

ARMED SERVICES BOARD OF CONTRACT APPEALS

Appeals of --)
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Mumford & Miller Concrete, Inc.) ASBCA Nos. 53652, 53653
)
Under Contract No. DACW61-99-C-0022)

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OPINION BY ADMINISTRATIVE JUDGE FREEMAN

Mumford & Miller Concrete, Inc. (M&M) appeals the denial of its claims under a bulkhead construction contract for (i) a government suspension of work and (ii) a government direction to remove and reinstall sheet piles. Pursuant to the Board's order of 18 March 2002, the hearing was limited to entitlement.¹ We find that M&M's initial installation of the piles did not comply with the contract, that the removal and reinstallation were properly ordered, and that there was no unreasonable suspension of work by the government.

FINDINGS OF FACT

1. On 2 August 1999, the U.S. Army Corps of Engineers District, Philadelphia awarded M&M the captioned contract to demolish an existing bulkhead and install a new bulkhead along a 524.5 foot section of canal bank at Delaware City, Delaware. The firm fixed contract price was \$1,120,000. (R4, tab 1 at 2-3, tab 27 at sheet 1) The contract included among other provisions the FAR 52.242-14, SUSPENSION OF WORK (APR 1984)

¹ Administrative Judge Coldren who presided at the hearing of these appeals is deceased.

clause, and the FAR 52.246-12, INSPECTION OF CONSTRUCTION (AUG 1996) clause (R4, tab 1 at 13).

2. The contract drawings showed the new bulkhead consisting of 349 interlocking PZ27 steel sheet piles, plus one specially fabricated 90 degree corner pile to accommodate a right angle turn in the bulkhead. The PZ27 piles were fabricated in a wide Z shape with one side formed as a socket and the opposite side formed as a pin. (See Illustration A) The pin side of one sheet pile would be driven into the socket side of the adjacent sheet pile to form the bulkhead of interlocking piles. (See Illustration B)

A. Single PZ27 Pile

B. Interlocking PZ27 Pile Wall

(R4, tab 27 at 1, 10)

3. The contract drawings showed the setting width of each pile on the bulkhead baseline as 18 inches. Two piles joined together (a double pile) were shown with a setting width of 36 inches. Since the pin/socket joint allowed the adjacent piles to rotate, the specified setting width had to be carefully adhered to during pile driving. If the setting width of the double piles exceeded 36 inches, the bulkhead would have fewer piles than specified, the section modulus of the wider double piles (cubic inches of pile per linear foot of bulkhead) would be reduced, and the wider double piles would be deflected (not a straight line) at the pin socket joint of the adjoining piles. (See illustrations C and D below)

C. Double PZ27 Pile
Setting Width: 36 in.
Deflection: 0 Degrees

D. Double PZ27 Pile
Setting Width: 37.63 in.
Deflection: 10 Degrees

(Ex. A-38 at 2, 4; tr. 2/261-65)

4. The contract specifications at section 02411, paragraph 3.2.2.1 entitled "Placing" stated in relevant part:

Pilings shall be carefully located as shown or directed.
Pilings shall be placed plumb with out-of-plumbness not exceeding 1/8 inch per foot of length and true to line.
Temporary wales, templates, or guide structure shall be provided to insure that the pilings are placed and driven to the

correct alignment. . . . Pilings properly placed and driven shall be interlocked throughout their length with adjacent pilings to form a continuous diaphragm throughout the length or run of the piling wall.

(R4, tab 1 at 279)

5. The contract specifications at section 02411, paragraph 3.2.2.2 entitled “Driving” stated in relevant part: “Driving hammers shall be maintained in proper alignment during driving operations by use of leads or guides attached to the hammer” (R4, tab 1 at 279). The contract specifications at section 01440, paragraph 3.4.2 required M&M to have a Contractor Quality Control (CQC) System Manager “on site at all times during construction . . . [with] no other duties” (R4, tab 1 at 235).

6. M&M received notice to proceed on 13 August 1999 (R4, tab 2). The contract required completion of the work by 8 June 2000, 300 days after receipt of the notice to proceed (R4, tab 1 at 90, SC-1). M&M’s shop drawings were submitted on 27 December 1999 and approved on 17 February 2000. They showed in detail the installation of 349 PZ27 sheet piles forming the bulkhead with each pile having a setting width of 18 inches (double pile 36 inches) on the bulkhead baseline. (R4, tab 44 at sheets 1 and 2, tab 45 at 2)

7. Specification section 02411 at paragraph 2.1 required the PZ27 piles to be fabricated with a minimum 50,000 psi yield strength (R4, tab 1 at 275; tr. 4/23). The mill certified yield strength test reports for the 13 heats from which the delivered piles were taken ranged from 50,000 psi to 58,000 psi. The average yield strength of the delivered piles was 54,991 psi. (Ex. A-38 at 6-9)²

8. M&M began its initial driving of the new piles on 16 February 2000 and completed it on 31 March 2000 (R4, tabs 49, 64 at 1, 5). On 16 February and again on 21 and 25 February 2000, the government quality assurance representative (QAR) noted in his daily report that the alignment of the piles was not straight (R4, tab 49 at 2, tab 51

² The 349 piles for M&M’s contract were taken from 13 “heats” totaling 393 piles. M&M’s expert computed an average yield strength per pile of 55,462 psi by dividing the sum of the 26 yield strength tests (two per heat) by 26 (ex. A-38 at 6; tr. 4/23). This calculation ignores the variations in the averages of the two yield strength tests for each heat and the variations from 8 to 56 in the number of piles in each heat. The lower average in the finding is the sum of the average of the two yield strength tests of each heat times the number of piles in the heat divided by the total number of piles. (Ex. A-38 at 7-9)

at 2, tab 5 at 2). M&M's foreman and its quality control manager (who was driving the piles)³ both admitted at hearing that they took no steps to (i) control the setting width of the piles at 18 inches as specified in the contract; or (ii) drive the specified number of piles (tr. 2/136-37, 238-40).

9. On 13 April 2000, the government conducted a "staff" inspection of the project. The inspectors observed, among other things, "misalignment of the steel piling wall in both vertical and horizontal directions," and seven "leftover" piles indicating that the specified setting width had not been maintained and that the specified number of piles (349) had not been installed.⁴ (R4, tab 98)

10. By letter to M&M dated 19 April 2000, the contracting officer's representative (COR) stated that: "a significant number of sections of the steel piling work has not been installed properly or plumb."⁵ This letter concluded with a direction to M&M to submit "your detailed and specific work plan, and explain how you intend to re-align the piling wall . . ." (R4, tab 10). By letter of the same date, M&M replied that (i) with the exception of "two localized areas," the piles were installed properly, (ii) the extra sheets were the result of mill fabrication tolerances, and (iii) it would correct the two "localized areas" by pushing and pulling the sheets into alignment with a backhoe. (R4, tab 11)

11. By letter dated 20 April 2000, the contracting officer told M&M that its 19 April 2000 corrective work plan was unacceptable and suspended work on the project pending submission and approval of a satisfactory corrective work plan (R4, tab 12). M&M submitted corrective work plans on 21 April and 24 April 2000. Both plans again provided for correcting misalignments by pushing and pulling the piles into place with a backhoe (R4, tabs 14, 15).

12. On or about 21 April 2000, the government measured the actual setting width of the 170 double piles making up the bulkhead. The setting width of 61 of the 170 double piles ranged from 37.125 inches to 39.250 inches⁶. (R4, tab 13; tr. 1/203)

³ This was a violation of contract specification section 01440, paragraph 3.4.2 (see finding 5).

⁴ A subsequent government measurement of double pile widths showed that 170 double piles and one single pile had been installed for a total of 341 piles (R4, tab 13).

⁵ The government contention that a significant number of sheets were not installed plumb was not confirmed by a subsequent survey of the top of the bulkhead. That survey showed that the tops of only two piles (Nos. 137 and 206) were outside the ± 5 inch "out-of-plumbness" tolerance allowed by the contract for 40-foot long piles (see finding 4; R4, tab 115; tr. 2/93-94).

⁶ The fifth photograph at R4, tab 118 shows the double pile with the greatest setting width.

Neither the contract specifications nor the contract drawings, nor the approved shop drawings specified a tolerance for the setting width of the piles. M&M's expert alleges an industry standard fabrication tolerance of $\pm 3\%$ for the PZ27 double pile width (ex. A-38 at 5, 14). The supporting documentation offered for this allegation does not appear to be applicable to the PZ27 sheet pile (ex. A-38 at 5). Nevertheless, assuming a three percent setting width tolerance, the upper limit of that tolerance for the PZ27 double pile was 37.08 inches, and 61 (more than one third) of the double piles as initially installed by M&M exceeded that limit.

13. After discussions and correspondence with M&M, the government by letter dated 10 May 2000 rejected the 21 and 24 April 2000 corrective action plans for, among other reasons, concern over the structural integrity of the bulkhead under the stresses that would be induced by manipulating in place the large number of piles that were misaligned. The government's 10 May 2000 letter again directed M&M to submit a satisfactory corrective action plan. (R4, tabs 16-18, 20)

14. On or about 5 June 2000, M&M submitted an engineering report that stated, among other things, that the increase in material yield strength of the delivered steel piles, over and above the specified minimum yield strength, compensated for the reduction in section modulus caused by the increase in setting width. The report concluded that the as-built bulkhead had substantially the same strength as the specified bulkhead, and proposed a plan for completing the bulkhead "based on acceptance of the steel piling as currently driven" (ex. A-38 at 17). On 20 June 2000, the parties met to discuss the 5 June 2000 engineering report and agree on the action to be taken. No agreement was reached. (R4, tab 24)

15. In three memoranda dated 27 and 28 June 2000, the Chief of the Civil and Structural Section of the Philadelphia District set forth a detailed evaluation of the as-built piling, the 5 June 2000 report of M&M's consulting engineer, and M&M's proposed corrective actions. The memoranda concluded, among other things, that the increased double pile setting widths in excess of the specified 36 inches resulted in a reduced section modulus, that a reduced section modulus correlated to a reduced factor of safety and a reduced design life, and that the average increase in the yield strength of the delivered pilings did not prove that the entire wall was strengthened because it did not show "the strength of the wall in the areas where the alignment was particularly bad and the section modulus, therefore significantly reduced." (R4, tabs 106, 107, 108 at 1)

16. By letter dated 7 July 2000, the contracting officer referred to the 5 June 2000 "work plan" for completing the bulkhead, stated that "[t]he wall as constructed does not meet our design requirements or specifications," rescinded the suspension of work, and directed M&M to remove and re-drive the first 81.5 double piles, and either remove and re-drive the remainder or provide detailed engineering data showing which piles needed realignment and how they would be realigned (R4, tab 25). On 12 July 2000, M&M told

the government that it would comply with the 7 July 2000 letter under protest and reserve its rights to claim price and time adjustments (R4, tab 26 at 3).

17. On 29 August 2000, the government and M&M had a work plan review. At this review, M&M stated that all piles would be pulled and re-driven (R4, tab 30; ex. 16). M&M began extracting the piles on 29 August 2000 (R4, tab 30, ex. 17 at 22). On 5 September 2000, M&M began installing the template for re-driving the piles. This template included tabs every three feet to assure that the specified setting width was maintained during the driving process. This had not been done when the sheets were initially installed in February – April 2000 (R4, tab 67 at 5, tab 68 at 1-2). On 6 September 2000, M&M began re-driving the piles (R4, tab 69 at 1).

18. The government enforced a ½ inch tolerance on the double pile setting widths during this second installation and required M&M to remove and reinstall several double piles that were initially driven with a 37 inch setting width (tr. 3/228-29). The second installation was completed on 7 November 2000 (R4, tab 30; ex. 17 at 109). All 349 of the specified piles were installed with only a two-foot extension of the bulkhead beyond its specified length (tr. 2/98-99).

19. On 6 October 2000, M&M submitted a certified claim for a price increase in the amount of \$199,733.58 and a time extension of 79 days for the suspension of work from 20 April 2000 through 7 July 2000 (R4, tab 29). On 8 December 2000, M&M submitted a certified claim for a price increase of \$395,754.15 and a 124 day time extension for the direction to remove and reinstall the piles for the new bulkhead (R4, tab 30 at 6). On 27 December 2000, the amount of the suspension of work claim was increased to \$200,900.69 (R4, tab 31). By decision dated 15 October 2001, the contracting officer denied both claims (R4, tabs 32, 33). These appeals followed. The appeal of the denial of the suspension of work claim is docketed as ASBCA No. 53652. The appeal of the denial of claim for removing and reinstalling the piles for the new bulkhead is docketed as ASBCA No. 53653.

20. The “maximum moment” in the government’s Design Analysis Report for the Delaware City bulkhead was 34,844 ft. lbs per linear foot (app. supp. R4, tab 12 at 63). The contractually specified design consisting of PZ27 piles with a minimum 50,000 psi fabricated yield strength and installed with a double pile setting width of 36 inches (0 degree deflection) provided a section modulus of 30.2 cubic inches per linear foot, a “moment capacity” of 62,917 ft. lbs. per linear foot and a safety factor (moment capacity ÷ maximum moment) of 181 percent. (Ex. A-38 at 10, ex. A-39 at 5; tr. 4/37)

21. M&M’s expert, Mr. Peirce, calculated a moment capacity of 62,626 ft. lbs per linear foot and a safety factor of 180 percent for the initially installed bulkhead based on an average fabricated yield strength of 55,462 psi for the PZ27 piles, and a maximum setting width of 37.63 inches and ten degree deflection providing a section modulus of 27.1 cubic inches per linear foot. Mr. Peirce concluded that the increased fabricated yield

strength of the delivered PZ27 piles compensated for the increased setting width/decreased section modulus in the first installation, and that “although [the bulkhead] was not as straight looking . . . because of the rotation of the sheets, it was basically as strong as [the bulkhead] that was specified on the contract documents.” (Ex. A-38 at 4, ex. A-39 at 5; tr. 4/35-49, 80)

22. The average yield strength of the delivered piles was less than the 55,462 psi used in Mr. Peirce’s calculation (*see* finding 7). Moreover, twenty (20) of the initially installed double pilings had a greater setting width and correspondingly greater deflection than the “maximum” setting width of 37.63 inches and ten degree deflection in Mr. Peirce’s calculation (R4, tab 13).

23. Columns (1) and (2) in the table below show the setting width and section modulus for three examples of PZ27 double piles having setting widths in excess of the maximum assumed in Mr. Peirce’s calculations. Columns 3 and 4 show the corresponding moment capacity and safety factor for those piles using Mr. Peirce’s computation method.

(1) Setting Width <u>(in.)</u>	(2) Section Modulus <u>(in.³/lf)</u>	(3) Moment Capacity <u>(ft. lbs/lf)⁷</u>	(4) Safety Factor <u>(percent)⁸</u>
37.926	24.81	56,847	163
38.343	23.36	53,935	154
38.7343	21.94	50,271	144

(R4, tab 121 at 7-9; ex. A-39 at 5; tr. 4/44-46)

24. Double piles Nos. 9, 11, 22, 23, 42 and 69 had setting widths greater than 37.926 inches and therefore safety factors of less than 163 percent of the maximum moment in the Design Analysis Report for the project. Double piles Nos. 54 and 131 had setting widths between 38.343 and 38.7343 inches and safety factors of no more than 154 percent of the maximum moment in the Design Analysis Report. Double piles Nos. 25, 73 and 76 had setting widths greater than 38.7343 inches and safety factors less

⁷ Moment capacity = (½ average yield strength of steel x section modulus) ÷ 12. The average yield strength of the delivered steel was 54,991 psi (*see* finding 7).

⁸ Safety factor = moment capacity ÷ design analysis maximum moment (34,844 ft. lbs/lf) (*see* finding 20).

than 144 percent of the maximum moment in the Design Analysis Report. (R4, tab 13; finding 23)

25. The parties' expert witnesses disputed whether substantial compliance with the specified double pile setting width should be determined on the basis of the average deviation for all 170 double piles, or on the basis of the greatest individual deviation. Appellant's expert testified that: "These sheets are all interlocked together. All of this dirt is pushing on the back of this wall. It doesn't push put one individual sheet. . . . So if this sheet were weaker than the sheet next to it, its going to lean on those two and they are going to lean on the others." (Tr. 4/70) A government expert witness testified to the contrary: "[S]teel sheet pile walls are designed on a per-foot basis. You have to design every foot of that wall to support the soil pressure and water pressure and surcharge load, whatever the loads are, and every foot of that wall has to be able to support the load." (Tr. 3/45) We find the testimony of the government expert witness persuasive that the strength of the bulkhead is to be determined not by the average condition over the entire length but by the condition at its weakest points.

DECISION

A. ASBCA No. 53653⁹

The evidence is clear that M&M's initial installation of the piles for the new bulkhead did not comply with the contract specifications and drawings. The contract drawings required the installation of 349 PZ27 sheet piles with a double pile setting width of 36 inches on the bulkhead baseline (*see* findings 2, 3). M&M's initial installation contained only 341 sheet piles, and 61 of the 170 double piles had setting widths ranging from 37.125 inches to 39.250 inches. The contract did not specify any setting width tolerance and these 61 double piles were outside the three percent tolerance suggested by appellant's expert as the industry standard. (*See* findings 9, 12)

The contract specifications also required the piles to be "carefully located as shown," that the driving hammers "be maintained in proper alignment during driving operations by use of leads or guides attached to the hammer," and that a quality control manager "[with] no other duties" be on site at all times during construction (*see* findings 4, 5). During the first installation, the quality control manager was driving the piles and both he and the M&M foreman admitted that they took no steps to control the setting width or install the specified number of piles. (*See* finding 8)

The government generally has the right to require contractor performance in strict compliance with the specifications, and under paragraph (f) of the Inspection of

⁹ Since the reasonableness of the suspension of work depends on whether the initial installation of the piles substantially complied with the contract, we decide this appeal first.

Construction clause of the contract, the government may require a contractor to correct noncompliant work at no additional cost to the government. *S.S. Silberblatt, Inc. v. United States*, 433 F.2d 1314, 1323 (Ct. Cl. 1970). M&M contends that the first installation of the piles substantially complied with the contract and that their removal and second installation were economic waste (app. br. at 30). See *Granite Construction Co. v. United States*, 962 F.2d 998, 1007 (Fed. Cir. 1992); *Toombs & Co., Inc.*, ASBCA No. 34590 *et al.*, 91-1 BCA ¶ 23,403 at 117,432-33; *Shirley Construction Corp.*, ASBCA No. 41098, 93-3 BCA ¶ 26,245 at 130,557-58, *aff'd*, 34 F.3d 1079 (Fed. Cir. 1994) (table).

We do not agree that the first installation of the piles substantially complied with the contract. Installation of the piles in accordance with the specifications and drawings would have provided a safety factor of 181 percent (*see* finding 20). At their weakest points of greatest increased setting widths, the piles as initially installed provided safety factors ranging from no more than 154 percent to less than 144 percent (*see* findings 20-24). We found above the testimony of the government expert witness persuasive on the proper determination of the strength of the bulkhead (*see* finding 25). Where a matter of safety is concerned, the government is particularly entitled to err on the side of caution in design and execution and to require strict compliance with the specified design. See *Valenzuela Engineering, Inc.*, ASBCA Nos. 53608, 53936, 04-1 BCA ¶ 32,517 at 160,854, *aff'd*, 122 Fed. Appx. 500 (Fed Cir. 2005).

The appeal in ASBCA No. 53653 is denied.

B. ASBCA No. 53652

M&M's claim for an unreasonable suspension of work from 20 April through 7 July 2000 is also without merit. The Suspension of Work clause of the contract provided that the contracting officer may suspend performance of the work for a period of time he deems appropriate, and provided for a price and time adjustment only if the suspension was for an unreasonable time. The suspension of work was properly ordered by the contracting officer on 20 April 2000 when it appeared that the piling was misaligned and might have to be removed and reinstalled. The delay thereafter in the resumption of work was entirely due to M&M's repeated failures to present an appropriate and acceptable corrective action plan, and submitting an engineering report purporting to justify the initial installation on the basis of average conditions rather than the weakest point condition. The suspension could have been entirely avoided by M&M had it proceeded with the initial installation in accordance with the contract and had it subsequently proceeded promptly with the necessary removal and reinstallation of that work where it was demonstrably deficient.

The appeal in ASBCA No. 53652 is denied.

Dated: 31 May 2007

MONROE E. FREEMAN, JR.
Administrative Judge
Armed Services Board
of Contract Appeals

I concur

I concur

MARK N. STEMLER
Administrative Judge
Acting Chairman
Armed Services Board
Of Contract Appeals

EUNICE W. THOMAS
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 Nos. 53652 and 53653, Appeals of Mumford & Miller Concrete, Inc., rendered in conformance with the Board's Charter.

Dated:

CATHERINE A. STANTON
Recorder, Armed Services
Board of Contract Appeals