

TO: City of Alexandria City Staff

FROM: AECOM

REGARDING: Third Party Review of Robinson Terminal South:
Potential Barging Operations/Costs

DATE: April 3, 2015

Per the request of The City of Alexandria, dated February 26, 2015, AECOM has performed a third party review of supplied cost estimates for barging versus trucking of soil material as outlined in the attached Robinson Terminal South (RTS) report (s) / memo(s). The reports were furnished by the City of Alexandria and prepared by EYA and/or their respective consultants to assess feasibility of barging certain construction materials, specifically, the import and/or export of demolition materials and soil. Our objective was to assess this feasibility and to review and validate the costs of barging and trucking estimated by the developer.

Understanding of Existing Documents

The sequence of construction for RTS is: demolish existing buildings, import and place 15,000CY of clean fill to raise the site to or above the Base Flood Elevation, and then remove 55,000CY of fill (some of which is contaminated) in order to facilitate construction of the underground parking garages.

EYA, performed a study on the feasibility of berthing barges carrying granular fill against the Robinson Terminal South Pier during landside construction. This study indicates that in its current state, the Robinson Terminal South Pier is not capable of berthing a material barge or supporting the equipment necessary to load or unload barges, without rehabilitation and appropriate repairs and/or replacements of deficient structural elements. While AECOM finds no calculations or record drawings to verify the 200psf live load limitation statements, it is reasonable to believe, based on our familiarity with the piers, that at least a lateral barge construction load of any magnitude should not be imparted on the piers. For sake of this review, it is an accepted premise not to use the piers to stage and operate construction equipment as part of the means and methods without proper reinforcement.

As outlined in the feasibility studies, an effective approach to solve the lack of berthing capacity issues of the Robinson Terminal South Pier is the use of spud barges. The proposal notes that a material barge would be brought up to the outboard face of the pier without berthing directly against the pier and would drop spud piles to stay in place. A crane barge or conveyor system would also be needed adjacent to the pier in order to move fill/excavated material between the barge and the stockpile area, and a temporary work platform staging deck constructed between the trestles adjacent to land. See clipped sketch below (from EYA/Moffat Nichol drawing no. C-100, dated 10/18/2013):

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- Due to the volatility of the dirt market, we would anticipate the trucking cost for this operation to be in the \$27-31/CY range, which include \$25/CY for a 15 mile haul (which would offer multiple fill/waste sites and active construction projects with potential soil to 'waste') as well as \$1-3/CY to purchase the fill and \$1-3/CY to place the material, understanding that compaction is not needed for this fill exercise.
- The EYA proposal did mention a conveyor system but seemed to focus upon a crane barge. We feel that a conveyor system could be used to convey the soil for fill and/or excavation but we would not envision a significant cost, schedule, or operational advantage to a conveyor system.
- The EYA team elected to dispose of all of the excavation at the unit price of \$67.50/cubic yard. While we agree with the cost estimate, if all of the material is contaminated, this cost element could possibly be reduced with a segregated approach to disposal (see Conclusions section).
- The EYA estimated a barging premium of approximately \$1,350,000 and then the EYA team added a 15% contingency for a total premium of \$1,552,500. We would expect at one-three month time impact to the schedule using the barging option, so we tend to agree with the schedule estimates. The total estimated cost for the barging operation for RTS is \$4,795,500 compared to a total estimated cost for trucking of \$3,243,000.
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Conclusions

- The barging concept proposed by RTS is feasible, although potentially more challenging than trucking due to the following :
 - As part of our independent review and experience working on the Potomac, we note that very few commercially-available options exist regarding heavy bulkheads for loading/offloading material on the Potomac. In fact, to our knowledge, there are none that are currently available without extensive permitting/agreements/infrastructure improvements. Thus, we are forced to look to Baltimore, Norfolk, and beyond for loading/offloading options, which significantly increases transport /towing costs.

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- There is also no tug service on the Potomac River and very limited resources for fuel, maintenance, and repair of large marine equipment which tends to increase cost and reduce efficiency. Tug service must come out of Baltimore or the Norfolk area.
- The RTS documents note that approximately 700CY of demo material will need to be removed from the site and that quantity would not be cost effective for barge transport. After reviewing the latest EYA schedule available to us (March 5, 2015), it seems that the fill operation is scheduled to start soon after demo (within a month). Since the EYA barging concept would seem to work for loading out demo material as well as soil, it may make sense to load the demo material onto a barge and take it to Baltimore for offloading for delivery to a local recycling/scrap yard, potentially offsetting some of the transport costs. We do acknowledge that 700CY may not fill a 2000CY super jumbo hopper barge but the 700CY demo material estimate may rise and this exercise might serve as a good practice run for the larger and more aggressive fill operation.
- Most material/hopper barges commonly used in this region do not have spuds, so it is more likely that the barges used to haul material will marry up to a spud barge (which could be a crane barge), which would be spudded adjacent to the existing pier(s).
- Without a conveyor system at RTS, the crane radius is substantial to reach and pick from the staging area to an awaiting barge to be loaded, so a substantial crane barge would be required, which would have a substantial monthly cost/rental. This seems to have been included in EYA's cost estimate but the potential spud barge between the pier and hopper barge, noted above, would increase the needed crane radius.
- We believe the crane barge could be spudded down along the east face of the pier as an alternative to the EYA concept. This spudded barge would protect the pier from the material/hopper barges. This would also alleviate any water depth concerns as a recent bathymetric survey shows a water depth of at least 10' mean low water (MLW) along the east pier face (tugs and barges for this type of operation typically need at least 9' of

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water depth at MLW. The crane radius for this alternate would be the same, if not less, than the EYA concept.

- It is anticipated that a crane barge would likely utilize a clamshell to move material, which has a limited production rate. This coupled with the long tow to Weanack would likely elongate this activity compared to trucking. With 3-4 barges in rotation and one tug towing full time, we find the projected durations in the EYA documents to be reasonable, if not a bit aggressive, based on the same general operational parameters for the recently completed City Marina Dredging Project.
- We believe that the barging schedule could be condensed by barging as much soil as possible to Baltimore as opposed to Weanack. Further details are listed below.
- We investigated facilities that treat and landfills that accept TPH, lead, and PAH-contaminated soils in Baltimore but, to our knowledge, none are currently available. As an example, one of the more established facilities recently moved from Baltimore to Brandywine, Maryland (20 miles from Alexandria). There are multiple firms in Baltimore that provide hazardous material disposal services but they simply truck material (usually small quantities) out-of-state to permitted facilities in PA, NJ, VA, NY, and beyond.
- The Weanack site is fully permitted and operational with a heavy 400'+ bulkhead and offers a turnkey offloading and transport operation to the nearby Charles City County Landfill (or other nearby landfills), which will accept contaminated and/or hazardous waste.
- Further efforts should be completed to locate potential disposal options for contaminated soil - perhaps within the placement basins at the Weanack Reclamation Site, which would be approximately \$15-20/CY less expensive than the Charles City County Landfill (same tow and offload but minimal trucking component and lower tipping fee). Contaminated sediment has been permitted and successfully placed at Weanack in the past and should be considered for this operation to reduce cost and improve the schedule. Weanack has valid permits which require that all inbound material be pre-screened and approved by VDEQ. With adequate analysis for RTS already complete, this process should proceed swiftly (approximately one month). Beyond approval, the Weanack offloading and placement operation is essentially in place and turn-key.

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- The amount of clean fill should be well defined and segregated via geotextile or similar means. Clean fill could then be excavated and returned to Baltimore to reduce transport and disposal costs. Since the clean fill could be loaded out first (as the clean fill should be on the top surface and possibly on the south side of the site), this should be feasible, operationally. We acknowledge that once contaminated material is placed into a given barge, clean fill cannot be hauled in that barge until a proper barge clean out is performed. We estimate that towing clean fill to Baltimore for disposal could save at least \$550,000 for RTS. Further analysis of the soil could increase the amount of existing material that could be disposed of a clean fill, reducing cost and improving the schedule.

In conclusion, the proposed barging operations at RTS appear to be feasible and the cost estimates for barging seems to be in alignment with the current market. A premium will likely be paid for barging, largely due to the long tows required for both material sources and disposal locations. The soil contamination issue further limits soil disposal options and further increases costs associated with barging. Finally, a barging operation is likely to take one to three months longer than a trucking operation due to the cycle times associated with the long tows.

We do find that the EYA trucking costs are somewhat lower than our estimates, which would tend to increase the noted premium paid for barging. Also, we would recommend reconsidering barging the demo material to Baltimore for scrap/disposal, based on the current schedule and operational feasibility. In addition, based on information provided to us, we would suggest that it may be feasible to define some portion of the excavated material as 'clean' and deliver this material to Baltimore for disposal, thus potentially saving on cost and time as compared to towing all excavated material to Weanack for contaminated disposal. Further, it is possible that some if not most of the contaminated material could be placed within the placement basins at Weanack instead of being trucked to a local landfill to again, reduce cost and improve the schedule.