENV-4	Bird Nesting	Bird nesting impacts construction	Winter work window is also based on bird nesting concerns. Risk is minimized, but such an encounter may shut down work activity for a period of time.	Environmental	Unlikely	Marginal	Low	Unlikely	Marginal	Low	Less Than 1%	Low Risk - Not Studied	Less Than 1%	*Schedule Risks Not Formerly Studied	Contract Cost & Schedule					
ENV-5	Wright Whale Restrictions	Encounter potential impacts dredge fleet speed	Probably of the 10 knot speed restriction is low. Larger hopper dredges have a higher speed that could be impacted. Facts may not require this restriction on a federal project and the current estimate assumes smaller dredges with slower speed capability. Facts also monitor whale movement. Estimate must accommodate speed restrictions, affecting the productivity. The estimate will be redeveloped to accommodate the speed restrictions.	Environmental	Unlikely	Marginal	Low	Unlikely	Marginal	Low	Less Than 1%	Low Risk - Not Studied	Less Than 1%	*Schedule Risks Not Formerly Studied	Contract Cost & Schedule					
ENV-6	Environmental Monitoring	Environmental monitoring required during dredging	Dredge relocation to another borrow source would be required if impacts are found. Environmental group will have a separate monitoring contract. The monitoring costs have been considered within P&E.	Environmental	Unlikely	Marginal	Low	Unlikely	Marginal	Low	Less Than 1%	Low Risk - Not Studied	Less Than 1%	*Schedule Risks Not Formerly Studied	Contract Cost & Schedule					
ENV-7	Dune Revegetation	Dune revegetation may be required	Estimate includes first vegetation. Dune revegetation equipment is likely and may not be adequately covered within the estimate.	Environmental	Likely	Marginal	Moderate	Likely	Negligible	Low	\$530,000 MORE	Uniform	Less Than 1%	*Schedule Risks Not Formerly Studied	Contract Cost	MOST LIKELY: The estimate currently includes initial planting, no revegetation if fair planting rate. BEST CASE: No replanting. WORST CASE: Replace 50% of field.				
ENV-8	Archeological	Concern that there may be uncovered archeological finds during the underwater excavations.	Borrow areas have been well established with adequate investigation to determine this is not a concern. If anything was discovered, another available nearby borrow source, already identified and studied, would be the next source.	Coastal/Geotech	Very Unlikely	Marginal	Low	Very Unlikely	Marginal	Low	Less Than 1%	Low Risk - Not Studied	Less Than 1%	*Schedule Risks Not Formerly Studied	Contract Cost & Schedule					

Estimate										
EST-1	Dredge number & size	Estimate choice can affect efficiency and productivity, causing a change to the estimate.	Estimate assumed two medium-sized hopper dredges but equipment is not restrictive with contract. The chosen estimate hopper size and number can affect the cost and productivity. Hopper dredges accommodate poor weather better than pipeline dredges. A large hopper results in greater efficiency as compared to two smaller hoppers, but beds available and may be impacted by speed restrictions. Estimate hopper dredge choice is more common at 75% efficiency and based on historical occurrence. Further study is still necessary.	Estimator	Likely	Marginal	Moderate	Likely	Marginal	Moderate
EST-2	Pipeline dredge	The potential that a pipeline dredge is used in lieu of the estimated hopper dredge could impact the bid cost.	The estimate assumes hopper dredge as more cost efficient for this project based on distance between borrow source, beach location and historical experience. Assuming bedrock, the pipeline dredge is no real cost benefit.	Estimator	Unlikely	Marginal	Low	Unlikely	Marginal	Low
EST-3	Fuel	Fuel fluctuations can impact dredging costs.	On dredging projects, fuel is a major cost driver for equipment. Fuel has fluctuated drastically in the past 18 months. It is now back on the upswing. Study should be for line of funding cost estimate.	Estimator	Likely	Significant	High	Unlikely	Marginal	Low
EST-4	Two Dredge Productivity	The estimate assumes a certain productivity based on two medium sized dredge. Productivity may vary.	The current estimate makes assumptions in the size and productivity for two medium sized hopper dredges with a 3.2 mile haul. Those estimate assumptions establish the schedule. Productivity of two hopper dredges can vary due to various possibilities.	Estimator	Likely	Significant	High	Likely	Notifiable	Low
EST-5	Borrow Location Assumptions	The estimate makes assumptions as to which borrow areas will be used to support the beach locations.	There may be a potential that the assumed locations are not the ones approved for each contract. The estimate assumed the best case of closer locations, but there is a possibility that borrow sources farther from the beach will be used. This could impact productivity and mobilization costs.	Contract/Geotech	Likely	Marginal	Moderate	Likely	Notifiable	Low

Construction										
CON-1	Contract Modifications	There may be modification issues that have not been captured in current risks.	The normal modifications for dredging is quantities. This is considered elsewhere. Each contract will likely carry the awarded quantities per contract, but is restricted by the work window. Compacting work, less of dredger, quantity assumption can cause modifications such as mobilizations and delays. Other modification potentials could include borrow source mobilization resulting from environmental impacts.	Estimator	Likely	Marginal	Moderate	Unlikely	Significant	Moderate
CON-2	Pipeline Dredge	The estimate assumes a hopper dredge because of longer pipeline distances and depth to borrow.	Reviewing the project, the hopper dredge seems the most likely choice. Dredge shortages may result in pipeline dredges bidding. This could increase the cost. Schedule would be affected by mobilization distances, but better productivity.	Estimator	Unlikely	Marginal	Low	Unlikely	Marginal	Low

External Risk Items are those that are generated, caused, or controlled exclusively outside the PDT's sphere of influence.

Risk No.	Risk/Opportunity Event	Concerns	PDT Discussions	Project Cost			Project Schedule		
				Responsibility/POC	Likelihood*	Impact*	Risk Level*	Likelihood*	Impact*

EXT-1	Market Conditions	Market conditions and competing projects may impact bid competition.	Currently, there are a lot of projects planned when considering the number of dredges available. There are more hopper dredges than pipeline dredges. It is a tough bidding climate based on environmental time-line restrictions. Construction start is scheduled for 2014.	Estimator	Likely	Significant	High	Likely	Notifiable	Low
EXT-2	External Opposition	External opposition may cause scope or schedule change.	Feds adhering to the environmental requirements. Sponsors in favor of project. No serious historical intervention because it is a beach reinforcement project.	PM	Unlikely	Marginal	Low	Unlikely	Marginal	Low
EXT-3	Acts of God	Severe weather may impact cost or schedule.	Not winter storms or hurricanes could impact construction as well as beach profile. Construction occurs in low period of weather risks; however, storms are still a potential. As long as the estimate and schedule assume some inefficiency, it should not be a serious issue.	God	Likely	Notifiable	Low	Likely	Notifiable	Low
EXT-4	Borrow Competition	External entities may compete for the borrow sources.	Full cost construction is unlikely. Long term competition is likely. The long term competition does not impact initial appropriation needs and feasibility funding request. Future projects must consider this potential as it occurs in future contracts.	PM	Unlikely	Marginal	Low	Unlikely	Marginal	Low
EXT-5	Fuel exceeds OMB rates	Over longer periods of time, the actual market may be greater than the OMB rates, impacting project costs.	Volatile fuel, being a larger risk on dredging projects, may not correlate with the OMB rates and may be higher as time goes into the 4th contract year.	Estimator	Likely	Marginal	Moderate	Unlikely	Notifiable	Low

*Likelihood, Impact, and Risk Level to be verified through market research and analysis (conducted by cost engineer).

1. Risk/Opportunity identified with reference to the Risk Identification Checklist and through deliberation and study of the PDT.

2. Concerns and Discussions elaborate on Risk/Opportunity Events and includes any assumptions or findings (discussion to support the event rating).

3. The responsibility of POC is the entity responsible as the Subject Matter Expert (SME) for action, monitoring, or information on the PDT for the identified risk or opportunity.

4. Likelihood is measured as likelihood of impacting cost or schedule.

5. Impact is a measure of the event's effect on project objectives with relation to scope, cost, and/or schedule. - Negligible, Marginal, Significant, Critical, or Crisis. Impacts on Project Cost may vary in severity from impacts on Project Schedule.

6. Risk Level is the resultant of Likelihood and Impact Low, Moderate, or High. Refer to the matrix located at top of page.

7. Variance Distribution refers to the behavior of the individual risk item with respect to its potential effects on Project Cost and Schedule. For example, an item with clearly defined parameters and a solid most likely scenario would normally follow a

8. Correlation recognizes those risk events that may be related to one another. Care should be given to ensure the risks are handled correctly without a "double counting."

9. Affected Project Component identifies the specific item of the project to which the risk directly or strongly correlates.

10. Project Implications identifies whether or not the risk item affects project cost, project schedule, or both. The PDT is responsible for conducting studies for both Project Cost and for Project Schedule.

11. Results of the risk identification process are studied and further developed by the Cost Engineer, then analyzed through the Monte Carlo Analysis Method for Cost (Contingency) and Schedule (Escalation) Growth.

*Can not assess these items

*Schedule impacts are captured within the Cost Risk Analysis (Risk EXT-5), as this project is not otherwise susceptible to uncaptured escalation or notable "Hotel" costs.

\$7,178,000 LESS	Uniform	Less Than 1%	ALL WORK IN 2 SEASONS INSTEAD OF 4 SEASONS and reflected in new cost of \$7,126mil	*Schedule Risks Not Formerly Studied	EST-4, PPM-8	Contract Cost & Schedule	MOST LIKELY: Base estimate assumes 2 medium sized hopper dredges at a productivity rate of 77% = 2.9 Million CY/season (4 mo) based on average historical rates. BEST CASE: 4.3 million CY/season assuming 3 various-sized hopper dredges. WORST CASE: Same as most likely.	MOST LIKELY: Base estimate assumes 2 medium sized hopper dredges at a productivity rate of 77% = 2.9 Million CY/season (4 mo) based on average historical rates. BEST CASE: 4.3 million CY/season assuming 3 various-sized hopper dredges. WORST CASE: Same as most likely.
Less Than 1%	Low Risk - Not Studied	Less Than 1%		*Schedule Risks Not Formerly Studied		Contract Cost & Schedule		
\$11,798,000 MORE	Triangular	Less Than 1%		*Schedule Risks Not Formerly Studied	EXT-5	Contract Cost	MOST LIKELY: Base estimate assumes \$2,800gal based on historical data and projection studies that eliminate anomalies. BEST CASE: \$1,600gal at Feb 23, 2009. WORST CASE: \$6,000gal based on studied projection to 2010 feasibility authorization. \$4,000gal experienced in 2008.	
\$15,965,000 MORE AT 60% EWT AND \$10,290,000 LESS AT 80% EWT	Triangular	Less Than 1%	At work for 60% will require 5 mobilizations AND for 80% will require 3 mobilizations separate.	*Schedule Risks Not Formerly Studied	EST-1, PPM-8	Contract Cost	MOST LIKELY: Base estimate assumes 2 medium sized hopper dredges at a productivity rate of 77% EWT = 2.9 Million CY/season (4 mo) based on average historical data. BEST CASE: Assuming 2 medium hopper dredges at a productivity rate 88% EWT. WORST CASE: 2 medium sized hopper dredges at a 60% EWT = 1 extra hopper season at \$900,000.	MOST LIKELY: Base estimate assumes 2 medium sized hopper dredges at a productivity rate of 77% EWT = 2.9 Million CY/season (4 mo) based on average historical data. BEST CASE: Assuming 2 medium hopper dredges at a productivity rate 88% EWT. WORST CASE: 2 medium sized hopper dredges at a 60% EWT = 1 extra hopper season at \$900,000.
\$6,325,000 MORE	Triangular	Less Than 1%		*Schedule Risks Not Formerly Studied	CON-1	Contract Cost	MOST LIKELY: Assumes the closest borrows to the closest purpose stations averaging a 3.2 mile haul distance. BEST CASE: Same as most likely case. WORSE CASE: Average haul distance of 5 miles based on using Borrow Areas "1" and "7" as trial construction.	
\$1,780,000 MORE	Uniform	+12 mo		*Schedule Risks Not Formerly Studied	T-2, EST-6	Contract Cost & Schedule	MOST LIKELY: Base estimate. BEST CASE: Same as most likely. WORSE CASE: Repobilization into next season.	Modification may go beyond work window, causing work into the next season.
Less Than 1%	Low Risk - Not Studied	Less Than 1%		*Schedule Risks Not Formerly Studied		Contract Cost & Schedule		

Cost Impact (\$)	Variance Distribution (Cost)	Schedule Impact (mo)	COMPLETED BY RISK ANALYST		
			Variance Distribution (Schedule)	Correlation to Others	Affected Project Component
\$20,738,000 MORE	Triangular	Less Than 1%	*Schedule Risks Not Formerly Studied		Contract Cost
Less Than 1%	Low Risk - Not Studied	Less Than 1%	*Schedule Risks Not Formerly Studied		Project Cost & Schedule
Less Than 1%	Low Risk - Not Studied	Less Than 1%	*Schedule Risks Not Formerly Studied		Project Cost & Schedule
Less Than 1%	Low Risk - Not Studied	Less Than 1%	*Schedule Risks Not Formerly Studied		Contract Cost
\$1,051,725 MORE	Uniform	Less Than 1%	*Schedule Risks Not Formerly Studied	EST-3	Project Cost

MOST LIKELY: Base estimate. BEST CASE: 5% below the most likely based on GAD audit. WORSE CASE: 25% above most likely estimate (5% no profit) due to lack of dredging companies and dredges for competing projects because of the work window restrictions.

MOST LIKELY: Base estimate. BEST CASE: 5% below the most likely based on GAD audit. WORSE CASE: 25% above most likely estimate (5% no profit) due to lack of dredging companies and dredges for competing projects because of the work window restrictions.

MOST LIKELY: Base estimate. BEST CASE: 5% below the most likely based on GAD audit. WORSE CASE: 25% above most likely estimate (5% no profit) due to lack of dredging companies and dredges for competing projects because of the work window restrictions.

MOST LIKELY: Base estimate. BEST CASE: 5% below the most likely based on GAD audit. WORSE CASE: 25% above most likely estimate (5% no profit) due to lack of dredging companies and dredges for competing projects because of the work window restrictions.

MOST LIKELY: Base estimate. BEST CASE: 5% below the most likely based on GAD audit. WORSE CASE: 25% above most likely estimate (5% no profit) due to lack of dredging companies and dredges for competing projects because of the work window restrictions.

MOST LIKELY: Base estimate. BEST CASE: 5% below the most likely based on GAD audit. WORSE CASE: 25% above most likely estimate (5% no profit) due to lack of dredging companies and dredges for competing projects because of the work window restrictions.

MOST LIKELY: Base estimate. BEST CASE: 5% below the most likely based on GAD audit. WORSE CASE: 25% above most likely estimate (5% no profit) due to lack of dredging companies and dredges for competing projects because of the work window restrictions.

MOST LIKELY: Base estimate. BEST CASE: 5% below the most likely based on GAD audit. WORSE CASE: 25% above most likely estimate (5% no profit) due to lack of dredging companies and dredges for competing projects because of the work window restrictions.

MOST LIKELY: Base estimate. BEST CASE: 5% below the most likely based on GAD audit. WORSE CASE: 25% above most likely estimate (5% no profit) due to lack of dredging companies and dredges for competing projects because of the work window restrictions.

MOST LIKELY: Base estimate. BEST CASE: 5% below the most likely based on GAD audit. WORSE CASE: 25% above most likely estimate (5% no profit) due to lack of dredging companies and dredges for competing projects because of the work window restrictions.

MOST LIKELY: Base estimate. BEST CASE: 5% below the most likely based on GAD audit. WORSE CASE: 25% above most likely estimate (5% no profit) due to lack of dredging companies and dredges for competing projects because of the work window restrictions.

MOST LIKELY: Base estimate. BEST CASE: 5% below the most likely based on GAD audit. WORSE CASE: 25% above most likely estimate (5% no profit) due to lack of dredging companies and dredges for competing projects because of the work window restrictions.

MOST LIKELY: Base estimate. BEST CASE: 5% below the most likely based on GAD audit. WORSE CASE: 25% above most likely estimate (5% no profit) due to lack of dredging companies and dredges for competing projects because of the work window restrictions.

MOST LIKELY: Base estimate. BEST CASE: 5% below the most likely based on GAD audit. WORSE CASE: 25% above most likely estimate (5% no profit) due to lack of dredging companies and dredges for competing projects because of the work window restrictions.

MOST LIKELY: Base estimate. BEST CASE: 5% below the most likely based on GAD audit. WORSE CASE: 25% above most likely estimate (5% no profit) due to lack of dredging companies and dredges for competing projects because of the work window restrictions.

MOST LIKELY: Base estimate. BEST CASE: 5% below the most likely based on GAD audit. WORSE CASE: 25% above most likely estimate (5% no profit) due to lack of dredging companies and dredges for competing projects because of the work window restrictions.

MOST LIKELY: Base estimate. BEST CASE: 5% below the most likely based on GAD audit. WORSE CASE: 25% above most likely estimate (5% no profit) due to lack of dredging companies and dredges for competing projects because of the work window restrictions.

MOST LIKELY: Base estimate. BEST CASE: 5% below the most likely based on GAD audit. WORSE CASE: 25% above most likely estimate (5% no profit) due to lack of dredging companies and dredges for competing projects because of the work window restrictions.

MOST LIKELY: Base estimate. BEST CASE: 5% below the most likely based on GAD audit. WORSE CASE: 25% above most likely estimate (5% no profit) due to lack of dredging companies and dredges for competing projects because of the work window restrictions.

MOST LIKELY: Base estimate. BEST CASE: 5% below the most likely based on GAD audit. WORSE CASE: 25% above most likely estimate (5% no profit) due to lack of dredging companies and dredges for competing projects because of the work window restrictions.

MOST LIKELY: Base estimate. BEST CASE: 5% below the most likely based on GAD audit. WORSE CASE: 25% above most likely estimate (5% no profit) due to lack of dredging companies and dredges for competing projects because of the work window restrictions.

MOST LIKELY: Base estimate. BEST CASE: 5% below the most likely based on GAD audit. WORSE CASE: 25% above most likely estimate (5% no profit) due to lack of dredging companies and dredges for competing projects because of the work window restrictions.

MOST LIKELY: Base estimate. BEST CASE: 5% below the most likely based on GAD audit. WORSE CASE: 25% above most likely estimate (5% no profit) due to lack of dredging companies and dredges for competing projects because of the work window restrictions.

MOST LIKELY: Base estimate. BEST CASE: 5% below the most likely based on GAD audit. WORSE CASE: 25% above most likely estimate (5% no profit) due to lack of dredging companies and dredges for competing projects because of the work window restrictions.

MOST LIKELY: Base estimate. BEST CASE: 5% below the most likely based on GAD audit. WORSE CASE: 25% above most likely estimate (5% no profit) due to lack of dredging companies and dredges for competing projects because of the work window restrictions.

MOST LIKELY: Base estimate. BEST CASE: 5% below the most likely based on GAD audit. WORSE CASE: 25% above most likely estimate (5% no profit) due to lack of dredging companies and dredges for competing projects because of the work window restrictions.

MOST LIKELY: Base estimate. BEST CASE: 5% below the most likely based on GAD audit. WORSE CASE: 25% above most likely estimate (5% no profit) due to lack of dredging companies and dredges for competing projects because of the work window restrictions.

MOST LIKELY: Base estimate. BEST CASE: 5% below the most likely based on GAD audit. WORSE CASE: 25% above most likely estimate (5% no profit) due to lack of dredging companies and dredges for competing projects because of the work window restrictions.

MOST LIKELY: Base estimate. BEST CASE: 5% below the most likely based on GAD audit. WORSE CASE: 25% above most likely estimate (5% no profit) due to lack of dredging companies and dredges for competing projects because of the work window restrictions.

MOST LIKELY: Base estimate. BEST CASE: 5% below the most likely based on GAD audit. WORSE CASE: 25% above most likely estimate (5% no profit) due to lack of dredging companies and dredges for competing projects because of the work window restrictions.

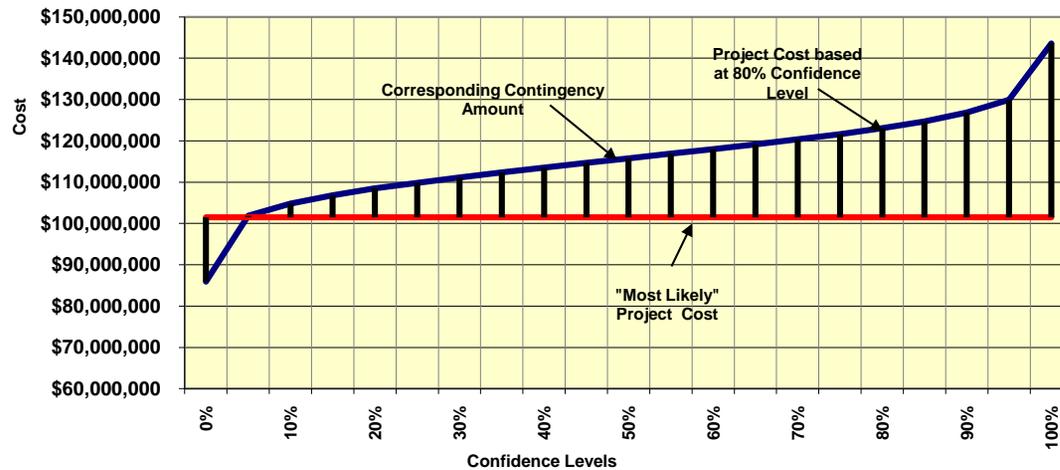
Contingency on Base Estimate	80% Confidence Project Cost
Total Construction Cost (Most Likely) ->	\$101,494,800
Construction Cost Contingency Amount ->	\$21,538,221
Total Construction Cost (80% Confidence) ->	\$123,033,021

- CONSTRUCTION COST CONTINGENCY DEVELOPMENT -

Contingency Analysis

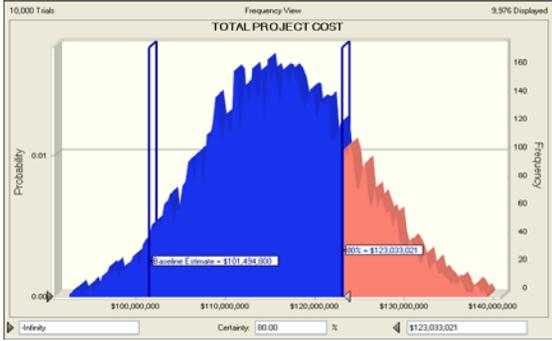
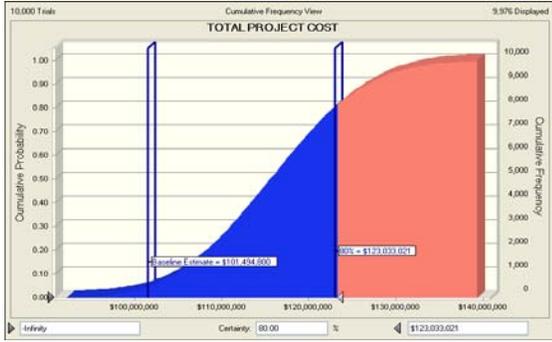
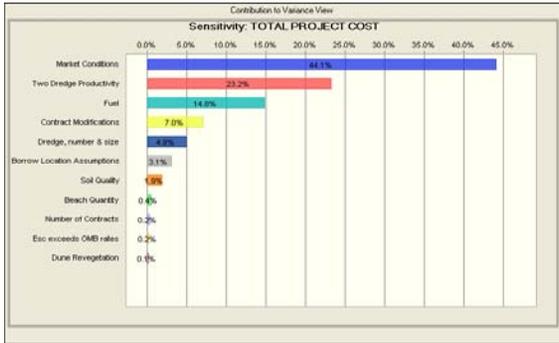
Most Likely Cost Estimate	\$101,494,800	
Confidence Level	Value	Contingency
0%	\$85,925,481	-15.34%
5%	\$101,911,908	0.41%
10%	\$104,795,243	3.25%
15%	\$106,814,070	5.24%
20%	\$108,499,275	6.90%
25%	\$109,841,194	8.22%
30%	\$111,138,419	9.50%
35%	\$112,343,382	10.69%
40%	\$113,477,724	11.81%
45%	\$114,679,638	12.99%
50%	\$115,734,303	14.03%
55%	\$116,877,628	15.16%
60%	\$117,966,618	16.23%
65%	\$119,114,634	17.36%
70%	\$120,364,594	18.59%
75%	\$121,596,135	19.81%
80%	\$123,033,021	21.22%
85%	\$124,677,058	22.84%
90%	\$126,882,131	25.01%
95%	\$129,928,279	28.01%
100%	\$143,584,335	41.47%

Base Estimate Cost Contingency Analysis (Does not Include Escalation)

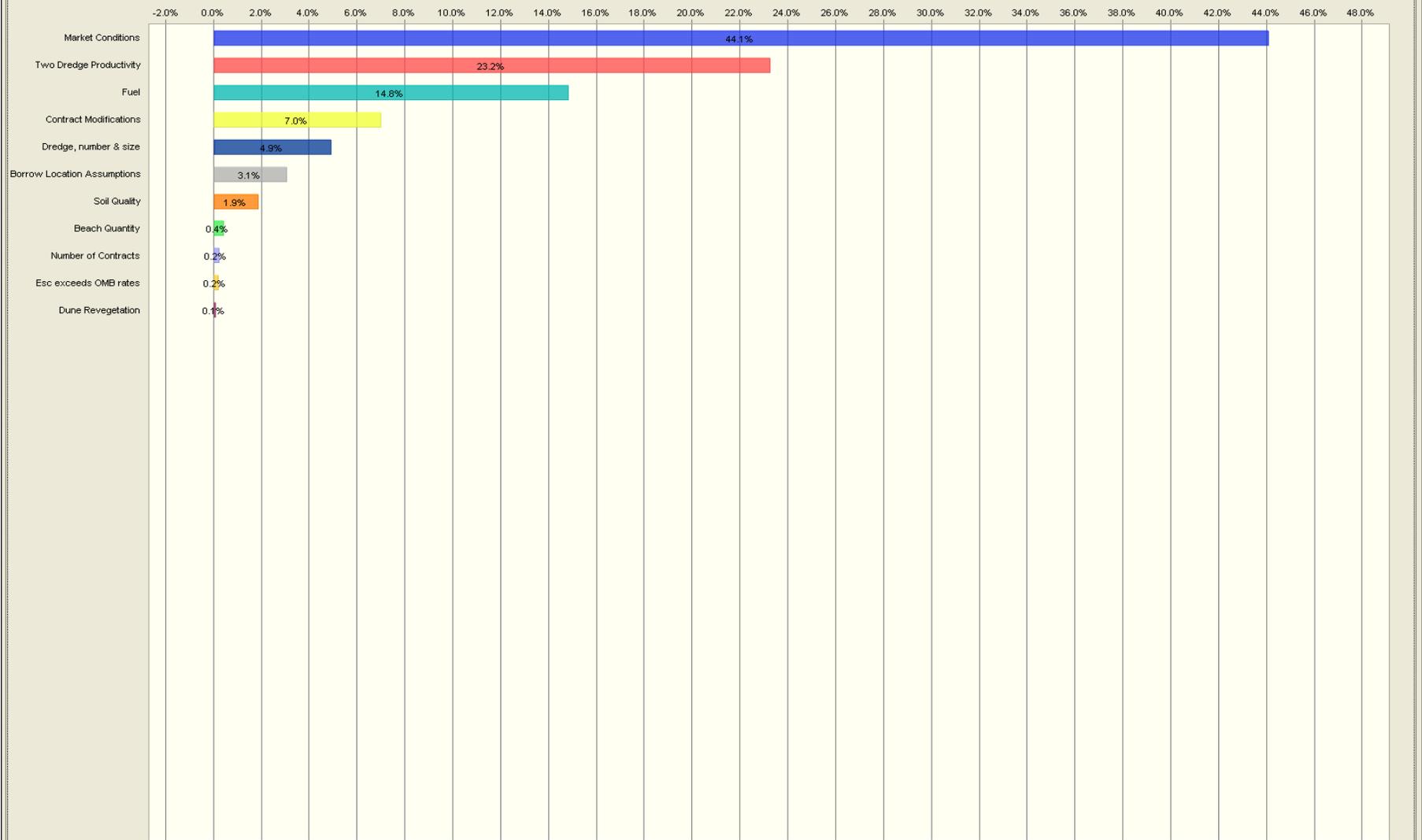


Programmatic Risks (External Risk items are those that are generated, caused, or controlled exclusively outside the PDT's sphere of influence.)															
EXT-1	Market Conditions	Market conditions and competing projects may impact bid competition.	Currently, there are a lot of projects planned when considering the number of dredges available. There are more hopper dredges than pipeline dredges. It is a tough bidding climate based on environmental time-line restrictions. Construction start is scheduled for 2014.	Likely	Significant	High	Triangular		(\$5,379,224)	\$0	\$13,701,798	5.0%	0.0%	14.0%	
EXT-5	Esc exceeds OMB rates	Over longer periods of time, the actual market may be greater than the OMB rates, impacting contract costs.	Variable fuel, being a larger risk on dredging projects, may not correlate with the OMB rates and may be higher as time goes into the 4th contract year.	Likely	Marginal	Moderate	Uniform	EST-3	\$0	\$0	\$1,420,027	0.0%	0.0%	1.4%	
	All Other Project Costs		Placeholder for costs not captured in summation of risks being studied.												
										\$101,494,800			<i>Not Herror or Study - Placeholder for Project Summation Purposes Only</i>		

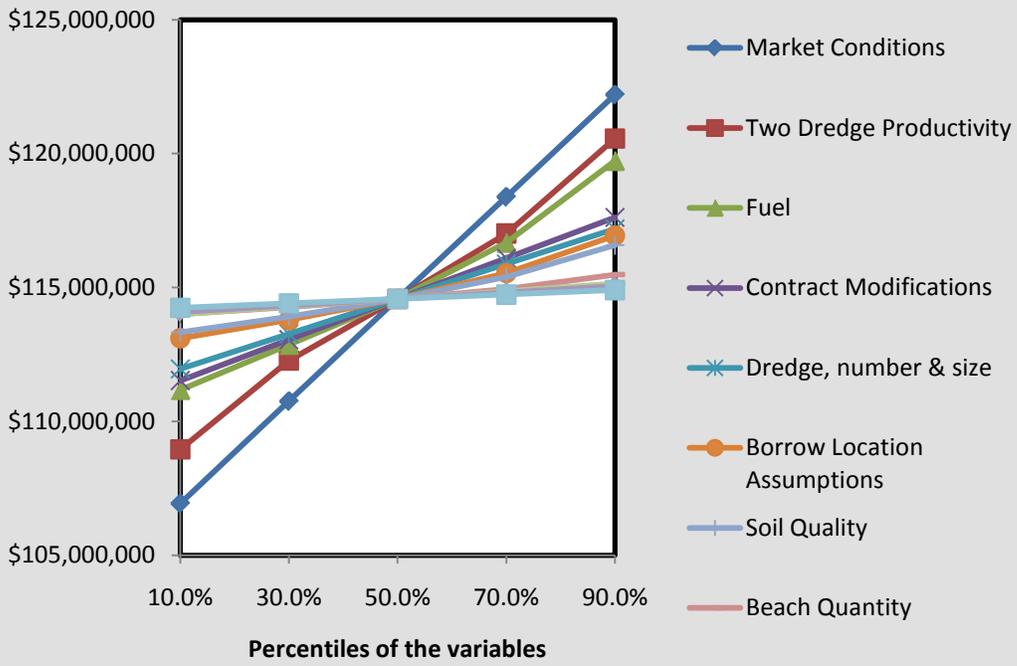
TOTAL PROJECT COST	Percentile	Forecast values	Contingency Amount	Contingency %
	0%	\$85,925,481	(\$15,569,319)	-15.34%
	5%	\$101,911,908	\$417,108	0.41%
	10%	\$104,795,243	\$3,300,443	3.25%
	15%	\$106,814,070	\$5,319,270	5.24%
	20%	\$108,499,275	\$7,004,475	6.90%
	25%	\$109,841,194	\$8,346,394	8.22%
	30%	\$111,136,419	\$9,643,619	9.50%
	35%	\$112,343,382	\$10,848,582	10.69%
	40%	\$113,477,724	\$11,982,924	11.81%
	45%	\$114,679,638	\$13,184,838	12.99%
	50%	\$115,734,303	\$14,239,503	14.03%
	55%	\$116,877,628	\$15,382,828	15.16%
	60%	\$117,966,618	\$16,471,818	16.23%
	65%	\$119,114,634	\$17,619,834	17.36%
	70%	\$120,361,594	\$18,869,794	18.59%
	75%	\$121,596,135	\$20,101,335	19.81%
	80%	\$123,033,021	\$21,538,221	21.22%
	85%	\$124,677,058	\$23,182,258	22.84%
	90%	\$126,882,131	\$25,387,331	25.01%
	95%	\$129,928,279	\$28,433,479	28.01%
	100%	\$143,584,335	\$42,089,335	41.47%



Sensitivity: TOTAL PROJECT COST

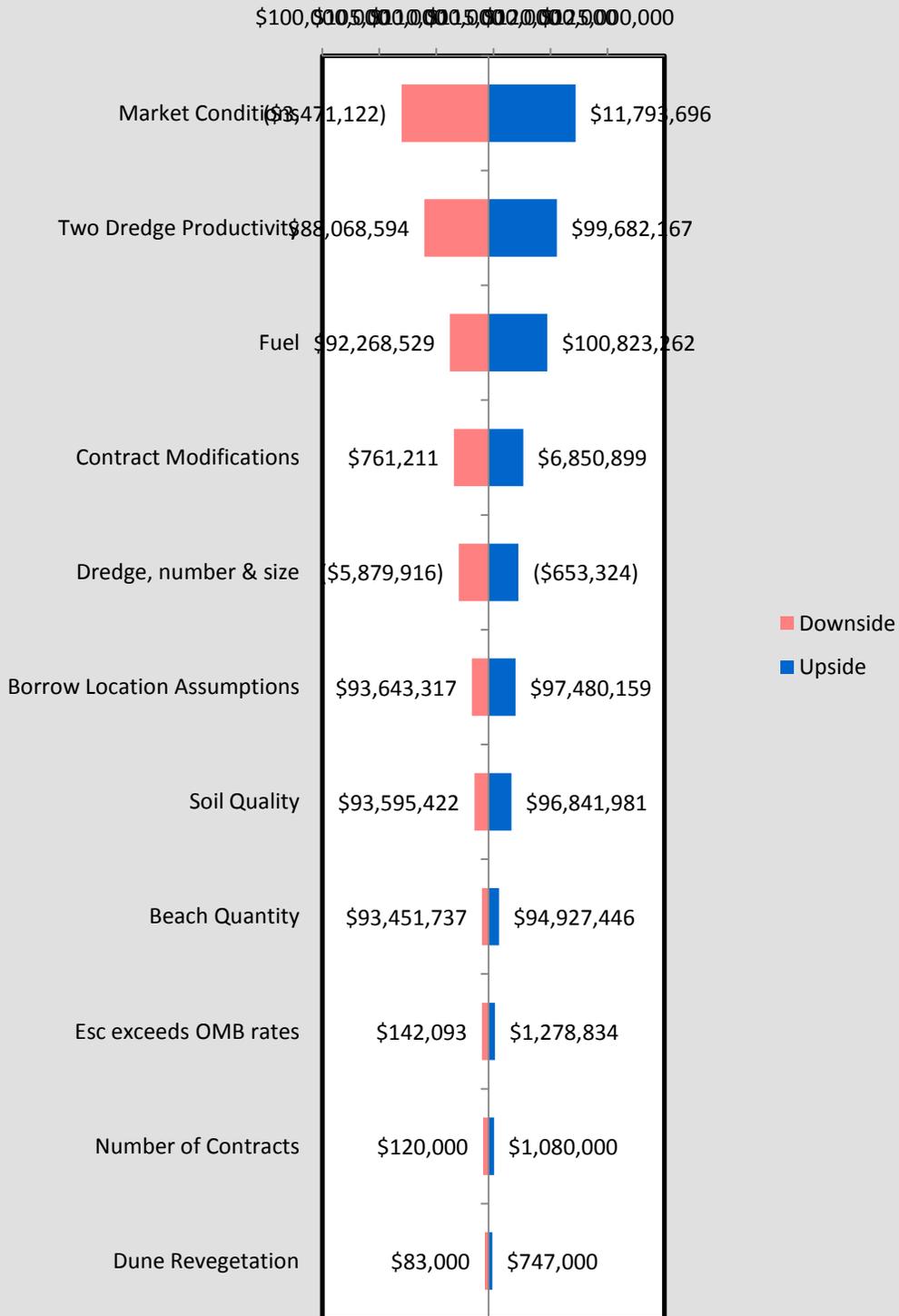


TOTAL PROJECT COST



<i>Variable</i>	TOTAL PROJECT COST				
	<i>10.0%</i>	<i>30.0%</i>	<i>50.0%</i>	<i>70.0%</i>	<i>90.0%</i>
Market Conditions	\$106,938,367	\$110,754,571	\$114,570,776	\$118,386,980	\$122,203,185
Two Dredge Productivity	\$108,951,728	\$112,272,642	\$114,570,776	\$117,015,094	\$120,565,301
Fuel	\$111,176,921	\$112,860,250	\$114,570,776	\$116,675,167	\$119,731,654
Contract Modifications	\$111,525,932	\$113,048,354	\$114,570,776	\$116,093,198	\$117,615,620
Dredge, number & size	\$111,957,480	\$113,264,128	\$114,570,776	\$115,877,424	\$117,184,072
Borrow Location Assumptions	\$113,105,232	\$113,784,831	\$114,570,776	\$115,537,693	\$116,942,075
Soil Quality	\$113,330,701	\$113,905,745	\$114,570,776	\$115,388,936	\$116,577,259
Beach Quantity	\$114,007,105	\$114,268,489	\$114,570,776	\$114,942,667	\$115,482,814
Esc exceeds OMB rates	\$114,002,405	\$114,286,590	\$114,570,776	\$114,854,961	\$115,139,147
Number of Contracts	\$114,090,776	\$114,330,776	\$114,570,776	\$114,810,776	\$115,050,776
Dune Revegetation	\$114,238,776	\$114,404,776	\$114,570,776	\$114,736,776	\$114,902,776

TOTAL PROJECT COST



<i>Variable</i>	TOTAL PROJECT COST			Input	
	<i>Downside</i>	<i>Upside</i>	<i>Range</i>	<i>Downside</i>	<i>Upside</i>
Market Conditions	\$106,938,367	\$122,203,185	\$15,264,818	(\$3,471,122)	\$11,793,696
Two Dredge Productivity	\$108,951,728	\$120,565,301	\$11,613,573	\$88,068,594	\$99,682,167
Fuel	\$111,176,921	\$119,731,654	\$8,554,733	\$92,268,529	\$100,823,262
Contract Modifications	\$111,525,932	\$117,615,620	\$6,089,688	\$761,211	\$6,850,899
Dredge, number & size	\$111,957,480	\$117,184,072	\$5,226,592	(\$5,879,916)	(\$653,324)
Borrow Location Assumptions	\$113,105,232	\$116,942,075	\$3,836,842	\$93,643,317	\$97,480,159
Soil Quality	\$113,330,701	\$116,577,259	\$3,246,559	\$93,595,422	\$96,841,981
Beach Quantity	\$114,007,105	\$115,482,814	\$1,475,708	\$93,451,737	\$94,927,446
Esc exceeds OMB rates	\$114,002,405	\$115,139,147	\$1,136,742	\$142,093	\$1,278,834
Number of Contracts	\$114,090,776	\$115,050,776	\$960,000	\$120,000	\$1,080,000
Dune Revegetation	\$114,238,776	\$114,902,776	\$664,000	\$83,000	\$747,000

<i>Base Case</i>
\$4,161,287
\$93,687,642
\$95,662,384
\$3,806,055
(\$3,266,620)
\$95,108,860
\$94,835,497
\$94,015,408
\$710,464
\$600,000
\$415,000

Risk Refer No.	Risk Event	Low	Most Likely	High	
PPM-8	Construction Schedule - 4 years	(\$7,178,000)	\$0	\$0	Removed from risk model - captured by Risk EST-1

- Notes:** This item captures the opportunity that using larger dredges may result in substantial savings due to dredging over fewer seasons (2 instead of 4).
- Likely** This risk item follows a uniform distribution behavior -- no change to most likely cost. Base estimate assumes 2 medium sized hopper dredges at a productivity rate of 77% = 2.9 Million CY/season (4 mo) based on average historical data.
- Low** Low assumes 4.3 million CY/season assuming 3 various-sized hopper dredges, creating efficiencies and requiring fewer seasonal mobilizations.
- High** High assumes that no opportunity is realized, yielding no savings.

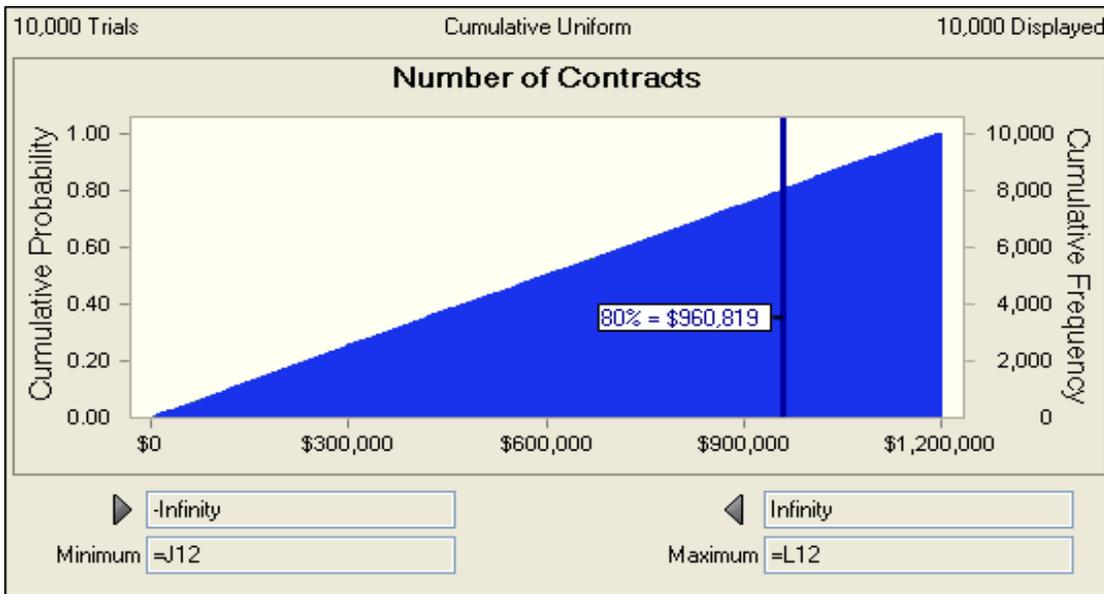
Risk Refer No.	Risk Event	Low	Most Likely	High
CA-2	Number of Contracts	\$0	\$0	\$1,200,000

Notes: Multiple contracts are likely, which would reduce risks related to bid competition and funding availability. However, multiple contracts will result in more PED and Contracting efforts. This item captures the risk that multiple contracts increases total project cost.

Likely This risk item follows a uniform distribution behavior -- no change to most likely cost.

Low Low assumes no adverse effects from utilizing multiple contracts.

High High assumes up to an additional \$1.2 M due to utilizing multiple contracts. PED costs are ~ \$2.4M. Approx \$800K of the \$2.4M is for subsurface investigations. There is an additional \$200K for final plans and specs prep. Assuming \$150K for P&S and \$150K for subsurface investigations per contract.



Assumption: Number of Contracts

Percentile	Assumption values	Resulting Item Contingency
0%	\$85	\$85
10%	\$119,567	\$119,567
20%	\$236,080	\$236,080
30%	\$355,774	\$355,774
40%	\$476,420	\$476,420
50%	\$598,628	\$598,628
60%	\$723,087	\$723,087
70%	\$839,531	\$839,531
80%	\$960,819	\$960,819
90%	\$1,073,717	\$1,073,717
100%	\$1,199,752	\$1,199,752

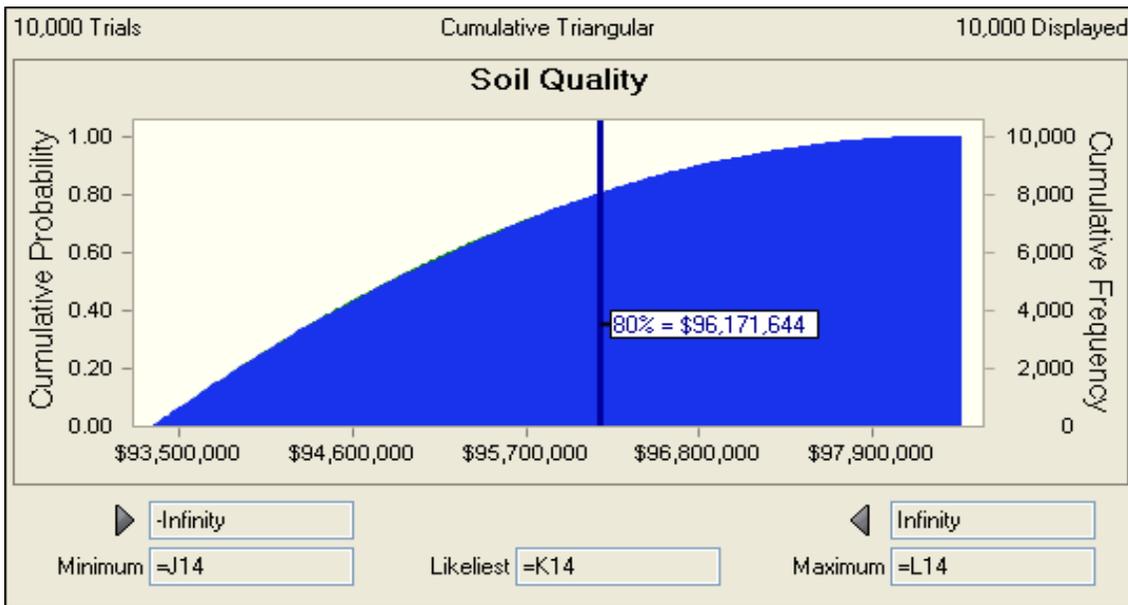
Risk Refer No.	Risk Event	Low	Most Likely	High
T-1	Soil Quality	\$93,332,000	\$93,332,000	\$98,465,260

Notes: This item captures the risk of cost growth due to soil characterization contributing to greater losses than anticipated in the base estimate.

Likely Most likely estimate assumes 18% losses from borrow area to the beach fill based on geotech studies.

Low Low assumes no change from Most Likely.

High High assumes that there are up to 25% losses total OR 7% INCREASE IN QUANTITY.

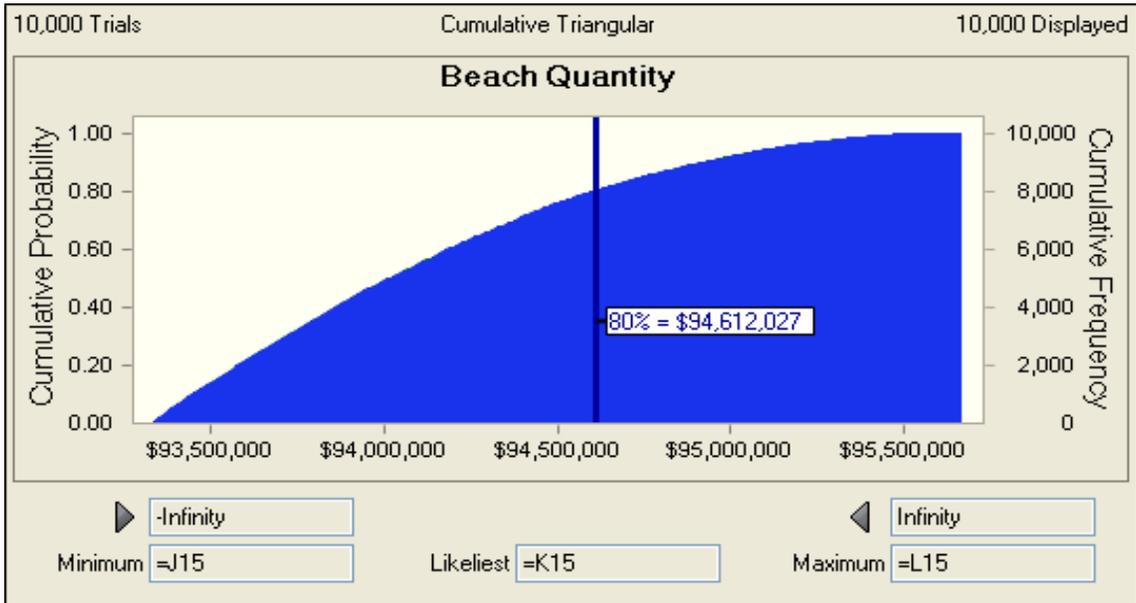


Assumption: Soil Quality

Percentile	Assumption values	Resulting Item Contingency
0%	\$93,332,354	\$354
10%	\$93,610,179	\$278,179
20%	\$93,883,300	\$551,300
30%	\$94,181,871	\$849,871
40%	\$94,509,621	\$1,177,621
50%	\$94,855,579	\$1,523,579
60%	\$95,250,174	\$1,918,174
70%	\$95,664,835	\$2,332,835
80%	\$96,171,644	\$2,839,644
90%	\$96,821,387	\$3,489,387
100%	\$98,446,161	\$5,114,161

Risk Refer No.	Risk Event	Low	Most Likely	High
T-2	Beach Quantity	\$93,332,000	\$93,332,000	\$95,665,300

- Notes:** This item captures the risk that quantities will significantly differ from those in the current baseline estimate.
- Likely** The most likely estimate assumes funding for FY 13 and subsequent erosion until that FY 13.
- Low** Low assumes no change from Most Likely.
- High** High assumes that there is 91,500 cy erosion each year beyond scheduled year FY 13. Assume 4 years delay or about 400,000 cy.



Assumption: Beach Quantity

Percentile	Assumption values	Resulting Item Contingency
0%	\$93,332,149	\$149
10%	\$93,448,663	\$116,663
20%	\$93,581,072	\$249,072
30%	\$93,717,369	\$385,369
40%	\$93,860,127	\$528,127
50%	\$94,019,015	\$687,015
60%	\$94,188,354	\$856,354
70%	\$94,382,589	\$1,050,589
80%	\$94,612,027	\$1,280,027
90%	\$94,927,387	\$1,595,387
100%	\$95,638,677	\$2,306,677

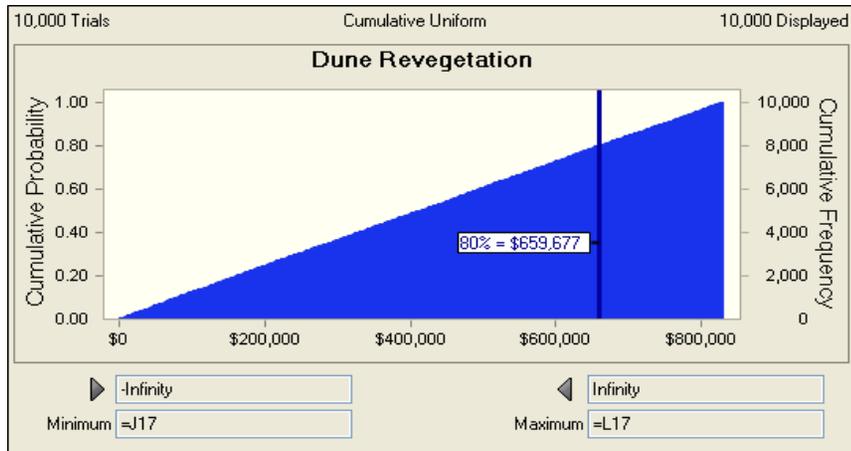
Risk Refer No.	Risk Event	Low	Most Likely	High
ENV-7	Dune Revegetation	\$0	\$0	\$830,000

Notes: Estimate includes first vegetation. This item captures the risk that dune revegetation requirement is likely and may not be adequately covered within the estimate.

Likely The estimate currently includes initial planting, no revegetation if first planting fails.

Low Low assumes no replanting.

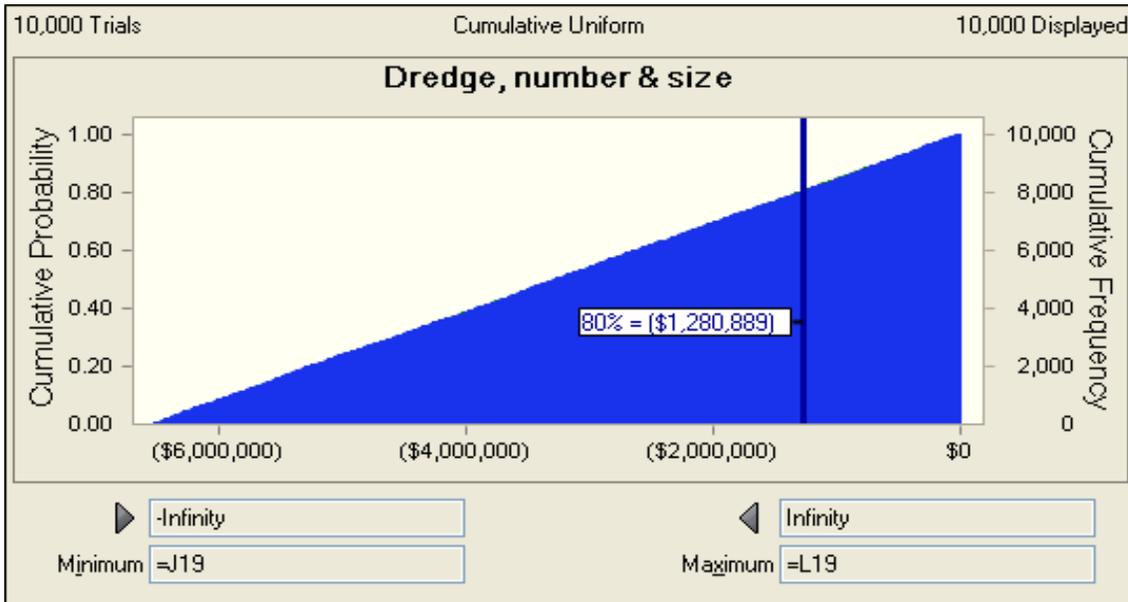
High High assumes replanting 60% of initial.



Assumption: Dune Revegetation		Resulting Item Contingency
Percentile	Assumption values	
0%	\$47	\$47
10%	\$79,934	\$79,934
20%	\$161,964	\$161,964
30%	\$246,165	\$246,165
40%	\$329,147	\$329,147
50%	\$413,633	\$413,633
60%	\$494,615	\$494,615
70%	\$578,574	\$578,574
80%	\$659,677	\$659,677
90%	\$746,922	\$746,922
100%	\$829,970	\$829,970

Risk Refer No.	Risk Event	Low	Most Likely	High
EST-1	Dredge, number & size	(\$6,533,240)	\$0	\$0

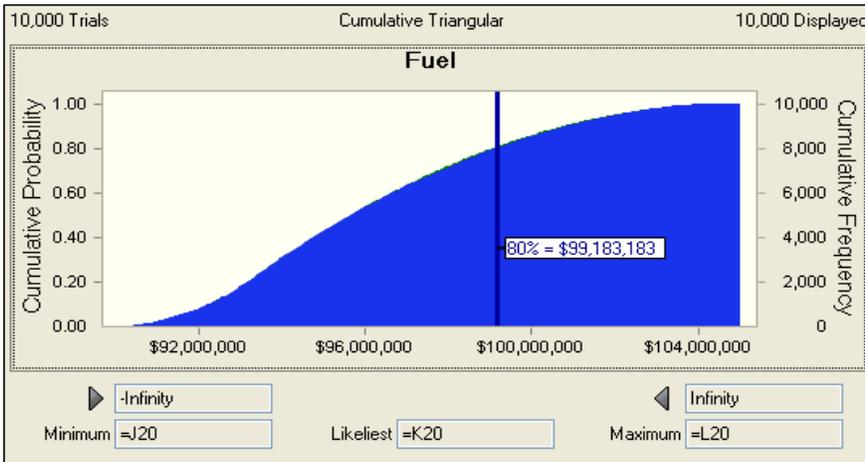
- Notes:** This item captures the opportunity that using larger dredges may result in substantial savings due to dredging over fewer seasons (2 instead of 4).
- Likely** This risk item follows a uniform distribution behavior -- no change to most likely cost. Base estimate assumes 2 medium sized hopper dredges at a productivity rate of 77% = 2.9 Million CY/season (4 mo) based on average historical data.
- Low** Low assumes 4.3 million CY/season assuming 3 various-sized hopper dredges, creating efficiencies and requiring fewer seasonal mobilizations.
- High** High assumes that no opportunity is realized, yielding no savings.



Assumption: Dredge, number & size		Resulting Item Contingency
Percentile	Assumption values	
0%	(\$6,533,066)	(\$6,533,066)
10%	(\$5,896,579)	(\$5,896,579)
20%	(\$5,263,201)	(\$5,263,201)
30%	(\$4,567,773)	(\$4,567,773)
40%	(\$3,903,151)	(\$3,903,151)
50%	(\$3,275,336)	(\$3,275,336)
60%	(\$2,626,523)	(\$2,626,523)
70%	(\$1,967,556)	(\$1,967,556)
80%	(\$1,280,889)	(\$1,280,889)
90%	(\$641,121)	(\$641,121)
100%	(\$1,953)	(\$1,953)

Risk Refer No.	Risk Event	Low	Most Likely	High
EST-3	Fuel	\$90,056,047	\$93,332,000	\$104,998,500

- Notes:** This item captures the risk that fuel prices will significantly fluctuate either higher or lower, contributing to increased or decreased dredging cost.
- Likely** The most likely baseline estimate assumes \$2.80/gal based on historical data and projection studies that eliminate anomalies.
- Low** Low assumes that fuel prices could be as low as \$1.50/gal (Feb 23 2009).
- High** High assumes that fuel prices could be as high as \$6.00/gal based on studied projection to 2010 feasibility authorization. \$4.50/gal experienced in 2008.



Assumption: Fuel		
Percentile	Assumption values	Resulting Item Contingency
0%	\$90,114,194	(\$3,217,806)
10%	\$92,293,751	(\$1,038,249)
20%	\$93,213,973	(\$118,027)
30%	\$93,968,640	\$636,640
40%	\$94,800,497	\$1,468,497
50%	\$95,698,478	\$2,366,478
60%	\$96,692,820	\$3,360,820
70%	\$97,882,182	\$4,550,182
80%	\$99,183,183	\$5,851,183
90%	\$100,933,557	\$7,601,557
100%	\$104,890,295	\$11,558,295

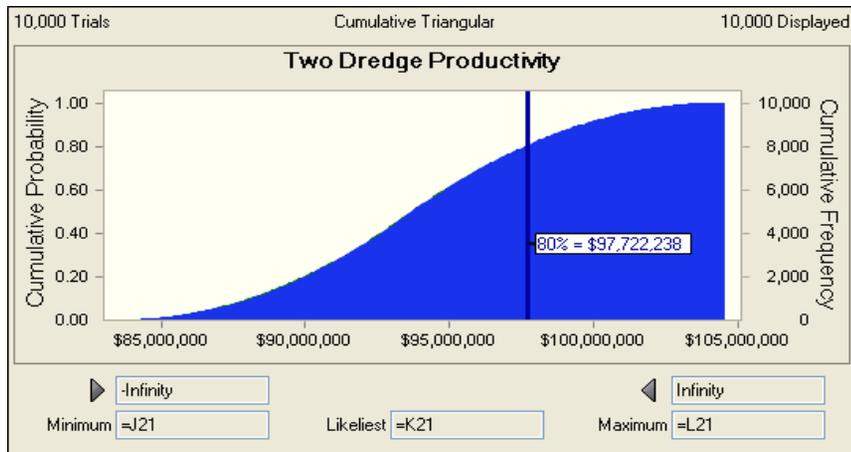
Risk Refer No.	Risk Event	Low	Most Likely	High
EST-4	Two Dredge Productivity	\$83,532,140	\$93,332,000	\$104,531,840

Notes: This item captures the risk that the cost may significantly increase or decrease based on the effective work time of the assumed dredging system.

Likely The most likely baseline estimate assumes 2 medium sized hopper dredges at a

Low Low assumed 2 medium hopper dredges at a productivity rate 88% EWT.

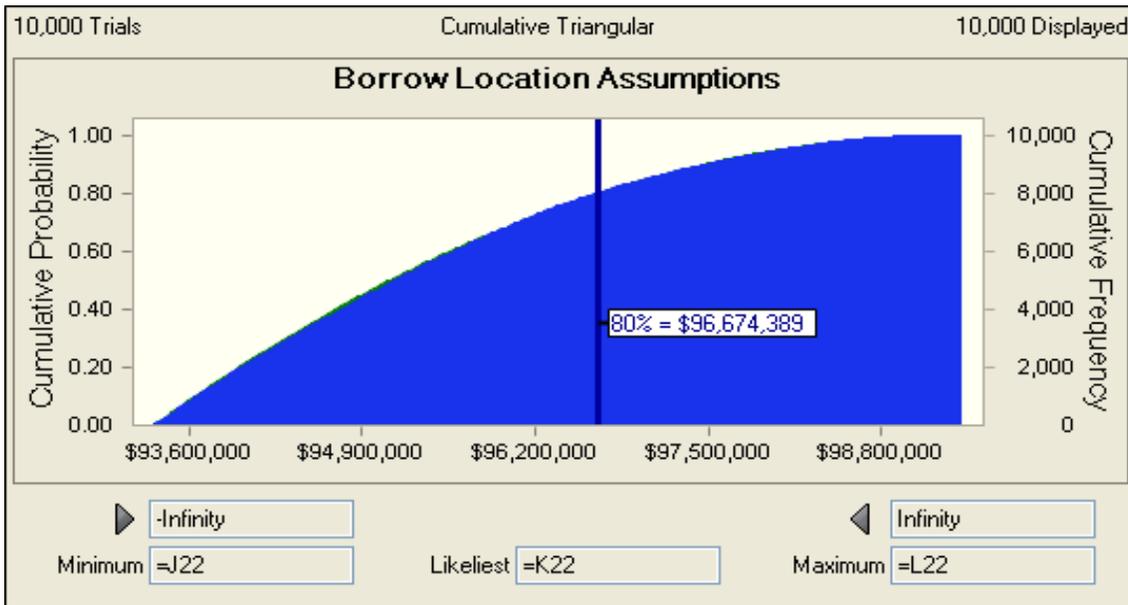
High High assumed 2 medium sized hopper dredges at a 60% EWT.



Assumption: Two Dredge Productivity		
Percentile	Assumption values	Resulting Item Contingency
0%	\$83,683,870	(\$9,648,130)
10%	\$88,220,185	(\$5,111,815)
20%	\$90,025,502	(\$3,306,498)
30%	\$91,466,759	(\$1,865,241)
40%	\$92,693,409	(\$638,591)
50%	\$93,717,470	\$385,470
60%	\$94,910,261	\$1,578,261
70%	\$96,138,059	\$2,806,059
80%	\$97,722,238	\$4,390,238
90%	\$99,689,817	\$6,357,817
100%	\$104,413,830	\$11,081,830

Risk Refer No.	Risk Event	Low	Most Likely	High
EST-5	Borrow Location Assumptions	\$93,332,000	\$93,332,000	\$99,398,580

- Notes:** This item captures the risk that the dredging and haul costs could increase if the borrow locations are further away than assumed in the current baseline estimate.
- Likely** The most likely baseline estimate assumes the closest borrows to the closest pumpout
- Low** Low assumes that closer borrow locations are not available, and hence no savings based on favorable conditions.
- High** High assumed that the average haul distance of 5 miles based on using Borrow Areas "L" and "J" as initial construction.



Assumption: Borrow Location Assumptions

Percentile	Assumption values	Resulting Item Contingency
0%	\$93,332,170	\$170
10%	\$93,663,035	\$331,035
20%	\$94,007,639	\$675,639
30%	\$94,365,139	\$1,033,139
40%	\$94,757,349	\$1,425,349
50%	\$95,162,030	\$1,830,030
60%	\$95,595,223	\$2,263,223
70%	\$96,081,964	\$2,749,964
80%	\$96,674,389	\$3,342,389
90%	\$97,503,736	\$4,171,736
100%	\$99,337,115	\$6,005,115

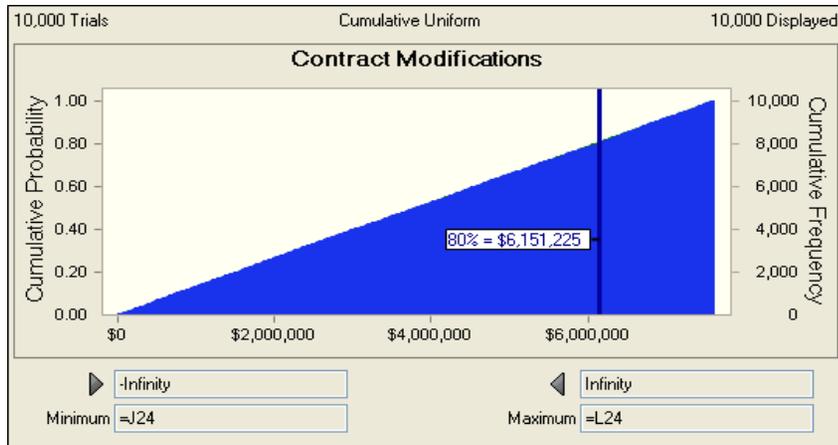
Risk Refer No.	Risk Event	Low	Most Likely	High
CON-1	Contract Modifications	\$0	\$0	\$7,612,110

Notes: This item captures the risk that contract modifications will require additional mobilizations and a 7% increase in quantity.

Likely This risk item follows a uniform distribution behavior -- no change to most likely cost.

Low Low assumes that there are no modifications, and hence, no impact to cost.

High High assumes that an additional mobilization is required, plus a 7% increase in the quantity to be dredged.



Assumption: Two Dredge Productivity		Resulting Item Contingency
Percentile	Assumption values	
0%	\$833	\$833
10%	\$735,228	\$735,228
20%	\$1,519,396	\$1,519,396
30%	\$2,255,865	\$2,255,865
40%	\$3,012,223	\$3,012,223
50%	\$3,799,454	\$3,799,454
60%	\$4,556,553	\$4,556,553
70%	\$5,330,454	\$5,330,454
80%	\$6,151,225	\$6,151,225
90%	\$6,863,962	\$6,863,962
100%	\$7,611,320	\$7,611,320

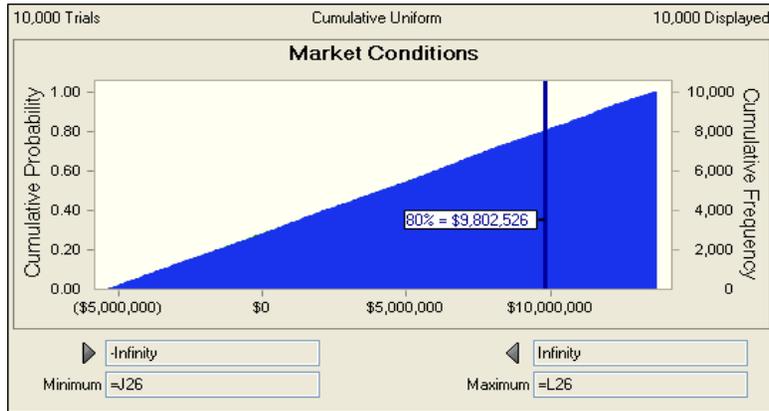
Risk Refer No.	Risk Event	Low	Most Likely	High
EXT-1	Market Conditions	(\$5,379,224)	\$0	\$13,701,798

Notes: Currently, there are a lot of projects planned when considering the number of dredges available. There are more hopper dredges than pipeline dredges. It is a tough bidding climate based on environmental time-line restrictions. Construction start is scheduled for 2014. This item captures the risk that there will be significant fluctuations in prices due to market conditions.

Likely Most likely is the total project cost in the baseline estimate.

Low Low assumes that the project could be up to 5% below the most likely based on GAO audit.

High High assumes that the project could be up to 15% above most likely estimate (25% w/o profit) due to lack of dredging companies and dredges for competing projects because of the work window restrictions.



Assumption: Market Conditions		Resulting Item
Percentile	Assumption values	Contingency
0%	(\$5,378,966)	(\$5,378,966)
10%	(\$3,488,380)	(\$3,488,380)
20%	(\$1,528,574)	(\$1,528,574)
30%	\$381,014	\$381,014
40%	\$2,178,275	\$2,178,275
50%	\$4,145,267	\$4,145,267
60%	\$6,029,642	\$6,029,642
70%	\$7,825,916	\$7,825,916
80%	\$9,802,526	\$9,802,526
90%	\$11,670,214	\$11,670,214
100%	\$13,696,819	\$13,696,819

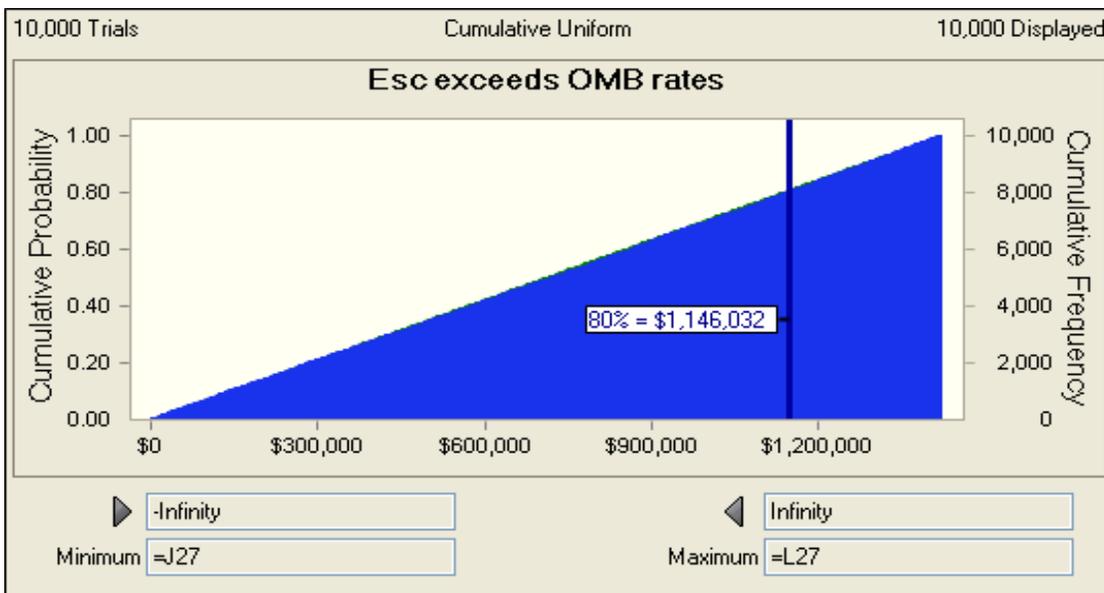
Risk Refer No.	Risk Event	Low	Most Likely	High
EXT-5	Esc exceeds OMB rates	\$0	\$0	\$1,420,927

Notes: Fuel is the greatest cost driver that may cause annual costs to go beyond the OMB rates. The study will focus on fuel projections converted to excavation unit prices as the measurement made against the OMB rates. This item captures the risk that there will be significant cost increase due to inflation above OMB rates.

Likely This risk item follows a uniform distribution behavior -- no change to most likely cost.

Low Low assume no increase or decrease from the base estimate based on inflation.

High High assumes up to an overall \$1,051,725 increase based on a fuel rate of \$6.00/gallon for marine diesel. This was calculated as the difference between the baseline estimate using 2.1% OMB escalation rates vs. the estimate using \$6.00/gallon.



Assumption: Esc exceeds OMB rates

Percentile	Assumption values	Resulting Item Contingency
0%	\$219	\$219
10%	\$139,869	\$139,869
20%	\$282,891	\$282,891
30%	\$430,263	\$430,263
40%	\$576,785	\$576,785
50%	\$721,585	\$721,585
60%	\$864,503	\$864,503
70%	\$1,004,855	\$1,004,855
80%	\$1,146,032	\$1,146,032
90%	\$1,282,695	\$1,282,695
100%	\$1,420,847	\$1,420,847

Crystal Ball Report - Full

Simulation started on 11/23/2010 at 3:11 PM
Simulation stopped on 11/23/2010 at 3:12 PM

Run preferences:

Number of trials run	10,000
Monte Carlo	
Seed	999
Precision control on	
Confidence level	95.00%

Run statistics:

Total running time (sec)	12.54
Trials/second (average)	797
Random numbers per sec	8,772

Crystal Ball data:

Assumptions	11
Correlations	0
Correlated groups	0
Decision variables	0
Forecasts	1

Forecasts

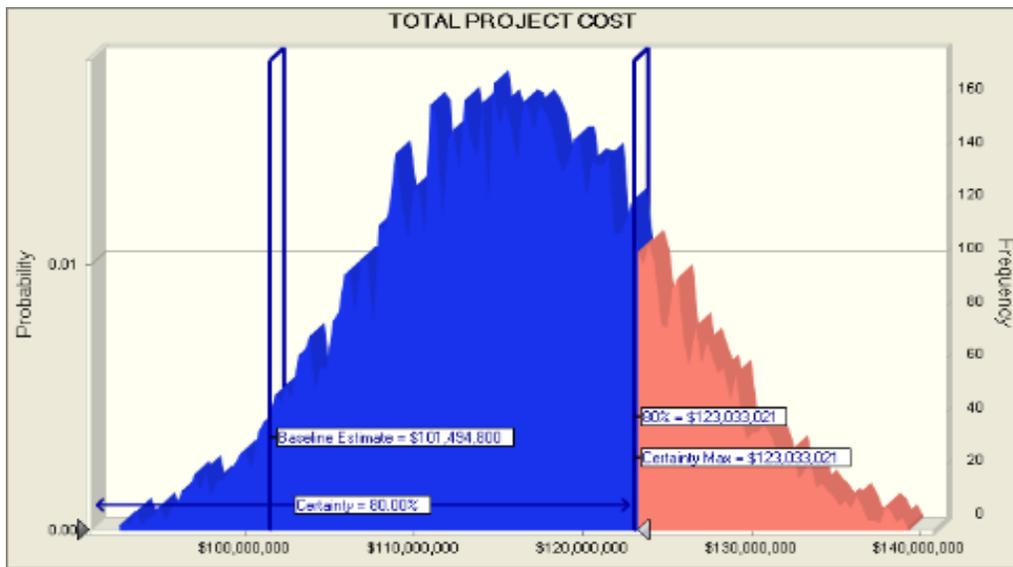
Worksheet: [Final Report Cost-Risk Analysis - Surf City.xlsx]Cost Risk Model

Forecast: TOTAL PROJECT COST

Cell: K29

Summary:

- Certainty level is 80.00%
- Certainty range is from -Infinity to \$123,033,021
- Entire range is from \$85,925,481 to \$143,584,335
- Base case is \$101,494,800
- After 10,000 trials, the std. error of the mean is \$84,715



Forecast: TOTAL PROJECT COST (cont'd)

Cell: K29

Statistics:	Forecast values
Trials	10,000
Base Case	\$101,494,800
Mean	\$115,794,232
Median	\$115,734,772
Mode	---
Standard Deviation	\$8,471,509
Variance	\$71,766,457,130,160
Skewness	0.0466
Kurtosis	2.74
Coeff. of Variability	0.0732
Minimum	\$85,925,481
Maximum	\$143,584,335
Range Width	\$57,658,854
Mean Std. Error	\$84,715

Percentiles:	Forecast values
0%	\$85,925,481
10%	\$104,795,243
20%	\$108,499,275
30%	\$111,138,419
40%	\$113,477,724
50%	\$115,734,303
60%	\$117,966,618
70%	\$120,364,594
80%	\$123,033,021
90%	\$126,882,131
100%	\$143,584,335

End of Forecasts

Assumptions

Worksheet: [Final Report Cost-Risk Analysis - Surf City.xlsx]Cost Risk Model

Assumption: Beach Quantity

Cell: K15

Triangular distribution with parameters:

Minimum	\$93,332,000	(=J15)
Likeliest	\$93,332,000	(=K15)
Maximum	\$95,665,300	(=L15)

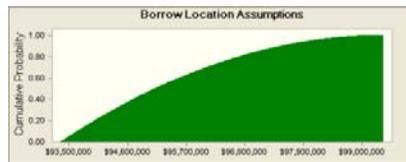


Assumption: Borrow Location Assumptions

Cell: K22

Triangular distribution with parameters:

Minimum	\$93,332,000	(=J22)
Likeliest	\$93,332,000	(=K22)
Maximum	\$99,398,580	(=L22)



Assumption: Contract Modifications

Cell: K24

Uniform distribution with parameters:

Minimum	\$0	(=J24)
Maximum	\$7,612,110	(=L24)

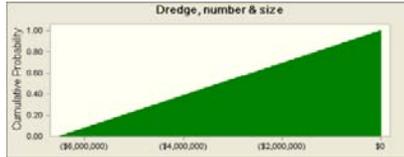


Assumption: Dredge, number & size

Cell: K19

Uniform distribution with parameters:

Minimum (\$6,533,240) (=J19)
 Maximum \$0 (=L19)

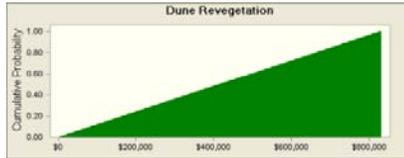


Assumption: Dune Revegetation

Cell: K17

Uniform distribution with parameters:

Minimum \$0 (=J17)
 Maximum \$830,000 (=L17)



Assumption: Esc exceeds OMB rates

Cell: K27

Uniform distribution with parameters:

Minimum \$0 (=J27)
 Maximum \$1,420,927 (=L27)



Assumption: Fuel

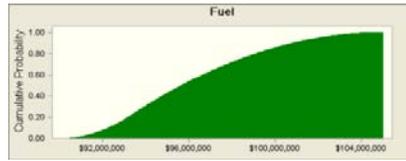
Cell: K20

Triangular distribution with parameters:

Minimum \$90,056,047 (=J20)
 Likeliest \$93,332,000 (=K20)
 Maximum \$104,998,500 (=L20)

Assumption: Fuel (cont'd)

Cell: K20

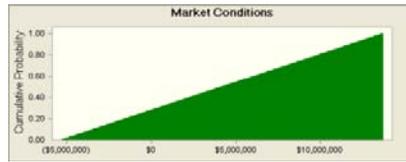


Assumption: Market Conditions

Cell: K26

Uniform distribution with parameters:

Minimum (\$5,379,224) (=J26)
 Maximum (\$13,701,798) (=L26)



Assumption: Number of Contracts

Cell: K12

Uniform distribution with parameters:

Minimum \$0 (=J12)
 Maximum \$1,200,000 (=L12)



Assumption: Soil Quality

Cell: K14

Triangular distribution with parameters:

Minimum \$93,332,000 (=J14)
 Likeliest \$93,332,000 (=K14)
 Maximum \$98,465,260 (=L14)

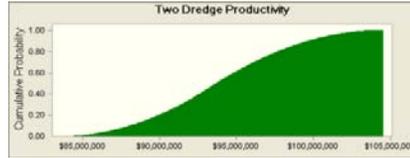


Assumption: Two Dredge Productivity

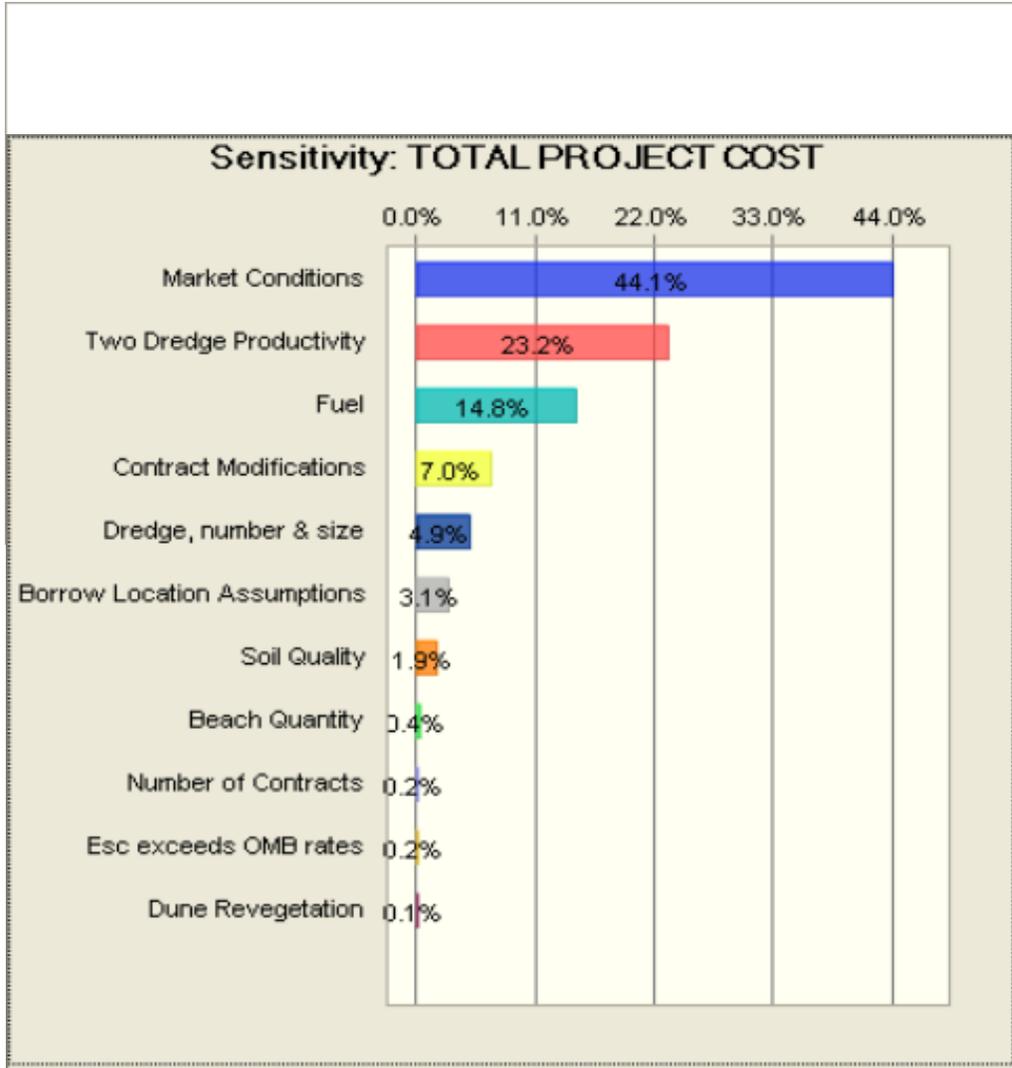
Cell: K21

Triangular distribution with parameters:

Minimum	\$83,532,140	(=J21)
Likeliest	\$93,332,000	(=K21)
Maximum	\$104,531,840	(=L21)



End of Assumptions



End of Sensivity Charts

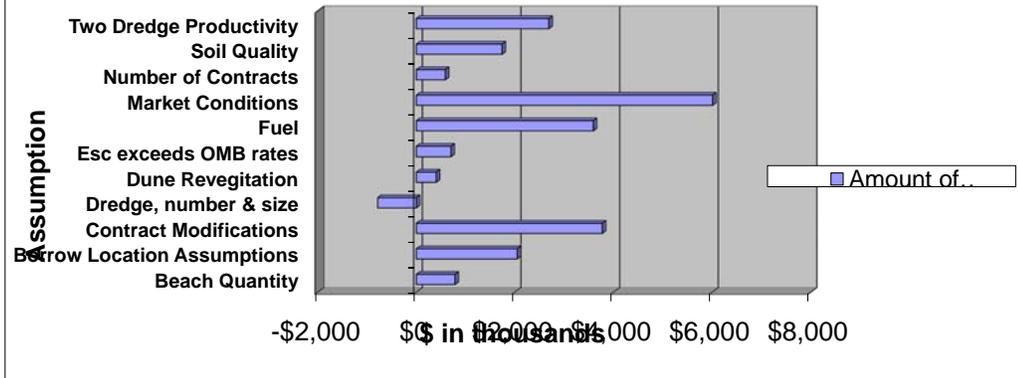
Statistics	TOTAL PROJECT COST	Beach Quantity	Borrow Location Assumptions	Contract Modifications	Dredge, number & size	Dune Revegetation	Esc exceeds OMB rates
Trials	10000	10000	10000	10000	10000	10000	10000
Base Case	\$101,494,800	\$93,332,000	\$93,332,000	\$0	\$0	\$0	\$0
Mean	\$115,734,232	\$94,109,564	\$95,379,434	\$3,807,960	(\$3,268,939)	\$412,324	\$715,528
Median	\$115,734,772	\$94,019,062	\$95,162,337	\$3,799,856	(\$3,273,791)	\$413,653	\$721,607
Mode	---	---	---	---	---	---	---
Standard Deviation	\$8,471,509	\$548,512	\$1,418,863	\$2,209,804	\$1,896,686	\$240,285	\$412,623
Variance	\$71,766,457,130,160	\$300,865,468,059	\$2,013,171,590,523	\$4,883,235,699,451	\$3,597,419,377,029	\$57,736,975,623	\$170,257,493,460
Skewness	0.0466	0.5683	0.5541	0.0061	-0.0025	0.0082	-0.0221
Kurtosis	2.74	2.43	2.42	1.79	1.80	1.80	1.79
Coeff. of Variability	0.0732	0.0058	0.0149	0.5803	-0.5802	0.5828	0.5763
Minimum	\$85,925,481	\$93,332,149	\$93,332,170	\$833	(\$6,533,066)	\$47	\$219
Maximum	\$143,584,335	\$95,638,677	\$99,337,115	\$7,611,320	(\$1,953)	\$829,970	\$1,420,847
Range Width	\$57,658,854	\$2,306,529	\$6,004,944	\$7,610,487	\$8,531,114	\$829,922	\$1,420,628
Mean Std. Error	\$84,715	\$5,485	\$14,189	\$22,098	\$18,967	\$2,403	\$4,126

Percentiles	TOTAL PROJECT COST	Beach Quantity	Borrow Location Assumptions	Contract Modifications	Dredge, number & size	Dune Revegetation	Esc exceeds OMB rates
0%	\$85,925,481	\$93,332,149	\$93,332,170	\$833	(\$6,533,066)	\$47	\$219
5%	\$101,911,308	\$93,387,362	\$93,509,265	\$398,437	(\$6,234,857)	\$40,704	\$67,478
10%	\$104,795,243	\$93,448,663	\$93,663,035	\$735,228	(\$5,896,579)	\$79,934	\$139,869
15%	\$106,814,070	\$93,516,227	\$93,830,783	\$1,123,442	(\$5,573,568)	\$121,857	\$214,127
20%	\$108,499,275	\$93,581,072	\$94,007,639	\$1,519,396	(\$5,263,201)	\$161,964	\$282,891
25%	\$109,941,194	\$93,647,935	\$94,185,167	\$1,894,323	(\$4,933,211)	\$203,660	\$358,519
30%	\$111,138,419	\$93,717,369	\$94,365,139	\$2,255,865	(\$4,567,773)	\$246,165	\$430,263
35%	\$112,343,382	\$93,789,689	\$94,554,352	\$2,638,788	(\$4,253,655)	\$287,208	\$502,751
40%	\$113,477,724	\$93,860,127	\$94,757,349	\$3,012,223	(\$3,903,151)	\$329,147	\$576,785
45%	\$114,679,638	\$93,937,546	\$94,955,009	\$3,420,388	(\$3,589,584)	\$370,997	\$645,003
50%	\$115,734,303	\$94,019,015	\$95,162,030	\$3,799,454	(\$3,275,396)	\$413,633	\$721,585
55%	\$116,877,629	\$94,106,939	\$95,371,355	\$4,206,517	(\$2,945,558)	\$455,367	\$793,676
60%	\$117,966,618	\$94,188,354	\$95,595,223	\$4,556,553	(\$2,626,523)	\$494,615	\$864,503
65%	\$119,114,634	\$94,281,646	\$95,837,116	\$4,947,315	(\$2,276,489)	\$536,630	\$928,149
70%	\$120,364,594	\$94,382,589	\$96,081,964	\$5,330,454	(\$1,967,556)	\$578,574	\$1,004,855
75%	\$121,596,135	\$94,483,899	\$96,341,286	\$5,731,179	(\$1,638,311)	\$618,479	\$1,077,997
80%	\$123,033,021	\$94,612,027	\$96,674,389	\$6,151,225	(\$1,290,889)	\$659,677	\$1,146,032
85%	\$124,677,058	\$94,754,476	\$97,050,782	\$6,500,223	(\$950,131)	\$703,114	\$1,215,138
90%	\$126,882,131	\$94,927,387	\$97,503,736	\$6,863,962	(\$641,121)	\$746,922	\$1,282,995
95%	\$129,928,279	\$95,147,995	\$98,065,046	\$7,258,299	(\$321,527)	\$789,372	\$1,351,933
100%	\$143,584,335	\$95,638,677	\$99,337,115	\$7,611,320	(\$1,953)	\$829,970	\$1,420,847

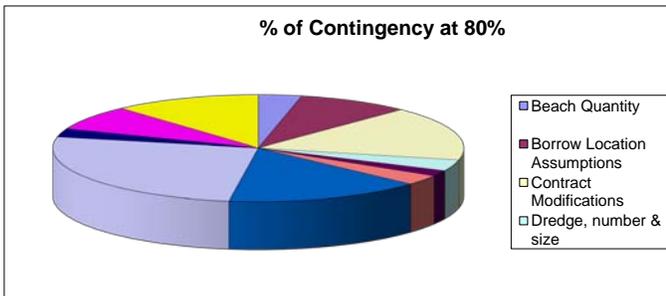
Sensitivity Data Assumptions	TOTAL PROJECT COST
Beach Quantity	0.06
Borrow Location Assumptions	0.17
Contract Modifications	0.26
Dredge, number & size	0.22
Dune Revegetation	0.03
Esc exceeds OMB rates	0.04
Fuel	0.38
Market Conditions	0.65
Number of Contracts	0.05
Soil Quality	0.14
Two Dredge Productivity	0.47

	Raw	Normalized	
	Amount of Contingency at 8%	Amount of Contingency at 80%	% of Contingency at 80%
Beach Quantity	\$1,280,027	5.94%	3.64%
Borrow Location Assumptions	\$3,342,389	15.52%	9.51%
Contract Modifications	\$6,151,225	28.56%	17.50%
Dredge, number & size	(\$1,280,889)	-5.95%	-3.64%
Dune Revegetation	\$659,677	3.06%	1.88%
Esc exceeds OMB rates	\$1,146,032	5.32%	3.26%
Fuel	\$5,851,183	27.17%	16.85%
Market Conditions	\$9,802,526	45.51%	27.89%
Number of Contracts	\$960,819	4.46%	2.73%
Soil Quality	\$2,839,644	13.18%	8.08%
Two Dredge Productivity	\$4,390,238	20.38%	12.49%

Amount of Contingency at 80%



% of Contingency at 80%



Fuel	Market Conditions	Number of Contracts	Soil Quality	Two Dredge Productivity
10000	10000	10000	10000	10000
\$93,332,000	\$0	\$0	\$93,332,000	\$93,332,000
\$96,176,219	\$4,123,862	\$598,864	\$95,051,747	\$93,852,451
\$95,698,712	\$4,145,384	\$598,726	\$94,855,791	\$93,717,909
---	---	---	---	---
\$3,237,913	\$5,466,780	\$346,169	\$1,201,484	\$4,246,218
\$10,484,080,826,956	\$29,885,686,105,848	\$119,832,825,985	\$1,443,563,169,538	\$18,030,370,597,064
0.4332	-0.0052	-0.0044	0.5422	0.0581
2.35	1.81	1.79	2.38	2.42
0.0337	1.33	0.5780	0.0126	0.0452
\$90,114,194	(\$5,378,966)	\$85	\$93,332,354	\$83,683,870
\$104,890,295	\$13,696,819	\$1,199,752	\$96,446,161	\$104,413,830
\$14,776,102	\$19,075,785	\$1,199,668	\$5,113,807	\$20,729,560
\$32,379	\$54,668	\$3,462	\$12,015	\$42,462

Fuel	Market Conditions	Number of Contracts	Soil Quality	Two Dredge Productivity
\$90,114,194	(\$5,378,966)	\$85	\$93,332,354	\$83,683,870
\$91,555,112	(\$4,417,817)	\$62,853	\$93,467,452	\$86,849,274
\$92,293,751	(\$3,488,380)	\$119,567	\$93,610,179	\$88,220,185
\$92,811,861	(\$2,545,180)	\$178,057	\$93,744,054	\$89,218,372
\$93,213,973	(\$1,528,574)	\$236,080	\$93,883,300	\$90,025,502
\$93,582,272	(\$544,021)	\$296,103	\$94,031,622	\$90,780,278
\$93,968,640	\$381,014	\$355,774	\$94,181,871	\$91,466,759
\$94,380,732	\$1,291,811	\$415,879	\$94,336,242	\$92,107,277
\$94,800,497	\$2,178,275	\$476,420	\$94,509,621	\$92,693,409
\$95,233,768	\$3,188,540	\$541,123	\$94,679,784	\$93,243,982
\$95,698,478	\$4,145,267	\$598,628	\$94,855,579	\$93,717,470
\$96,182,005	\$5,178,260	\$663,952	\$95,044,738	\$94,306,252
\$96,692,820	\$6,029,642	\$723,087	\$95,250,174	\$94,910,261
\$97,261,065	\$6,928,205	\$782,225	\$95,454,115	\$95,468,831
\$97,882,182	\$7,825,916	\$839,531	\$95,664,835	\$96,138,059
\$98,512,717	\$8,794,387	\$899,853	\$95,897,701	\$96,882,058
\$99,183,183	\$9,802,526	\$960,819	\$96,171,644	\$97,722,238
\$99,975,214	\$10,779,036	\$1,015,492	\$96,457,919	\$98,562,979
\$100,933,557	\$11,670,214	\$1,073,717	\$96,821,387	\$99,689,817
\$102,138,957	\$12,624,277	\$1,138,108	\$97,302,146	\$101,018,210
\$104,890,295	\$13,696,819	\$1,199,752	\$98,446,161	\$104,413,830