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# **Carteret County – Dredging Operation Cost – Final Report**

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Presented to:

Carteret County, NC

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Prepared by:



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## 1. Introduction

Carteret County, North Carolina is preliminarily evaluating an independent dredging operation for their inner channels, AIWW crossings and portions of shallow inlets. This will allow the County to maintain channels for their citizens without depending on outside contractors and market forces. To accomplish this, the County will not only need to purchase a dredge, but also establish a dredge operations building, and maintain and operate the dredge. The estimated land needed to setup the operation, as well as the initial cost and annual maintenance cost will be detailed in this report.

## 2. Assumptions

The dredging operation is assumed to be a year round operation, staffed by the County. Assumptions for the operation include:

- 300,000 CY per year (taken from past studies)
- 50 weeks per year in operation
- 5 days per week
- 1 single 10 hour shift per day
- 25% downtime during operations
- 3 mile maximum pumping distance
- 1 mile average pumping distance
- 7 foot draft maximum
- Operate inland and within inlets up to COLREGS line
- 4' average dredging depth
- \$3.00 / gal for diesel
- Shore Crew Consisting of:
  - D-6 Dozer
  - 980 Front Loader
- 9 Man Dredge Crew Consisting of:
  - Leverman
  - Watch Engineer
  - Dredge Mate
  - Launchman
  - Deckhand
  - Shore Operators (2)
  - Booster Engineers (2)

## 3. Methodology

Three sources of data have been used to develop this cost estimate: one municipality, The City of Virginia Beach; one dredging contractor from the Hampton Roads area; and a spreadsheet used by the US Army Corps of Engineers used to determine dredging costs. The City of Virginia Beach has

their own dredging operation used to dredge the Rudee Inlet sand trap. The Virginia Beach dredging operation is simpler than the one needed for this estimate; no shore crew is needed as the pipe is fixed and the dredge does not travel large distances during dredging, but it is helpful for comparison purposes.

The dredging company discussion included topics on the initial setup costs and operation of the dredge. They recommended having costs for initial purchase of spare materials to reduce downtime of the dredge.

The main cost estimate for this was created using the Corps of Engineers Dredge Estimating Program (CEDEP) worksheet that accounts for the efficiency of the dredges for a project based upon the areas, volume, amount of pay amount not dug on average, and the amount dug in excess of the allowable pay amount, and many other factors associated with dredging operations. All costs associated with a typical contractor operation including overhead, profit, and bonds can be included in the unit price calculated. For the purposes of this estimate, no profit has been included, but overhead costs are assumed to be included as the County will have overhead costs such as paid time off, administration costs and payroll taxes. Bond costs were also included. Even though there is no contractor being hired that would need a bond, the County will have insurance costs associated with the operation that would be of similar cost to a typical contractor bond.

## **4. Cost Estimate**

### **4.1. Initial Setup**

The City of Virginia Beach utilizes a 14" dredge to dredge 200,000 CY per year, so a 16" dredge is recommended for this operation. The CEDEP program confirms that a 16" dredge is sufficient to complete the desired operation. The initial cost of the 16" dredge is estimated to be in the range of \$3,500,000 - \$5,000,000 for a newly built dredge. It should be noted that used dredges could be purchased for significantly cheaper (around \$2,000,000), but these would have higher maintenance costs. It is recommended that the County purchase additional parts to expedite repairs and limit downtime. This real-time, on-hand parts inventory should cost about \$500,000 to \$1,000,000.

A survey vessel is recommended as part of the operation. A small survey vessel with equipment is estimated to cost about \$100,000 to buy.

A crane barge and tender are required to support the cutterhead dredging operation and will cost approximately \$800,000 and \$300,000 to buy initially.

A new D6 Cat Dozer is estimated to cost about \$400,000, while the CAT 480 Front Loader is estimated to cost about \$600,000. These are required for the shore crew to move the pipe and spread the material at potential disposal sites.

CEDEP estimated that 2 booster pumps are needed for the 3 mile maximum pumping distance. These booster pumps and the 3 miles of pipeline required need to be purchased as well. Each booster is assumed to cost about \$500,000 and the pipeline is estimated to total \$1,900,000. This includes 50 floats for to allow for up to 1,000 feet of floating pipe, 30 connection joints in the pipeline to allow it to be taken apart into pieces estimated at \$5,000 each, and the pipe itself estimated at about \$100 per foot based upon steel pipe at 0.626 in thick.

The total estimated cost of the dredge, pipeline, boosters, shore equipment, spare parts, and survey equipment is thus estimated to be within a range of \$9,100,000 to \$11,100,000.

For a maintenance yard, approximately 2.5 acres of land would be needed adjacent to the water for a bulkhead to dock the dredge and associated equipment. This amount of land is needed to store the additional pipeline when not in use. The survey vessel could be docked at this location as well, and a maintenance building about 6,000 sf in size for operations is assumed to be included on this parcel. The City of Virginia Beach utilizes this building for other operations, including for maintenance of their fire and police boats.

At \$150 / sf for the maintenance building, the initial cost of the building is \$900,000. The associated bulkhead is estimated to cost about \$150,000 and remaining ground improvements, including pavement, fencing, etc. is estimated at \$450,000. This totals \$1.5 million for the operations building and land based infrastructure required for the initial setup. The cost of land was not considered for this estimate, as the County may have land available, and land values vary greatly near water.

Therefore, the total initial setup costs for the dredging equipment and land based infrastructure (without land costs) is estimated to be within the range of \$10.6 Million - \$12.6 Million.

## **4.2. Operations**

The CEDEP program estimated that the total operations cost for a given year is \$3,200,000. This includes all costs associated with the operation include operating the survey vessel, booster pumps, fuel for all equipment, all labor, and maintenance costs associated with all equipment.

The City of Virginia Beach only budgeted \$2,095,568 for in 2016 for their dredge, but their dredging operation does not require a shore crew of moving pipes. For comparison purposes, the shore crew and pipe relocation was removed from CEDEP to determine a comparison cost and the price dropped to about \$2.3 million, so this CEDEP estimate does seem appropriate given the costs in Virginia Beach.

Depending on potential variabilities in production rates and downtime, an appropriate range for annual operating costs is estimated at \$2.7 – \$3.7 million per year.

## 5. Summary

The estimated initial cost of the 16" dredge and associated marine equipment is in the range of \$9.1 – \$11.1 million. The estimated initial cost of the maintenance building and associated land based infrastructure is \$1.5 million. The estimated annual operating cost for the 300,000 CY dredging operation is within the range of \$2.7 - 3.7 million per year. Please note that the costs above do not include any amortization of the initial costs or possible cost-sharing with the state concerning maintenance/operation costs.

For the initial costs of \$10.6 - \$12.6 million (dredge, equipment, and buildings), annual payments of \$1.2 – \$1.5 million would be needed from the County assuming a 10-yr loan at 3%. If the State of NC would provide its current 2/3 cost share (reimbursement) for maintenance/operation costs via the Shallow Draft Navigation Channel Dredging and Aquatic Weed Fund, the annual County costs for these items would range from \$0.9 - \$1.3 million, compared to \$2.7 - 3.7 million annually without state reimbursement.