

**PORTSMOUTH HARBOR AND PISCATAQUA RIVER
NEW HAMPSHIRE AND MAINE
NAVIGATION IMPROVEMENT STUDY
FEASIBILITY REPORT**

**APPENDIX E
COST ENGINEERING**

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Table of Contents

- E.1 COST NARRATIVE
 - E.1.1 Recommended Alternative Plans
 - E.1.2 Construction Cost
 - E.1.3 Non-Construction Cost
 - E.1.4 Plan Formulation Cost Estimates
 - E.1.5 Construction Schedule
 - E.1.6 Total Project Cost Summary
 - E.1.7 Risk Management Measures
- E.2 QUANTITIES
- E.3 PLAN FORMULATION COST ESTIMATES (MCASES Cost Estimate)
- E.4 SCHEDULES
- E.5 RISK AND UNCERTAINTY ANALYSIS
 - E.5.1 Risk Analysis Methods
 - E.5.2 Risk Analysis Results
- E.6 TOTAL PROJECT COST SUMMARY

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E.1 COST NARRATIVE

Corps of Engineers cost estimates for planning purposes are prepared in accordance with the following guidance:

- Engineer Technical Letter (ETL) 1110-2-573, Construction Cost Estimating Guide for Civil Works, 30 September 2008
- Engineer Regulation (ER) 1110-1-1300, Cost Engineering Policy and General Requirements, 26 March 1993
- ER 1110-2-1302, Civil Works Cost Engineering, 15 September 2008
- ER 1110-2-1150, Engineering and Design For Civil Works Projects, 31 August 1999
- ER 1105-2-100, Planning Guidance Notebook, 22 April 2000, as amended
- Engineer Manual (EM) 1110-2-1304 (Tables revised 30 March 2007), Civil Works Construction Cost Index System, 31 March 2013
- CECW-CP Memorandum For Distribution, Subject: Initiatives To Improve The Accuracy Of Total Project Costs In Civil Works Feasibility Studies Requiring Congressional Authorization, 19 Sep 2007
- CECW-CE Memorandum For Distribution, Subject: Application of Cost Risk Analysis Methods To Develop Contingencies For Civil Works Total Project Costs, 3 Jul 2007
- Cost and Schedule Risk Analysis Guidance, 17 May 2009

The goals of the cost estimating for the Portsmouth Harbor and Piscataqua River Navigation Improvement Project study are to present a Total Project Cost (construction and non-construction costs) for both the Federal Base Plan and the tentatively recommended (Beneficial Use) plan at the current price level to be used for project justification/authorization and to project costs forward in time for budgeting purposes. In addition, the costing efforts are intended to produce a final product, or cost estimate, that is reliable and accurate and that supports the definition of the Government's and the non-Federal sponsor's obligations. The cost estimating efforts for the study also yielded a series of alternative plan formulation cost estimates for decision making. The final set of plan formulation cost estimates used for plan selection relies on construction feature unit pricing. The cost estimate supporting the National Economic Development (NED) plan (base plan), as well as the beneficial use plan, is prepared in MCASES/MII format. The estimate is supported by the preferred labor, equipment, materials, and crew/production breakdown. A fully funded (escalated for inflation through project completion) cost estimate, the Baseline Cost Estimate or Total Project Cost Summary, has also been developed for both the Federal Base Plan and Beneficial Use Plan. A risk analysis was prepared that addresses the uncertainties in, and sets contingencies for, the Federal Base Plan and Beneficial Use Plan cost items. A discussion of the risk analysis is included at the end of this appendix.

The Portsmouth Harbor and Piscataqua River Navigation Improvement Project consists of widening the upper turning basin from a width of 800 feet to a width of 1200 feet at the authorized depth of -35 MLLW. Approximately 728,100 cubic yards of sand and gravel and approximately 25,300 cubic yards of rock would be removed. The Federal Base Plan consists of disposal of both the sand and gravel and rock to an ocean disposal site referred to as Isle of

Shoals North (IOS-N). However, as four coastal communities (Wells, Newbury, Newburyport, and Salisbury) have indicated their desire for the dredged material (sand only) to be placed in near shore areas to nourish their nearby beaches, a beneficial use plan was also developed. The total project cost established by the Federal Base Plan will determine the portion of the project paid for by the Government. The increased total project cost for the Beneficial Use Plan will be distributed to those four communities based on quantity of material and increased disposal distance from the Isle of Shoals North site.

E.1.1 Recommended Alternative Plans

The NED plan was selected based on the results of Corps planning guidance that specifies the plan that reasonably maximizes net economic benefits consistent with protecting the Nations environment is the selected plan. In this case, widening the existing turning basin to a width of 1200 feet and disposing of dredged material at the IOS-N ocean disposal site was the NED plan and is the Federal base plan that would be selected for implementation. However, as those four coastal communities have indicated their desire for the sand material, the Beneficial Use Plan is selected as the tentatively recommended plan. The Economics Appendix fully describes the plan selection. The scope of work for both the Federal Base Plan and the Beneficial Use Plan was conveyed to the Cost Engineer by the Project Manager and is based on quantities provided by the Civil Section and is summarized in table form in E.2 QUANTITIES. The MCACES/MII cost estimates are based on these quantities. The notes provided in the estimate detail the estimate parameters and assumptions. These include pricing at the Fiscal Year 2013 price level (1 October 2012 – 30 September 2013). The QUANTITIES section also provides values for the two non-selected turning basin sizes (1020' and 1100' wide) for comparison purposes as cost estimates were completed for these cases, but no risk analysis or total project cost summary was prepared.

E.1.2 Construction Cost

The MCACES/MII estimate is based on unit prices and mob/demob sums calculated in CEDEP and in a District-standard Drilling & Blasting spreadsheet. The estimate does not contain any contingency or escalation as they are determined in the risk analysis and total project cost summary processes, respectively. In the past two years NAE has had two dredging projects similar in magnitude to the subject project; both of which were bid on by three large dredging contractors in this area. These three contractors were contacted and confirmed they have the necessary equipment and would likely self-perform the drilling and might only sub out the diving portion, which is a small percentage of the overall drilling & blasting cost. The Drilling & Blasting spreadsheet does not provide a simple breakout of diving costs; therefore the Drilling & Blasting construction costs were placed under the Prime and the risk of a diving subcontractor has been accounted for in the risk analysis.

E.1.3 Non-Construction Cost

Non-construction costs typically include Real Estate, Planning, Engineering and Design (PED), and Construction Management (Supervision and Administration, S&A). It was determined that no real estate is required for this project as the area to be dredged and open water placement areas required for construction are below the ordinary high watermark of the navigable watercourse. Berth access for all equipment would be provided at the State's terminal and are subject to navigation servitude and no credit would be due the non-Federal sponsor for this use.

Planning, Engineering and Design costs are broken down into Preconstruction, Engineering and Design (PED), or preparation of contract plans and specifications and Engineering during Construction (EDC). PED costs were solicited from the Project Manager and the PDT

Construction Management costs were also solicited from the Project Manager and the PDT.

The main report details both cost allocation and cost apportionment for the Federal government and the non-Federal sponsor. Also included in the main report are the non-Federal sponsor's obligations (items of local cooperation).

E.1.4 Plan Formulation Cost Estimates

For the plan formulation cost estimates, dredging and disposal costs for both the Federal Base Plan and Beneficial Use Plan were calculated in CEDEP. Drill and blasting costs for both plans were calculated in a District-standard spreadsheet. The unit prices for each of these major or variable construction elements were entered into MCACES/MII and differentiated each plan by the quantities required to construct the plans. It should be noted that the unit prices derived from the CEDEP spreadsheet are in line with the previous two years of dredging work seen in the New England District. Over this two year period (FY12 and FY13) there have been a total of nine dredging projects of various sizes with an average unit price of approximately \$13.98/cy compared to \$15.68/cy and \$17.98/cy for the Federal Base Plan and Beneficial Use Plan, respectively. This represents a good correlation between historic and these calculated unit prices.

Designs and quantities for each element were provided to the Cost Section by the Civil Section. It should be noted that without additional borings/rock investigations, the Civil Section has assumed a conservative material quantity and the Geology Section has assumed a rock-type that necessitates drill and blast. With additional borings/investigations it is likely that the rock quantity could be lower and the rock type will be one that could be fractured and dredged with a large rock bucket (with no drill and blast necessary).

The plan formulation process for this study involved numerous iterations. Since the costs for the plans were calculated via CEDEP and drill & blast spreadsheets it was fairly simple to adjust

each of them accordingly as plan components changed and as plans were added or removed from consideration. Refer to the Economic Analysis section in the Feasibility Report for the final Plan Formulation cost tables.

E.1.5 Construction Schedule

Construction schedules for both the Federal Base Plan and Beneficial Use Plan were prepared by the Cost Engineer. These schedules considered not only durations of individual components but also timing of construction contracts. They are based on multiple crews with shift work and overtime due to the established environmental windows based on lobster and shellfish peak spawning periods. These schedules were used in the generation of the Total Project Cost Summary as well as for the completion of the risk analysis. The construction schedule may change as design of the project proceeds in the plans and specifications phase and then it may change again when the contract is awarded and the contractor provides his/her schedule. Interestingly, the construction schedule does change significantly between the Federal Base Plan and the Beneficial Use Plan as the increased disposal distance and subsequent haul time is mitigated by the increase in scows under the Beneficial Use Plan.

E.1.6 Total Project Cost Summary

The Total Project Cost Summary for both plans includes escalation through project completion. The cost estimates for both plans was prepared with an identified price level date. Inflation factors are used to adjust the pricing to the project schedule. This is known as the Fully Funded Cost Estimate or Total Project Cost Summary. They include all Federal and non-Federal costs including all construction features, Preconstruction Engineering and Design, Construction Management, Contingency, and Inflation.

E.1.7 Risk Management Measures

The PDT identified highly rated concerns in order to evaluate the proper means to mitigate and limit their effect on the project as follows:

- Construction Environmental Concerns – Lobsters and shellfish have historically presented obstacles to dredging. Their spawning periods provide a construction window from approximately the end of October/beginning of November to the end of March/middle of April. Mitigation measures include, but are not limited to, issuing the NTP well in advance of construction start to allow the contractor sufficient time to mobilize and complete the work.

- Fuel Price Increases - Given that fuel prices are inevitable and unpredictable the team acknowledges the effect on the cost of all work. Mitigation measures are somewhat limited but could include grouping work into larger contracts to allow bulk fuel purchases and scheduling work to occur as soon as possible.
- Drill & Blast Prices – Drill & blast is not a common construction feature and, therefore, background cost data is limited. The drill and blast cost spreadsheet that was used is based on a quote from a marine drill & blast company obtained in 2008 and then escalated to 2010 in that year for a separate project. Costs for most of the explosive-related materials were updated specifically for this project. The remaining costs have been escalated to current dollars utilizing a conservative escalation factor (8.88%) from 2010. Several material items were researched and costs were updated accordingly specifically for this project but not enough resources were allotted to complete this effort. Mitigation measures could include the research and updating of additional factors in the drill & blast spreadsheet currently utilized by the Cost Engineer to provide a more current estimating tool. While the spreadsheet is based on real costs with appropriate escalation, further updating based on current industry pricing would strengthen the spreadsheet and provide a more accurate total drilling and blasting price.

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E.2 QUANTITIES

QUANTITIES

		Sand and Gravel Material					Rock Material		
		Disposal To					Disposal To		
Improvement Area		Quantities	Isle of Shoals 100%	Newbury /			Quantities	Isle of Shoals 100%	
				Wells 50%	Newburyport 37.50%	Salisbury 12.50%			
1020-Foot	Required (to -35)	340,502	340,500	170,300	127,700	42,500	Required (to -35)	8,854	8,900
Wide	Overdepth (to -37)	<u>44,387</u>	<u>44,400</u>	<u>22,200</u>	<u>16,700</u>	<u>5,500</u>	Overdepth (to -37)	6,050	<u>13,600</u>
Turning	Total	384,889	384,900	192,500	144,400	48,000	Overdepth (to -39)	<u>7,485</u>	
Basin							Total	22,389	22,500
	Area	493,930	493,930	246,965	185,224	61,741	Area	106,800	106,800
1120-Foot	Required (to -35)	519,778	519,800	259,900	194,900	65,000	Required (to -35)	8,883	8,900
Wide	Overdepth (to -37)	<u>53,930</u>	<u>53,900</u>	<u>27,000</u>	<u>20,200</u>	<u>6,700</u>	Overdepth (to -37)	6,123	<u>14,000</u>
Turning	Total	573,708	573,700	286,900	215,100	71,700	Overdepth (to -39)	<u>7,717</u>	
Basin							Total	22,723	22,900
	Area	705,840	705,840	352,920	264,690	88,230	Area	110,174	110,174
1200-Foot	Required (to -35)	661,266	661,300	330,700	248,000	82,600	Required (to -35)	9,139	9,200
Wide	Overdepth (to -37)	<u>66,810</u>	<u>66,800</u>	<u>33,400</u>	<u>25,100</u>	<u>8,300</u>	Overdepth (to -37)	6,777	<u>16,100</u>
Turning	Total	728,076	728,100	364,100	273,100	90,900	Overdepth (to -39)	<u>9,237</u>	
Basin							Total	25,153	25,300
	Area	890,350	890,350	445,175	333,881	111,294	Area	128,987	128,987

1) All quantities are in cubic yards and all areas are in square feet

2) All quantities and areas were provided by Civil Section from graphic **Figure 4 - Dredged and Rock Quantities for Alternative 1**, dated 24 October 2013

3) Federal Base Plan consists of the 1200' Turning Basin and Sand and Gravel disposal to Isle of Shoals and Rock disposal to Isle of Shoals

4) Beneficial Use Plan consists of the 1200' Turning Basin and Sand and Gravel disposal to Wells, Newbury/Newburyport, and Salisbury and Rock disposal to Isle of Shoals

5) Material quantities were rounded to nearest 100 cubic yards as standard practice

6) Rock material Overdepth to -37 and Overdepth to -39 quantities combined to enter into CEDEP and Drilling & Blasting spreadsheet

E.3 PLAN FORMULATION COST ESTIMATES
(MCASES Cost Estimate)

Portsmouth Harbor & Piscataqua River Federal Navigation Project
Feasibility Estimate

Scope of Work:

The project involves dredging and drilling/blasting operations in the Portsmouth Harbor and Piscataqua River area. The Feasibility Report looked at three improvement areas resulting in three different turning basin sizes; 1020', 1120', and 1200' to a depth of -35' with -2' of overdepth to -37'. The Feasibility Report looked at two different scenarios for sand material disposal; (1) 100% near shore disposal at the Isle of Shoals and (2) 50% near shore disposal at Wells Beach, 37.5% near shore disposal between Newbury & Newburyport Beach, and 12.5% near shore disposal at Salisbury Beach. All disposal will be near-shore to benefit the nearby beaches and slow erosion. There is some estimated amount of rock that will be encountered which will require drilling and blasting and subsequent dredging and disposal to remove. The rock removal is required to -35' with -2' of overdepth to -37' and an additional 2' of overdepth to -39'. The rock is expected to be dredged by the same equipment as the sand with a different, tougher, clamshell and placed on flat-top work barges. The estimate looked at two different scenarios for rock material disposal; (1) near-shore disposal at the Isle of Shoals and (2) disposal and storage upland at the State Pier. Ultimately, the report concluded that the 1200' Turning Basin was favorable. The FEDERAL BASE PLAN consists of IMPROVEMENT AREA 1200' TURNING BASIN with sand and rock disposal both near shore at Isle of Shoals. The BENEFICIAL USE PLAN consists of IMPROVEMENT AREA 1200' TURNING BASIN with sand disposal near shore at Wells, Newbury/Newburyport, and Salisbury and rock disposal near shore at Isle of Shoals. It was also decided that both the FEDERAL BASE PLAN and BENEFICIAL USE PLAN would dispose of the blasted rock material at the Isle of Shoals.

Assumptions:

Dredging costs were calculated using CEDEP spreadsheet and drill and blast costs were calculated using a District-standard drilling & blasting spreadsheet. Unit prices obtained from CEDEP appear reasonable based on the historic dredge project unit price of \$13.89/cy (based on 9 dredging projects in FY12 and FY13). The drill and blast cost spreadsheet that was used is based on a quote from a marine drill & blast company obtained in 2008 and then escalated to 2010 in that year for a separate project. Costs for most of the explosive-related materials were updated specifically for this project. The remaining costs have been escalated to current dollars utilizing a conservative escalation factor (8.88%) from 2010. Several material items were researched and costs were updated accordingly specifically for this project. It is assumed a dredging contractor would be the prime contractor on the job, but would also perform the rock drilling and blasting as well as the rock removal. In the last two years NAE has had two dredging projects of this magnitude both of which were bid on by three large dredging contractors in this area (specifically Great Lakes, Cashman, and Weeks). Cost Engineer spoke with personnel at all three firms who confirmed that they would perform the drilling and might only sub out the diving portion, which is a small percentage of the overall drilling & blasting cost. The drilling & blasting spreadsheet does not provide a simple breakout of diving costs; therefore the d&b has remained under the prime and the risk of a diving subcontractor has been accounted for in the risk analysis. The estimate includes provisions for pilots to accompany the tug captains in order for them to learn to navigate the waters safely (estimate assumed ~9 trips necessary per tug captain). Due to the tides and water levels within the river corridor, there are approximately 9 hours in a 24 hour day (4-5 hours per tide cycle) in which the tugs will not be able to bring scows through. Therefore, the haul time was "set" to at least equal 62.5% of the excavation time by including additional scows and tugs to mitigate this delay. All quantities for sand dredging and rock drill/blast and subsequent dredging were obtained from Civil Section. It should be noted that without additional borings/rock investigations, the Civil Section has assumed a conservative material quantity and the Geology Section has assumed a rock-type that necessitates drill and blast. With additional borings/investigations it is likely that the rock quantity could be lower and the rock type will be one that could be fractured and dredged with a large rock bucket (with no drill and blast necessary).

Estimated by Jeffrey Gaeta

Designed by Mark Godfrey

Prepared by Jeffrey Gaeta

Preparation Date 11/4/2013

Effective Date of Pricing 11/4/2013

Estimated Construction Time 150 Days

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Contractor Level & Markups:

OH 17%, Profit 10%, Bond 2% for Prime Contractor (with OH 10%, Profit 7%, Bond 2% on all sub work). The drill and blast work carries the following markups:
OH 15%, Profit 10%, Bond 3%. This estimate includes no contingency or escalation.

Labor rates obtained from Davis Bacon General Decision Number: NH130003 01/04/2013 NH3 - Heavy Dredging. The Davis Bacon rates were entered into CEDEP. Equipment rates from CEDEP and Drill & Blast spreadsheet were used in respective spreadsheets. Portsmouth Pilots costs obtained from Harbormaster.

Estimated by Jeffrey Gaeta

Designed by Mark Godfrey

Prepared by Jeffrey Gaeta

Preparation Date 11/4/2013

Effective Date of Pricing 11/4/2013

Estimated Construction Time 150 Days

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Description	Quantity	UOM	LaborCost	MatlCost	EQCost	SubBidCost	BareCost	ContractCost	ProjectCost
Project Cost Summary			72,900.00	0.00	0.00	32,219,189.00	32,292,089.00	32,292,089.00	32,292,089.00
			32,400.00	0.00	0.00	15,276,769.00	15,309,169.00	15,309,169.00	15,309,169.00
FEDERAL BASE PLAN - Improvement Area 1200' Turning Basin	1	EA	32,400.00	0.00	0.00	15,276,769.00	15,309,169.00	15,309,169.00	15,309,169.00
			0.00	0.00	0.00	1,190,890.00	1,190,890.00	1,190,890.00	1,190,890.00
Mob & Demob	1	EA	0.00	0.00	0.00	1,190,890.00	1,190,890.00	1,190,890.00	1,190,890.00
Mob/Demob	1	LS	0.00	0.00	0.00	608,237.00	608,237.00	608,237.00	608,237.00
USR Mob/Demob - 1200' TB (Note: See CEDEP printouts for additional estimate details.)	1	LS	0.00	0.00	0.00	608,237.00	608,237.00	608,237.00	608,237.00
Mob/Demob	1	LS	0.00	0.00	0.00	15,653.00	15,653.00	15,653.00	15,653.00
USR Additional Mob/Demob - 1200' TB: Rock (Note: See CEDEP printouts for additional estimate details. Rock dredging mob/demob - sand dredging mob/demob. Additional mob/demob includes a seperate rock dredge clamshell and additional flat top work barges to transport rock material.)	1	LS	0.00	0.00	0.00	15,653.00	15,653.00	15,653.00	15,653.00
Mob/Demob	1	LS	0.00	0.00	0.00	567,000.00	567,000.00	567,000.00	567,000.00
USR Drill & Blast - Mob/Demob (Note: See Drill & Blast printouts for additional estimate details.)	1	LS	0.00	0.00	0.00	567,000.00	567,000.00	567,000.00	567,000.00
			0.00	0.00	0.00	96.52	96.52	96.52	96.52
Rock - Drill & Blast	25,300	CY	0.00	0.00	0.00	2,441,956.00	2,441,956.00	2,441,956.00	2,441,956.00
			0.00	0.00	0.00	96.52	96.52	96.52	96.52
Drill & Blast	25,300	CY	0.00	0.00	0.00	2,441,956.00	2,441,956.00	2,441,956.00	2,441,956.00
			0.00	0.00	0.00	96.52	96.52	96.52	96.52
USR Drill & Blast (Note: See Drill & Blast printouts for additional estimate details. Duration = 38 calendar days.)	25,300	CY	0.00	0.00	0.00	2,441,956.00	2,441,956.00	2,441,956.00	2,441,956.00
			0.04	0.00	0.00	14.80	14.84	14.84	14.84
Sand - Dredge & Disposal to Isle of Shoals	728,100	CY	32,400.00	0.00	0.00	10,775,880.00	10,808,280.00	10,808,280.00	10,808,280.00
			0.04	0.00	0.00	14.80	14.84	14.84	14.84
Dredge/Disposal	728,100	CY	32,400.00	0.00	0.00	10,775,880.00	10,808,280.00	10,808,280.00	10,808,280.00
			0.00	0.00	0.00	14.80	14.80	14.80	14.80
USR Dredging - 1200' TB: 100% Disposal @ Isle of Shoals (Note: See CEDEP printouts for additional estimate details. Duration = 3.24 months.)	728,100	CY	0.00	0.00	0.00	10,775,880.00	10,775,880.00	10,775,880.00	10,775,880.00
			900.00	0.00	0.00	0.00	900.00	900.00	900.00
USR Scow Pilot (Note: Due to the size of the barges and layout of the river, the Harbormaster and USCG will require all scows to operate with Portsmouth Pilots. \$890/round trip, use \$900/round trip. With 4 towing vessles and an average of 9 trips necessary per operator = 4 * 9 = 36 trips.)	36	EA	32,400.00	0.00	0.00	0.00	32,400.00	32,400.00	32,400.00
			0.00	0.00	0.00	34.31	34.31	34.31	34.31
Rock - Dredge & Disposal to Isle of Shoals	25,300	CY	0.00	0.00	0.00	868,043.00	868,043.00	868,043.00	868,043.00
			0.00	0.00	0.00	34.31	34.31	34.31	34.31
Dredge/Disposal	25,300	CY	0.00	0.00	0.00	868,043.00	868,043.00	868,043.00	868,043.00
			0.00	0.00	0.00	34.31	34.31	34.31	34.31
USR Dredging - 1200' TB: Rock (Note: See CEDEP printouts for additional estimate details. Duration = 0.20 months.)	25,300	CY	0.00	0.00	0.00	868,043.00	868,043.00	868,043.00	868,043.00
			900.00	0.00	0.00	0.00	900.00	0.00	0.00
USR Scow Pilot	0	EA	0.00	0.00	0.00	0.00	0.00	0.00	0.00

Description	Quantity	UOM	LaborCost	MatlCost	EQCost	SubBidCost	BareCost	ContractCost	ProjectCost
(Note: Assume same tug operators for rock dredging as sand dredging; therefore do not require additional Portsmouth Pilots ride-alongs.)									
BENEFICIAL USE PLAN - Improvement Area 1200' Turning Basin	1	EA	40,500.00	0.00	0.00	16,942,420.00	16,982,920.00	16,982,920.00	16,982,920.00
			0.00	0.00	0.00	1,302,862.00	1,302,862.00	1,302,862.00	1,302,862.00
Mob & Demob	1	EA	0.00	0.00	0.00	1,302,862.00	1,302,862.00	1,302,862.00	1,302,862.00
Mob/Demob	1	LS	0.00	0.00	0.00	720,209.00	720,209.00	720,209.00	720,209.00
USR Mob/Demob - 1200' TB	1	LS	0.00	0.00	0.00	720,209.00	720,209.00	720,209.00	720,209.00
(Note: See CEDEP printouts for additional estimate details.)									
Mob/Demob	1	LS	0.00	0.00	0.00	15,653.00	15,653.00	15,653.00	15,653.00
USR Additional Mob/Demob - 1200' TB: Rock	1	LS	0.00	0.00	0.00	15,653.00	15,653.00	15,653.00	15,653.00
(Note: See CEDEP printouts for additional estimate details. Rock dredging mob/demob - sand dredging mob/demob. Additional mob/demob includes a seperate rock dredge clamshell and additional flat top work barges to transport rock material.)									
Mob/Demob	1	LS	0.00	0.00	0.00	567,000.00	567,000.00	567,000.00	567,000.00
USR Drill & Blast - Mob/Demob	1	LS	0.00	0.00	0.00	567,000.00	567,000.00	567,000.00	567,000.00
(Note: See Drill & Blast printouts for additional estimate details.)									
			0.00	0.00	0.00	96.52	96.52	96.52	96.52
Rock - Drill & Blast	25,300	CY	0.00	0.00	0.00	2,441,956.00	2,441,956.00	2,441,956.00	2,441,956.00
			0.00	0.00	0.00	96.52	96.52	96.52	96.52
Drill & Blast	25,300	CY	0.00	0.00	0.00	2,441,956.00	2,441,956.00	2,441,956.00	2,441,956.00
			0.00	0.00	0.00	96.52	96.52	96.52	96.52
USR Drill & Blast	25,300	CY	0.00	0.00	0.00	2,441,956.00	2,441,956.00	2,441,956.00	2,441,956.00
(Note: See Drill & Blast printouts for additional estimate details. Duration = 38 calendar days.)									
			0.06	0.00	0.00	16.93	16.99	16.99	16.99
Sand - Dredge & Disposal to Wells, Newbury/Newburyport & Salisbury	728,100	CY	40,500.00	0.00	0.00	12,329,559.00	12,370,059.00	12,370,059.00	12,370,059.00
			0.06	0.00	0.00	16.93	16.99	16.99	16.99
Dredge/Disposal	728,100	CY	40,500.00	0.00	0.00	12,329,559.00	12,370,059.00	12,370,059.00	12,370,059.00
			0.00	0.00	0.00	17.36	17.36	17.36	17.36
USR Dredging - 1200' TB: 50% Disposal @ Wells	364,100	CY	0.00	0.00	0.00	6,320,776.00	6,320,776.00	6,320,776.00	6,320,776.00
(Note: See CEDEP printouts for additional estimate details. Duration = 1.62 months.)									
			0.00	0.00	0.00	16.64	16.64	16.64	16.64
USR Dredging - 1200' TB: 37.5% Disposal @ Newbury/Newburyport	273,100	CY	0.00	0.00	0.00	4,544,384.00	4,544,384.00	4,544,384.00	4,544,384.00
(Note: See CEDEP printouts for additional estimate details. Duration = 1.21 months.)									
			0.00	0.00	0.00	16.11	16.11	16.11	16.11
USR Dredging - 1200' TB: 12.5% Disposal @ Salisbury	90,900	CY	0.00	0.00	0.00	1,464,399.00	1,464,399.00	1,464,399.00	1,464,399.00
(Note: See CEDEP printouts for additional estimate details. Duration = 0.40 months.)									
			900.00	0.00	0.00	0.00	900.00	900.00	900.00
USR Scow Pilot	45	EA	40,500.00	0.00	0.00	0.00	40,500.00	40,500.00	40,500.00
(Note: Due to the size of the barges and layout of the river, the Harbormaster and USCG will require all scows to operate with Portsmouth Pilots. \$890/round trip, use \$900/round trip. With 5 towing vessles and an average of 9 trips necessary per operator = 5 * 9 = 45 trips.)									
			0.00	0.00	0.00	34.31	34.31	34.31	34.31
Rock - Dredge & Disposal to Isle of Shoals	25,300	CY	0.00	0.00	0.00	868,043.00	868,043.00	868,043.00	868,043.00
			0.00	0.00	0.00	34.31	34.31	34.31	34.31
Dredge/Disposal	25,300	CY	0.00	0.00	0.00	868,043.00	868,043.00	868,043.00	868,043.00

Description	Quantity	UOM	LaborCost	MatlCost	EQCost	SubBidCost	BareCost	ContractCost	ProjectCost
USR Dredging - 1200' TB: Rock (Note: See CEDEP printouts for additional estimate details. Duration = 0.20 months.)	25,300	CY	0.00	0.00	0.00	868,043.00	868,043.00	868,043.00	868,043.00
			0.00	0.00	0.00	34.31	34.31	34.31	34.31
USR Scow Pilot (Note: Assume same tug operators for rock dredging as sand dredging; therefore do not require additional Portsmouth Pilots ride-alongs.)	0	EA	0.00	0.00	0.00	0.00	0.00	0.00	0.00
			900.00	0.00	0.00	0.00	900.00	0.00	0.00

E.4 SCHEDULES

E.5 RISK AND UNCERTAINTY ANALYSIS

E.5 RISK AND UNCERTAINTY ANALYSIS

An Abbreviated Risk Analysis was conducted according to the procedures outlined in the manual entitled “Cost and Schedule Risk Analysis Process”, dated March 2008.

E.5.1 Risk Analysis Methods

Members of the PDT participated in a cost risk analysis brainstorming session to identify risks associated with Federal Base Plan and tentatively recommended plan (Beneficial Use Plan). The risks were listed in the risk register and evaluated by the team. The Risk Analyses utilized the Moderate Risk category as this is a navigation improvement project to provide additional depth and area to maneuver inside the turning basin. This represents minimal life safety risks. In addition, a majority of costs associated with the project are represented in the dredging sand and rock work features which are standard features in the New England District area where no significant cost fluctuations have occurred or are expected to occur in the near future. Assumptions were made as to the likelihood and impact of each risk item, as well as the probability of occurrence and magnitude of the impact if it were to occur. Adjustments were made to the analysis accordingly and the final contingencies were established. The contingency was applied to each plan estimate in order to obtain the Total Project Cost. The risks between plans were the same due to the disposal method (near-shore disposal using bottom-dump scows) being the same.

E.5.2 Risk Analysis Results

Refer to the Abbreviated Risk Analysis in this report. Both the Federal Base Plan and Beneficial Use Plan, with the appropriate Risk Analysis and Total Project Cost Summary, will undergo Cost Review and Certification by the Walla Walla Mandatory Center of Expertise prior to submittal of the Final Report.

Abbreviated Risk Analysis

Project (less than \$40M): **Portsmouth Harbor & Piscataqua River Federal Naviga**
 Project Development Stage: **Feasibility (Recommended Plan)**
 Risk Category: **Moderate Risk: Typical Project or Possible Life Safety**

**** FEDERAL BASE PLAN ****

Total Construction Contract Cost = \$ **15,309,213**

	<u>CWWBS</u>	<u>Feature of Work</u>	<u>Contract Cost</u>	<u>% Contingency</u>	<u>\$ Contingency</u>	<u>Total</u>
	01 LANDS AND DAMAGES	Real Estate	\$ -	0.00%	\$ -	\$ -
1	12 NAVIGATION, PORTS AND HARBORS	Mobilization & Demobilization	\$ 1,190,890	15.49%	\$ 184,514	\$ 1,375,403.86
2	12 NAVIGATION, PORTS AND HARBORS	Drill & Blast	\$ 2,442,000	31.02%	\$ 757,587	\$ 3,199,586.87
3	12 NAVIGATION, PORTS AND HARBORS	Sand - Dredge & Disposal	\$ 10,808,280	19.38%	\$ 2,094,570	\$ 12,902,849.62
4	12 NAVIGATION, PORTS AND HARBORS	Rock - Dredge & Disposal	\$ 868,043	22.69%	\$ 196,992	\$ 1,065,034.59
12		Remaining Construction Items	\$ -	0.0%	\$ -	\$ -
13	30 PLANNING, ENGINEERING, AND DESIGN	Planning, Engineering, & Design	\$ 894,000	11.52%	\$ 102,966	\$ 996,965.74
14	31 CONSTRUCTION MANAGEMENT	Construction Management	\$ 716,000	15.49%	\$ 110,935	\$ 826,935.46

Totals						
	Real Estate	\$	-	0.00%	\$	-
	Total Construction Estimate	\$	15,309,213	21.12%	\$	3,233,662
	Total Planning, Engineering & Design	\$	894,000	11.52%	\$	102,966
	Total Construction Management	\$	716,000	15.49%	\$	110,935
	Total	\$	16,919,213		\$	3,447,563
					\$	20,366,776

Abbreviated Risk Analysis

Project (less than \$40M): **Portsmouth Harbor & Piscataqua River Federal Naviga**
 Project Development Stage: **Feasibility (Recommended Plan)**
 Risk Category: **Moderate Risk: Typical Project or Possible Life Safety**

**** BENEFICIAL USE PLAN ****

Total Construction Contract Cost = \$ **16,982,964**

	<u>CWWBS</u>	<u>Feature of Work</u>	<u>Contract Cost</u>	<u>% Contingency</u>	<u>\$ Contingency</u>	<u>Total</u>
	01 LANDS AND DAMAGES	Real Estate	\$ -	0.00%	\$ -	\$ -
1	12 NAVIGATION, PORTS AND HARBORS	Mobilization & Demobilization	\$ 1,302,862	15.49%	\$ 201,863	\$ 1,504,724.56
2	12 NAVIGATION, PORTS AND HARBORS	Drill & Blast	\$ 2,442,000	31.02%	\$ 757,587	\$ 3,199,586.87
3	12 NAVIGATION, PORTS AND HARBORS	Sand - Dredge & Disposal	\$ 12,370,059	19.38%	\$ 2,397,232	\$ 14,767,290.55
4	12 NAVIGATION, PORTS AND HARBORS	Rock - Dredge & Disposal	\$ 868,043	22.69%	\$ 196,992	\$ 1,065,034.59
12		Remaining Construction Items	\$ -	0.0%	\$ -	\$ -
13	30 PLANNING, ENGINEERING, AND DESIGN	Planning, Engineering, & Design	\$ 894,000	11.52%	\$ 102,966	\$ 996,965.74
14	31 CONSTRUCTION MANAGEMENT	Construction Management	\$ 716,000	15.49%	\$ 110,935	\$ 826,935.46

Totals						
	Real Estate	\$	-	0.00%	\$	-
	Total Construction Estimate	\$	16,982,964	20.92%	\$	3,553,673
	Total Planning, Engineering & Design	\$	894,000	11.52%	\$	102,966
	Total Construction Management	\$	716,000	15.49%	\$	110,935
	Total	\$	18,592,964		\$	3,767,574
					\$	22,360,538

E.6 TOTAL PROJECT COST SUMMARY

E.6 TOTAL PROJECT COST SUMMARY

The Total Project Cost Summary (TPCS) addresses inflation through project completion (accomplished by escalation to mid-point of construction). The TPCS includes Federal and non-Federal costs for all construction features, PED, and S&A, along with the appropriate contingencies and escalation associated with each of these activities. The TPCS is formatted according to the CWWBS.

The Total Project Cost Summary was prepared using the MCACES/MII cost estimate for the two plans with contingencies set by the Abbreviated Cost Risk Analysis (CRA).

The CRS based total project contingency was applied to the Total Project Cost Summary.

The Estimated Federal Cost was calculated in the Federal Base Plan TPCS at the typical 75%. This figure was carried over and utilized in the Beneficial Use Plan TPCS as the four local towns will pay the difference in disposal costs to their respective communities.

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

PROJECT: Portsmouth Harbor & Piscataqua River Fed Nav Improvement
 PROJECT NO: P2 109098
 LOCATION: Portsmouth, NH [Disposal to IoSN Only (Sand and Rock)]

DISTRICT: NAE North Atlantic Division
 POC: CHIEF, COST ENGINEERING, Patricia H. Bolton
 PREPARED: 12/12/2013
**** FEDERAL BASE PLAN ****

This Estimate reflects the scope and schedule in report; -

Civil Works Work Breakdown Structure		ESTIMATED COST				PROJECT FIRST COST (Constant Dollar Basis)				TOTAL PROJECT COST (FULLY FUNDED)				
WBS NUMBER A	Civil Works Feature & Sub-Feature Description B	COST (\$K) C	CNTG (\$K) D	CNTG (%) E	TOTAL (\$K) F	Program Year (Budget EC): 2015 Effective Price Level Date: 1 OCT 14				Spent Thru: 4-Nov-13 (\$K) K	L	COST (\$K) M	CNTG (\$K) N	FULL (\$K) O
						ESC (%) G	COST (\$K) H	CNTG (\$K) I	TOTAL (\$K) J					
12	NAVIGATION PORTS & HARBORS	\$15,309	\$3,233	21%	\$18,543	1.8%	\$15,590	\$3,293	\$18,883	\$0		\$15,962	\$3,371	\$19,334
CONSTRUCTION ESTIMATE TOTALS:		\$15,309	\$3,233		\$18,543	1.8%	\$15,590	\$3,293	\$18,883	\$0		\$15,962	\$3,371	\$19,334
01	LANDS AND DAMAGES	\$0	\$0 -		\$0	-	\$0	\$0	\$0	\$0		\$0	\$0	\$0
30	PLANNING, ENGINEERING & DESIGN	\$894	\$103	12%	\$997	3.7%	\$927	\$107	\$1,033	\$0		\$949	\$109	\$1,059
31	CONSTRUCTION MANAGEMENT	\$716	\$111	15%	\$827	3.7%	\$742	\$115	\$857	\$0		\$781	\$121	\$902
PROJECT COST TOTALS:		\$16,919	\$3,447	20%	\$20,366		\$17,259	\$3,514	\$20,774	\$0		\$17,693	\$3,602	\$21,295

Mandatory by Regulation	CHIEF, COST ENGINEERING, Patricia H. Bolton
Mandatory by Regulation	PROJECT MANAGER, Richard Heidebrecht
Mandatory by Regulation	CHIEF, REAL ESTATE, Joseph M. Redlinger
	CHIEF, PLANNING, John R. Kennelly
	CHIEF, ENGINEERING, Scott E. Acone
	CHIEF, OPERATIONS, Frank J. Fedele
	CHIEF, CONSTRUCTION, Sean C. Dolan
	CHIEF, CONTRACTING, Shiela Winston-Vincuilla
	CHIEF, PM-PB, xxxx
	CHIEF, DPM, William C. Scully

ESTIMATED FEDERAL COST:	75%	\$15,971
ESTIMATED NON-FEDERAL COST:	25%	\$5,324
(FEDERAL BASE PLAN)		
ESTIMATED TOTAL PROJECT COST:		\$21,295

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

**** CONTRACT COST SUMMARY ****

PROJECT: Portsmouth Harbor & Piscataqua River Fed Nav Improvement
 LOCATION: Portsmouth, NH [Disposal to IoSN Only (Sand and Rock)]
 This Estimate reflects the scope and schedule in report; -

DISTRICT: NAE North Atlantic Division PREPARED: 12/12/2013
 POC: CHIEF, COST ENGINEERING, Patricia H. Bolton
 ** FEDERAL BASE PLAN **

Civil Works Work Breakdown Structure		ESTIMATED COST				PROJECT FIRST COST (Constant Dollar Basis)				TOTAL PROJECT COST (FULLY FUNDED)				
		Estimate Prepared: 11/4/2013		Effective Price Level: 4-Nov-2013		Program Year (Budget EC): 2015		Effective Price Level Date: 1 OCT 14						
		RISK BASED												
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	INFLATED (%)	COST (\$K)	CNTG (\$K)	FULL (\$K)
A	B	C	D	E	F	G	H	I	J	P	L	M	N	O
PHASE 1 or CONTRACT 1														
12	NAVIGATION PORTS & HARBORS	\$15,309	\$3,233	21%	\$18,543	1.8%	\$15,590	\$3,293	\$18,883	2016Q2	2.4%	\$15,962	\$3,371	\$19,334
	#N/A	\$0	\$0	0%	\$0	0.0%	\$0	\$0	\$0	0-Jan-1900	0.0%	\$0	\$0	\$0
	#N/A	\$0	\$0	0%	\$0	0.0%	\$0	\$0	\$0	0-Jan-1900	0.0%	\$0	\$0	\$0
	#N/A	\$0	\$0	0%	\$0	0.0%	\$0	\$0	\$0	0-Jan-1900	0.0%	\$0	\$0	\$0
	#N/A	\$0	\$0	0%	\$0	0.0%	\$0	\$0	\$0	0-Jan-1900	0.0%	\$0	\$0	\$0
	CONSTRUCTION ESTIMATE TOTALS:	\$15,309	\$3,233	21%	\$18,543		\$15,590	\$3,293	\$18,883			\$15,962	\$3,371	\$19,334
01	LANDS AND DAMAGES	\$0	\$0	0%	\$0	0.0%	\$0	\$0	\$0	0-Jan-1900	0.0%	\$0	\$0	\$0
30	PLANNING, ENGINEERING & DESIGN													
0.4%	Project Management	\$57	\$7	12%	\$64	3.7%	\$59	\$7	\$66	2015Q3	2.1%	\$60	\$7	\$67
2.8%	Planning & Environmental Compliance	\$431	\$50	12%	\$481	3.7%	\$447	\$51	\$498	2015Q3	2.1%	\$456	\$53	\$509
1.7%	Engineering & Design	\$257	\$30	12%	\$287	3.7%	\$266	\$31	\$297	2015Q3	2.1%	\$272	\$31	\$303
0.2%	Reviews, ATRs, IEPRs, VE	\$27	\$3	12%	\$30	3.7%	\$28	\$3	\$31	2015Q3	2.1%	\$29	\$3	\$32
0.1%	Life Cycle Updates (cost, schedule, risks)	\$16	\$2	12%	\$18	3.7%	\$17	\$2	\$18	2015Q3	2.1%	\$17	\$2	\$19
0.0%	Contracting & Reprographics	\$0	\$0	12%	\$0	0.0%	\$0	\$0	\$0	0-Jan-1900	0.0%	\$0	\$0	\$0
0.7%	Engineering During Construction	\$106	\$12	12%	\$118	3.7%	\$110	\$13	\$123	2016Q2	5.3%	\$116	\$13	\$129
0.0%	Planning During Construction	\$0	\$0	12%	\$0	0.0%	\$0	\$0	\$0	0-Jan-1900	0.0%	\$0	\$0	\$0
0.0%	Project Operations	\$0	\$0	12%	\$0	0.0%	\$0	\$0	\$0	0-Jan-1900	0.0%	\$0	\$0	\$0
31	CONSTRUCTION MANAGEMENT													
4.0%	Construction Management	\$607	\$94	15%	\$701	3.7%	\$629	\$97	\$727	2016Q2	5.3%	\$662	\$103	\$765
0.0%	Project Operation:	\$0	\$0	15%	\$0	0.0%	\$0	\$0	\$0	0-Jan-1900	0.0%	\$0	\$0	\$0
0.7%	Project Management	\$109	\$17	15%	\$126	3.7%	\$113	\$18	\$130	2016Q2	5.3%	\$119	\$18	\$137
CONTRACT COST TOTALS:		\$16,919	\$3,447		\$20,366		\$17,259	\$3,514	\$20,774			\$17,693	\$3,602	\$21,295

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

PROJECT: Portsmouth Harbor & Piscataqua River Fed Nav Improvement
 PROJECT NO: P2 109098
 LOCATION: Portsmouth, NH [Disposal to Wells, Salisbury, Newbury/Newburyport (Sand), and IoSN (Rock)]

DISTRICT: NAE North Atlantic Division
 POC: CHIEF, COST ENGINEERING, Patricia H. Bolton
 PREPARED: 12/12/2013
**** BENEFICIAL USE PLAN ****

This Estimate reflects the scope and schedule in report; -

Civil Works Work Breakdown Structure		ESTIMATED COST				PROJECT FIRST COST (Constant Dollar Basis)				TOTAL PROJECT COST (FULLY FUNDED)				
WBS NUMBER A	Civil Works Feature & Sub-Feature Description B	COST (\$K) C	CNTG (\$K) D	CNTG (%) E	TOTAL (\$K) F	ESC (%) G	COST (\$K) H	CNTG (\$K) I	TOTAL (\$K) J	Spent Thru: 4-Nov-13 (\$K) K	L	COST (\$K) M	CNTG (\$K) N	FULL (\$K) O
12	NAVIGATION PORTS & HARBORS	\$16,983	\$3,553	21%	\$20,536	1.8%	\$17,295	\$3,618	\$20,913	\$0		\$17,708	\$3,704	\$21,412
CONSTRUCTION ESTIMATE TOTALS:		\$16,983	\$3,553		\$20,536	1.8%	\$17,295	\$3,618	\$20,913	\$0		\$17,708	\$3,704	\$21,412
01	LANDS AND DAMAGES	\$0	\$0	-	\$0	-	\$0	\$0	\$0	\$0		\$0	\$0	\$0
30	PLANNING, ENGINEERING & DESIGN	\$894	\$103	12%	\$997	3.7%	\$927	\$107	\$1,033	\$0		\$949	\$109	\$1,059
31	CONSTRUCTION MANAGEMENT	\$716	\$111	15%	\$827	3.7%	\$742	\$115	\$857	\$0		\$781	\$121	\$902
PROJECT COST TOTALS:		\$18,593	\$3,767	20%	\$22,360		\$18,964	\$3,840	\$22,803	\$0		\$19,438	\$3,935	\$23,373

- Mandatory by Regulation** CHIEF, COST ENGINEERING, Patricia H. Bolton
- Mandatory by Regulation** PROJECT MANAGER, Richard Heidebrecht
- Mandatory by Regulation** CHIEF, REAL ESTATE, Joseph M. Redlinger
- CHIEF, PLANNING, John R. Kennelly
- CHIEF, ENGINEERING, Scott E. Acone
- CHIEF, OPERATIONS, Frank J. Fedele
- CHIEF, CONSTRUCTION, Sean C. Dolan
- CHIEF, CONTRACTING, Shiela Winston-Vincuilla
- CHIEF, PM-PB, xxxx
- CHIEF, DPM, William C. Scully

ESTIMATED FEDERAL COST: 1) SEE \$15,971
 ESTIMATED NON-FEDERAL COST: BELOW \$7,402
 (BENEFICIAL USE PLAN)
ESTIMATED TOTAL PROJECT COST: \$23,373

1) The ESTIMATED FEDERAL COST is taken directly from the TPCS - FEDERAL BASE PLAN. Only the ESTIMATED NON-FEDERAL COST is increased under the BENEFICIAL USE PLAN to account for the increased costs associated with disposing of the sand material to the four local communities.

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

**** CONTRACT COST SUMMARY ****

PROJECT: Portsmouth Harbor & Piscataqua River Fed Nav Improvement
 LOCATION: Portsmouth, NH [Disposal to Wells, Salisbury, Newbury/Newburyport (Sand), and IoSN (Rock)]
 This Estimate reflects the scope and schedule in report;

DISTRICT: NAE North Atlantic Division PREPARED: 12/12/2013
 POC: CHIEF, COST ENGINEERING, Patricia H. Bolton
 ** BENEFICIAL USE PLAN **

Civil Works Work Breakdown Structure		ESTIMATED COST				PROJECT FIRST COST (Constant Dollar Basis)				TOTAL PROJECT COST (FULLY FUNDED)				
		Estimate Prepared: 11/4/2013		Effective Price Level: 4-Nov-2013		Program Year (Budget EC): 2015		Effective Price Level Date: 1 OCT 14						
		RISK BASED												
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	INFLATED (%)	COST (\$K)	CNTG (\$K)	FULL (\$K)
A	B	C	D	E	F	G	H	I	J	P	L	M	N	O
PHASE 1 or CONTRACT 1														
12	NAVIGATION PORTS & HARBORS	\$16,983	\$3,553	21%	\$20,536	1.8%	\$17,295	\$3,618	\$20,913	2016Q2	2.4%	\$17,708	\$3,704	\$21,412
	#/N/A	\$0	\$0	0%	\$0	0.0%	\$0	\$0	\$0	0	0.0%	\$0	\$0	\$0
	#/N/A	\$0	\$0	0%	\$0	0.0%	\$0	\$0	\$0	0	0.0%	\$0	\$0	\$0
	#/N/A	\$0	\$0	0%	\$0	0.0%	\$0	\$0	\$0	0	0.0%	\$0	\$0	\$0
	#/N/A	\$0	\$0	0%	\$0	0.0%	\$0	\$0	\$0	0	0.0%	\$0	\$0	\$0
	CONSTRUCTION ESTIMATE TOTALS:	\$16,983	\$3,553	21%	\$20,536		\$17,295	\$3,618	\$20,913			\$17,708	\$3,704	\$21,412
01	LANDS AND DAMAGES	\$0	\$0	0%	\$0	0.0%	\$0	\$0	\$0	0	0.0%	\$0	\$0	\$0
30	PLANNING, ENGINEERING & DESIGN													
0.3%	Project Management	\$57	\$7	12%	\$64	3.7%	\$59	\$7	\$66	2015Q3	2.1%	\$60	\$7	\$67
2.5%	Planning & Environmental Compliance	\$429	\$49	12%	\$478	3.7%	\$445	\$51	\$496	2015Q3	2.1%	\$454	\$52	\$506
1.5%	Engineering & Design	\$258	\$30	12%	\$288	3.7%	\$267	\$31	\$298	2015Q3	2.1%	\$273	\$31	\$304
0.2%	Reviews, ATRs, IEPRs, VE	\$27	\$3	12%	\$30	3.7%	\$28	\$3	\$31	2015Q3	2.1%	\$29	\$3	\$32
0.1%	Life Cycle Updates (cost, schedule, risks)	\$16	\$2	12%	\$18	3.7%	\$17	\$2	\$18	2015Q3	2.1%	\$17	\$2	\$19
0.0%	Contracting & Reprographics	\$0	\$0	12%	\$0	0.0%	\$0	\$0	\$0	0	0.0%	\$0	\$0	\$0
0.6%	Engineering During Construction	\$107	\$12	12%	\$119	3.7%	\$111	\$13	\$124	2016Q2	5.3%	\$117	\$13	\$130
0.0%	Planning During Construction	\$0	\$0	12%	\$0	0.0%	\$0	\$0	\$0	0	0.0%	\$0	\$0	\$0
0.0%	Project Operations	\$0	\$0	12%	\$0	0.0%	\$0	\$0	\$0	0	0.0%	\$0	\$0	\$0
31	CONSTRUCTION MANAGEMENT													
3.6%	Construction Management	\$607	\$94	15%	\$701	3.7%	\$629	\$97	\$727	2016Q2	5.3%	\$662	\$103	\$765
0.0%	Project Operation:	\$0	\$0	15%	\$0	0.0%	\$0	\$0	\$0	0	0.0%	\$0	\$0	\$0
0.6%	Project Management	\$109	\$17	15%	\$126	3.7%	\$113	\$18	\$130	2016Q2	5.3%	\$119	\$18	\$137
CONTRACT COST TOTALS:		\$18,593	\$3,767		\$22,360		\$18,964	\$3,840	\$22,803			\$19,438	\$3,935	\$23,373