ARMED SERVICES BOARD OF CONTRACT APPEALS

Appeal of --	)	
	)	
Optimum Services, Inc.	)	ASBCA No. 59952
	)	
Under Contract No. W912EP-09-C-0033	)	

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OPINION BY ADMINISTRATIVE JUDGE TING

Optimum Services, Inc. (OSI) entered into a contract with the Jacksonville District Corps of Engineers (the Corps) to reconstruct an existing Disposal Area, and to dredge Rose Bay in Volusia County, Florida, to restore its ecosystem. OSI subcontracted the dredging part of its contract to Ryan Incorporated Southern (Ryan). In our entitlement decision, we found that Ryan encountered a Type I differing site condition (DSC) in dredging eight out of the nine Acceptance Sections, and we remanded the case to the parties for negotiation of the quantum of equitable adjustment and the extent of the delay in contract completion caused by the DSC. *Optimum Services, Inc.*, ASBCA No. 58755, 15-1 BCA ¶ 35,939.

We resumed proceedings when the parties were unable to settle their quantum differences. To determine equitable adjustment, we use the Measured Mile Method comparing what Ryan would have spent without encountering the DSC and what it did spend with the DSC. The parties' disputes centered on what adjustments should be made to the Measured Mile formula. We conclude that OSI/Ryan is entitled to an equitable adjustment of $1,267,124.51 and a time extension of 66 calendar days.

FINDINGS OF FACT

Background

1. Rose Bay is located along the Intracoastal Waterway in east central Volusia County, Florida. As a part of the Rose Bay Task Force's multi-phase project to restore

Rose Bay's ecosystem, the Corps entered into a contract with OSI in June 2009 to reconstruct an existing Disposal Area at Lost Creek Island (Disposal Area)[1] and to remove by dredging unconsolidated sediments from the bay. In July 2009, OSI subcontracted the dredging work to Ryan. Dredging was to be performed by Acceptance Sections. There were nine Acceptance Sections (AS): AS#1 through AS#9. Upon the start of dredging in May 2010, Ryan ran into what it believed to be hard bottom at a much higher elevation in AS#8.[2] The Corps determined what Ryan encountered was not hard bottom and required Ryan to continue to dredge through the firm layers of crust encountered. The crust consisted of whole oyster shells, sand, and shell fragments interlocked with mud and sand. *Optimum*, 15-1 BCA ¶ 35,939 at 175,653.

2. Except in AS#7, Ryan continued to run into and dredge firm layers of crust in AS#1, AS#2, AS#3, and AS#4. By the end of October 2010, five months after Ryan began dredging, the Corps confirmed that the crusts "on top of the silt layer" and "dredged material with heavy shell content" were found "in patches scattered around the acceptance sections." In December 2010, the Corps deleted certain areas in AS#5 and AS#6 from dredging. In areas not deleted, Ryan continued to run into crusts and high concentrations of shell. The Corps acknowledged in areas not deleted, "we made them dredge it." Ryan completed its dredging in February 2011, three months longer than planned. *Optimum*, 15-1 BCA ¶ 35,939 at 175,653.

3. Ryan's Request for Equitable Adjustment (REA), dated 31 July 2012, sought $1,192,828 for dredging shells and sand, $55,104 in consultant cost for a total of $1,247,932, and a time extension of 93 calendar days (ASBCA No. 58755 (58755), ex. 200, tab D at 4, 47-48). Ryan contended that it incurred extra costs as a result of a constructive change and a differing site condition because it was "required to dredge oyster beds although oyster bed dredging was specifically excluded under the terms of the contract." It contended that it "worked an additional 93 calendar days to complete the dredging at Rose Bay." (*Id.*) On 30 August 2012, OSI submitted to the Corps administrative contracting officer (ACO) Ryan's REA (58755, R4, tab 3 at 36). With field and home office overhead plus profit, OSI's REA sought $1,877,057.79:

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[1] The construction of the Lost Creek Island Disposal Area was the subject of another appeal decided in 2013. *Optimum Services, Inc.*, ASBCA No. 57575, 13 BCA ¶ 35,412, *aff'd*, *Optimum Services, Inc. v. McHugh*, 582 F. App'x 879 (Fed. Cir. 2014).

[2] OSI's project manager Matthew Conneen testified in the entitlement hearing that AS#9 was the first Acceptance Section dredged (ASBCA No. 58755, tr. 3/133), the record shows, however, that AS#8 was the first Acceptance Section dredged (ex. G-2, tab 9).

Cost Elements	Amount
RIS-REA Cost	$1,247,932.00
Field Office Overhead @ 22.4%	$279,536.77[3]
Home Office Overhead @ 16.26%	$248,366.42[4]
Profit @ 5.7%	$101,222.60[5]
Total	$1,877,057.79

OSI's REA stated "We are available to answer any questions however we feel that a meeting with all firms involved will provide the best forum to discuss any details or negotiations." (58755, R4, tab 3 at 36)

4. In addition to its request for DSC costs and 93 days of time extension, Ryan's REA included invoices from Construction Consulting Associates, Inc., in the amount of $42,972.65, for providing consulting and REA preparation services for Ryan (58755, ex. 200, tab D-37 at 296-316). Adding Ryan's home office overhead at 16.24% and 10% profit to $42,972.65, Ryan claimed $55,104.19 as a part of $1,247,932 (58755, ex. 200, tab D-47; app. supp. R4, tab 3 at 30).

5. Ryan's 14 December 2012 letter to OSI said "as a result of the apparent lack of progress," it was in Ryan's best interest to convert its REA into a certified claim (58755, R4, tab 3 at 33). Ryan submitted a certification signed by its president, William H. Ryan (*id.* at 35). OSI then submitted its certified claim to the contracting officer (CO) by letter dated 20 December 2012 seeking an equitable adjustment of $1,877,057.79 and an "additional duration of 93 calendar days" (*id.* at 32, 36).

6. The CO's 3 April 2013 decision denied the claim (58755, R4, tab 2). OSI for itself and its subcontractor Ryan timely appealed the CO decision by notice dated 27 June 2013. The Board docketed the appeal as ASBCA No. 58755, and held a hearing on entitlement in May 2014. Ryan's entitlement to a 93-day time extension was deferred as a quantum issue.

7. In our entitlement decision issued on 25 March 2015, we found the following with respect to AS#7:

> 55. In mid-August 2010, Ryan mobilized to the west side of the US-1 Bridge where AS#7 and AS#1 were located. AS#7 was on the north side of AS#1 and was in a

3 Field Office Overhead was applied to the REA cost.

4 Home Office Overhead was applied to (1) the REA cost and (2) the Field Office Overhead cost.

5 Profit was applied to (1) the REA cost, (2) the Field Overhead cost and (3) the Home Overhead cost.

> "deeper area" near some private residences. Unlike AS#8 and AS#9, which took from May to mid-August 2010 to dredge, AS#7 had "very little shell[s]," and Ryan had "no problems dredging AS7 and...they finished it in the time they expected to" (tr. 4/24).
>
> 56. We note Boring CB-RB-7 was drilled within AS#7 (Drawing CN 107 and R4, tab 5 at 212). Boring CB-RB-7 described the material to be encountered as WOR material consisting of "SILT, some fine quartz sand, trace coarse sand-size shell fragments, gray (ML)" (*see* finding 19). With minor shell fragment size differences (medium versus coarse), this description was similar to those of the other borings except CB-RB-9 which contained WOH material. We find the material in AS#7 representative of what OSI/Ryan should encounter absent the firm layers of crust it encountered in all of the other acceptance sections. When Ryan reached AS#2 west of AS#7, it ran into crusts again which hindered its dredging efforts (tr. 3/92-93).

Optimum, 15-1 BCA ¶ 35,939 at 175,645.

8. Based upon findings 55 and 56 above, we concluded: "There was no differing site condition in AS#7. AS#7 thus exemplifies what OSI/Ryan should have encountered based on the representations in the Corps' contract documents (findings 55 and 56)." *Optimum,* 15-1 BCA ¶ 35,939 at 175,656.

9. As for the rest of the Acceptance Sections, our decision held that Ryan has proven, by a preponderance of the evidence, all of the elements of a Type I differing site condition, that the materials Ryan actually encountered (firm layers of crust in patches and high concentrations of broken and whole shells at various locations) in Rose Bay differed materially from those the contract documents indicated (zero blow count unconsolidated sediment with little to some sand, and trace to little sand-size shell fragments). *Optimum*, 15-1 BCA ¶ 35,939 at 175,656.

10. Having decided entitlement in favor of OSI/Ryan, we remanded the case to the parties for determination of the quantum of equitable adjustment and the extent of delay experienced by Ryan.[6] Based on the record before us, we summarized our conclusions as follows:

[6] Since this appeal involves subcontractor Ryan's performance exclusively, we will refer to Ryan unless context requires us to refer to OSI or OSI/Ryan.

> We do not wish to leave the impression that all nine acceptance sections were totally engulfed by firm layers of shell crusts or contained high concentrations of large broken or whole shell[s] (as opposed to sand size shell fragments). As QAR R. Wilson observed, crusts were found in "patches scattered around the acceptance sections," and "newly developed mounds of sand and shell" were found in specific locations but "most of the time the average discharge has been a sandy silt material with an occasional shell" (finding 69). There was no differing site condition in AS#7 (findings 55, 56). And, not all equipment failure was the Corps' responsibility (finding 52 n.10).

Optimum, 15-1 BCA ¶ 35,939 at 175,658.

OSI/Ryan's Quantum Appeal – ASBCA No. 59952

11. The parties were unable to reach agreement on remand. Ryan's 23 April 2015 email to the Board indicated it wished to proceed with its quantum case. The Board docketed the quantum case as ASBCA No. 59952 and directed the parties to file pleadings in accordance with an enclosed Order on Proof of Costs. That Order required Ryan, among other things, to summarize the basis or theory of recovery; provide the computation showing how each cost item and its components are computed; and to make the books and records upon which the claimed costs are based available to the Corps for examination. If the Corps challenges a cost, the Order required the Corps to specify each document supporting the challenge, and to summarize the basis or theory of its challenge.

12. In response to the Order, Ryan submitted on 29 May 2015, Appellant's Complaint for Costs Due Appellant with Statement of Costs (compl.). The complaint advanced three alternate methods or theories of recovery: (1) the Factor Method; (2) the Modified Total Cost Method; and (3) the Measured Mile Method (compl. at 9-10, ¶ 31, at 14-15, ¶¶ 41-44).

13. The three methods Ryan proposed produced slightly different but close results: Using the Factor Method, Ryan calculated it would be due $1,192,828.00 (compl. at 19). Using the Modified Total Cost Method, Ryan calculated it would be due $1,292,334 (compl., ex. A at 3). Ryan proposed two alternative Measured Mile Method calculations. The first alternative calculated $985,837 as the amount due (compl., ex. B at 2). The second alternative calculated $1,121,805 as the amount due (*id.* at 3). The amounts above

did not include $55,104.19 in outside consultant and REA preparation costs and OSI's markups for Field Office Overhead, Home Office Overhead and Profit (compl. at 19).

<u>The Factor Method</u>

14. Ryan's quantum complaint proffered that the Factor Method would be the most appropriate way to determine DSC damages. It explained that separating the actual costs incurred due to the differing site conditions on an hour-by-hour or day-by-day basis was not feasible because the differing site conditions were spread throughout the project site and were encountered intermittently at times and more continuously at other times. (Compl. at 9-10, ¶¶ 30, 31)

15. Ryan's Factor Method for calculating its DSC damages used the "Material Factor" for different materials such as mud and silt, loose sand, composite sand, stiff clay or composite shell. The Material Factors were derived from Dr. John B. Herbich's *Handbook of Dredging Engineering* (2d ed.), Appendix 9. Dr. Herbich is a professor at Texas A&M University, and the Director of Center for Dredging Studies (compl. at 10, ¶ 32). As explained in the handbook: "The sediment type is a very significant factor in the determination of the production rate. A fine-grained silt material is easier to pump than larger-grained sediments or clay." The handbook listed 10 sediment types:

Material	SG[7]	Factor
mud & silt	1.2	3
mud & silt	1.3	2.5
mud & silt	1.4	2
loose sand	1.7	1.1
loose sand	1.9	1
compacted sand	2	0.9
stiff clay	2	0.6
composite shell	2.3	0.5
soft rock	2.4	0.4
blasted rock	2	0.25

(58755, ex. 200, tab 36 at 295)

16. Use of Material Factors, according to Ryan, is based on the concept that composite shell, for example, with a Material Factor of 0.5 would be twice as difficult and therefore expensive to dredge than loose sand with a Material Factor of 1; and sand with a Material Factor of 1 would be three times as difficult and therefore expensive to dredge than silt and mud with a Material Factor of 3 (compl. at 10, ¶ 33; 58755, ex. 200, tab 36

7 "SG" means "specific gravity."

at 295). Material Factors were developed from averages of many dissimilar projects (tr. 2/114). Ryan adjusted its bid unit price of $8.06 per cubic yard (c.y.) for dredging mud and silt by the Material Factors for dredging for sand and shell (compl. at 10, ¶ 34). The additional cost of dredging sand and shell was then calculated by multiplying the adjusted unit cost per c.y. for sand and for shell by the volumes dredged. Using the Factor Method, Ryan calculated its additional cost for dredging sand and shell to be $1,192,828. (Compl. at 19)

17. Mr. William S. Humphreys, Ryan's consultant who prepared its REA, acknowledged it is always best to use "discrete cost[s]" to determine equitable adjustment, if the costs relating to the DSC can be tracked. He testified he "went down [a] list of the options" and determined the Factor Method was "by far the preferable one to use." He explained tracking discrete costs was "not an option" because dredging did not separate the DSC materials from the non-DSC materials. (Tr. 1/29)

18. Mr. Humphreys argued that the use of the Factor method would be "ideal" (tr. 1/29) because (1) the entire issue of extra cost was tied to material – the "consolidated heavy material versus light unconsolidated material"; (2) "there are a set of numbers that go directly to the increased cost by type of materials" known as "Material Factor"; (3) the damages in the appeal "are really all about the material"; and (4) there would be no need to address "any arguments about inefficienc[ies] or extra costs on the job" (tr. 1/29-30).

19. On the last point, Mr. Humphreys explained the Factor Method would "[get] rid of all [the Government's] argument...about inefficiencies" (tr. 3/87), and "cleans up all [of the Corps'] issues that have surfaced in this trial" (tr. 2/63). He acknowledged that the inefficiencies that were not the Corps', or Ryan's, responsibility would not be a part of the Factor Method of damage calculations (tr. 1/37).

20. Mr. Humphreys testified the Factor Method "is used every day by heavy civil contractors" such as road and site development projects and it is often used to price changes (tr. 1/32, 232). He observed that the Corps itself used Dr. Herbich's Material Factors in preparing its Independent Government Estimate (IGE) for the Rose Bay ecosystem restoration project (tr. 1/35, 48-49; app. wit. book,[8] tab 17 at 457).

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[8] The record in this quantum appeal is voluminous. Each party submitted 10 volumes of Rule 4 files. To proceed more efficiently at the hearing, both parties prepared witness books containing the hearing exhibits as well as Rule 4 documents they used at the hearing. We refer to the documents in the witness books as "Gov't wit. book" or "App. wit. book," as appropriate.

The Modified Total Cost Method

21. Ryan's alternate Modified Total Cost Method calculated the difference between what Ryan actually incurred in dredging Rose Bay and the cost it bid to dredge the final pay quantity of materials specified in the contract documents plus the cost which was not the Corps' responsibility (compl. at 14, ¶ 42). According to Ryan, it booked $1,778,474 in direct dredging costs. With G&A (19.92%) and profit (10%), that amount added up to $2,346,021. (*Id.*, ex. A at 1) Based upon its original bid price of $8.06/c.y. and the pay volume of 127,199 c.y. dredged as measured by the Corps, Ryan calculated that it should have been able to complete the dredging anticipated for $1,025,224 ($8.06 x 127,199 c.y.). Based upon its average daily dredging cost of $8,625 per day, and based upon its assessment that the Corps was not responsible for 3.3 calendar days of downtime[9] at $28,463 ($8,625 x 3.3 days), Ryan calculated that it would be due $1,292,334 ($2,346,021 - $1,025,224 - $28,463) plus OSI markups. (*Id.* at 3)

The Measured Mile Method

22. Ryan's third alternative method for determining DSC damages was the Measured Mile Method. This method compares the productivity achieved at an un-impacted section with the productivity achieved at an impacted section of a project. Equitable adjustment can then be calculated by multiplying the average per hour by the additional hours required to complete the project. (Compl. at 15, ¶ 44, ex. B)

23. Ryan contends that the use of AS#7 as an un-impacted section "without some adjustment" would be incorrect (compl. at 15, ¶ 46). It contends that (1) "some shell and consolidated material was dredged in A.S. No. 7, in sufficient quantities to have some productivity impacts"; (2) to avoid clogging its equipment with large shells and consolidated materials when dredging AS#7, bars were welded across the suction mouthpiece of the dredge which reduced productivity; and (3) "to ensure complete dredging of A.S. No. 7, adjoining areas of A.S. Nos. 1 and 2 were dredged along with A.S. No. 7." (Compl., ex. B at 1)

24. With these adjustments in mind, Ryan made two Measured Mile calculations. The first calculation assumed there were not enough areas of consolidated sand and shell (crust) in AS#7 to have any meaningful impact on dredging production, but made a 10% adjustment to account for the bars welded across the suction mouthpiece, and accounted 7.5 hours for dredging the boundaries between AS#7 and AS#1 and AS#2. These adjustments resulted in an equitable adjustment for dredging in the amount of $985,837.

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[9] Ryan took responsibility for 3.3 calendar days of downtime due to (1) booster pump problems on 7 to 9 August 2010; (2) workboat and booster pump problems on 23-25 August 2010; and (3) its second shift dredge operator did not show up for work on 15 January 2011 (app. br., app'x C at 2-3).

(Compl., ex. B, calculation A at 1-3) The second calculation assumed a 10% adjustment "due to beds of consolidated sand and shell ('crust' areas)" in AS#7. This additional adjustment resulted in an equitable adjustment for dredging in the amount of $1,121,805. (*Id.*, calculation B at 3)

<u>Time Extension Claimed</u>

25. Ryan summarized its time extension claim as follows:

> Ryan Incorporated Southern planned to complete the dredging in 6 months or less, working one shift (daylight hours only) per day. As a result of the increased difficulty caused by the differing site condition, the dredging lasted nine months, and for over half of these months Ryan worked double shifts. Nine months at an average of more than one shift per day minus six months at one shift per day translates to a time extension of greater than 3 months.

(Compl. at 26)

26. More specifically, Ryan's 93-day time extension claim is based on the difference between what it believed to be the actual dredging duration of 272 calendar days from 10 May 2010 to 7 February 2011[10] and the 179 calendar days it originally projected would be required to dredge zero blow count materials (58755, ex. 200, tab D at 48).

<u>The Corps' Measured Mile Calculations</u>

27. The Corps filed its response to Ryan's Order on Proof of Cost submission on 31 July 2015. The Corps took the position that "the best method of calculating damages is not to base it on the quantities of shell and sand dredged, especially given that the quantities cannot be proven." It maintained that "[t]he best method of determining damages is to calculate the effect on productivity that was caused by the differing site condition" by using the Measured Mile Method. (Answer at 28[11]) The Corps' answer stated that "[t]he Measured Mile method has a history in construction claim case law related to differing site conditions extending back to at least 1975 as being an acceptable method for proving and quantifying production impacts due to the differing site conditions being claimed" (answer at 31).

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[10] There are actually 273 calendar days from 10 May 2010 through 7 February 2011.

[11] The Corps' 43-page answer is not numbered. For reference purposes, we manually numbered the pages consecutively from 1 to 43.

28. The Corps argued that (1) "The shell material below the crust is described in the contract and is not part of the DSC" (answer at 25); (2) "the presence of shell up to gravel-sized in the dredging prism is anticipated by the contract and must not be included in the DSC" (*id.*); and (3) "all the sand dredged in the pay prism" should not be a part of the DSC (*id.* at 27). Since the Factor Method depends upon the volume of the DSC-related sand and shells dredged, and there is no way to distinguish between the DSC-related shell and sand dredged and the non DSC-related sand and shell dredged, the Corps contended that calculating damages using the Factor Method would not be "accurate or acceptable" (*id.* at 18, 21).

29. The Corps proposed two alternative ways of calculating DSC damages. The first alternative proposed an adjustment to the impacted side of the Measured Mile equation by removing AS#8 and AS#9 from determining the gross production rate achieved in the impacted areas. It explained "[w]hile the production problems in AS-8 and 9 may have been partially due to the DSC, the poor production was more strongly influenced by the contractor's 'learning curve.'" (Answer at 33) With this adjustment, and using the Measured Mile Method, the Corps calculated an equitable adjustment for the cost of dredging DSC materials, without markups, at $358,995.34 (*id.* at 36).

30. Unlike Ryan, the Corps argued that no adjustments should be made to the productivity of AS#7 where no differing site condition was found. It contended that the daily Quality Control Reports (QC Reports) for AS#7 showed no sand and shell, only mud and silt. It emphasized Boring CB-RB-7 described the materials that the contractor would encountered as "SILT, some fine quartz sand, trace coarse sand-size shell fragments, gray (ML)." The Corps contended that dredging beyond the limits of AS#7 into AS#1 and AS#2 was not unique to AS#7 but occurred in all Acceptance Sections. It questioned the 10% adjustment for the bars installed on the dredge suction mouthpiece for lack of supporting data and documentation showing that the bars were installed while dredging AS#7. (Answer at 34-35)

31. The Corps also presented an alternate Measured Mile Method calculation using what it referred to as the Cost Engineering Dredge Estimating Program for Pipeline Dredges (CEDEP) Unit Costs (answer at 38). This method calculated the direct costs attributable to the DSCs at $276,671.31 (*id.*). The CEDEP is a proprietary program, and only the Corps' estimators are allowed to see the program codes (tr. 2/43). With other, better equitable adjustment methods available, we see no reason to resort to this method especially since the codes are not available.

32. With the disagreements outlined above, the parties went to a quantum hearing on 4-6 November 2015 in Jacksonville, Florida. Ryan urged us to determine its DSC damages employing the Factor Method. It did not object to the Measured Mile Method but urged us to make adjustments to AS#7. The Corps argued that the

Factor Method would "grossly exaggerate the impact of the DSC" (answer at 18), and urged us to determine damages based upon the Measured Mile Method without considering production rates achieved in AS#8 and AS#9 in calculating the average production rate of the impacted areas (*id.* at 33).

Dredging Sequence

33. Contract 0033 gave OSI 324 calendar days after receiving the notice to proceed to complete the contract work. *Optimum*, 15-1 BCA ¶ 35,939 at 175,637, ¶ 5. As planned, OSI was to complete the reconstruction of the Disposal Area in four months or by October 2009. The Disposal Area "took a lot longer"; OSI did not finish it until April or May 2010. *Optimum*, 15-1 BCA ¶ 35,939 at 175,643, ¶ 42.

34. Ryan began dredging Rose Bay on 10 May 2010 and completed dredging on 7 February 2011 (gov't wit. book, ex. G-2, tab 9). Of the nine Acceptance Sections to be dredged, AS#8 and AS#9 were located on the east side of the U.S. 1 Bridge and the rest of the Acceptance Sections (AS#1 – AS#7) were located on the west side of the bridge. Ryan dredged AS#8 first, then AS#9. It then moved to the west side of the bridge and dredged AS#7 (Wilson dep.,[12] ex. G-4 at 58). The sequence and the periods during which dredging took place are summarized in the table below:

Acceptance Sections	Date began	Date Completed	No. of Days
AS#8	05/10/10	07/24/10	76 days
AS#9	07/26/10	08/19/10	25 days
AS#7	08/25/10	09/17/10	24 days
AS#1	09/18/10	10/06/10	19 days
AS#2	10/07/10	10/21/10	15 days
AS#3	10/22/10	11/09/10	19 days
AS#4	11/10/10	12/06/10	27 days
AS#5	12/08/10	01/18/11	42 days
AS#6	01/19/11	02/07/11	20 days

(Gov't wit. book, ex. G-2, tab 9)

35. Ryan originally planned to work 1 shift of 10 hours a day, 5 days a week, and 8 hours on Saturday (tr. 1/133). Less than 2 weeks after it started, Ryan increased its shift to 13½ hours a day (tr. 1/133-34, 138). On or about 12 July 2010, after it

[12] Ronald L. Wilson was scheduled to deploy overseas just before the quantum hearing was to begin. Corps counsel took his deposition which was admitted into evidence as exhibit G-4. Ryan's counsel cross-examined Mr. Wilson at the conclusion of direct examination (ex. G-4 at 46-61).

overhauled the dredge, Ryan went to "round the clock operations 6 days a week" or two 12-hour shifts a day (R4, tab 529; tr. 1/133-35).

Learning Curve, Inefficiency, Equipment Downtime Issues

36. Ronald L. Wilson was the Corps' quality assurance representative (QAR) on the Rose Bay project. He was at the project site three or four days a week. (Wilson dep., ex. G-4 at 14) He was the Corps' eyes and ears on the project.

37. QAR Wilson testified "It was pretty obvious [Ryan was] going through a learning curve. You can see that through the duration of the job." He testified Ryan was going through a learning curve "[e]specially in the beginning of it." (Wilson dep., ex. G-4 at 49)

38. In response, Mr. Ryan testified "you're always going to have some adjustments you make when you start pumping. You make little adjustments here and there." (Tr. 2/79) He testified Ryan expected to dredge silt but due to the DSC, it had to add flotation, move its booster pump several times, and make a number of other adjustments (*id.*). He acknowledged Ryan's performance was not perfect and "could have been more efficient at times." He testified Ryan was "substantially efficient" and had factored non-DSC-related problems into its bid, and the problems Ryan encountered were "primarily the differing site condition." (Tr. 2/63) Without more specific proof, we are unable to determine what, if any, amount Ryan factored into its bid to cover learning curve issues.

39. Ryan's dredging consultant, Mr. Humphreys, testified the Corps had brought up "a lot of different" learning curves and inefficiency issues and he looked into them and did not find "most of them or any of them are really valid" (tr. 1/97). He testified there is a learning curve in any project and the learning curve should be a part of the bid price (tr. 1/97, 224). He testified that, in the case of AS#8 and AS#9, especially AS#8, the learning curve was "learning to deal with the different material[s]" from what the contractor "came to the job prepared to dredge" (tr. 1/97). Mr. Humphreys did not know if Ryan included any inefficiencies in its bid (tr. 1/243). He testified even if inefficiencies took place, the Corps "never quantified all these alleged inefficiencies" (tr. 1/224).

Downtime Installing a Global Positioning System (GPS)

40. QAR Wilson's log of Friday, 7 May 2010 indicated that the Corps approved the as-built cross-sections of the Disposal Area and gave OSI permission to commence dredging and disposal operations (app. supp. R4, tab 54 at 5420). His log of Tuesday, 11 May 2010, indicated that Ryan started dredging on Monday, 10 May 2010, but only dredged about an hour and spent the rest of the day installing a GPS on

the dredge. On 11 May 2010, Ryan continued dredging AS#8 in the morning, and worked on the GPS again in the afternoon. (*Id.* at 5422)

41. Ryan contends "[t]he Corps offered no analysis to demonstrate that the installation of the GPS system while dredge was running affected productivity" (app. br. at 44). We find Ryan should have installed the GPS before it began dredging. We find to the extent installing the GPS resulted in downtime, the downtime delayed project completion but does not affect the Measured Mile calculation which uses dredge running time not dredge downtime. We find to the extent installing the GPS delayed Ryan, it made up for the loss time by later extending its shift hours and ultimately going to two 12-hour shifts.

Downtime Due to Low Tide

42. QAR Wilson's log of 14 May 2010 indicated Ryan continued to dredge AS#8 on that day "until extreme low tide, then they had to shut down" (app. supp. R4, tab 54 at 5424). This problem related to the draft of the dredge. The draft is the depth of the dredge which could be two to three feet when it sits in water. Because Rose Bay was shallow, Ryan "couldn't dredge through the low tide cycles" and had to stop. (Wilson dep., ex. G-4 at 17). According to QAR Wilson, this affected Ryan's productivity because the dredge was "sitting there not doing anything, waiting on the tide to come back in" (*id.* at 19).

43. When Ryan realized what was occurring, it decided to add pontoons to the dredge. It built the pontoons in its yard in Deerfield, Florida. (Tr. 1/257) Sonny Buchanan, Ryan's vice president of operations, who was in charge of all operations at Rose Bay (tr. 1/250) testified it took "[a] couple [of] weeks" from the time Ryan started work to have the pontoons attached (tr. 1/258). Mr. Ryan testified that "the flotation was added within two weeks of the job" (tr. 2/101). After Ryan installed the pontoons, it was able to dredge through the low tide cycles (Wilson dep., ex. G-4 at 19). According to Mr. Humphreys, low tide "created down time" for the first 51 hours at the start of the job (tr. 1/198).

44. Section 00 33 50 of Contract 0033 entitled "Weather, Water Stages and Tide Data" provided elevations of tidal datums in the vicinity of the project area. The datums provided were based upon values established by the National Oceanic and Atmospheric Administration from a tide station located on a pier along the Halifax River, approximately four miles from the project area. In addition, Section 00 33 50 referred bidders to a publication and a website for daily tidal predictions at locations along the coastline of North and South America. (58755, R4, tab 5 at 312-14) Ryan has not shown that the low tides experienced deviated from the norm.

45. We find Ryan should have anticipated encountering low tide which would hamper its dredging efforts. We find that it should have installed the pontoons before it began dredging. Dredge downtime caused by low tide, however, does not affect the Measured Mile Method of damage calculation because that method uses running time hours not downtime hours (tr. 1/101). We find to the extent dredge downtime delayed Ryan's dredging, it made up some of the downtime by later extending its shift hours and by ultimately working double shifts.

<u>Loss of Efficiency Dredging in a Swing Ladder versus in a Swing Anchor Configuration</u>

46. Ryan's dredge was capable of working in a swing ladder configuration or in a swing anchor configuration (tr. 1/220). According to the Corps, working in a swing ladder configuration, the dredge had a 20-foot radius but it had a 70-foot radius working in a swing anchor configuration. Because the cutter-head of the dredge had to stop and reverse direction at the end of each swing, dredging in a swing anchor configuration with a longer radius would result in fewer stops and thus at a higher production rate. The Corps faulted Ryan in initially dredging in a swing ladder configuration and switching later to a swing anchor configuration. (Answer at 33; gov't br., app'x A at 5)

47. QAR Wilson testified Ryan began its dredging in AS#8 and AS#9 in a swing ladder configuration and did not change to a swing anchor configuration until it reached AS#7. Ryan stayed with the swing anchor configuration for the rest of the Acceptance Sections. According to QAR Wilson, dredging in a swing anchor configuration "increased...production quite a bit" because Ryan "was able to make a wider cut." (Wilson dep., ex. G-4 at 25-26)

48. Mr. Buchanan testified that Ryan began dredging on the north and east sides of AS#8 near the mouth of the canal where it was "very confined." He explained there was a restaurant at one end and "houses and docks all the way down that north side." He testified "[i]t would be extremely difficult in some of those areas to put anchors down and use a winch." He testified had Ryan used the dredge in a swing anchor configuration in that area, it would have been inefficient because "[w]e wouldn't have been able to make our cuts." (Tr. 1/267)

49. The evidence is by no means clear that dredging in a swing ladder configuration is less efficient than dredging in a swing anchor configuration. Dr. Luis A. Prieto-Portar, who teaches the Corps' engineers throughout the country "dredging fundamentals," and who appeared as Ryan's geotechnical expert witness, testified that the dredge Ryan used had the "same" or "equal" efficiency factor according to the Corps' CEDEP formula. (Tr. 2/24-27) We find Ryan's operating its dredge in the swing ladder configuration in AS#8 and AS#9 was not due to its lack of proficiency but was dictated by the confined environment in which Ryan was

dredging. We find Ryan switched to operating its dredge in a swing anchor configuration as soon as the areas in which it was dredging allowed it to do so. We find switching from one dredge operating configuration to the other was a part of Ryan's on-site learning process.

Single Versus Double Shifts

50. The Corps argues that AS#8 and AS#9 "should be removed from the Measured Mile Calculation" because Ryan "worked only one shift per day for over 2 months." According to the Corps, this has "a significant impact on production as slightly over 4 months was spent dredging these 2 areas so this period covers over half the time the Appellant required to finish them." (Gov't br., app'x A at 6)

51. To be accurate, Ryan began dredging AS#8 on 10 May and finished on 24 July 2010, a period of 76 days. It began dredging AS#9 on 26 July 2010 and finished on 19 August 2010, a period of 25 days. Thus, AS#8 and AS#9 took slightly over 3 months to finish not "slightly over 4 months." Ryan went to a longer shift and double shifts because "it became obvious that it was going to take a lot longer to dredge the job with all the shells," and Ryan was trying to mitigate damages by shortening the overall duration of the project (tr. 1/134).

52. Under the Measured Mile Method of calculating damages, the rate of production in an impacted area depended upon the makeup of the materials dredged, not upon the number of shifts worked. We find working longer shifts and double shifts should be a part of the project's delay analysis, not a part of the Measured Mile productivity comparison analysis.

Downtime due to Dredge Overhaul

53. The Corps cites the "major overhaul" of the dredge while working in AS#8 and AS#9 in late June and early July 2010 as "not attributable to the DSC," and as one reason AS#8 and AS#9 should be removed in calculating DSC damages using the Measured Mile Method (gov't br., app'x A at 6). Ryan rented the dredge it used at Rose Bay (tr. 1/280). Mr. Marc Barnell, Ryan's equipment and maintenance division manager (tr. 1/293), looked at several potential dredges to rent, and provided the dredging supply company the parameters of what Ryan was "going to dig." The dredging supply company "put together hydraulic datas [sic] and pump curves" and recommended a dredge that would be sufficient to pump the materials expected. (Tr. 1/296)

54. Ryan rented the dredge known as "Snyder 4" from Snyder Industries, Inc. (Snyder) on or about 1 December 2009 (tr. 1/297; gov't wit. book, ex. G-2, tab 15). Before it rented the dredge, Mr. Barnell and Ryan's first mechanic conducted a "visual inspection," "[s]tarted the engine, checked the oil compartments," and "gave it an overall

look to make sure...it was in the shape to...do this job" (tr. 1/297). In addition, Ryan had a third-party marine surveyor inspect the dredge to ensure it was operational (tr. 1/298).

55. A month-and-a-half after Ryan began dredging AS#8, the dredge had to be overhauled due to a cracked head (tr. 1/299). Dredging was shut down for eight or nine days, from 25 June to 2 July 2010, while it was being overhauled (tr. 1/120, 3/123; gov't wit. book, ex. G-2, tab 9).

56. The head of an engine sits atop of the engine. When the engine works hard, "the firing pressure and everything goes way up," and the head "gets so hot it cracks" (tr. 1/122). Pumping silt would not crack the head of an engine but dredging shells and sand could (tr. 1/121-22). Mr. Humphreys, who had extensive experience in dredging (tr. 1/15), testified he "absolutely" would not expect a properly running dredge at the time it was brought to the site would need an overhaul in the course of dredging 250,000 c.y. of zero blow count materials described in the specifications (tr. 1/122-23).

57. Mr. Barnell explained that the dredge engine became overheated for two reasons: (1) pumping consolidated materials such as shell placed more demand on the engine than pumping silt; and (2) the consolidated crusts or "the layer of shell...would not allow that dredge to dissipate the heat" (tr. 1/300). He testified when the engine of a dredge overheated "[s]everal times," that could finally crack the head of the engine (tr. 1/302).

58. QAR Wilson opined at his deposition that "when the dredge was brought on the job it needed an overhaul" (Wilson dep., ex. G-4 at 23). Mr. Barnell countered "there's no life expectancy at the 11,000 hours" for a well maintained engine, and the factors that contributed to the life of an engine included "[h]ow well it was maintained...how well it was run; the conditions, the environment it [ran] in" (tr. 1/298). He testified he visually checked the dredge for leaks and discoloration; he checked the oil compartments for cleanliness; and he started the engine and listened before renting the dredge from Snyder (tr. 1/299).

59. In determining what could potentially cause overheating the dredge engine, we examine OSI's daily QC Reports. We find the reports credible because they were contemporaneously prepared by OSI's quality control representative (QCR), Matt Hart, who was an eye-witness to the dredging conditions encountered on a daily basis, and whose job it was to file the QC Reports with the Corps (tr. 3/80). We also find these reports credible because the Corps had its own QAR at the job site, and the Corps had never complained that the QC Reports over or under stated the materials dredged.

60. We recognize the percentages of the various materials reported were estimates. We believe, however, they provide reliable information on a day-to-day basis, the nature and order of magnitude of the various materials dredged. To us, a day on which Ryan dredged 50% mud and 50% silt was far different from a day on which

Ryan dredged 25% sand, 25% mud, 25% silt and 25% shell because sand and shell were far more difficult to dredge than mud and silt, especially when they existed in a consolidated crust-like state. Moreover, if Ryan was dredging 25% sand and 25% shell for four or five days straight, the difficult dredging condition would more likely put far more stress on Ryan's equipment (engine, booster pump, etc.) than dredging 25% sand and 25% shell once a week or once every 10 days.

61. We noted previously that AS#8 was dredged over a 76-day period from 10 May to 24 July 2010. In our entitlement decision, we found that OSI first notified the Corps on 19 May 2010 that on 13 May 2010 Ryan encountered hard bottom sooner than expected. *Optimum*, 15-1 BCA ¶ 35,939 at 175,643, ¶ 43. We found what the parties believed to be hard bottom turned out to be crusts consisting of whole oyster shells, sand, shell fragments, and at some locations clusters of oysters interlocked with mud and sand. We found that the Corps directed OSI to continue to dredge through the firm layers of crust above the hard bottom. (*Id.*, ¶ 47)

62. The daily QC Reports show that Ryan encountered significant amounts of sand and shell the week preceding the dredge overhaul:

Date	Sand	Mud	Silt	Shell
6/18/2010	0%	50%	50%	0%
6/19/2010	10%	30%	40%	20%
6/20/1010	0%	0%	0%	0%
6/21/2010	35%	20%	25%	20%
6/22/2010	20%	30%	25%	25%
6/23/2010	0%	50%	50%	0%
6/24/2010	0%	50%	50%	0%

(Gov't wit. book, ex. G-2, tab 4[13])

63. Based on the testimonial evidence, we find Ryan carefully selected a suitable and operational dredge for dredging what it expected to be unconsolidated zero-blow count material. Other than unsupported belief, we find no evidence to support the Corps' contention that the rented dredge was "past its useful life." Based upon what OSI QCR's daily QC Reports, we find the most probable cause of engine overheating that ultimately cracked the engine head was the fact that Ryan encountered significant quantities of sand and shell from 19 to 22 June 2010. In any event, dredge downtime would not affect the Measured Mile calculations because that method uses running time hours, not downtime hours.

[13] This exhibit is a summary prepared from the daily QC Reports contained in app. supp. R4, tab 52 at 2469 to 5616.

Dredging into High Spots and Clogging the Dredge Discharge Pipeline

64. The Corps argues that another reason for excluding AS#8 and AS#9 from the Measured Mile calculation was Ryan's failure to use pre-dredge surveys to plan the job. It argues this failure "was detrimental to the production on the project [which] did not result from the DSC." (Gov't br., app'x A at 6)

65. The Corps refers to two incidents. The first occurred on 22 September 2010. QAR Wilson's log reflected that in the late afternoon that day Ryan encountered "some shell material" which "plugged up the dredge discharge pipe between [the] dredge and booster #2 pump," and Ryan's crew was observed "working to unblock the dredge discharge pipe" (app. supp. R4, tab 54 at 5512).

66. QAR Wilson's log stated after probing the area, he found a high spot or mound where the dredge had been dredging before the blockage occurred, and he subsequently confirmed that the high spot was indicated on the pre-dredge survey. He opined:

> It appears that Ryan's crew and management are not reviewing the pre-dredge surveys very closely. Because the leverman was unaware of the high spot/mound and cut right into it plugging the discharge pipe.

(App. supp. R4, tab 54 at 5513) His log went on to say "It was obvious the leverman was unaware of this condition; therefore, caused pipe blockage!" (*id.*).

67. QAR Wilson testified after he brought up the pre-dredge survey, Ryan "had the leverman review the predredge surveys and [kept] a close eye on him." Ryan's dredging superintendent also "went out and started marking the high spots." According to QAR Wilson, after this incident, Ryan did not experience more plugged dredge lines. (Wilson dep., ex. G-4 at 32)

68. Having to un-clog the dredge discharge pipe resulted in downtime. We find the clogging on 22 September 2010 could have been avoided had Ryan's leverman consulted the pre-dredge survey. Because the Measured Mile Method of calculating damages uses dredge running time hours not downtime hours, the 22 September 2010 incident would not affect the Measured Mile damage calculations. Moreover, the incident occurred in AS#1 and not AS#8 or AS#9 (*see* finding 30), and should not have any bearing in considering whether AS#8 and AS#9 should be removed from the Measured Mile calculations. We find to the extent the 22 September 2010 clogging of the dredge pipeline caused downtime, Ryan made up some of the downtime by working double shifts.

69. The second incident of clogging occurred on 13 October 2010: Referring to QAR Wilson's log of 15 October 2010, the Corps' post-hearing brief noted "only one more clogged line" "associated with a mechanical breakdown of the dredge" took place (gov't br., app'x A at 6). QAR Wilson's log of 15 October 2010 indicated that Ryan "stopped dredging on Wednesday [13 October 2010] about 1700 hrs because dredge engine went down with a cracked head. It had overheated prior to that after dredging thru some sand [and] shell material." (App. supp. R4, tab 54 at 5530) OSI's daily QC Reports show Ryan was dredging the following materials just before 13 October 2010:

Date	Sand	Mud	Silt	Shell
10/09/2010	30%	0%	30%	40%
10/11/2010	25%	25%	25%	25%
10/12/2010	25%	25%	25%	25%
10/13/2010	50%	0%	10%	40%

(Gov't wit. book, ex. G-2 at tab 4)

70. We find the 13 October 2010 clogging incident was caused by the high concentration of sand and shell materials encountered in AS#2.

Use of 12-Inch Dredge Pipe

71. The Corps contends that by using a 12-inch dredge pipe on a 10-inch dredge affected Ryan's productivity. For dredging purposes, Ryan purchased 11,000 feet of plastic dredge pipe to run from the dredge, through a booster pump, to the Disposal Area (tr. 1/304). At the hearing, the Corps called as its witness a leverman (dredge operator) with 30 years of dredging experience (tr. 3/17). This witness opined that Ryan's use of a 12-inch dredge pipe behind a 10-inch dredge caused a 20% drop in pumping velocity (gov't wit. book, ex. G-3, tab 20). Being a field person, the witness was unable to explain how he derived the 20% drop in pumping velocity. He testified the information was provided to him by contracting officer's representative (COR) Michael A. Presley (tr. 3/27; gov't wit. book, ex. G-3, tab 22). COR Presley is a civil engineer who has worked in the contract administration section of the Corps' north Florida area office for 12 years since 2003 (tr. 3/69).

72. Documentary evidence shows a 12-inch dredge pipe actually has an outside diameter (O.D.) of 12.750" and an inside diameter (I.D.) of 11.160" (gov't wit. book, ex. G-3, tab 22). Ryan's Mr. Barnell testified that even though Ryan could have purchased a 10-inch discharge pipe (with O.D. of 10.750" and I.D. of 9.409") (*id.*), it chose a slightly larger pipe to "reduce the friction loss" pumping "silt or light sand" (tr. 1/306-07, 309-10). He testified that with silt, it "would've made no difference...whether it was an inch smaller or an inch larger" (tr. 1/259).

73. Based upon unrebutted testimony, we find the use of a 12-inch dredge pipe would have made little productivity difference if Ryan had been dredging zero-blow count unconsolidated sediment with little to some sand, and trace to little sand-sized shell fragments, as described in the contract documents. We find to the extent there was loss in productivity, it was caused by the firm layers of crust in patches and high concentration of broken and whole shells at various locations that Ryan actually encountered. Since Ryan used the same 12-inch dredge pipe in dredging all of the Acceptance Sections, its use would have affected the dredging productivity of all impacted areas to the same degree, and no adjustment needs to be made for comparing the productivity of the impacted dredging areas and the un-impacted dredging area under the Measured Mile Method.

Implementing Dredging Advice

74. Concerned that production was not as expected, Ryan turned to Mr. Humphreys for advice.[14] Mr. Humphreys is a professional civil engineer. He first worked on a dredge in 1962 when he was 19. After graduation from college, he worked in the estimating department and was assigned as a project manager of a dredging company. He was the chief engineer of the dredging division of a large company in Louisiana. He later returned to the dredging company he worked for as its vice president of operations. Since 2001, he has worked as a consultant for dredging and construction companies. (Tr. 1/14-18) Mr. Humphreys prepared Ryan's expert report for the entitlement case (58755, ex. 201). He prepared Ryan's REA which ultimately became OSI's certified claim (tr. 1/18). He also developed and testified to Ryan's various methods of calculating DSC damages (tr. 1/18-249).

75. The Corps contends that Ryan did not follow many of the recommendations Mr. Humphreys made (tr. 1/246). Mr. Humphreys visited Rose Bay on 14 July 2010 when Ryan was dredging AS#8 (tr. 1/241; finding 30). As a result of his visit, Mr. Humphreys wrote two letters, both dated 18 July 2010: The first letter provided his "suggestions about production" (R4, tab 549 at 5157-61); the second letter contained his observations and comments of the plans and specifications he reviewed (*id.* at 5162-68).

76. Mr. Humphrey's first letter observed that Ryan had "very long pipelines" and "material to be dredged that can vary from silt to sand with shell fragments to occasional oyster shells" (R4, tab 549 at 5157). His letter advised that "depending upon how you operate you will have very wide swings in production rates." He advised that other than daily running time and a good leverman, "the most important factor will be the flow rate of the slurry through the pipeline." (*Id.* at 5157) Since the area inside the pipeline was constant, Mr. Humphreys' letter said "flow rate comes down to velocity of the slurry."

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[14] As his firm's letterhead indicated, Construction Consulting Associates, Inc. provides consultations for "THE HEAVY CIVIL, DREDGING, AND MARINE CONSTRUCTION INDUSTRIES" (*see* 58755, ex. 200, tab D-37).

He recommended that Ryan should (1) operate at a "velocity in the 14 - 16 feet/sec. range," and (2) "never have less than a full pipe when dredging anything but the lightest silt or organic material." In order to keep track of the flow rate, Mr. Humphreys recommended that Ryan invest in a velocity meter, and suggested "[a] combination velocity and density meter would be great if not cost prohibitive." (*Id.*)

77. As far as the "booster or boosters" were concerned, Mr. Humphreys' letter said he would "set the controls to run each booster unit at the highest speed that is safe all of the time that the dredge is digging" with certain exceptions. The letter said that he would "try to place the booster(s) so that under normal operating conditions...at least 25-30 psi [is] coming in." (R4, tab 549 at 5160) He advised:

> Whether operating with one booster or two it is very important to have accurate data every day. There are so many things that can affect production when you have long lines, material that varies, and multiple pumping units that if you do not have consistent and dependable information every day you will have a lot of trouble trying to determine what is going on when production varies, or trying to determine what you need to do to increase production.

(*Id.*)

78. Mr. Humphreys' letter also said "given the fact that your pipeline lengths are going to vary, the material may vary, and given the fact that you have two pumps in the system (and probably will have three at some point)" it would be important to maintain certain data (R4, tab 549 at 5158). He also stated "Whether operating with one booster or two, it is very important to have accurate data every day" (*id.* at 5160). Contrary to the Corps' argument (gov't br. at 17), Mr. Humphreys did not say that Ryan must operate with two booster pumps where one was sufficient. Nor did he say that operating with two booster pumps would necessarily improve productivity.

79. Mr. Humphreys' second letter of the same date summarized what he found the borings showed: Nine of the ten borings were in the dredging area, with Borings 2 through 8 west of the U.S. 1 Bridge and Borings 9 and 10 east of the bridge. The letter said west of the bridge, the boring logs showed all of the materials within the dredging template were WOR (Weight of Rods); and east of the bridge, one boring (CB-RB-9) was WOH (Weight of Hammer) and one boring (CB-RB-10) was WOR. Mr. Humphreys summarized the nature and character of the materials Ryan should have encountered in these words:

> The fact that the boring logs indicate that all of your material should be WOR or WOH agrees with the Corps

> general description of material ("...as indicated by the absence of blow count").... This indicates soft material.

The letter advised that in order to have a claim for the tide level, Ryan would have to demonstrate that the low tides it was experiencing were lower than what it could reasonably have expected based upon the best information available at the time of bid. (R4, tab 549 at 5164)

80. Mr. Humphreys explained that his letters were "more of a general, industry suggestions about dredging on a job like that," and did not address "the difference in what was expected and what was encountered" (tr. 1/233).

81. The Corps contends that the "flow" in Ryan's pipeline was less than optimum. The "flow" has to do with the velocity of the materials going through a pipeline; the greater the velocity, the greater the production. The flow in the pipeline would be greater with silt and water than with sand, shell and water. (Tr. 1/136-37)

82. Mr. Charles Hartsfield, the Corps' expert leverman, testified Ryan was dredging at a velocity of as high as 8 fps and as low as 0.52 fps (tr. 3/39-40). It is not clear when and where Ryan was dredging at the time. No record evidence or analysis of the actual flow rate or velocity of the slurry was presented. Mr. Buchanan testified that given what Ryan encountered, there was nothing Ryan could do to increase the flow (tr. 1/264) and the flow would "slow down slightly...if you got into...heavy shell" (tr. 1/263).

83. A velocity or flow meter is used to provide velocity information in the pipeline (tr. 1/237). A velocity meter is "just a gauge" that could be used with normal gauges, vacuum and pressure gauges on a dredge to provide information (tr. 1/308). It does not make pumping more or less efficient. An experienced leverman could gauge the velocity of materials going through a pipeline. (Tr. 1/264, 308) It is common for dredging to be done without a velocity meter. The dredge Ryan rented did not come with a velocity meter. (Tr. 1/308) There was no contract requirement for Ryan to have a velocity meter (tr. 1/238).

84. At Mr. Humphreys' recommendation, Ryan did obtain a velocity meter. Ryan's dredge operators, however, chose not to use the velocity meter but to rely on the vacuum gauges instead (tr. 1/307) Mr. Buchanan explained that his experienced dredge operators would rather use vacuum gauges and go by "the feel" of the dredge (tr. 1/262).

85. Since Ryan did encounter a DSC in all but one of the Acceptance Sections, we find that Mr. Humphreys recommendations, based upon dredging "material...that can vary from silt to sand with shell fragments to occasional oyster shells" (finding 76) and "soft material" as indicated by "the absence of blow count" (finding 79) cannot be

used as a criteria for measuring the flow rate or pumping velocity Ryan could or should have achieved.

Booster Pump Placement

86. The Corps contends that Ryan "experienced numerous issues with the booster pumps installed on the project." It alleges that "[a]fter over 2 months of dredging, the Appellant moved the booster 2000 feet closer to the dredge in an effort to improve production." (Gov't br., app'x A at 5)

87. Because the materials dredged had to be moved from Rose Bay to the Disposal Area, some distance away, a booster pump was needed to maintain the flow rate or velocity of the dredged materials from the dredge to the Disposal Area (Wilson dep., ex. G-4 at 26). As Mr. Humphreys explained, a booster is essentially "a dredge without all the winches and spuds. It's an engine and a pump," and its purpose is to add "head" "to push the slurry from the dredge to the disposal area" (tr. 1/114).

88. To dredge Rose Bay, Ryan rented two boosters (tr. 1/280). Ryan brought one booster to the site initially (tr. 1/281). It then rented the second booster as a spare in the event the first booster failed. Using both boosters at the same time would not have increased the efficiency of dredging. (Tr. 1/286) As the distance between the dredge and the Disposal Area increased, the pressure of the booster could start to drop. In that case, the booster would have to be moved. Mr. Ryan testified "depending [on] how far from the dump we were we'd have to put in the second booster. We never had to do that." (Tr. 2/90)

89. QAR Wilson testified that when Ryan initially set up its dredging operations, it positioned the booster pump "about halfway between the dredge and the disposal area" (Wilson dep., ex. G-4 at 27). According to QAR Wilson, during dredging of AS# 8 and AS#9, Ryan "moved the booster right up behind the dredge at one time" and then moved the booster "back to the original position" (*id.* at 28-29) suggesting that Ryan did not know what it was doing.

90. Opinions varied as to where the booster should be placed. According to QAR Wilson, typically, a booster should be placed halfway or "somewhere close to halfway" between the dredge and the Disposal Area. He acknowledged, however, it was up to Ryan to place the booster pump where it believed was most efficient. (Wilson dep., ex. G-4 at 60-61). The Corps' expert leverman report stated "The booster should have been no more than 500' behind the dredge, and remain 500' the entire job in order to maintain proper vacuum, discharge pressure and velocity. All discharge pipe should have been added behind the booster. By maintaining 500' from the booster working pressure would be the same from start to finish." (Gov't wit. book, ex. G-3, tab 20) At the hearing, he testified if the materials to be dredged had

been primarily silt with some sand and shell, the best location for the booster would still be 500' behind the dredge (tr. 3/20).

91. After his consultation trip to Rose Bay in July 2010, Mr. Humphreys recommended moving the booster closer to the dredge (R4, tab 549 at 5158). He explained at the hearing where the booster was placed made no difference "up to the point...where you have less than zero pressure coming in and then it makes a difference" (tr. 1/178). He testified he recommended moving the booster closer to the dredge because "the incoming pressure to the booster was getting very low," although still positive (tr. 1/118, 177). He suggested moving the booster closer to the dredge "to avoid taking a chance," and Ryan eventually "moved it back out again" (tr. 1/118). On 16 July 2010, Ryan moved the booster pump to within 2,000 feet of the dredge (app. supp. R4, tab 54 at 5464).

92. Mr. Buchanan testified "[t]he problem wasn't the booster. It was the materials difference that prompted us to try to move the booster to another location." (Tr. 1/260) He testified changing the booster placement was "[j]ust to try something different" with the idea that "maybe if [the booster] got close to the back end of the dredge that... might help...with the oversized material" (tr. 1/261). After the booster was moved closer to the dredge, it could be operated at a higher and more efficient rpm. This, however, created too much pressure from the dredge discharge and created air inside the impellers causing cavitation and overheating in the pump. (Tr. 1/283) Ryan then moved the booster back out to between 4,000 to 4,500 feet from the Disposal Area. According to Mr. Buchanan, the dredge "worked pretty well the rest of the job in that same location," and Ryan "never moved it again." (Tr. 1/283)

93. Based on the evidence in the record, we find where the booster pump should be placed depended upon the particular circumstances of dredging. Given the DSC encountered in AS#8 and AS#9, we cannot conclude that moving the booster pump back and forth to address the crusts it was directed to dredge reflected a lack of proficiency in Ryan's dredging operations. We find moving the booster pump was a part of the learning Ryan went through to address the DSC it encountered as it dredged further and further away from the Disposal Area.

Booster Pump Replacement

94. When the booster overheated and broke down and had to be replaced while dredging AS#9, the Corps contends the breakdown was not the result of encountering a DSC but the result of Ryan's "inefficiencies" and "incompetencies" (tr. 1/112). Ryan dredged AS#9 between 26 July and 19 August 2010 (*see* finding 34). QAR Wilson's log of 6 August 2010 noted "Ryan has mobilized another booster pump" (app. supp. R4, tab 54 at 5472).

95. OSI's daily QC Reports immediately preceding the booster pump breakdown show Ryan encountered an area of heavy sand and shell concentration:

Date	Sand	Mud	Silt	Shell
8/2/2010	25%	25%	25%	25%
8/3/2010	25%	25%	25%	25%
8/4/2010	25%	25%	25%	25%
8/5/2010	25%	25%	25%	25%
8/6/2010	25%	25%	25%	25%

(Gov't wit. book, ex. G-2, tab 4 at 2)

96. We find from 2 to 6 August 2010, immediately preceding the booster pump breakdown, Ryan was dredging 25% sand and 25% shell every day for an entire week. We find the most probable cause of the booster pump breakdown and the downtime experienced was the high content of sand and shell encountered prior to the breakdown. Ryan has acknowledged that it was responsible for the booster problems that occurred on 7 to 9 August 2010 (*see* finding 21 n.6)

Treatment of AS#8 and AS#9 in the Corps' Measured Mile Calculation

97. The Corps contends that Ryan "had a huge learning curve due to the shallow bay and long pipeline" (gov't br. at 32). It argues that "[w]hile the production problems in AS-8 and 9 may have been partially due to the DSC, the poor production was more strongly influenced by the contractor's 'learn curve.'" The Corps argues that "AS-8 and AS-9 must be removed during the determination of the gross production achieved for comparison to the control period" (gov't br., app'x A at 5).

98. The Corps' post-hearing brief attached as Appendix B a 12-page list entitled "RYAN SOUTHERN DREDGING ISSUES" (gov't br., app'x B). The list purports to show examples that "Appellant had a huge learning curve due to shallow bay and a long pipeline" (gov't br. at 32-33). The Corps did not provide this list before or during the hearing. While some of the events were addressed by QAR Wilson at his deposition and Ryan was able to provide a rebuttal at the hearing, most of the events were cryptically written and incomprehensible absent proper context. We do not find the list helpful in distinguishing events which were differing site condition-caused versus those caused by Ryan's learning curve.

Ryan's Proposed Adjustment in Using the Measured Mile Method

99. For purposes of determining damages using the Measured Mile Method, the production rate of AS#7 is used to establish what Ryan could have achieved absent the differing site conditions encountered. If the Measured Mile Method is to be used, Ryan

proposed three adjustments: (a) a 10% adjustment for encountering some shell and consolidated material in AS#7 in sufficient quantities to have some impact; (b) a 10% adjustment for installing rebars across the suction mouthpiece of the dredge in AS#7; and (c) an adjustment taking into account running time reported in AS#7 that was actually running time dredging in AS#1 and AS#2. (Compl., ex. B, calculations A and B)

(a) Ryan's Proposed Adjustment for Encountering Some Shells and Consolidated Materials in AS#7

100. Based upon a question from Ryan's counsel, Mr. Humphreys testified he knew shells were in AS#7 because he saw them there and he heard "other testimony about it." He also testified he saw the Corps' cross-sections. (Tr. 3/90) He acknowledged, however, that cross-sections horizontally and vertically could be exaggerated for depiction purposes by "a factor of five" (tr. 1/217).

101. AS#7 was dredged during a 24-day period between 25 August and 17 September 2010 (finding 34). The daily QC Reports during this period reported 0% sand and 0% shell were encountered:

Date	Sand	Mud	Silt	Shell
8/25/2010	0%	50%	50%	0%
8/26/2010	0%	50%	50%	0%
8/27/2010	0%	50%	50%	0%
8/28/2010	0%	50%	50%	0%
8/29/2010	0%	0%	0%	0%
8/30/2010	0%	50%	50%	0%
8/31/2010	0%	50%	50%	0%
9/1/2010	0%	50%	50%	0%
9/2/2010	0%	50%	50%	0%
9/3/2010	0%	50%	50%	0%
9/4/2010	0%	50%	50%	0%
9/5/2010	0%	0%	0%	0%
9/6/2010	0%	0%	0%	0%
9/7/2010	0%	50%	50%	0%
9/8/2010	0%	50%	50%	0%
9/9/2010	0%	50%	50%	0%
9/10/2010	0%	50%	50%	0%
9/11/2010	0%	50%	50%	0%
9/12/2010	0%	0%	0%	0%
9/13/2010	0%	50%	50%	0%
9/14/2010	0%	50%	50%	0%
9/15/2010	0%	50%	50%	0%

9/16/2010	0%	50%	50%	0%
9/17/2010	0%	50%	50%	0%

(Gov't wit. book, ex. G-2, tab 4)

102. Weighing the evidence, Mr. Humphreys' testimony is too weak to overcome OSI's contemporaneously prepared daily QC Reports. Ryan never notified OSI or the Corps that it encountered a DSC in AS#7 as it did in other Acceptance Sections. Also, based on the Geotechnical Data Report's definition, we have found that "a prospective contractor should expect to dredge whole or broken shells up to three inches in diameter." *Optimum*, 15-1 BCA at 175,638, ¶ 13. Thus, encountering some shells should be expected. We find there were not enough areas of consolidated sand and shell ("crust"), if they existed at all in AS#7, to have any meaningful adverse impact on dredging production to warrant a 10% adjustment to AS#7's production rate that Ryan advocated.

(b) Ryan's Proposed Adjustment to AS#7 as a Result of Welding Rebars to the Suction Mouthpiece

103. In calculating damages using the Measured Mile Method, Mr. Humphreys proposed a 10% adjustment to the average gross production per hour in AS#7 to account for the adverse impact to production from welding rebars over the suction mouthpiece of the dredge (compl., ex. B, calculation A.). This adjustment has the effect of raising Ryan's productivity in the un-impacted AS#7 thus widening the productivity difference between AS#7 and the impacted areas.

104. The Corps objected to this adjustment because (1) "it is not supported by any data and purely opinion"; (2) "there is no documentation of a screen being installed for the work in AS-7"; and (3) "the screen was installed October 9, several weeks after the dredging in AS-7 was complete" (answer at 35).

105. Mr. Buchanan testified that the dredge it rented "came with [a] partial screen" on the suction inlet (tr. 1/268, 278, 288). As a result of its experience dredging AS#8 and AS#9, Ryan welded rebars to the original screen when it reached AS#7 "to try to cut down on some of the larger shells" which were clogging up the pump (tr. 1/278). After Ryan finished dredging AS#7, it purchased a "commercially-manufactured...Gatling" which was mounted to the back of the cutter head to "further help to reduce the oversized material getting through" (tr. 1/269). We find the Gatling was the screen QAR Wilson referred to as having been installed "may be 8 or 9 October [2010]" (Wilson dep., ex. G-4 at 29-30). The rebars Ryan welded over the suction intake was not the same as the Gatling Ryan installed in October 2010. The adjustment Ryan proposed pertained to the rebars it installed when it reached AS#7.

106. The Corps questioned Ryan's 10% adjustment for lack of support. At the hearing, Mr. Humphreys explained that his calculation was based on an equation used in a thesis on the subject of "MEASURING THE EFFECTS OF CUTTER SUCTION DREDGE OPERATING PARAMETERS ON MINOR LOSSES DUE TO FIXED SCREENS INSTALLED AT SUCTION INLET" submitted by a Master of Science Ocean Engineering student to the Office of Graduate and Professional Studies of Texas A&M University (app. wit. book, tab 22 at 1722). Using the equation, Mr. Humphreys calculated a 12.61% reduction in production on account of the rebars. In comparing the screens shown in the thesis (*see id.* at 1770, figure 11) and the sketch of the bars Mr. Humphreys drew for his calculation (*id.* at 5745), we find they look totally dissimilar.

107. Mr. Buchanan described the rebars Ryan added as "something that sticks out on the sides and goes around so that it stops the material from getting through" (tr. 1/276) which fits Mr. Humphrey's sketch. At the hearing, he volunteered "[t]he rebar screen that we put on there had no impact at all on the flow, nothing" (*id.*), and did not restrict the flow of dredged materials (tr. 1/277). He later changed his testimony based upon a question from counsel:

> Q. Okay. Now, that second screen that was put on there with the rebar is going to necessarily affect the flow of material in – it's going to restrict it somehow into the pipe. Correct? Because you've got rebar, you've got now things covering the opening to a certain degree.
>
> A. If you're over the direct intake on the pipe it will affect it.

(Tr. 1/288) Weighing the evidence, we find Mr. Buchanan's initial testimony more credible. We find the rebars Ryan welded to the dredge's suction mouthpiece made too little difference, if at all, to warrant a 10% upward adjustment to Ryan's AS#7 production rate.

108. AS#7 was the third Acceptance Section dredged. After AS#7, Ryan went on to dredge six more Acceptance Sections (AS#1 through AS#6) (finding 34). Thus, if the welded bars affected the production rate of AS#7, they would have the same effect dredging AS#1 through AS#6. The Measured Mile Method compares the difference in production rates between an impacted and an un-impacted area assuming all other conditions, including the equipment used, remains the same. Here, the same equipment – a 10-inch dredge with bars welded across the suction intake – was used in AS#7 and AS#1 through AS#6. Making an adjustment to account for the effect of the welded bars for AS#7 without making the same adjustment for AS#1 through AS#6 would introduce a variable for no reason into the Measured Mile calculations. We recognize AS#8 and AS#9 were dredged without the welded bars. In averaging the

production rates of all eight impacted Acceptance Sections, as we will do in our Measured Mile calculations, the effect of the welded rebars will, to whatever extent existed, be included in the average production rate achieved in the impacted areas.

109. The Corps posits that "it was not the material that was impacting production, but rather other factors which were the responsibility of the Appellant" (gov't reply br. at 50). As support, the Corps points out that in AS#6, an Acceptance Section that was 2,500 feet further away from the Disposal Area than AS#7, where 25% shell was dredged for the entire duration it was dredged (19 January to 7 February 2011) (*see* gov't wit. book, ex. G-2, tab 4), had a comparable production rate as AS#7 (195 gross c.y./hr. for AS#6 compare to 210 gross c.y./hr. for AS#7)[15] (*id.*). After the Gatling was installed in October 2010 when Ryan finished dredging AS#7, there was a noticeable production improvement in dredging AS#1 through AS#6 (*see* finding 117). We find installation of the Gatling made the difference as Ryan learned to dredge DSC materials.

(c) <u>Ryan's Adjustment to AS#7's Running Time for Dredging into AS#1 and AS#2</u>

110. AS#7 shared common borders with AS#1 and AS#2. To ensure that AS#7 was dredged to the required depth at the boundaries, Ryan dredged slightly into AS#1 and AS#2 while dredging AS#7. Estimating that it dredged 10 feet into AS#1 and AS#2, and based upon 1,555 feet of common sides between AS#7 and AS#1 and AS#2, Ryan estimated it dredged 15,500 square feet into AS#1 and AS#2. Estimating that it was dredging approximately 2,060 square feet per running hour in AS#7, Ryan calculated that 7.5 hours of dredge running time in AS#7 was actually dredging AS#1 and AS#2. According to Ryan, the daily reports logged 196.5 hours of total running time dredging AS#7. Deducting the 7.5 running hours dredging AS#1 and AS#2, Ryan arrived at 189 hours of dredge running time in AS#7. (Compl., ex. B, calculation A, note 1) In its post-hearing brief, Ryan changed the 7.5 hours to 4.6 hours to arrive at 191.9 hours as the AS#7 dredging running time (app. br., app'x B at 1, 3). Reducing the dredge running hours in AS#7 has the effect of increasing the productivity rate for AS#7 which, in turn, would increase Ryan's recovery under the Measured Mile calculations.

111. The Corps objected to this adjustment because the extent to which AS#1 and AS#2 was dredged was, in its words, "speculation." The Corps argued that this adjustment was unnecessary because "a proportional amount of dredging 'beyond the lines' would be required to clear all of the other sections." (Answer at 34) The Corps used 39,548 c.y. (*see* finding 116) as the amount of materials dredged in AS#7. The Corps used 199.25 hours as the actual AS#7 running time (*see* finding 116). For purposes of the Measured Mile calculation, we will use 199.25 hours as the AS#7 dredge running time.

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15 We computed 197.74 c.y./hr. as the production rate of AS#6 and 198.48 c.y./hr. as the production rate for AS#7 (*see* finding 116).

112. We find cross border dredging occurred in every Acceptance Section (*see* 58755, ex. 200, tab D-2, schematic at 107-08). We find the adjustment Ryan proposed would treat AS#7 differently when the same cross border dredging occurred in every Acceptance Section, contrary to the Measured Mile Method of calculation in keeping the same conditions constant.

Key Numbers in Calculating Damages Using the Measured Mile Method

113. After dredging was completed in each Acceptance Section, the Corps had ARC Surveying & Mapping, Inc. (ARC) survey the volume of materials dredged. The ARC surveys reported:

AS No.	Report Date	Volume Dredged (c.y.)
AS#1	12 October 2010	19,434
AS#2	16 November 2010	21,875
AS#3	14 December 2010	31,963
AS#4	14 December 2010	34,822
AS#5	19 January 2011	30,963
AS#6	9 February 2011	24,767
AS#7	12 October 2011	39,548
AS#8	20 August 2011	28,161
AS#9	20 August 2011	19,024
	Total	250,557

(Gov't wit. book, ex. G-2, tab 10) The volume of materials dredged in each Acceptance Section as shown in the table above has not been disputed by Ryan.

114. Based upon ARC's post-dredge survey, we accept 39,548 c.y. as the volume dredged in AS#7. We will use 39,548 c.y. in our Measured Mile calculation.

115. Based upon ARC's post-dredge survey, we accept 250,557 c.y. as the total volume dredged from all nine Acceptance Sections.

116. The pumping hours in the rest of the Acceptance Sections are not in dispute (gov't wit. book, ex. G-2, tab 9 at 2). By dividing the volume dredged in each Acceptance Section by the corresponding pumping hours logged in that Acceptance Section, the production rate (in c.y. per hour) in each Acceptance Section can be calculated:

AS No.	Pumping Time	Volume Dredge (c.y.)	Production Rate (c.y./hr.)
AS#1	113.13	19,434	171.78
AS#2	148.00	21,875	147.80
AS#3	211.00	31,963	151.48
AS#4	200.63	34,822	173.56
AS#5	267.75	30,963	115.64
AS#6	125.25	24,767	197.74
AS#7	199.25	39,548	198.48
AS#8	432.75	28,161	65.07
AS#9	189.25	19,024	100.52
Total	1,887	250,557	

117. Based upon the sequence of dredging, we find there was a steady improvement and leveling off in production rates as Ryan proceeded from one Acceptance Section to another. We find this improvement was due partly to learning and implementing the lessons learned:

Order Dredged	AS No.	Production Rate (c.y./hr.)
1	AS#8	65.07
2	AS#9	100.52
3	AS#7	No DSC
4	AS#1	171.79
5	AS#2	147.80
6	AS#3	151.48
7	AS#4	173.57
8	AS#5	115.64
9	AS#6	197.74

118. Excluding the un-impacted AS#7, we calculate the average production rate of all impacted Acceptance Sections (AS#1 – AS#6, AS#8 and AS#9) to be 125.02 c.y./hr.:

AS No.	Pumping Time	Volume Dredge (c.y.)	Production Rate (c.y./hr.)
AS#1	113.13	19,434	171.78
AS#2	148.00	21,875	147.80
AS#3	211.00	31,963	151.48
AS#4	200.63	34,822	173.56
AS#5	267.75	30,963	115.64
AS#6	125.25	24,767	197.74
AS#7			
AS#8	432.75	28,161	65.07
AS#9	189.25	19,024	100.52
Total	1,687.76	211,009	125.02 (average)

We will use 125.02 c.y./hr. as the average production rate achieved in the impacted areas for comparison with the 198.48 c.y./hr. production rate achieved in the un-impacted AS#7 (*see* finding 116) in our Measured Mile calculations.

119. Ryan booked a total of $2,381,385.48 on the Rose Bay project (app. wit. book, tab 5). Removing mobilization/demobilization, consulting, legal, and other disallowed costs, Ryan's actual dredging cost was $1,778,473.54 (*id.*, tab 6). Adding 19.92% G&A ($354,272) and 10% profit ($213,275) to $1,778,473.54, Ryan calculates its actual direct job cost for dredging work only to be $2,346,021 (app. br., app'x B at 4, note 2). Ryan calculates its average dredging running cost per hour to be $1,242.86 ($2,346,021/1,887.6 hrs.[16]) (*id.* at 3). At the hearing, the Corps sought to reduce Ryan's per hour running rate (gov't wit. book, ex. G-2, tab 19; tr. 2/193-95). The Corps' post-hearing brief argues "[t]he 'hourly pumping rate' should only include costs directly related to the excavation operation" such as "labor, equipment and gasoline." It concedes that "without better information the Government is unable to calculate a different rate. (Gov't br. at 47) In calculating Ryan's DSC damages, we will use $1,242.86 ($2,346,021/1,887.6 hrs.) as the dredge running cost per hour.[17]

120. In 2010, Mr. Humphreys sent Ryan one invoice dated 26 October 2010 in the amount of $3,348.46. This invoice was for (1) traveling to the Rose Bay job site on 27 September 2010 to discuss dredging progress and what was believed to be a differing

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[16] Ryan's actual pumping hours of 1,887.6 hours varies slightly with our pumping hours of 1,887 (*see* finding 116). We accept 1,887.6 hours because the variation is insignificant and the Corps used $1,242.86, calculated from using 1,887.6 pumping hours in its Measured Mile calculations (finding 119 n.12).

[17] The Corps did not challenge Ryan's $1,242.86 dredge running rate per hour in response to Ryan's Proof of Cost submission (*see* compl., ex. B, calculation A at 2, calculation B at 3). The Corps actually used the $1,242.86 rate in its own calculations of what it believed was Ryan's entitlement (*see* answer at 36). The Corps could have audited Ryan's costs but did not do so.

site condition; (2) drafting a recommended response to the ACO on what was believed to be a differing site condition; and (3) traveling to the job site on 13-14 October 2010 to view the materials in AS#3, AS#4, AS#5 and AS#6 and at the Disposal Area. (58755, ex. 200, tab D-37 at 297-98)

121. In 2011, Mr. Humphreys sent Ryan five invoices totaling $22,749.19: (1) 30 April 2011 invoice for $5,419.61 for discussing the DSC and reviewing daily dredge reports; (2) 31 August 2011 invoice for $2,463.75 for preparing an REA; (3) 30 September 2011 invoice for $7,298.06 for preparing the REA; (4) 30 November 2011 invoice for $1,998.77 for preparing the REA; and (5) 31 December 2011 invoice for $5,569.00 for meeting with OSI to discuss the DSC (58755, ex. 200, tab D-37 at 299-308).

122. In 2012, Mr. Humphreys sent Ryan four invoices totaling $16,875.00: (1) 31 January 2012 invoice for $4,725.00; (2) 30 April 2012 invoice for $7,256.25; (3) 22 June 2012 invoice for $2,025.00; and (4) 20 July 2012 invoice for $2,868.75. All four invoices were for continued preparation of the REA (58755, ex. 200, tab D-37 at 309-16).

123. As a part of its 31 July 2012 REA submitted to OSI, Ryan sought $55,104.19 for outside consultant assistance and in preparing its REA (58755, ex. 200 tab D at 47). The REA included the 10 invoices Mr. Humphreys submitted to Ryan through his firm Construction Consulting Associates, Inc., up through 20 July 2012, a month prior to submission of Ryan's REA (*id.*, tab D-37) to OSI. The REA provided the breakdown for the costs requested:

Cost Elements	Amount
Direct cost, outside consultant, 2010	$3,348.46
Home office overhead @ 20.52% (2010 rate)	$687.10
Direct cost, outside consultant, 2011	$22,749.19
Home office overhead @ 16.24% (2011 rate)	$3,694.47
Direct cost, outside consultant, 2012 (through 7/20/2012)	$16,875.00
Home office overhead @ 16.24% (2011 rate)	$2,740.50
Subtotal	$50,094.72
Profit at 10%	$5,009.47
Total amount requested	$55,104.19

(58755, ex. 200, tab D at 47)

124. We find all of the invoices totaling $42,972.65 ($3,348.46 + $22,749.19 + $16,875.00) were for Mr. Humphreys' consulting services and for preparing Ryan's REA in connection with what we ultimately found to be a differing site condition. At $135.00 per hour, we find Mr. Humphreys' fees, on the bases of his expertise (*see* finding 74) and the comprehensive nature of the REA in the record (*see* 58755,

ex. 200) reasonable and allocable to the additional DSC costs Ryan incurred. One month after Mr. Humphreys submitted his 20 July 2012 invoice to Ryan, OSI submitted its REA to the Corps. As OSI's 30 August 2012 REA cover letter stated, it sought an administrative resolution through a meeting, discussion and negotiation (finding 3). We find what Ryan incurred was not in connection with the prosecution of claims or appeals against the federal government. The Corps has not disputed the professional and consultant service costs nor their associated overhead and the profit claimed.

125. The Corps agrees that OSI is entitled to apply the following markups to the amount found due:

Markup Elements	Percentages
Field Office Overhead (FOOH)	22.40%
Home Office Overhead (HOOH)	20.40%
Profit	5.66%
Bond	1%

(App. wit. book, tab 26 at 301)

Time Extension and Liquidated Damages

126. Contract 0033 includes FAR 52.211-2, LIQUIDATED DAMAGES – CONSTRUCTION (SEP 2000) which provides that the contractor shall pay the government $1,329.37 in liquidated damages for each calendar day of delay until the work is completed and accepted (R4, tab 505 at 455).

127. FAR 52.211-10, COMMENCEMENT, PROSECUTION, AND COMPLETION OF WORK (APR 1984) required OSI to begin work within 30 calendar days and to complete the work within 324 calendar days after receiving notice to proceed (NTP)[18] (R4, tab 505 at 455).

128. In our decision on the construction of the Disposal Area, we found that "OSI acknowledged receipt of the NTP on 5 August 2009, thus establishing 25 June 2010 as the contract completion date." *Optimum Services, Inc.*, ASBCA No. 57575, 13 BCA ¶ 35,412 at 173,716, ¶ 14. QAR Wilson's log of Tuesday, 11 May 2010

[18] The 324-day contract performance period included (1) 30 calendar days for mobilization and demobilization, (2) 116 calendar days for the base item, (3) 130 calendar days for Option A, (4) 20 calendar days for Option B, and (5) 28 calendar days for Option C. The "Base bid" refers to the "Disposal Area Dike Construction & Other Disposal Area Related Tasks." Option A refers to AS#1 through AS#6; Option B refers to AS#7; and Option C to AS#8 and AS#9. (R4, tab 505 at 455)

indicated that Ryan started dredging on Monday, 10 May 2010 (app. supp. R4, tab 54 at 5422). His log of 10 February 2011 indicated Ryan finished dredging AS#6 and cleaned up AS#5 on Monday, 7 February 2011 (*id.* at 5588). The parties do not dispute and we find that Ryan began dredging on 10 May 2010 and finished on 7 February 2011, a period of 272 calendar days.

129. OSI's president, Daniel Eastman, testified that the Corps had withheld 225 calendar days of liquidated damages from his firm (tr. 2/52). At $1,329.37 per day, the Corps had thus withheld $299,108.25 ($1,329.37 x 225) in liquidated damages. Since the contract completion date was 25 June 2010, the Corps considered OSI/Ryan's delay to Saturday, 5 February 2011 (25 June 2010 + 225 calendar days) inexcusable. At the hearing, Mr. Eastman agreed to absorb all but 93 calendar days of liquidated damages or 132 calendar days (225 c.d. – 93 c.d.).[19] (Tr. 2/49-50)

130. While the Corps has withheld liquidated damages, it has not formally assessed them (tr. 1/68-69). Nor has Ryan, through OSI, claimed the return of any liquidated damages.

131. In contending that it is entitled to 93 days of time extension, Ryan did not provide any schedule analysis. Ryan argues that since dredging was the only thing left to do "other than maintaining the seeding and mulching at the disposal area," all dredging work was critical (tr. 1/167, 2/51).

132. When Ryan bid the project, it estimated it could finish dredging Rose Bay in six months or 179 calendar days working one shift a day (tr. 1/67). We find that based on its original plan, Ryan expected to finish by, Saturday, 6 November 2010 (10 May 2010 + 179 days). Ryan contends that due to the DSC, dredging took "a lot longer than anticipated" (tr. 1/66). Its claim for 93 days of extension is based on the difference from 6 November 2010 to 7 February 2011. This simple analysis reached the same result as its more elaborate calculations first advanced in its REA (58755, ex. 200, tab D-48), and subsequently used in its post-hearing brief with minor revisions (app. br., app'x A at 5-6).

133. In its brief, Ryan first calculates the average dredge running time per calendar day of 6.94 hours by dividing 1,887.49 hours of total dredge running time by 272 calendar days of dredging duration. It then deducted 16,916 c.y. of sand dredged as what it should have expected and thus not claimed, from the 250,558 c.y. of total materials dredged to arrive at 233,642 c.y. of expected silt material dredged. Based on its estimated production rate of 222 c.y./hr. dredging silt, Ryan calculates it should have taken 151.6 calendar days to dredge 233,642 c.y. of silt (233,642 c.y./222 c.y./hr. x 6.94

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[19] We denied OSI's DSC claim on the construction of the Disposal Area. *Optimum*, 13 BCA ¶ 35,412, *aff'd, Optimum Services, Inc. v. McHugh*, 582 F. App'x 879 (Fed. Cir. 2014).

hrs./day). Ryan calculates that it should have taken an additional 27.4 calendar days to dredge 16,916 c.y. of sand at a production rate of 89 c.y./hr. (16,916 c.y./89 c.y./hr. x 6.94 hrs./day). Adding 151.6 calendar days to dredge silt and 27.4 calendar days to dredge sand, Ryan contends it should have taken 179 calendar days to finish Dredging Rose Bay (151.6 c.d. + 27.4 c.d.). Since actual dredging took 272 calendar days—from 10 May 2010 to 7 February 2011—Ryan contends it is due a time extension of 93 calendar days (272 c.d. – 179 c.d.). This calculation uses volumes of sand calculated for the Factor Method. Ryan did not have a different calculation for the Measured Mile Method. (App. br., app'x A at 5-6)

134. The Corps acknowledged that Ryan is entitled to a time extension as a result of the Board's entitlement decision. It calculated the time extension by dividing the additional chargeable dredging time by the number of working hours per day (assumed to be 24 hours per day) (DSC Pumping Time/EWT).[20] Using this formula, which depends on its Measured Mile Method calculation, the Corps reached the result that Ryan is entitled to a time extension of 25 days:

$$\text{Days} = \frac{\dfrac{\text{Impact of DSC (Pumping Time)}}{\text{EWT}}}{\text{Working hours per day}} = \frac{\dfrac{289\text{ hrs.}}{0.486}}{24\text{ hrs./day}} = 25\text{ days}$$

(Gov't br., app'x A at 9)

135. As explained at the hearing, Ryan performed preparatory work in order to be able to pump or dredge every day. In order to compensate Ryan for this preparatory work, a ratio referred to as the Effective Working Time (EWT) was developed. (Tr. 2/150) Ryan used an EWT of 43.2% (compl., ex. D); the Corps used 48.6%. Neither party has explained how its EWT was derived. Since the parties are relatively close, we use 45% as the EWT for determining the time extension Ryan is due on account of the differing site conditions encountered. Although skewed in its own favor, we find the time extension formula the Corps proposed reasonable because it takes into consideration: (1) the additional dredging time caused by the DSC in the impacted Acceptance Sections used in the Measured Mile calculations; (2) an EWT ratio in recognition of the prepartory work Ryan had to do to be able to dredge everyday; and (3) Ryan's working hours per day.

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[20] Effective Working Time, which the Corps defines as the ratio of time specifically spent pumping to the total dredging time chargeable to the cost of work (gov't br., appx. A at 3).

DECISION

In our entitlement decision, we concluded that OSI/Ryan has proven, by a preponderance of the evidence, all of the elements of a Type I differing site condition, and is entitled to an equitable adjustment of its contract price. We remanded the case to the parties for determination of the quantum of adjustment and the extent of the delay experienced by OSI/Ryan. *Optimum*, 15-1 BCA ¶ 35,939 at 175,659. The parties were unable to resolve their differences. Consequently, a hearing to address quantum and project delay issues was held.

Ryan advances three alternate methods or theories of recovery: (1) the Factor Method; (2) the Modified Total Cost Method; and (3) the Measured Mile Method (finding 12). Ryan argues that the Factor Method would be the most appropriate way to determine its DSC damages (finding 14). The Corps contends that calculating damages using the Factor Method would not be "accurate or acceptable" because there is no way to distinguish between the differing site condition-related and the non-differing site condition-related sand and shells dredged (finding 28). The Corps maintains that "[t]he best method of determining damages is to calculate the effect on productivity that was caused by the differing site condition" by using the Measured Mile Method with certain adjustments to the impacted areas (finding 27). Although not its first choice, Ryan does not object to the Measured Mile Method but urges us to make certain adjustments to the productivity of the un-impacted area – AS#7 (finding 32).

Ryan's Factor Method

Ryan's proposed Factor Method is based upon the "Material Factors" in Dr. John B. Herbich's *Handbook of Dredging Engineering*. "Material Factors" were developed for different sediment types. (Finding 15) For example, composite shell, with a Material Factor of 0.5 would be twice as difficult and therefore more expensive to dredge than loose sand with a Material Factor of 1; and sand with a Material Factor of 1 would be three times as difficult and therefore more expensive to dredge than silt and mud with a Material Factor of 3. Using the Material Factors for sand and shell, Ryan adjusts its bid unit price of $8.06 per c.y. based upon dredging mud and silt. To arrive at the additional cost it claims it is entitled, Ryan multiplies the adjusted bid unit price for sand and shell by the volumes of sand and shell it calculates it dredged. (Finding 16)

While the Factor Method has been used for pre-performance estimating purposes, such as forward-pricing a change or estimating the cost of a project for bid evaluation purposes (finding 20), the principal problem we have with the method is that it does not take into account a contractor's execution of the work, from planning, to using the right equipment, to having qualified personnel on the job. It is one thing if the Corps ultimately fails to prove Ryan may itself be responsible for a part of the costs it claims, the Factor Method makes no provision for any adjustments due to the fault of the contractor. Indeed, Mr. Humphreys acknowledged that the inefficiencies that were not the Corps' responsibility would not be a part of the Factor Method of damage calculations. And, the principal reasons Ryan chose the Factor Method was that it would "[get] rid of all [the Government's] argument...about inefficiencies," and "clean[] up all [of the Corps'] issues that have surfaced in this trial." (Finding 19)

In its post-hearing brief, Ryan argues that *Holloway Construction Company and Holloway Sand and Gravel Co.*, ENG BCA No. 4805, 89-2 BCA ¶ 21,713, "discussed quantum of recovery in a manner consistent with the Appellant's [Factor Method] approach to calculating damages" (app. br. at 5). The specific language in the decision that Ryan relied upon stated:

> We consider that the adjustment should be measured by the difference in production costs and related reasonable expenses in dredging the "hard clay" (or glacial till layer) with substantial quantities of C&Bs [cobbles and boulders] throughout and dredging that layer without, or, at most, with nominal quantities of, C&Bs, as reasonably indicated in the contract, excluding problems attributable to non-pay dredging.

Holloway, 89-2 BCA ¶ 21,713 at 109,191.

As Ryan's brief acknowledged: "The decision did not reach the issue of the specific damages calculation methodology to use for purposes of calculating the difference in productivity for the differing material" (app. br. at 6 n.2).

Ryan also relied on *D.W. Sandau Dredging*, ENG BCA No. 5812, 96-1 BCA ¶ 28,064, *aff'd*, 96-2 BCA ¶ 28,300, where the Board held that a dredging contractor that encountered sand instead of muck in a particular area was entitled to compensation for a Category I differing site condition. In that case, the Board found "As median grain size increases, dredge production decreases." (*Id.* at 140, 156) While Ryan argues that "the general analysis of declining dredge production rates as the grain size of the dredged material increases...is consistent with the Appellant's approach here," Ryan nonetheless acknowledges that the decision "did not reach the issue of the finite calculation of the quantum of damages" (app. br. at 6).

We do not read the Engineers Board's general instructions in these decisions as mandating the use of the Factor Method or precluding the use of another method based upon project records.[21] Due to the lack of precedent in using the Factor Method in a

[21] Nor are that Board's decisions binding on this Board.

post-performance dispute scenario, we are not persuaded that the method is appropriate in this case.

The Modified Total Cost Method

The Modified Total Cost Method was derived from the Total Cost Method which the Court described as a method of "last resort" to be used in "extraordinary circumstances where no other way to compute damages was feasible." *Servidone Constr. Corp. v. United States*, 931 F.2d 860, 861-62 (Fed. Cir. 1991). The theory was developed to "prevent the government from obtaining a windfall stemming from the plaintiff's inability to satisfy all of the elements of the total cost method." *Youngdale & Sons Constr. Co. v. United States*, 27 Fed. Cl. 516, 541 (1993). The Total Cost method requires the contractor to prove: (i) the impracticability of proving actual losses directly; (ii) the reasonableness of its bid; (iii) the reasonableness of its actual costs; and (iv) the lack of responsibility for the added costs. *Servidone*, 931 F.2d at 861. To use the Modified Total Cost Method, we are to use the four elements identified in *Servidone* as "the starting point" from which to adjust a contractor's recovery to reflect its inability to prove any of the four elements. *See Boyajian v. United States*, 423 F.2d 1231 (Ct. Cl. 1970); *MacDougald Constr. Co. v. United States*, 122 Ct. Cl. 210 (1952). Because we can use the widely accepted Measured Mile Method in this case, we need not resort to the Modified Total Cost Method.

The Measured Mile Method

The Measured Mile method compares the productivity achieved by a contractor in an un-impacted area of work with the contractor's productivity on the same work in an impacted area. Rather than basing damage calculation upon estimates and theoretical adjustments as in the Factor Method, the Measured Mile Method has the advantage of using actual data from the project to determine the cost difference between work performed under normal conditions and work performed under changed conditions.

In contrast to the Factor Method, the Measured Mile Method had been accepted by the courts and this Board as an appropriate method for calculating loss of productivity costs. *U.S. Industries, Inc. v. Blake Construction Co.*, 671 F.2d 539, 547 (D.C. Cir. 1982) ("comparison of the cost of performing work in different periods is a well-established method of proving damages, which frequently has been used in breach of contract cases") (citing *Anvil Mining Co. v. Humble*, 153 U.S. 540 (1894); *Abbett Electrical Corp. v. United States*, 142 Ct. Cl. 609 (1958)); *States Roofing Corporation*, ASBCA No. 54860 *et al.*, 10-1 BCA ¶ 34,356 at 169,667 ("We have accepted the measured mile approach as an appropriate method of determining impact to productivity."); *Bay West, Inc.*, ASBCA No. 54166, 07-1 BCA ¶ 33,569 at 166,302-03 (Board accepted the measured mile approach in determining damages for encountering stiff clay during dredging operations); *W.G. Yates & Sons Construction Company*, ASBCA Nos. 49398, 49399, 01-2 BCA

¶ 31,428 at 155,210 ("[W]e accept Yates' use of [the Measured Mile] methodology as an acceptable vehicle for determining incurred labor inefficiency costs due to the Government's defective specification."); *DANAC, Inc.*, ASBCA No. 33394, 97-2 BCA ¶ 29,184 at 145,152, *aff'd on recon.*, 98-1 BCA ¶ 29,454 (use of the "good period vs. bad period" method of analysis in comparing the contractor's cost performing work during periods affected and unaffected by government-caused disruption); *International Terminal Operating Company*, ASBCA No. 18118, 75-2 BCA ¶ 11,470 (ASBCA adopted method of computing excess costs in a terminal services contract by comparing the tons handled per direct labor hour during the period affected by the change with the tons handled per direct labor hour during a period unaffected by the change).

Use of the Measured Mile Method, however, is not without some limitations. As the D.C. Circuit observed in *U.S. Industries, Inc.*:

> Unlike the delay claim, the disruption claim is intended not to redress USI's loss from being unable to work, but to compensate USI for the damages it suffered from Blake's actions that made its work more difficult and expensive than USI anticipated....

671 F.2d at 546. Thus, the Measured Mile Method is intended to compensate Ryan for encountering a consolidated material of a "sandy sandbar shelly bar nature" (*see* 15-1 BCA ¶ 35,939 at 175,643, ¶ 44), and patches of crust, newly formed oyster beds, and dredged materials with heavy shell content, on the surface of the sea floor and on top of the silt layer that scattered around eight of the nine Acceptance Sections (*see* 15-1 BCA ¶ 35,939 at 175,647, ¶ 69) which made Ryan's dredging work more difficult and expensive than anticipated. To the extent overcoming learning curve and equipment failure resulted in downtime and delays, such delays are not compensated as a part of productivity. Such delays and downtime can be redressed separately as time extensions.

As both parties recognized, separating differing site condition-related shells and sand from non-differing site condition-related shells and sand with precision is impossible (findings 14, 17, 28). In choosing the Measured Mile Method, we believe we are within the well-established principle that the determination of equitable adjustment is not an exact science; where responsibility for damage is clear it is not essential that the damage amount be ascertainable with absolute or mathematical precision. *Electronic & Missile Facilities, Inc. v. United States*, 416 F.2d 1345, 1358 (Ct. Cl. 1969); *see also Wunderlich Contracting Co. v. United States*, 351 F.2d 956, 968 (Ct. Cl. 1965) ("A claimant need not prove his damages with absolute certainty or mathematical exactitude. It is sufficient if he furnishes the court with a reasonable basis for computation, even though the result is only approximate.") (citations omitted); *Specialty Assembling & Packaging Co. v. United States*, 355 F.2d 554, 572

(Ct. Cl. 1966) ("It is enough if the evidence adduced is sufficient to enable a court or jury to make a fair and reasonable approximation.").

The Parties' Proposed Adjustments

The Corps argues that in using the Measured Mile Method, AS#8 and AS#9 must be excluded from determining the gross production rate achieved in the impacted areas. It explained "[w]hile the production problems in AS-8 and AS-9 may have been partially due to the DSC, the poor production was more strongly influenced by the contractor's 'learning curve.'" (Finding 29) By excluding the low production rates of AS#8 and AS#9, the Corps seeks to increase the average production rate of the other impacted areas which, in turn, would lower Ryan's recovery in an un-impacted versus impacted productivity comparison.

Ryan, on the other hand, wants the Measured Mile calculations to be adjusted to account for (1) encountering some shell and consolidated materials in AS#7; (2) the rebars Ryan welded over the dredge's suction mouthpiece to minimize clogging of the dredge pipeline when it began dredging AS#7; and (3) the few hours when Ryan dredged into AS#1 and AS#2 when it was dredging AS#7 (findings 23-24). In adjusting AS#7's production rate downward due to the occurrence of these events, Ryan seeks to increase its production rate absent these events which, in turn, would increase its recovery in an un-impacted versus impacted productivity comparison.

The Corps' Proposed Adjustments

In arguing for removing AS#8 and AS#9 from calculating the production rate of the impacted areas, the Corps identified a number of incidents relating to (a) equipment downtime as a result of (1) stopping dredging to install a GPS (findings 40-41); (2) stopping dredging during low tide at Rose Bay (findings 42-45); (3) overhauling its dredge while dredging AS#9 (findings 53-63); (4) clogging of its dredge pipeline (findings 64-70); and (5) stopping dredging during booster pump breakdown (findings 94-96).

The Corps also identified several events relating to Ryan "undergoing a significant 'learning curve'" (gov't br., app'x A at 5) in (1) failing to use the most efficient dredge configuration when dredging AS#8 and AS#9 (findings 46-49); and (2) experimenting with placing its booster pump at a proper distance from the dredge (findings 86-93).

In further support of its argument that AS#8 and AS#9 should be excluded from calculating the production rate of the impacted areas, the Corps attached to its post-hearing brief a 12-page list of events purporting to show that Ryan was responsible for much of the low productivity achieved in the impacted areas (gov't br., app'x B).

Equipment Downtime Issues

We found installing its GPS on 10 and 11 May 2010 resulted in dredge downtime. We found Ryan should have installed the GPS before it began dredging. (Findings 40, 41) We found Ryan could not dredge when Rose Bay was experiencing low tide cycles resulting in dredging downtime (findings 42-43). Based on the information provided in the contract (finding 44), we found Ryan should have anticipated encountering low tide which would hamper its dredging efforts and installed the pontoons before it began dredging (finding 45). We found that the most probable cause for the eight or nine-day shut down from 25 June to 2 July 2010 to overhaul the dredge was that Ryan encountered significant quantities of sand and shell from 19 to 22 June 2010 (findings 55, 62-63). Of the two incidents of dredge pipe clogging incidents resulting in downtime, we found Ryan could have avoided the clogging on 22 September 2010 had its leverman consulted the pre-dredge survey (finding 68). We found the 13 October 2010 clogging incident was caused by the high concentration of sand and shell materials encountered in AS#2 (findings 69-70). Ryan had to replace its booster pump on or about 6 August 2010 resulting in downtime (finding 94). We found from 2 to 6 August 2010, immediately preceding the booster pump breakdown, Ryan had been dredging 25% sand and 25% shell every day for an entire week. We found the most probable cause of the booster pump breakdown and downtime experienced was the high content of sand and shell encountered just before the breakdown. (Findings 94-96)

Because all of the occurrences above resulted in dredge downtime as opposed to dredge running time used in the Measured Mile calculation, we will consider their impacts as a part of the project delay analysis. We found working longer shifts and double shifts should also be a part of the project's delay analysis (finding 52).

Learning Curve Issues

We found operating its dredge in a swing ladder configuration in AS#8 and AS#9 was not due to Ryan's lack of proficiency but was dictated by the confined areas in which it was dredging. We found that Ryan switched to operating its dredge in a swing anchor configuration as soon as the areas in which it was dredging allowed it to do so. We found switching from one dredge operating configuration to the other was a part of Ryan's on-site learning process. (Finding 49) Given the DSC encountered in AS#8 and AS#9, we cannot conclude that moving the booster pump back and forth to address the crusts it was directed to dredge reflected a lack of proficiency on Ryan's dredging operations. We found that moving the booster pump was a part of the learning process Ryan went through to address the DSC it encountered as it dredged further and further away from the Disposal Area. (Finding 93)

In its further attempt to support its argument that AS#8 and AS#9 should be excluded from calculating the production rate of the impacted areas on the basis that

Ryan was "undergoing a significant 'learning curve'" (gov't br., app'x A at 5) and that Ryan had "a huge learning curve due to the shallow bay and long pipeline" (finding 97), the Corps attached a 12-page list of events purporting to show that Ryan was responsible for much of the production issues. The Corps did not provide this list before or during the hearing. As demonstrated in the Corps' downtime and learning curve arguments, the context in which events occurred is important in assigning responsibility. Providing cryptic excerpts without context requires us to make assumptions we are unwilling to make. *See States Roofing*, 10-1 BCA ¶ 34,356 at 169,667 (Board rejected the government's citation to selected excerpts from the Daily Reports for failing to "come forward with credible evidence providing either context for the comments it selected from the Daily Reports or their significance.").

In *United Technologies Corporation*, ASBCA No. 25501, 86-3 BCA ¶ 19,171, we refused to accept modified versions of spreadsheets the government submitted with its post-hearing brief. We said the government "has not laid the necessary foundation to enable us to reach a finding that the contents and results reflected in its spreadsheets are what it claims." We also rejected the spreadsheets on the basis of due process because receiving them without permitting appellant to test the validity of the evidence "would be tantamount to receiving evidence *ex parte*." *Id.* at 96,923 (citing *Wright v. Southwest Bank,* 554 F.2d 661, 663 (5th Cir. 1977)) (held "it is error to accept evidence ex parte because it is inherently unfair to allow one party to put evidence before the court without allowing his opponent the opportunity to test its validity"). Here, the 12-page list the Corps attached to its post-hearing brief was unauthenticated and Ryan had no opportunity to test the validity of many of the allegations made in the list.[22]

Ryan's Proposed Adjustments

Ryan urges us to consider three alternative adjustments to the production rate of AS#7. Any one or more of the adjustments, if allowed, would increase the productivity difference between AS#7, the un-impacted Acceptance Section and the impacted Acceptance Sections, resulting in greater recovery under the Measured Mile Method.

Adjustment 1: Crust Areas in AS#7

Despite our conclusion in our entitlement decision that "[t]here was no differing site condition in AS#7" (15-1 BCA ¶ 35,939 at 175,656), Ryan contends there were "beds of consolidated sand and shell ('crust') areas" in AS#7 (compl., ex. B at 3, calculation B). Ryan claim is based on what Mr. Humphreys testified he saw and

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22 Some of the events covered by the 12-page list appear to be those QAR Wilson testified to at his deposition. As to those events, Ryan had the opportunity to address them at the hearing through its witnesses and we have considered and weighed the evidence and made findings accordingly.

heard from another witness and his interpretation of the cross sections which he acknowledged could be exaggerated as much as five times (finding 100).

We found there were not enough areas of consolidated sand and shell ("crusts"), if they existed at all, in AS#7 to have a meaningful adverse impact on dredging to warrant a 10% adjustment to AS#7's production rate: OSI's daily QC reports during the 24-day period in which AS#7 was dredged reported 0% sand and 0% shell were encountered (finding 101). We found Ryan never notified OSI or the Corps that it encountered a DSC in AS#7. Moreover, the Geotechnical Report in the specifications warned prospective contractors to "expect to dredge whole or broken shells up to three inches in diameter." Thus, Ryan should have expected to encounter some shells in dredging AS#7. (Finding 102)

Adjustment 2: Welding Rebars to the Dredge's Suction Mouthpiece

As a result of its experience dredging AS#8 and AS#9, Ryan welded rebars to the original screen when it reached AS#7 "to try to cut down on some of the larger shells" which were clogging up the pump (finding 105). Ryan proposed a 10% adjustment to the average gross production per hour in AS#7 to account for the adverse impact to production from welding rebars over the suction mouthpiece of the dredge (finding 103).

At the hearing, Mr. Buchanan, Ryan's vice president of operations in charge of all operations at Rose Bay, testified "[t]he rebar screen that we put on there had no impact at all on the flow, nothing" and did not restrict the flow of dredged materials (finding 107).

In support of the 10% adjustment, Mr. Humphreys relied on an equation used in a thesis submitted by a Master of Science student at Texas A&M University. Using the equation, Mr. Humphreys calculated a 12.61% reduction in production on account of the rebars. In comparing the screens shown in the thesis and the sketch of the rebars Mr. Humphreys drew for his calculation, we found they looked totally dissimilar (finding 106). Mr. Buchanan described the welded rebars as "something that sticks out on the sides and goes around" which fits Mr. Humphrey's sketch (finding 107). Weighing the evidence, we found Mr. Buchanan's testimony more credible. We found the rebars Ryan welded to the dredge's suction mouthpiece made little, if any, difference to warrant a 10% upward adjustment to Ryan's AS#7 production rate. (*Id.*)

Adjustment 3: Cross Border Dredging Time Adjustment

Because AS#7 shared common borders with AS#1 and AS#2, Ryan dredged slightly into AS#1 and AS#2 when dredging AS#7. In its Measured Mile calculations, Ryan sought to reduce the dredge running time in AS#7 by 4.6 hours for the time it was dredging into AS#1 and AS#2. This would increase the dredge running time in AS#7 which, in turn, would increase Ryan's recovery. We found cross border dredging occurred in every Acceptance Section. (Finding 110) We reject Ryan's proposed adjustment because it would treat the production rate of AS#7 differently when the same cross border dredging also occurred in every Acceptance Section, contrary to the Measure Mile Method of calculation in keeping the same conditions constant (finding 112).[23]

Application of the Measured Mile Method

After dredging was completed in each Acceptance Section, the Corps had a surveying company, ARC, survey the volume of the material dredged. The volume of the materials dredged in each Acceptance Section is not in dispute. (Finding 113) The pumping hours in each Acceptance Section is also not in dispute. Thus, by dividing the volume dredged by the pumping hours logged, the production rate (in c.y. per hour) of each Acceptance can be determined. (Finding 116)

As demonstrated by the production rates of the impacted Acceptance Sections, they improved as dredging progressed: The production rate of AS#8, the first Acceptance Section dredged, was 65.07 c.y. per hour. When Ryan dredged AS#9, the second Acceptance Section dredged, its production rate improved to 100.52 c.y. per hour. When Ryan dredged AS#1 and AS#2, after it encountered no DSC in AS#7, its production rates continued to improved but leveled off to some degree. (Finding 116) We conclude that improvement in its production rate was the result of Ryan overcoming its learning curve: We found Ryan switched from operating its dredge from a swing ladder to a swing anchor configuration was a part of its on-site learning process (finding 49). We found moving its booster pump was a part of the learning process Ryan went through to address the differing site condition it encountered at various locations in Rose Bay (finding 93). We found installation of the Gatling improved Ryan's production rate as it learned to minimize clogging of its dredge pipeline (finding 109).

Based upon what the Corps has shown, we are not persuaded that the production rates of AS#8 and AS#9 should be excluded as "outliers" (*see* gov't br. at 42) from calculating the production rate of the impacted areas. We believe the better approach would be to consider all of the impacted Acceptance Sections – AS#8, AS#9, AS#1, AS#2, AS#3, AS#4, AS#5 and AS#6 – as one impacted area. From the production rates of all eight impacted Acceptance Sections, an average production rate for the impacted area can be derived. (Finding 118) This average production rate

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[23] In the same vein, the Corps contends Ryan's use of a 12-inch dredge pipe was inefficient. We found the same 12-inch pipe was used in dredging all Acceptance Sections, and to the extent there was productivity loss, that would affect all Acceptance Sections to the same degree. (Findings 71-73) Such productivity loss would be included in calculating the production rates of all Acceptance Sections in the Measured Mile calculations.

would have taken into consideration the learning and improvements Ryan experienced throughout the dredging period.

Having rejected the adjustments each party proposed, we set out the mathematical steps we will employ to determine Ryan's equitable adjustment using the Measured Mile Method: (1) We calculate first the production rate in c.y. per hour Ryan achieved in dredging the un-impacted AS#7; (2) Based upon the un-impacted production rate, we calculate the number of hours Ryan would have required to dredge the eight impacted Acceptance Sections had it not encountered the differing site condition in those Acceptance Sections; (3) We then calculate the average production rate, in c.y. per hour, Ryan actually took to dredge the eight impacted Acceptance Sections; (4) Calculating the difference in hours between what Ryan took to dredge the eight impacted Acceptance Sections and the hours it would have taken to dredge the same eight Acceptance Sections had no differing site condition was encountered yields the additional hours Ryan is entitled to as a result of dredging differing site condition materials in the eight impacted Acceptance Sections; and (5) The equitable adjustment due Ryan is determined by multiplying the additional hours Ryan was required to dredge the eight additional Acceptance Sections by Ryan's average dredge running cost per hour.

Inserting numbers into the Measured Mile formula, we conclude that Ryan is entitled to an equitable adjustment on account of the DSC encountered in the amount of $776,389.78:

Step 1: The total volume dredged in AS#7 was 39,548 c.y. (finding 113). The total dredge running time in AS#7 was 199.25 hours (finding 111). Therefore, the production rate at the un-impacted AS#7 is 198.48 c.y. (39,548 c.y./199.25 hrs.).	198.48 c.y.
Step 2: The total volume dredged in the eight impacted Acceptance Sections was 211,009 c.y. (finding 118). If all eight impacted Acceptance Sections were not affected by the differing site condition, Ryan should have been able to dredge the eight Acceptance Sections in 1,063.12 hours (211,009 c.y./198.48 c.y./hr.).	1,063.12 hrs.
Step 3: The average production rate of the eight impacted Acceptance Sections was 125.02 c.y./hr. (211,009 c.y./1,687.76 hrs.) (finding 118). At this average production rate, Ryan required 1,687.80 hrs. (211,009 c.y./125.02 c.y./hr.) to finish dredging all eight impacted Acceptance Sections.	1,687.80 hrs.
Step 4: It took Ryan 624.68 additional hours to dredge the eight impacted Acceptance Sections (1,687.80 hrs. – 1,063.12 hrs.).	624.68 hrs.

Step 5: Ryan's average dredge running cost was $1,242.86 per hour (finding 119). At this cost, 624.68 additional dredging hours would cost Ryan an additional $776,389.78 ($1,242.86 x 624.68 hrs.) to dredge.	$776,389.78

Professional and Consultant Services Costs

Ryan seeks $55,104.19 in professional and consultant services costs paid to Construction Consulting Associates, Inc., for Mr. Humphreys' services (finding 123). Under FAR 31.205-33, Professional and consultant service costs,[24] "Costs of professional and consultant services are allowable subject to this paragraph and paragraphs (c) through (f) of this subsection when reasonable in relation to the services rendered and when not contingent upon recovery of the costs from the Government (but see 31.205-30 and 31.205.47)." FAR 31.205-47, Costs related to legal and other proceedings, provides at subsection (f)(1) that "Costs...are unallowable if incurred in connection with": "prosecution of claims or appeals against the Federal Government."

Interpreting an earlier version of FAR 31.205-33 (1987) with similar language, the Federal Circuit said in *Bill Strong Enterprises, Inc. v. Shannon*, 49 F.3d 1541, 1550 (Fed. Cir. 1995), *overruled on other grounds by Reflectone, Inc. v. Dalton*, 60 F.3d 1572, 1579, n.10 (en banc) that "[i]n classifying a particular cost as either a contract administration cost or a cost incidental to the prosecution of a claim, contracting officers, the Board, and courts should examine the objective reason why the contractor incurred the cost." The Court went on to say:

> If a contractor incurred the cost for the genuine purpose of materially furthering the negotiation process, such cost should normally be a contract administration cost allowable under FAR 31.205-33, even if negotiation eventually fails and a CDA claim is submitted. *See Armada*, 84-3 BCA ¶ 17,694 at 88,242-43. On the other hand, if a contractor's underlying purpose for incurring a cost is to promote the prosecution of a CDA claim against the Government, then such cost is unallowable under FAR 31.205-33.

See also Advanced Engineering & Planning Corporation, ASBCA Nos. 53366, 54044, 03-1 BCA ¶ 32,157, *aff'd*, *Johnson v. Advanced Engineering & Planning Corp.*, 292 F. Supp. 2d 846 (E.D. Va. 2003) (cost to prepare REA were incurred for

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[24] The Corps awarded Contract 0033 in June 2009. *Optimum*, 13 BCA ¶ 35,412 at 173,714. The FAR as of 1 July 2008 is therefore applicable.

the purpose of accomplishing a comprehensive resolution of the entire job order held allowable under FAR 31.205-33 as professional and consultant services costs).

We found the 10 invoices totaling $42,972.65 Mr. Humphreys submitted to Ryan were for consulting services and for preparing Ryan's REA in connection with what we ultimately found to be a differing site condition. At $135.00 an hour, we found Mr. Humphreys' rate, on the basis of his expertise (*see* finding 74) and the comprehensive and well documented REA (58755, ex. 200) he prepared reasonable and allocable to the additional differing site condition costs Ryan incurred. We found the consultant costs incurred was for the purpose of seeking an administrative resolution through a meeting, discussion and negotiation and not for the purpose of prosecuting a claim or appeal against the Corps. The Corps has not disputed the professional and consultant services costs nor the associated overhead and profit claimed. (Finding 124) Accordingly, we conclude Ryan is entitled to the $55,104.19 claimed.

Time Extension

When Ryan bid the project, it estimated it could finish dredging Rose Bay in about six months or 179 calendar days. We found that having started work late because of OSI's delay, Ryan expected to finish by 6 November 2010. (Finding 132) Having begun dredging on 10 May 2010, Ryan finished on 7 February 2011, 93 calendar days later than expected (findings 26, 128). In seeking a 93-calendar day extension, Ryan did not provide any delay or schedule analysis except to say that since dredging was the only work left to do "other than maintaining the seeding and mulching at the disposal area," all dredging work was critical (finding 131).

On a calendar-day basis, Ryan originally planned to work 1 shift of 10 hours a day, 5 days a week, and 8 hours on Saturday. When it began to fall behind, it increased its shift to 13½ hours a day. Then, on 12 July 2010, after it overhauled its dredge, Ryan went to "round the clock operations 6 days a week" or two 12-hour shifts a day. (Finding 35)

We found Ryan's self-imposed acceleration absorbed some of the equipment downtime (due to installation of the GPS (finding 41); low tide (finding 45); and dredge pipeline clogging (finding 68)) due to its fault and reduced the overall dredging time. Had Ryan not accelerated on its own, the delay in contract completion would have extended beyond 7 February 2011.

Although skewed in its own favor, the Corps proposes a reasonable formula for computing the time extension. The Corps' formula takes into consideration (1) the additional dredging time caused by the DSC in the impacted Acceptance Sections used in the Measured Mile calculation; (2) of an EWT ratio in recognition of the preparatory work Ryan had to do to be able to dredge every day; and (3) Ryan's working hours per day. (Findings 134-35)

We make the following adjustments to the numbers the Corps used: The Corps' assumption that Ryan worked 24 hours a day for the entire dredging period overstates the hours actually Ryan worked. Ryan worked 1 shift per day for 10 to 13½ hours from 10 May to 11 July 2010, or 62 out of the 272 calendar day dredging period. Ryan worked two 12-hour shifts a day from 12 July 2010 to 7 February 2011, or 210 out of the 272 calendar day dredging period. For the first 62 days, Ryan worked an average of 11.75 ((10 hours + 13.50 hours)/2) hours a day. For the last 210 days, Ryan worked 24 hours a day. Thus, Ryan worked an average of 21.21 hours ((11.75 hours x 62 days + 24 hours x 210 days)/272 days) a day over the course of 272 calendar days. The parties have not disputed that application of an EWT ratio is appropriate for computing dredging duration. Ryan used a ratio of 43.2% (compl., ex. D); the Corps used 48.6% (finding 134). Neither party has explained how its EWT ratio was derived. Since the parties are relatively close, we use 45% as the EWT ratio (finding 135).

Based upon the formula the Corps proposed, and based upon (1) 624.68 hours of additional dredging hours on account of the differing site condition; (2) an EWT ratio of 45%; and (3) an average of 21.21 hours of work per day over the 272 calendar days when dredging took place, we calculate that Ryan is entitled to a time extension of 65.45, say 66 calendar days:

$$\text{Days} = \frac{\frac{\text{Impact of DSC (Pumping Time)}}{\text{EWT}}}{\text{Working hours per day}} = \frac{\frac{624.68 \text{ hrs.}}{0.45}}{21.21 \text{ hrs./day}} = 65.45 \text{ days}$$

Liquidated Damages

The Corps has withheld 225 calendar days of liquidated damages totaling $299,108.25 ($1,329.37 x 225 days). OSI has agreed to absorb all but 93 calendar days of liquidated damages or for 132 calendar days (225 c.d. – 93 c.d.). (Finding 129) Thus, at $1,329.37 per day, OSI has agreed that the Corps is entitled to withhold $175,476.84 ($1,329.37 x 132 c.d.) for its part delaying completion of the project.

Of the 93 calendar days of delay Ryan claims, we have found it is entitled to a time extension of 66 calendar days. This means 27 of the 93 calendar days (93 c.d. – 66 c.d.) were not excusable delay days. Had Ryan chosen not to accelerate on its own volition and worked double shifts beginning on 12 July 2010, it would not have finished dredging Rose Bay by 7 February 2011. By accelerating, Ryan made up some of the delays caused by the differing site condition as well as some of the downtime for which it was responsible.

We summarize OSI's recovery in this appeal in the table below:

Additional dredging cost	$776,389.78
Outside consultant cost	$55,104.19
Subtotal	$831,493.97
OSI Field Office Overhead @ 22.40% (finding 125)	$186,254.65
OSI Home Office Overhead @ 20.40% (finding 125)	$169,624.77
Subtotal	$1,187,373.39
Profit @ 5.66% (finding 125)	$67,205.33
Subtotal	$1,254,578.72
Bond @ 1% (finding 125)	$12,545.79
Total Recovery	$1,267,124.51

Other than withholding $299,108.25 (225 days) of liquidated damages, the Corps had not formally assessed any liquidated damages. While OSI, on behalf of Ryan, claimed 93 days of time extension, no claim was submitted for return of liquidated damages. Thus, the remission of liquidated damages is not before us. Nevertheless, in light of our decision that Ryan is entitled to an extension of 66 out of the 93 calendar days claimed, we leave it to the parties to compute and remit the proper amount of liquidated damages.

CONCLUSION

Because Ryan encountered a differing site condition dredging eight of the nine Acceptance Sections at Rose Bay, because we considered the Measured Mile Method the most appropriate approach in determining the equitable adjustment to which Ryan is entitled, OSI is entitled to recover $1,267,124.51. Interest pursuant to 41 U.S.C. § 7109 on this amount is to run from 24 December 2012, the putative date on which the CO should have received OSI's certified claim, until paid. In addition, OSI/Ryan is entitled to a time extension of 66 calendar days.

Dated: 6 September 2016

PETER D. TING
Administrative Judge
Armed Services Board
of Contract Appeals

(Signatures continued)

I concur

MARK N. STEMPLER
Administrative Judge
Acting Chairman
Armed Services Board
of Contract Appeals

I concur

RICHARD SHACKLEFORD
Administrative Judge
Vice Chairman
Armed Services Board
of Contract Appeals

I certify that the foregoing is a true copy of the Opinion and Decision of the Armed Services Board of Contract Appeals in ASBCA No. 59952, Appeal of Optimum Services, Inc., rendered in conformance with the Board's Charter.

Dated:

JEFFREY D. GARDIN
Recorder, Armed Services
Board of Contract Appeals