Wilmington Harbor, North Carolina

Wilmington Harbor Navigation

Improvement Project

Integrated Section 203 Feasibility Study and Environmental Report

APPENDIX S

Quality Control Report

June 2019

Comments on the Economics Appendix were provided by Larry Prather, former Assistant Director of Civil Works (Legislation and Planning), USACE and Chief, Navigation Planning Branch, USACE.

Wilmington Harbor Navigation Improvement Project
Economics Appendix
Comments

General Comments.

1. Overall the report is well written and attractive. It presents information on Wilmington port and the east coast to Asia services critical to informing the investment decision at Wilmington. These general comments attempt to summarize the critical implications of the review of the economic analysis.

2. **Principles and Guidelines standards for benefit estimation.** Examining the full origin to destination costs (or the delivered price of commodities including full transportation costs) is critical to conducting the economic benefit analysis and to providing information to readers and reviewers sufficient to judge the accuracy of the analysis and underlying assumptions. This cost analysis approach is prescribed in the steps of the Evaluation Procedures Section VII—NED Benefit Evaluation Procedures: Transportation (Deep-Draft Navigation, Principles and Guidelines. Paragraph 4.1 Plan formulation acknowledges this in saying, "Transportation cost savings are calculated as reductions in the cost of transporting goods from their ultimate origin to their ultimate destination." The analysis should focus on ways to incorporate full origin to destination transportation cost comparisons to better support the assumptions and benefit analysis. This comment is a recurring theme in the sequel. However, see General Comments 4 and 5 for additional perspective on analytical challenges.

3. Identification of the NED Plan. The recommendation of this document and the identification of the NED plan turn on two assumptions that are not strongly supported by underlying analysis.

a. The **without project assumption** that the Port of Wilmington would not be included as port of call in the without project condition US East Cost – Asia (USEC-Asia) container service with the associated assumption that all Wilmington hinterland Asia service movements as projected would use other ports remaining in the Asia services (specifically Savannah) at the expense of truck haul distances and costs that exceed current truck haul distances and costs currently incurred to ship via Wilmington. These additional truck costs are the source of with project benefits; they become the cost-reduction benefits of an improved channel at Wilmington.

b. The **with-project assumption** is that Wilmington would be included as a port-of-call in USEC-Asia services at a with-project depth of 47 feet and that all projected Wilmington hinterland USEC-Asia service traffic that would otherwise use Savannah in the without project conditions will use Wilmington at the establishment of a 47-foot draft at Wilmington's . Project benefits are the

added overland truck costs that would have to be incurred in the without condition to access the USEC-Asia services through Savannah. The NED plan is this 47-foot channel because there are no benefits for channels less than 47-feet deep and negative estimated benefits for greater depths.

Essentially, the entire analysis and the identification of the NED plan turn on these two assumptions. More detailed comments in the sequel focus attention on the need to support these assumptions by comparing full origin to destination costs transportation costs among alternative port routings between the with and without project conditions. Without such analyses or without other strong evidence why the assumptions are accurate in the absence of such cost comparisons, readers and reviewers will be challenged to verify the appropriateness of the assumptions of the economic analysis. **Response: see subsequent revisions to the analysis.**

4. **Acknowledgement of significant challenges to responding to these comments.** The current P&G framework for analysis may not be well suited to the realities of container trades. Clearly, the P&G analysis works best when transportation is a dedicated service which is a form on "non-joint production." However, more often than not, transportation services are provided through joint production. This is true when backhauls are non-zero, but particularly true when characterized by interdependence that is the essence of containerized shipping. Scheduled container services are the joint production of transportation to and/or from the ports of call included in the service. In this case, the USEC-Asia container services jointly produce transportation to and/or from Charleston, Savannah, Wilmington, etc. Understanding the derived demand market for transportation services must take this into account, but there are few good models for transforming fully allocated costs into rates for the services. If one examines the on-line quote citations for the Qingdao to USEC-Asia range of ports, the rates quoted are identical among the USEC ports belonging to the service. A little reflection dictates that understanding the production function for transportation services, costs of services and pricing of services are interrelated among the ports of the service in a complex way that defies the simple movement by movement analysis contemplated in the P&G. Solving the problems of the marginal port to a service – like Wilmington – requires a complex market analysis that depends on how adding the service affects the costs and prices of transportation to or from the other ports within the service – how the market works to make the decision to add or not add the port of call and to reset the equilibrium prices for transportation to and from the other ports in the service. These complex features of the problem make very attractive the almost elegant approach of making the benefit analysis depend solely on the reductions in overland transportation costs that would be enabled by deeper channels at Wilmington. Unfortunately, without additional details, the approach evades the critical questions of painting an accurate picture of the without and with project conditions and, the depths at Wilmington that will capture various levels of benefits. The problem may be unsolvable with the available data and tools. (See

5. **Need for more powerful models.** A coherent method for estimating the benefits for an improved Wilmington Harbor would be to implement a mathematical programming model that minimizes the total transportation cost bill (all movements, origin to destination including overland) for the commodity movements belonging to the US East Coast (USEC) to Asia services. This model would incorporate the critical technological interdependence among the several ports and movements relevant to the NED account. The model would permit plotting minimum total USEC-Asia service costs against depths at Wilmington. The model would also provide for boundary solutions (Wilmington traffic essentially zero) when minimizing total service cost while assigning projected existing movements to other ports. The

curve would permit computation of net benefits to Wilmington as reductions in minimum total service transportation costs. This solution would achieve reasonable consistency with the P&G standard of founding benefits on reductions in transportation costs while coping with the inherent interdependence and joint production aspects of the container service. **Response: There is an inherent problem with this approach identified in the comment, which is that data on containerized cargo shows that cargo is not distributed in a "total transportation cost minimization" framework. Analyses of containerized data always show boxes that take a more costly route than would be calculated by a total transportation cost minimization model.** Unfortunately, USACE apparently has not implemented such an analytic capability. Such models would be costly and face calibration challenges. However, there isn't an obvious shortcut that is likely to be satisfying. USACE should work on this problem. The most common application of HarborSym might be thought of as a single port variant of the more general model required to optimally invest in channels. These applications often assert as an assumption that traffic diversions among ports are not important. The system implications of container service are avoided and estimates of reductions in transportation cost are made simple — perhaps deceptively so. "No inter-port/intra-service diversions" is a dubious assumption as this analysis shows. Given the importance of container services and their inherent inter-port interdependence to channel investments USACE should give expeditious attention to an appropriate extension of existing models. An associated need would be to formulate port improvements for systems of ports related to container services. **Response: Concur, analysis of port improvements as improvements to a system of ports as opposed to improvements to individual unrelated ports would be required. However, nearly all USEC ports have already been evaluated and recommended for construction. If we consider the USEC ports as a system of ports, USACE has improved all of the ports within the USEC system, with the exception of Wilmington. The system has been improved as a step function with improvements occurring incrementally over time – first New York, then Savannah, then Boston, Charleston, etc. The last incremental improvement to the system would be Wilmington.**

Specific Comments

1. Paragraph 4.1 No Action Alternative.

a. In the without project condition. all USEC-Asia service containers projected based on current Wilmington traffic are assumed to move to and from Wilmington hinterland origins and destinations via the port of Savannah at the overland transportation costs (truck costs) estimated in paragraph 2.6.2 Without-project Landside Transportation Costs). The choice of Savannah for all without project movements is not based on comparing transportation costs from origin to destination with corresponding origin to destination transportation costs assuming use of the other ports in the service. In fact, Charleston will have a substantial draft advantage over Savannah in the projected future without project condition and for some of the Wilmington hinterland origins/destinations, the overland transportation costs to Charleston are less than the overland costs to Savannah. This suggests that Charleston may be more cost competitive than Savannah for these movements. In selecting Savannah as the port for moving Wilmington hinterland movements, the report notes that Savannah has a time advantage, but any time advantage would be small compared to the overall length of the total cycle time including the containership voyage. **Response: The report has been revised to identify time and cost advantage of using Savannah over Charleston – two to four-day advantage for**

imports, same vessel for exports. Savannah's advantage is also based on the additional capacity at Savannah, which is capable of absorbing Port of Wilmington hinterland cargo. A sensitivity analysis has been performed for split between CHL and SAV.

b. Despite assuming significant overland costs for existing Wilmington hinterland movements in the without project condition, the analysis does not examine the impact of these substantial cost increases on the choice of sources (origins) of movements. It is possible that some origins would shift in the face of the loss of port-of-call status at Wilmington and the added substantial costs. The cost challenge to using existing patterns to satisfy demand might be particularly relevant to container exports which tend to move on the service at much lower ocean rates relative to exports (owing to the export-import imbalance on the service and associated empty backhauls). For these export movements, the added overland costs would be large proportionate to the current ocean freight rates and could threaten the continued competitiveness of these movements compared to alternative origins or destinations. **Response, cost challenge may be that exports can no longer compete internationally and the lost values of exports is an NED loss. The assumption that exports remain competitive with the additional overland cost is a conservative assumption of the analysis.**

c. The without project condition assumption that Wilmington will be excluded from the ports of call for the USEC-Asia Services raises the question of how Wilmington movements were modeled in the evaluation of the deepening of the ports of Savannah and Charleston. If the cost of including Wilmington is indeed prohibitively inconsistent with sustaining competitive service transportation costs, then that result should have been evident in these two evaluations through application of the HarborSym model. **Response, USACE typically does not include shifts of cargo and the two studies in question did not consider how traffic would flow when Wilmington is five feet shallower than the next shallowest port on a rotation.** The report should discuss the results of these two port evaluations and the evidence they shed on the assumption that Wilmington will be excluded as a port of call in the future without project condition. **Response: If the USEC ports on the USEC-Asia services were evaluated as a system, then depth changes at CHL and SAV would have been included in the analysis, but because each port was evaluated in isolation impacts to Wilmington cargo were not assessed.**

d. The reasonableness of without project condition assumptions would be more reliably assessed within the context of a complete analysis of origin to destination transportation costs rather than considering only the overland costs and speculating on routing and sourcing choices. If data other than transportation costs from origin to destination dominate the choices of routings or sources, that data should be presented. **Response: Waterborne costs have been added to the full to the full origin to destination cost**

2. Paragraph 4.52 Preliminary Alternative Plan Evaluation.

a. The analysis allocates zero benefits to channel depths less than 47 feet on the premise that a valid criterion for assuming the restoration of Asia services to Wilmington in the with-project condition is reducing the depth differential "down to differences in operating drafts under existing conditions." This is essentially an assumption with no underlying comparison of origin to destination transportation costs (see General Comment 2), or analysis supporting that competitive market forces would result in the restoration of Wilmington as a port of call in the USEC-Asia services. **Response: Analysis has been revised to show that waterborne unit costs affect deployment decisions**

b. Left unexamined is whether the cost structure of Asian services would support Wilmington as a port of call at depth less than 47 feet or even how much of the traffic diverted in the without condition should be allocated to Wilmington at 47 feet. Charleston will have a 52-foot channel and may remain competitive with Wilmington even with overland trucking charges. **Response: Report has been revised to show that waterborne savings for deeper loading at CHL is not sufficient to outweigh overland costs. Included is data showing that not all cargo takes the shortest route** In other words, even if the assumed restoration of port-of-call status at a 47-foot depth is valid, the analysis has not demonstrated that all the diverted traffic would be economically recaptured to Wilmington at that depth. Some movements might have a lower cost through one of the other ports of call. **Response: This is not the case because of the overwhelming expense of landside transportation.** To comply with the P&G, the analysis should examine Wilmington hinterland movements to compare estimates of the full origin destination costs of moving through other ports in the USEC-Asian service with the estimates of the full origin to destination costs of moving through Wilmington under the array of with project alternative depths. **Response: Concur, additional information has been provided.**

c. The analysis would better support the identification of benefits for alternative channel depths and therefore the NED plan if based on differences in transportation costs from origin to destination (or differences in delivered prices where the source might shift because of transportation differences inherent in the without project condition. **Concur. Additional calculations now include overland transport costs and compare to depth savings at CHL for each origin and destination to see if any would shift to CHL. Note that for the design vessel max loaded draft id 48 feet so additional depth at CHL or SAV is a small increment (one foot).**

d. It is unclear why Savannah's maximum draft was chosen as the criterion for determining the minimum draft at Wilmington consistent with membership as a port of call in the USEC-Asia services. **Analysis has been revised to highlight cost differentials at alternative depths.** If naïve draft comparisons are indeed indicative of viability of port-of-call status, one might argue that other draft criteria definable from the current ports of call in the service would measure "economic distance from the service" as well as the lower edge of the service represented by Savannah. The flowing tables show the arbitrary nature of solely using draft comparisons as a criterion for determining the minimum draft consistent with with-project port of call status for Wilmington. While the range of the minimum drafts is tight as one should reasonably anticipate using naïve draft comparisons to decide the issue of port-of-call status, it's clear that these draft

comparisons are fraught with conceptual challenge and make the NED plan uncertain. Should it be deeper than 47 feet? **Response: Perhaps, but the port is looking for only the minimum depth required to shift the cargo.** Obviously, the economics of being a port-of-call member of the services is more complicated than the relationship of maximum port draft to the maximum port drafts of the other ports of call in the service. **Response: This is a very good point and I have added it to my narrative – it's not the draft – it's about the resulting costs – analysis has been revised to show this**

Port	Max Existing Draft	Max W/O Draft
Jacksonville	40	47
Savannah	43	48
Charleston	45	52
Boston	40	48
Average	42	48.75
Median	41.5	48
Minimum	40	47
Maximum	45	52

Maximum Wilmington Draft Without Project: 41

Standard	Max Draft Difference Existing with Max Draft Wilmington - 41 feet	implied Maximum Draft for With Project Port of Call	Physical Channel Depth for With Project Port of Call
Savanaah	-2	46	47
Average	-1	47.75	48.75
Median	0.5	48.5	49.5
Minimum	1	48	49
Maxmum	-4	48	49

e. In addition to these concerns is the need to explain how the market for transportation services would preserve the Wilmington port-of-call given the assumptions in the analysis. Under the assumptions of the analysis, USEC-Asian service movements originating or terminating in the

Wilmington hinterland, use another port (Savannah) in the without project condition. If so, the shippers of these movements have a willingness to pay the complete origin to destination transportation costs through Savannah. The question not examined in the analysis is why the carriers providing the Asian services would have any incentive to provide a Wilmington service if market participants are willing to pay the higher transportation costs through Savannah?
Response: Yes – this is an excellent point and it's all about capturing the benefits. Will they raise the waterborne costs to capture the benefits? This is why USACE tries to use resource costs and not prices in their analyses. Presumably the only reason to offer a Wilmington port of call to shippers who are otherwise willing to pay the higher transportation costs is that competitive shippers will force such an offering. The analysis should address this issue and look for clues from this analysis about how traffic volumes and movements will vary by channel depth.
Observation – they are doing it today Is the scale of investment to enter a container service like the USEC-Asia service a potential "barrier to entry" that could serve to contract the size of the service (in terms of ports of call)? How do all these considerations bear on the reasonableness of the without project assumptions?

Additional Response for Discussion:

Under existing conditions, the Wilmington Harbor project and the Savannah Harbor Project have a similar project depth of -42 feet MLLW. The two USEC-Asia services, which call at the port of Wilmington, also call at the Port of Savannah. Large vessels calling at both ports use tidal advantage. Savannah has a greater tidal advantage that Wilmington. The deepest observed operating draft for containerships at Savannah is 42 feet. The deepest observed operating draft for containerships at Wilmington is -41 feet.

Vessel operating characteristics, which display vessel deployment and loading decisions made by vessel operators, have been explored in previous USACE deep draft navigation studies. The Savannah Harbor Expansion Project Feasibility Study (USACE 2012) identified the waterborne transportation cost per TEU per 1,000 miles as a decision point for vessel operators to switch to larger vessels with lower operating costs. Table 38 of the Economics Appendix (presented below) shows that at deeper channel depths carriers switch to larger vessels, which are able to load more deeply and take advantage of economies of scale, thereby lowering unit costs. This concept of switching vessel size based on unit costs can also be applied to the operator's decision to include a port as a port-of-call.

available for cargo at each sailing draft. Table 38 shows the estimated unit cost by vessel class by channel depth. Entries shaded in yellow identify the breakpoints or depth where it makes economic sense for a shipper to deploy a larger vessel to the route.

Table 38: Unit Cost in Tonnes per Thousand Miles

World Region Route	Vessel Classes	Channel Depths (feet)					
		42	44	45	46	47	48
FE (Suez) ECUS	PX MPD	$ 2.31	$ 2.31	$ 2.31	$ 2.31	$ 2.31	$ 2.31
	PPX1 MPD	$ 2.02	$ 1.85	$ 1.81	$ 1.81	$ 1.81	$ 1.81
	PPX2 MPD	$ 2.04	$ 1.87	$ 1.80	$ 1.73	$ 1.72	$ 1.72
ECUS MED	PX MPD	$ 2.07	$ 1.99	$ 1.99	$ 1.99	$ 1.99	$ 1.99
	PPX1 MPD	$ 2.02	$ 1.85	$ 1.78	$ 1.76	$ 1.76	$ 1.76
	PPX2 MPD	$ 2.04	$ 1.87	$ 1.80	$ 1.73	$ 1.67	$ 1.67
FE (Panama) ECUS	PX MPD	$ 2.46	$ 2.46	$ 2.46	$ 2.46	$ 2.46	$ 2.46
	PPX1 MPD	$ 2.02	$ 1.92	$ 1.92	$ 1.92	$ 1.92	$ 1.92
	PPX2 MPD	$ 2.04	$ 1.87	$ 1.82	$ 1.82	$ 1.82	$ 1.82
FE ECUS EU PEN	PX MPD	$ 2.38	$ 2.38	$ 2.38	$ 2.38	$ 2.38	$ 2.38
	PPX1 MPD	$ 2.02	$ 1.86	$ 1.86	$1.86	$ 1.86	$ 1.86
	PPX2 MPD	$ 2.04	$ 1.87	$ 1.80	$ 1.76	$ 1.76	$ 1.76
FE ECUS MED PEN	PX MPD	$ 2.27	$ 2.27	$ 2.27	$ 2.27	$ 2.27	$ 2.27
	PPX1 MPD	$ 2.02	$ 1.85	$ 1.78	$ 1.78	$ 1.78	$ 1.78
	PPX2 MPD	$ 2.04	$ 1.87	$ 1.80	$ 1.73	$ 1.69	$ 1.69
RTW	PX MPD	$ 2.07	$ 2.00	$ 2.00	$ 2.00	$ 2.00	$ 2.00
	PPX1 MPD	$ 2.02	$ 1.85	$ 1.78	$ 1.76	$ 1.76	$ 1.76
	PPX2 MPD	$ 2.04	$ 1.87	$ 1.80	$ 1.73	$ 1.67	$ 1.67
ECUS EU GULF PEN	PX MPD	$ 2.07	$ 2.06	$ 2.06	$ 2.06	$ 2.06	$ 2.06
	PPX1 MPD	$ 2.02	$ 1.85	$ 1.78	$ 1.76	$ 1.76	$ 1.76
	PPX2 MPD	$ 2.04	$ 1.87	$ 1.80	$ 1.73	$ 1.67	$ 1.67

The Charleston Post-45 Feasibility Study (USACE, 2015) projected operating draft distributions for the design vessel (PPX3) at various project depths at Charleston. Figure 26 from the Economics Appendix displays the cumulative distribution functions for operations drafts for the design vessel at project depths of 45 ft, 48 ft, 50 ft, and 52 feet (presented below). Note that the design vessel for the Charleston Post-45 Study is the same vessel as the Wilmington Harbor Design Vessel. Combining the vessel operator's deployment and loading decisions, as developed in the Savannah and Charleston studies, can be used to evaluate vessel deployment decisions under alternative project conditions at Wilmington Harbor.

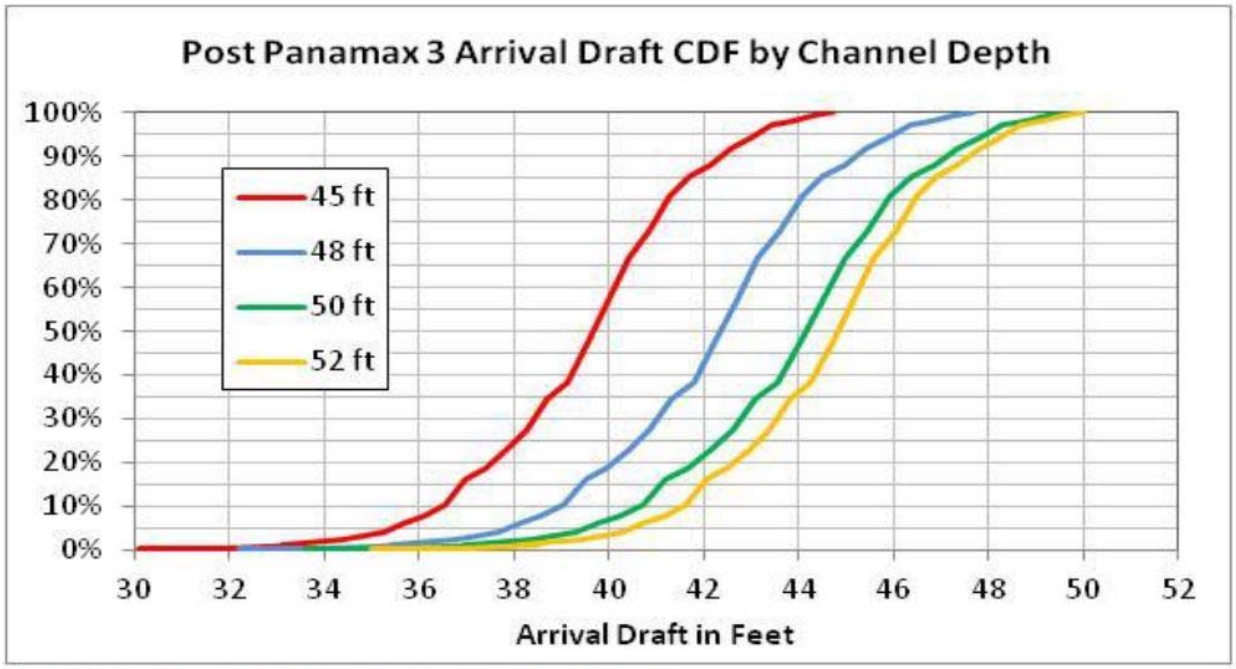


Figure 26: Post Panamax Gen III Arrival Draft by Channel Depth

Weighted average unit costs per TEU per 1,000 miles were developed for the Wilmington Harbor design vessel using observed TEU weights, calculated immersion rates, and 2017 USACE vessel operating costs approximated from the 2013 costs. Under existing conditions, with Ports of Savannah and Wilmington at the same project depth (-42 feet MLLW) unit costs are very similar among the two ports. The weighted average cost is slightly lower at Savannah due to the greater tidal advantage available at Savannah. The 6.3% cost differential for existing conditions – the weighted average unit cost is 6.3% higher at Wilmington -, is obviously acceptable to the carriers, as they call at both Wilmington and Savannah under existing conditions.

Under without-project conditions, in which Savannah Harbor is deepened to a project depth of -47 ft MLLW and Wilmington Harbor remains at -42 ft MLLW, the cost differential increases to 43.7% – the weighted average unit cost is 43.7% higher at Wilmington. Based on the cumulative distribution functions developed for the design vessel at Charleston Harbor, the five-foot difference in channel depth would restrict vessel calls from Savannah to Wilmington to a maximum draft of 41 feet, which would affect 70% of calls. This is the economic rationale for dropping the Port of Wilmington from the port rotation under without-project conditions.

The following table displays the weighted average unit costs for Savannah and Wilmington under alternative project conditions. The cost differential between Savannah and Wilmington decreases as the project depth at Wilmington Harbor increases. Weighted average unit costs are equivalent for a project depth of -47 feet MLLW at Savannah and -48 feet MMLW at Wilmington. Savanah accommodates

deeper operating drafts and lower unit costs at any depth than Wilmington due to the greater tidal advantage at Savannah. The unit cost differential for a -47-foot channel at Wilmington Harbor is similar to, but somewhat lower than, the cost differential under existing conditions. Vessel operators have shown that they are willing to incur a small cost differential and call at the Port of Wilmington.

Weighted Average Unit Costs for PPX3 at Alternative Depths

Port	Project depth (ft)	$/TEU/1,000 miles	Differential
Existing Condition			
Savannah	-42	$39.79	
Wilmington	-42	$42.30	6.3%
Without-Project Condition			
Savannah	-47	$29.43	
Wilmington	-42	$42.30	43.7%
With-Project Alternative Depths			
Wilmington	-44	$37.52	27.5%
Wilmington	-45	$35.44	20.4%
Wilmington	-46	$33.53	13.9%
Wilmington	-47	$30.85	4.8%
Wilmington	-48	$29.43	0%

The North Carolina State Ports Authority is satisfied with the -47-foot alternative, which is the smallest alternative that provides comparable unit costs to Savannah, and will not pursue -48 feet as a Locally Preferred Plan because of the cost and additional environmental impacts that would result from the additional depth.

Larry Prather Response to Additional Discussion:

Jerry Diamantides <jdiamantides@dma-us.com>

Re: Wilmington

1 message

Larry Prather <larry.j.prather@gmail.com> Mon, Jun 24, 2019 at 12:43 AM
To: Jerry Diamantides <jdiamantides@dma-us.com>
Cc: David Miller <dmiller@dma-us.com>

Jerry,

Thanks for this paper. I have studied it and believe I grasp what you are saying. I would be pleased to discuss it with you this week. I will call.

In the meantime, I had a notion while reviewing the report that another approach might be possible. Please see the attached which provides a very rough sketch. It's appealing based on economics but I don't know if we could find a way to complete the implementation.

Certainly we agree that planning needs to shift to formulating investments in collections of ports to serve container trades. A bit different than the navigation systems analysis that I spent so much time on in Cincinnati but a systems analysis nonetheless.

I want to help reach closure on the comments and keep you moving. I'm of the opinion that the case for 46 to 49 feet is strong and that investments in large scale modeling to resolve these issues (and exact NED) is probably not warranted.

However, I can imagine that the review staff in HQ may well want to hold a 203 to a high standard, and foot by foot justification is their mindset.

Look forward to talking through the resolutions of the issues.

Best, Larry

On Thu, Jun 20, 2019 at 4:37 PM Jerry Diamantides <jdiamantides@dma-us.com> wrote:

Larry,

Your reference to the Savannah and Charleston studies was just the suggestion I needed to revive an analysis I had done months ago but set aside, because. I was stuck on the idea of showing ranges of values. By combining information from the two previous studies i was able to define - in a much cleaner way - the tipping point for calling at Wilmington. This attachment does not address all of your concerns - I'm still working - but I would like to know if you think this is getting closer to the mark. My next step is to use the values in this document to calculate the full costs.

Please let me know when you are available to talk.

Jerry

Jerry Diaman_des, Ph.D.
Senior Economist
David Miller & Associates
1637 Brookfield Road
Berlin, VT 05602
802 223 2040

On Mon, Jun 17, 2019 at 12:19 AM Larry Prather <larry.j.prather@gmail.com> wrote:

Dear Jerry,

A_ached are my comments on the Wilmington appendix.

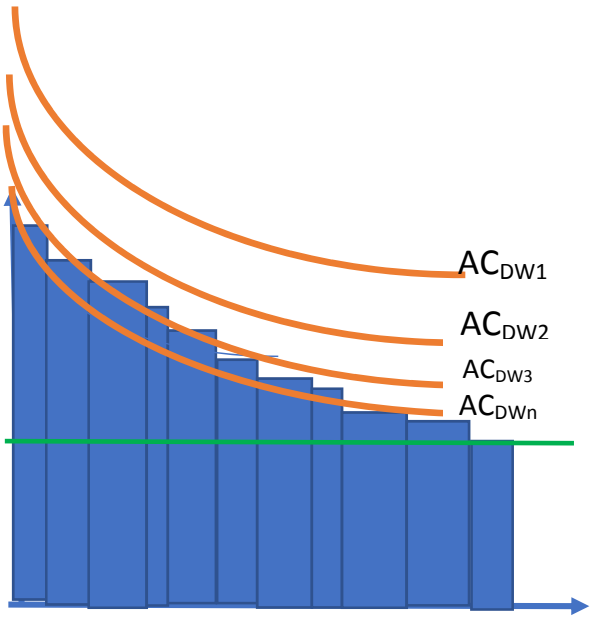
I spent a lot of _me thinking about this problem looking for a clever way to get to the answer but I wasn't successful. I recall that a number of years ago, HQ had an analysis like this where the traffic from a port was diverted overland in the without project condi_on. I believe the reviewers in HQ had pre_y much the same reac_on to that analysis as I'm having to this one. It might have been an itera_on of Boston. I don't remember. I don't know how it came out. I don't know what your thoughts will be on the comments. While they are valid, I don't

feel good that I can't tell you how to fix it. I doubt that USACE has the means to do this kind of analysis. I've tried to say that too.
Thanks for the opportunity to work with you. Call me any _me if you want to discuss.
Larry

Wilmington first order.docx
45K

- Let the without project equilibrium be represented by the diagram on the last page. Wilmington hinterland movements are using Savannah at the service rate (approximated by fully allocated cost) The blue rectangles represent Wilmington movements with a willingness to pay the service rate plus the overland transport costs. This is a "demand curve" or "surplus curve for Wilmington movements.
- Now assume the maximum draft at Wilmington is $DW_{n.}$
- Assume further that its proposed to add Wilmington to the service at that draft with the service consistently constrained in operations. This will increase the total cost of the service by an amount that includes the cost of Wilmington vessel call operations (WO_{DWn}) plus the induced costs imposed on the other USEC-Qingdao movements (IO_{DWn}). This cost is C_{DWn}.
- From this cost one may construct an average cost per 40ft container assuming all the costs will be born by Wilmington hinterland movements.
- As implied in the last bullet, the vessel operators add Wilmington traffic at fully allocated average cost including any induced cost to movements using the service.
- The condition for the Wilmington service is bearing all the last added costs of the service which includes induced costs imposed on the other movements in the service.
- In the diagram on of the AC curves cuts the demand curve and gives maximum benefits. Average cost pricing is appropriate gen the decling AC (assures no loss).
- Wilmington pays its freight and there are no losses. The other movements in the service continue to enjoy the same rate/cost. Of course full equilibrium will be a fully adjusted service.

- Questions. Can you get these cost numbers (estimate from Savannh/Charleston incremental HarborSym) ??? What about backhaul.
- A generous characterization is that this would be a “first order” or “partial equilibrium” determination of NED. It might actually be the kind of computation that a carrier might make to determine whether to add Wilmington.
- Perhaps some way to “estimate” a last added cost for Wilmington??? Scheduling arrivals and departures at Wilmington that might provide a reasonable added cost??? Might mean multiple calls at say Savannah on a leg. Come to Savannah. Unload some boxes to reach Wilmington draft. Go to Wilmington and unload some boxes. Load Wilmington boxes. Back to Savannah. This may be always prohibitive. I’m not familiar with the numbers.



USEC-Qingdao Rate/cost Without Project Condition for Wilmington

Comments on Cost Estimating

Comments on project cost estimating were provided by Wally Brassfield, Construction Estimating Services, LLC. Mr. Brassfield has over 40 years of construction cost estimating experience including 13 years estimating for small business heavy construction and specialty contractors. From 1989 to his retirement at the end of 2004, Mr. Brassfield served as the Division cost engineer for the US Army Corps of Engineers, Northwestern Division (NWD). At NWD he was responsible for coordinating and oversight of the five NWD District cost estimating organizations located at Seattle, WA, Portland, OR, Walla Walla, WA, Omaha, NE and Kansas City, MO.

1. This is a review of the planning estimate for the Moffatt & Nichol contract for deepening of the Wilmington harbor. The documents used for this review include:

A. Drawings

9232-06C-TYPICAL SECTIONS-Layout1; AdvPLANS_WH-IOB-_4Oct2017; Appendix A - Channel Figures(reduced); Channel Widening – Revised; and WHOOB-FY16_Adv_Plans.

B. Cost summary/quantities: VOLUMES with Disturbed Areas and Dredge Areas-Rev 20181217. This Excel file is used to calculate construction cost of the various channel deepening depths.

C. Dredging estimates part 1 and 2 (for review). These are based on a modified CEDEP program calculations. Dredge costs are estimated assuming excavated materials are deposited in the designated ocean disposal site; and used as beach nourishment. Dredge estimates are based on 1. Cutter dredge excavating sand and rock loaded on scows by spider barge; 2. Hopper dredge; 3. Cutter dredge to beach nourishment; and 4. Mechanical dredge with rock bucket and scows to disposal.

D. Port of Wilmington Section 203 Navigation Channel Improvement Integrated Feasibility Study and Environmental Impact Statement, Preliminary Draft Project Management Plan. Section 9 provides requirements for cost estimating documents for the project. The cost estimate construction cost summary Excel sheet are acceptable as preliminary reconnaissance level cost estimates as required by paragraph 9.2. Also, this paragraph stipulates the use of CEDEP which implies it is acceptable for the designers to use this program.

2. The project cost must be calculated by a total project cost summary (TPCS). As defined by the cost estimating guidance. Therefore, the total project cost from the Excel sheets would be shown on the (TPCS) and contingency, engineering, construction administration costs would be added to determine the total project cost summary (TPCS). The TPCS would be used along with the economic analysis to determine the project benefit/cost (BC) ratio.

3. The development of contingency percentage used in the TPCS of the preliminary level cost estimate could be calculated using the Corps abbreviated costs schedule risk analysis (CSRA) rather than the formal CSRA needed for the feasibility report estimate. Some items to be considered are A. What happens if the rock must be drilled and shot; B. What effect on the project cost would be caused by the designated ODMDS unsuitable for dredge material disposal; C. What would be the acquisition plan for the project would there be multiple contracts or single contract. D. What is the risk of only one cutter dredge capable of dredging rock.

4. Some miscellaneous dredging estimate comments. A. Mechanical dredging would be required around the mooring and docking areas of the port; B. A review of the typical cross-sections indicates the 150-foot channel increase occurs on one side of the channel. These include baldhead shoal reach 2, Smith Island reach, and battery island reach. It is recommended that this be accomplished with a mechanical dredge; C. The shore crew for the beach nourishment are subject to land labor laws. Generally, the crew would work two shifts per day 10 hours per shift seven days per week. Therefore, they are subject to overtime pay; D. Suggest increase floating pipeline from 450 feet to 1500 feet between the cutter dredge and the spider barge; E. Provide complete description on tab A of the CEDEP estimates. For example, type of work being performed (excavating cutter dredge to spider barge to scows, stationing of reach and haul distance to disposal; F. Cutter barge to beach nourishment will require the use of submerged pipeline because the line must cross the navigation channel from one side to the other.

5. The executive summary of the project management plan indicates the designer/port will submit the project to the assistant secretary of the Army for civil works to submit to Congress for project funding. If the project were to be designed by the Corps processes the project cost would be certified by a Corps representative. It is unclear how this is to be accomplished by the design team. Suggest this be explored and resolved rather than waiting to send the project for funding.

Wallace W. Brassfield, P. E.

Jerry Diamantides <jdiamantides@dma-us.com>

RE: WHNIP

1 message

Shelden, Jeff <JShelden@moffattnichol.com> Mon, Jun 24, 2019 at 10:00 AM
To: "jdiamantides@dma-us.com" <jdiamantides@dma-us.com>, "Jessup, Sean" <SJessup@moffattnichol.com>

No formal response, but Sean and Sam did consider / address all the comments in their revision.

Best regards,

Jeff Shelden, P.E.
Moffa_ & Nichol
4700 Falls of Neuse Road, Ste 300 | Raleigh, NC 27609
P 919.781.4626 **x.** 12135 | **F** 919.781.4869 | **C** 919.656.0640
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From: Jerry Diaman_des [mailto:jdiamantides@dma-us.com]
Sent: Monday, June 24, 2019 9:52 AM
To: Shelden, Jeff <JShelden@moffattnichol.com>; Jessup, Sean <SJessup@moffattnichol.com>
Subject: Re: WHNIP

Jeff,
Did you find out if we can state that all comments were resolved, or if we can include responses?
Thanks
Jerry

Jerry Diaman_des, Ph.D.
Senior Economist
David Miller & Associates
1637 Brookfield Road
Berlin, VT 05602
802 223 2040

On Wed, Jun 19, 2019 at 9:55 AM Shelden, Jeff <JShelden@moffattnichol.com> wrote:
Here are Wally's review comments. I'm checking with Sean to see if he ever responded formally or just addressed
these in his revisions.

Best regards,

Jeff Shelden, P.E.
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