ARMED SERVICES BOARD OF CONTRACT APPEALS

Appeal of -	)	
	)	
HDR Engineering, Inc.	)	ASBCA No. 62723
	)	
Under Contract No. W912EP-10-D-0017	)	

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OPINION BY ADMINISTRATIVE JUDGE O'CONNELL

Appellant, HDR Engineering, Inc. (HDR), appeals a final decision in which the United States Army Corps of Engineers (USACE) asserted a government claim for professional negligence related to the design of a dam. The Board conducted a hearing from May 13-20, 2024. Both entitlement and quantum are before us. The Board sustains the appeal.

FINDINGS OF FACT

This appeal arises from a project with a lengthy history. We will start with a brief description of the overall project, then summarize the three construction contracts, and finally describe HDR's design contract and task orders.

The Project

1. The project is known as the C-44 Reservoir/Stormwater Treatment Area, which is part of a Comprehensive Everglades Restoration Plan (R4, tab 12 at 5[1]). "C-44" is the name of a canal. The water in the C-44 Canal comes from the C-44 Basin, a 202-square-mile area in Martin County, Florida. (R4, tab 12 at 5-6) The purpose of the project is to improve water quality and slow down the flow of freshwater during rain events from the canal into the St. Lucie Estuary. The project

[1] Citations are to the .pdf page number in the electronic file.

pumps water from the C-44 Canal into an elevated reservoir that is surrounded by a 30-foot-high embankment dam. Water from the reservoir then flows by gravity through a discharge canal to stormwater treatment cells in which aquatic plants remove nitrogen and phosphorous. Water from the cells is then discharged into collection canals and then back into the C-44 Canal. (*Id.* at 5-6, 29; app. supp. R4, tab 2482; tr. 5/17-19) It takes about two weeks for water to pass through this system (tr. 5/18).

2. In the 2000s, the project was managed by the South Florida Water Management District (SFWMD), a water district in the state of Florida. Fla. Stat. § 373.069(1)(e). SFWMD planned on building the project through a single construction contract (R4, tab 14 at 8). SFWMD retained HDR as the designer sometime prior to August 1, 2005 (*see* app. supp. R4, tab 2154). Between 2005 and 2008 HDR produced extensive documentation for SFWMD (app. supp. R4, tabs 2038-2043, 2154, 2155), including a Basis of Design Report dated April 14, 2006 (app. supp. R4, tab 2040), and drawings marked "Issued for Bid" dated April 18, 2008 (app. supp. R4, tab 2043).

3. At some point between 2008 and 2010, USACE became involved with the project. USACE and SFWMD decided to divide the construction contract into three contracts, with USACE responsible for the first two contracts, and SFWMD responsible for the third (tr. 3/161-62).

4. Contract One was for an intake canal and a project access road. Contract Two, the contract relevant to this appeal, included the reservoir, an intake pump station and outlet works, and the embankment dam. The reservoir was designed to have a storage volume of 50,600 acre-feet[2] of water and had an exterior perimeter of 9.3 miles. Contract Three included the stormwater treatment areas. (R4, tab 12 at 7, 29; tab 14 at 8; tr. 6/69) The project site covers approximately 12,000 acres (18.75 square miles) (app. supp. R4, tab 2062 at 6).

5. On July 23, 2010, USACE entered into a contract with HDR. The contract described the scope of work as "providing engineering services to complete the C-44 Reservoir and STA Project in compliance with USACE standards." (R4, tab 3 at 1, 17) The contract provided that HDR would perform the work pursuant to task orders (*id.* at 18). The contract incorporated Federal Acquisition Regulation (FAR) 52.236-23, Responsibility of the Architect-Engineer Contractor (Apr 1984) (the "Architect-Engineer clause") (R4, tab 2 at 77). This clause provides:

[2] An acre-foot is the volume of water necessary to cover one acre of land with water to a depth of one foot and is equal to approximately 325,580 U.S. gallons. *Stockton E. Water Dist. v. United States*, 583 F.3d 1344, 1349 n.6 (Fed. Cir. 2009).

> (a) The Contractor shall be responsible for the professional quality, technical accuracy, and the coordination of all designs, drawings, specifications, and other services furnished by the Contractor under this contract. The Contractor shall, without additional compensation, correct or revise any errors or deficiencies in its designs, drawings, specifications, and other services.
>
> (b) Neither the Government's review, approval or acceptance of, nor payment for, the services required under this contract shall be construed to operate as a waiver of any rights under this contract or of any cause of action arising out of the performance of this contract, and the Contractor shall be and remain liable to the Government in accordance with applicable law for all damages to the Government caused by the Contractor's negligent performance of any of the services furnished under this contract.

(*Id.*)

6. While this clause specifies the designer's professional responsibilities, the contract also required HDR to design within USACE's budget. The contract incorporated FAR 52.236-22, Design Within Funding Limitations (Apr 1984), which provides that: "(a) The Contractor shall accomplish the design services required under this contract so as to permit the award of a contract, using standard FAR procedures for the construction of the facilities designed at a price that does not exceed the estimated construction contract price . . . " (R4, tab 2 at 76).

7. In August of 2010, HDR appointed Keith Ferguson as the designer of record for the embankment (tr. 1/18, 126). Mr. Ferguson has Bachelor of Science (1977) and Master of Science (1979) degrees in Civil Engineering from the University of Colorado and is a registered Professional Engineer in Florida and several other states (app. supp. R4, tab 2412 at 1). During his career, Mr. Ferguson has been involved in over 250 dam projects including numerous embankment dams on which he acted as the engineer of record, project manager and in other capacities (tr. 1/96; app. supp. R4, tab 2412 at 4-12). There is no dispute that Mr. Ferguson was well-qualified for this role.

The HDR Task Orders

8. Two task orders are relevant to the dispute. Task Order No. 3 in the amount of $569,882.03 is dated September 30, 2011 (R4, tab 12). The scope of work for this task order provides that it:

> [i]s for the additional data collection, re-evaluation of existing data, analyses, and technical coordination necessary for the C-44 Reservoir . . . previously completed under separate contract to the South Florida Water Management District . . .

(*id.* at 5). As evidenced by this description, the work did not include a complete redesign. However, the task order did provide for seepage analysis of the embankment (*id.* at 15).

9. HDR's 2008 design for SFWMD contained a blanket drain but not a toe trench drain (app. supp. R4, tab 2043 at 59 (The blanket and toe trench drains are shown at R4, tab 44 at 25 and app. supp. R4, tab 2476.)). The blanket drain was made of sand and sat at the bottom of the embankment and on top of the foundation (tr. 1/108-09, 120-21; app. supp. R4, tabs 2476, 2482, 2483). It collects seepage that passes through the embankment. The seepage flows into a slotted pipe and then is discharged into a drainage swale. (App. supp. R4, tab 2036 at 38; R4, tab 44 at 3-4)

10. During HDR's work on Task Order No. 3, two characteristics of the existing design and the site became relevant. First, as already stated, the reservoir was to be elevated. When it was completely full the reservoir would have an elevation 20 feet higher than a perimeter canal to be built outside the embankment to collect seepage. Second, the existing soil in the foundation (below the embankment) was highly permeable. As a result, water from the reservoir would seep through the foundation to the perimeter canal. HDR discovered through computer modeling that upwards pressure from this seepage could build and possibly cause a failure of the dam. HDR conveyed this concern to USACE. (Tr. 1/109-11, 126-27, 131).

11. On April 4-5, 2012, HDR met with USACE and SFWMD, and discussed HDR's analysis concerning the potential failure of the dam. The discussions played a role in USACE issuing the second relevant Task Order No. 4. (App. supp. R4, tab 2033 at 70-71; tr. 1/130-32).

12. Task Order No. 4 is dated September 27, 2012 and is in the amount of $3,456,293.64. The purpose of the task order was to prepare the construction contract for Contract Two (the reservoir and appurtenant features). The work included a requirement that HDR "[p]erform a limited qualitative risk analysis" of the

embankment with and without a "trench drain" to determine if this would be an effective drainage feature to prevent the failure of the dam. (R4, tab 14 at 1, 6, 42)

13. Mr. Ferguson testified that HDR conducted additional computer modeling and determined that a single-stage toe trench drain would be adequate for the site because seepage through the embankment was relatively low (tr. 1/133-34; *see* findings 26, 57 (describing single and two-stage toe trench drains)).

The Independent Panel Review

14. HDR decided to obtain an opinion on the toe trench drain and other issues from experts outside of the company. On January 8, 2013, HDR obtained approval from USACE for a three-person independent technical review panel (tr. 1/134; 5/33; app. supp. R4, tab 2054 at 1). The panel included Mr. James R. Talbot, who was a preeminent expert on dam seepage and filters/drains.[3] Mr. Talbot had taught and written extensively on the topic. (Tr. 1/86; 3/143; 4/76; 6/36; R4, tabs 2102, 2104-06, 2108-09)

15. HDR met with the independent panel on January 28-29, 2013. The panel issued a report dated February 5, 2013. (App. supp. R4, tab 2011) The panel stated that a toe trench drain around the entire dam would "greatly reduce the potential for seepage problems developing . . . " (*id.* at 3). The panel recognized that a toe trench drain would be "expensive" and "complex" (*id.*). The panel "strongly recommend[ed]" a toe trench drain for at least part of the dam, but also recommended that HDR present other alternatives to USACE so that USACE could "decide how much risk they are willing to take with the consideration of the cost and complexity of constructing the trench drain" (*id.*). The discussions between HDR and the panel focused upon a single-stage drain because a two-stage drain would be even more expensive (tr. 1/140).

16. HDR later submitted the February 5, 2013 report to USACE as part of a design documentation report required by the contract (tr. 5/37 (citing app. supp. R4, tab 2062 at 2521)).

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[3] There appears to be some imprecision in the use of the words "filter" and "drain" in the context of embankment dams. The U.S. Bureau of Reclamation (USBR) states that different authors have different meanings. Part of the confusion may stem from the fact that a single material can act as both a filter and a drain. (App. supp. R4, tab 2010 at 21) USBR states that in a two-stage system, both stages provide filtration and drainage, but the emphasis of the first stage is filtering and the second stage is draining (*id.* at 24). The Board generally uses "drain" in this opinion unless the cited testimony or document uses "filter."

17. On February 6, 2013, HDR, USACE, and SFWMD met for a Special Topic Meeting. Ten representatives of USACE attended, including Dan Blaydes, USACE's Chief of Soils Design, plus at least two geotechnical engineers, as well as three representatives from SFWMD, including a senior civil engineer (app. supp. R4, tab 2056 at 13-14; tr. 1/145; tr. 5/51-53).

18. The meeting minutes state that HDR "introduced" the independent technical review panel, but it does not appear that they actually attended (app. supp. R4, tab 2056 at 1, 13-14). The parties discussed adding the toe trench drain to the design. The discussion included the observation that toe trench drains had not always been a standard feature on dams and it appears that there was some reluctance by USACE. HDR stated that it believed that there was a "strong justification" for adding the toe trench drain and recommended adding it around the entire perimeter of the reservoir. The government representatives asked questions about how much a toe trench drain would cost and an estimate of $200-$400 per linear foot was discussed, or a total of $12 to $24 million. The government asked about offsets for the costs. (*Id.* at 5-6; tr. 1/148).

19. The meeting minutes do not specify that a single-stage toe trench drain was discussed. However, in unrebutted testimony, Mr. Ferguson testified that the discussion concerned a single-stage toe trench drain. He further testified that no one from USACE or SFWMD questioned the use of a single-stage toe trench drain instead of a two-stage drain (tr. 1/149-50). The Board found this testimony credible.

20. On February 15, 2013, HDR met again with four USACE employees, including Mr. Dan Blaydes and the two geotechnical engineers, and SFWMD. The minutes reflect an awareness by the participants that they were discussing an issue that could lead to "partial or full dam failure." USACE stated that it had analyzed the information presented on February 6, 2013, and asked why the toe trench drain could not be eliminated on the northern portion of the reservoir. The minutes state that "USACE felt this is a higher level discussion based on risk and cost; will defer discussion to Wed 20th meeting . . . ." (App. supp. R4, tab 2057 at 3, 5).

21. USACE did not call as witnesses any of the USACE employees who participated in these meetings.

22. There are no documents in the record that evidence a Wednesday, February 20, 2013 meeting, either between USACE and HDR, or internally at USACE. USACE has not presented any evidence that establishes how it analyzed the risks and costs of adding, or not adding, a toe trench drain. In fact, USACE's presentation ignores that any of this ever happened.

23. The next event evidenced by the record is a March 2, 2013 email from Mr. Ferguson to Mr. Talbot (of the technical review panel) stating that HDR and USACE had agreed to construct a single-stage toe trench drain around the entire perimeter of the reservoir. Mr. Talbot replied on March 4, 2013, stating that he "particularly like[d] using one gradation for the filter material" and that the design "is adequate for filtering" the soil at the site. (App. supp. R4, tab 2122 at 1-2) "[O]ne gradation" means a single-stage drain/filter (tr. 1/143).

24. On April 5, 2013, Mr. Talbot again wrote to HDR, stating that "I believe the present design with a trench drain at the downstream toe for full length of the embankment and drainage in the bottom of the perimeter canal will provide adequate protection against the piping failure mode" (R4, tab 2012 at 1).

25. Mr. Talbot is deceased and did not testify at the hearing (tr. 4/76).

The Toe Trench Drain

26. The single-stage toe trench drain that HDR designed in 2013 was a trench filled with sand that was 3-feet wide and up to 14-feet deep so that it would extend two feet into the existing layer of pervious soil in the foundation. Water from the elevated reservoir would flow by gravity through this pervious soil and then up through the sand in the trench until it reached a pipe. The pipe contained slots so that water would enter and flow to manholes, where it would go into another pipe that conveyed it to the perimeter canal. In a single-stage design, sand surrounds the pipe. The toe trench drain was to be installed near the toe of the slope of the embankment, on the far side from the reservoir. (App. supp. R4, tabs 2475A, 2476, 2481-82, 2484, 2485A, 2486; tr. 1/107, 109-12, 123-24) The perforated pipe was designed so that USACE would be able to inspect and maintain it (app. supp. R4, tab 2056 at 5; tr. 1/147).

27. HDR submitted an interim design in April 2013. In their comments on the design, multiple USACE reviewers continued to question the need for a toe trench drain, either in whole or around the entire 9.3-mile perimeter of the reservoir. (App. supp. R4, tab 2133 at comment 5164782; *see* app. supp. R4, tab 2036 at 65-66).

28. USACE and SFWMD performed multiple reviews of the design. These reviews included a quality assurance review by the Jacksonville District of USACE and SFWMD, including by structural and geotechnical engineers. In addition, there was an agency technical review by USACE's Louisville District. Further, USACE retained the firm Gannett Fleming, a designer of dams and embankments, to perform an independent expert review. The SFWMD hired another design consultant firm, Ardaman & Associates, to perform its own outside review. After all of these reviews had been completed, USACE performed a "bid ability, constructability, operability

and environmental" review of the design. In all, the design was subject to review by approximately 50 technical experts. While the reviewers posted approximately 1,000 comments, none of the experts at USACE, SFWMD, Gannett Fleming, or Ardaman & Associates questioned the use of a single-stage toe trench drain. (Tr. 5/41-46, 67)

29. USACE did not call as witnesses anyone from SFWMD, Gannett Fleming, or Ardaman & Associates.

30. We will address here one aspect of USACE's claim. Comments on the design were posted on a web-based platform known as Dr. Checks. While USACE does not allege that either USACE or the other commenters mentioned a two-stage toe trench drain in the comments, it does contend that HDR was negligent because it failed to respond to some comments concerning the toe trench drain (gov't br. at 5-7, 19-20). The problem for USACE is that this contention was largely undercut by its principal fact witness *on direct examination* when he testified that HDR "must have" resolved the comments (tr. 3/106-07; *see also* tr. 3/133). In addition, the record demonstrates that a contracting officer (CO) wrote to HDR on October 30, 2013 stating "[m]y understanding is that all comments in [Dr. Checks] have been addressed and are, or will be, closed shortly" (R4, tab 29 at 1). The Board finds that USACE has not proven that HDR failed to respond to any relevant Dr. Checks comments.

The Construction Contract

31. On September 11, 2015, USACE awarded Contract Two to Barnard Construction Company, Inc. (Barnard), in the base amount of $197,700,321.85 (R4, tab 83 at 2).

The Toe Trench Drain Flood Test

32. The contract required Barnard to construct a 300-foot section of the toe trench drain and then conduct a flood test. The purposes of the flood test included determining whether Barnard could achieve sufficient compaction of the soil. The test was not intended to simulate operating conditions of the toe trench drain. (Tr. 1/45, 114, 2/128; app. supp. R4, tab 2069 at 32) The test was conducted years before the reservoir was filled so that the "driving force" for the seepage did not exist (tr. 1/111, 3/120-21).

33. Two other characteristics of the site and design must be mentioned at this point. The soil at the site contains high amounts of iron. When iron encounters water, it forms what the parties variously call iron oxide, iron ochre, or simply rust.[4] There

[4] We will use iron oxide in this opinion because USACE's geologist indicated a preference for this term (tr. 2/153). HDR's expert stated in her report that iron

must be oxygen in the water to form iron oxide, otherwise the iron remains dissolved. Groundwater is not exposed to the air and is generally depleted of oxygen. HDR was aware of the presence of the iron in the soil and designed the toe trench drain pipe to be below groundwater level so that the water would be anoxic and the iron would remain dissolved. (Tr. 1/22, 45, 62, 114; 2/113-14; 6/109)

34. To perform the flood test, Barnard pumped groundwater at the site into an open-air metal tank. It then pumped water from the tank into a manhole where the toe trench drainpipe ended. The water flowed through that drainpipe. In other words, the test required Barnard to pump water backwards through the system (or backwards compared to the design) (tr. 1/115-16, 158-60, 6/87).

35. The test had two flaws, at least so far as they pertain to the present dispute. First, in the initial test in the fall of 2016 (R4, tab 82 at 1) there was dirt or sediment in the metal tank (tr. 1/179-80, 2/43). After the test was complete, USACE noticed rusty coloration in the toe trench drain sand and on top of the drainpipe (tr. 1/199). USACE also began noticing rusty discoloration in the drain canals (tr. 2/17).

36. Barnard addressed the issue with the cleanliness of the tank and conducted a second test in April 2017, but the results were similar in terms of the rusty water coming from the system (tr. 2/61-63).

37. This brings us to the second flaw in the flood test. As stated above, HDR designed the toe trench drainpipe so that it would be below the level of groundwater, meaning that the water that entered the pipe would be anoxic (finding 33). When the test water was stored in the open-air metal tank and pumped into the manholes, it had the opportunity to react with the atmospheric oxygen and produce iron oxide, which likely caused higher levels of iron oxide than if the system had been operated as designed. (App. supp. R4, tab 2035 at 18-20)

38. Because of this exposure to oxygen, and because the reservoir had not been built, the Board finds that USACE – the party with the burden of proof – has not proven that the flood tests were a reasonably accurate method for determining how HDR's single-stage drain would have performed if built and operated as designed.

39. There is no evidence that Barnard conducted a flood test of the blanket drain.

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ochre forms when iron oxide mixes with iron-oxidizing bacteria (app. supp. R4, tab 2035 at 14).

The Expert Analyses of the Clogging Rates

40. The perforations (or slots) in the toe trench drainpipe designed by HDR were 0.9 millimeters (mm) wide (R4, tab 44 at 3). Because these slots were so narrow, USACE became concerned that the iron oxide observed in the flood test would clog the pipes after the project was completed. USACE tasked one of its geologists with analyzing how quickly the slots would become clogged (R4, tab 105 at 2).

41. The USACE geologist issued a report dated July 17, 2017 analyzing the chemical reactions that would occur based upon the levels of iron and oxygen at the site. For some reason she did not analyze the actual 0.9 mm slots designed by HDR but rather considered 12.5 mm, 7.5 mm, and 3.2 mm slots. Not surprisingly, she found that the narrower the slot, the quicker it would become clogged. She concluded that the 3.2 mm slots could clog in as little as 21 days. (R4, tab 105 at 1, 5) The Board finds that this would be quite troubling, if it were true.

42. After filing this appeal, HDR retained Karen J. Murray, Ph.D., an expert in geochemistry and environmental chemistry (app. supp. R4, tab 2035; tr. 6/79). Dr. Murray concluded that the USACE geologist failed to take into account the law of conservation of mass, and failed to recognize that, as the dissolved iron reacted with oxygen and became iron oxide, the overall concentration of iron would become smaller and the reaction would slow (app. supp. R4, tab 2035 at 25-28). After analyzing the USACE calculation that the pipes could clog in as little as 21 days, Dr. Murray concluded that the calculation had a 234-fold overstatement of the amount of iron in the system, or, as she opined: "99.6% of the [iron oxide] that the USACE modeled in their maximum estimate of iron fouling was created *out of thin air* and could not be present based on the law of conservation of mass" (*id.* at 28 (emphasis in original); tr. 6/102).

43. After making what she deemed the appropriate corrections, Dr. Murray recalculated the clogging rate for a pipe with 3.2 mm slots using the same assumptions that the USACE geologist had used. Dr. Murray concluded that the pipe would take 7,775 days to clog. In other words, instead of clogging in 21 days, it would take over 21 years. For the 0.9 mm slots specified by HDR, Dr. Murray calculated that it would take 2,404 days to clog. (R4, tab 2035 at 87)

44. The Board was skeptical that USACE would go to a hearing with such a flawed analysis and expected USACE to vigorously challenge Dr. Murray's calculations at the hearing. However, USACE had no response.

45. USACE's geologist prepared a rebuttal report of approximately one page. In this report, she admitted that her July 2017 report "may have errors." Nevertheless, she insisted that her analysis was "sound." However, she did not revise her

calculations, nor did she dispute or challenge Dr. Murray's calculation of the clogging rates. (R4, tab 106) At the hearing, she testified "[t]here were errors in my calculations. I acknowledge that." (Tr. 2/187).

46. USACE did not provide any other evidence that challenged Dr. Murray's conclusions. The Board finds that Dr. Murray's analysis is persuasive and unrebutted, and that Dr. Murray was a credible witness.

47. In its post-hearing brief, USACE ignores these unpleasant developments and continues to cite the 21-day clogging scenario as if this were a viable assertion (gov't br. at 14). The Board finds that USACE has not proven that the pipes specified by HDR were likely to become clogged in an unreasonably short period of time, taking into account planned maintenance of the pipes (*see* tr. 3/120-121 (discussing plan to clean the pipes at "[a] little more than two years" after USACE began filling the reservoir)).

48. USACE's geologist did not perform any analysis of a clogging rate for the blanket drainpipe (R4, tabs 105-06; tr. 2/126-27).

The Change to Two-Stage Drains

49. On February 14, 2017, before Barnard had even conducted the second flood test, USACE began to discuss a two-stage drain with HDR (R4, tab 44 at 8).

50. HDR wrote to USACE on February 16, 2017. It stated that prior agriculture on the site was the likely source of the high levels of iron at the site. It opined that the iron would be flushed out over time through operation of the reservoir. HDR recommended a limited installation of two-stage drains with follow-up testing of water quality and geochemical modeling to determine if there were long-term water quality concerns and whether a two-stage drain was necessary. (R4, tab 36 at 3)

51. The USACE Jacksonville District asked the USACE Philadelphia District to review the toe trench drain design. Daniel M. Sirkis, the Chief of the Philadelphia Geo-Environmental Section, issued a four-page memorandum on March 6, 2017. Among other things, Mr. Sirkis expressed concern about the narrowness of the slots and the thickness of the pipes in the HDR design because they would make it difficult to clean the slots through water jetting. He stated that the pipes might need to be cleaned on an annual basis. He also opined that the custom pipe specified by HDR would be costly and that there might be problems with manufacturing quality. He recommended mass-produced, commercially available, pipe. (App. supp. R4, tab 2087 at 2-3)

52. Mr. Sirkis also opined that the HDR design "should have been more robust" with respect to the formation of iron oxide. He proposed a two-stage "filter pack" for both the toe trench and blanket drains, opining that it would "provide a superior pack for drainage and maintenance." (*Id.* at 3) However, he acknowledged that a two-stage system "may be somewhat more difficult to install and more expensive than a single stage filter." He emphasized that "careful quality control and quality assurance will be needed due to the increased complexity of this design and increased difficulty of construction." (*Id.*)

53. In 2017, USACE did not contend that HDR had committed professional negligence and did not demand that HDR design the two-stage drain at no charge. In fact, USACE paid HDR to perform the redesign (tr. 5/76). While HDR performed the redesign, it did not believe it was necessary (tr. 5/78).

54. Consistent with its earlier concerns about the costs of a single-stage toe trench drain, USACE quickly became concerned about the costs of two-stage drains, which it viewed as "excessive," due, in large part, to the additional sand and gravel costs (R4, tab 44 at 11).

55. In early July 2017, USACE formulated a plan it referred to as "Optimize C" that reduced the amount of drain sand and would be faster to construct. USACE would achieve this by substituting a geotextile for some of the drain sand. (*Id.*)

56. The problem with this idea was that various guidelines – including USACE's – seemed to prohibit the use of geotextile in an embankment dam. Nevertheless, USACE sought and obtained internal approval to use the geotextile. (R4, tab 121 at 1-2)

57. HDR designed the two-stage drain that USACE had selected. The drain continued to have sand in the bottom part of the trench, but the pipe was surrounded by gravel and a geotextile fabric instead of sand, and the pipe had larger perforations (app. supp. R4, tab 2485A; tr. 1/124-25).

The Modifications to the Barnard Contract

58. USACE issued two contract modifications to Barnard for the change to two-stage blanket and toe trench drains. The first, Modification No. P00014 dated August 4, 2017, increased the contract price by $2,338,864.55. This modification addressed the additional gravel that would be required. (R4, tab 87 at 2, 4; tr. 2/67)

59. Because USACE had concluded that the 0.9 mm slots on the pipe specified by HDR were too small and the pipe was too thick and would be difficult to clean (gov't br. at 5-7; finding 51), the modification also changed the pipe. However,

because the new pipe was cheaper, this resulted in cost savings to USACE (R4, tab 87 at 3-4).

60. The second Modification No. P00015, issued on September 27, 2017, increased the contract price by $12,529,030.87 and included the work of constructing the two-stage drains. The modification granted 76 days of delay priced at $3,809,332.49 (R4, tab 88 at 2-4, 7-8; tab 90).

61. After Barnard installed the two-stage toe trench drain, USACE did not require Barnard to perform a flood test (tr. 2/97). Accordingly, there is no flood test data to compare the performance of the single-stage drain to the two-stage. The Board finds that USACE has not proven that the two-stage drain would have performed better in a comparable flood test.

The Professional Negligence Claim

62. In October 2017, the USACE Jacksonville District's Engineering Division began an investigation (R4, tab 137 at 18). On January 29, 2018, CO Susan Forchette provided HDR "formal notification of potential Architect-Engineering (A-E) liability for a design deficiency discovered by the Government . . . " and stated that USACE had begun an investigation (R4, tab 43).

63. USACE appointed Mr. Bradley Cox, a lead geotechnical engineer, to conduct the investigation (tr. 3/64, 97). He testified that he opposed the investigation, but he was appointed anyway (tr. 3/151). Mr. Cox interviewed Mr. Blaydes, the Chief of Soils Design who was the senior USACE official meeting with HDR during the approval of the single-stage toe trench drain (findings 17, 20). But Mr. Cox did not ask Mr. Blaydes a basic question: why did Mr. Blaydes and dozens of other experts approve the single-stage toe trench drain? (Tr. 3/148)

64. On February 4, 2018, USACE issued a memorandum authored by Mr. Cox, and signed by Mr. Blaydes and three other USACE officials containing the findings of fact of the investigation. In this memorandum, USACE identified what it contended were errors or omissions by HDR and stated that HDR should be held liable for negligence in the design. The memorandum relied, in part, upon the USACE geologist's erroneous conclusion that the pipes could clog in as little as 21 days. (R4, tab 44 at 1, 13, 23)

65. The memorandum does not contain a clear explanation for the replacement of the single-stage blanket drain. The memorandum notes that the blanket drain does not collect the iron-rich groundwater but rather water from the reservoir. Accordingly, the memorandum acknowledges that USACE lacks evidence that the pipe would be susceptible to clogging. Nevertheless, the memorandum supports replacement of the

single-stage blanket drain stating, without elaboration, that the two-stage design is "industry standard." (*Id.* at 18)

66. During the hearing, Mr. Cox testified that the purpose of redesigning the toe trench and blanket drains was to reduce maintenance and the potential for clogging (tr. 3/84).

67. USACE convened an Architect Engineer Responsibility Board (AERB). Of the 76 days of delay granted in the Barnard modification, the AERB concluded that HDR should be held liable for only 21 days because Barnard had taken 55 days to respond to USACE's request for proposal (app. supp. R4, tab 2341 at 5; tr. 3/176).

68. On October 15, 2020, CO Katrina Hills-Denson issued a final decision asserting a government claim for $4,185,003.71. Without explanation, she rejected the recommendation of the AERB to hold HDR liable for only 21 days of delay. The majority of the damages was the $3,809,332.49 for the 76 days of delay paid to Barnard. The claim was based upon the contention that HDR committed negligence and/or a breach of contract in its design of the dam. The CO relied upon FAR 52.236-23, the Responsibility of the Architect-Engineer Contractor clause. (Finding 5; R4, tab 65 at 14)

69. The CO contended that there were two errors in the design. First, she contended that HDR failed to follow "agency and industry standards." She cited guidelines published by USACE, the Bureau of Reclamation (USBR), and the Federal Emergency Management Agency (FEMA). She stated that if HDR had "followed agency and industry standards, the original design would have incorporated a second drainage media around the pipe (also known as a two-stage drain) in lieu of the single-stage drain specified for construction." (R4, tab 65 at 5)

70. Second, the CO contended that HDR failed to identify the necessity for a two-stage design based on the water chemistry test results showing high iron concentrations at the site and failed to design the dam to reduce maintenance (*id.* at 9).

71. The final decision focuses upon the toe trench drain. However, the decision contained the same conclusory assertion from Mr. Cox's memorandum that a two-stage blanket drain is "industry standard" (R4, tab 65 at 9; finding 65)). At the hearing, USACE did not present any evidence that documented an industry standard for two-stage blanket drains.

72. HDR filed a timely appeal on November 11, 2020.

Applicable Standards and Guidelines

73. Both parties cite standards or guidelines published by USACE, USBR, and FEMA concerning the design of dams and filters/drains. In its opening brief, USACE refers to the relevant documents as "guidelines" and states that HDR was not required to follow them (gov't br. at 22). However, in its reply brief USACE refers to them as "Federal regulations" (gov't reply at 11). In any event, we summarize the relevant provisions concerning one and two-stage drains.

USACE Engineering Manual (EM) 1110-2-2300 (July 30, 2004)

74. EM 1110-2-2300 is entitled "General Design and Construction Considerations for Earth and Rock-Fill Dams" (app. supp. R4, tab 2091). In section 6.3, Earth Foundations, the EM lists various methods for controlling "underseepage," including trench drains. In section, 6.3(g), the EM provides that "[w]hen a complete cutoff is not required or is too costly, a trench drain may be used in conjunction with other underseepage control measures . . . " (app. supp. R4, tab 2091 at 42).

75. In appendix B, Filter Design, EM 1110-2-2300 further provides: "[i]n many instances a filter material meeting the criteria given by Table B-2 and Equation B-1 relative to the material being drained is too fine to meet the criteria given by Equation B-2. In these instances, multilayered or 'graded' filters are required." (*Id.* at 92)

76. The Board reads this provision to mean that "in many instances" a multi-stage filter is required, which would imply that in some cases a one-stage filter is appropriate.

EM 1110-2-1901

77. EM 1110-2-1901 is entitled Seepage Analysis and Controls for Dams (April 30, 1993) (app. supp. R4, tab 2089). This EM provides that:

> All earth and rock-fill dams are subject to seepage through the embankment, foundation, and abutments. Seepage control is necessary to prevent excessive uplift pressures, instability of the downstream slope, piping through the embankment and/or foundation, and erosion of material by migration into open joints in the foundation and abutments.

(*Id.* at 144)

78. This EM further provides that a "trench drain usually contains a perforated pipe surrounded by filter gravel, and backfilled with sand . . . " (*id.* at 246). Due to the

reference to both sand gravel, the Board understands this to be a reference to a two-stage drain. Thus, the Board understands this to mean that a trench drain "usually" is a two-stage drain.

USBR Embankment Dams Design Standards No. 13 (Nov. 2011)

79. Chapter 5 of this publication is entitled "Protective Filters" (app. supp. R4, tab 2010). In section 5.1.5, Scope, it discusses the balance of cost, constructability, and reliability in an effective design:

> Economical design requires the use of materials that protect against failure yet are easily constructed. Since filter materials are some of the most costly materials used in a dam, effort is made to minimize the amount of material used. Therefore, the balance of cost, constructability, and reliability go hand in hand in providing an economically safe structure.

(*Id.* at 25)

80. In section 5.2, Applications, it states:

> Historically, many small dams (<50 feet high) have been built without any filter or drainage zones, especially those constructed prior to 1980. Additionally, many mid-size dams (50 to 300 feet high) have been built without 'modern' filters, although they do contain graded transition zones. Many of the dams in each of these categories have performed successfully for many decades. On the other hand, there have been notable dam failures, including all dam sizes, that have resulted in loss of life and extensive property damage.

(*Id.* at 33)

81. USBR states that the failure of some dams led to the addition of filters in the 1970s. Interestingly, USBR casts some doubt on the efficacy of the filters because it also states: "It should be noted, however, that since the advent of the dam safety movement in the late 1970s, the failure rate of embankment dams due to internal erosion has remained about the same." (*Id.* at 33-34)

82. In section 5.2.3.2, Toe Drains, the document states:

> Toe drains should consist of a perforated pipe surrounded by a gravel drain which, itself, is surrounded by a sand filter. This arrangement is known as a two-stage toe drain. . . . While foundation conditions vary, this arrangement is considered the minimum necessary for an effective drain. . . . Single stage toe drains (a drain consisting of only filter sand and a drain pipe) may also be considered in the interest of minimizing costs. Again, single stage toe drains are not recommended due to uncertainties in foundation conditions and structure performance upon first filling.

(*Id.* at 53) (emphasis added)

83. While USBR clearly recommends against single-stage drains in the above-quoted text, three pages later it strikes a more permissive tone if there is low seepage:

> **5.2.3.2.2 One-Stage Versus Two-Stage Design**
> Historically, toe drains have incorporated one-stage and two-stage designs as shown in figure 5.2.3.2-1. One-stage designs are used when small amounts of seepage are expected. Two-stage designs are used when a large amount of seepage is expected.

(*Id.* at 56 (emphasis in original))

84. In Chapter 5, section 5.3.3, Cost, a general section applying to filter designs, USBR again strikes a more permissive tone with respect to single-stage drains:

> The design of a filter should result in the minimal cost necessary to satisfy the requirements of the application and provide for reasonable anticipated construction methods. . . .
>
> Another cost topic is single stage versus two stage (or greater) filter/drain systems. For some projects, a single element may serve as both filter and drain. In others, certainly including more critical and probably larger projects, two stage systems are appropriate.

(*Id.* at 71-72)

85. HDR disputes the applicability of the USBR guidance, contending that when USBR uses the term "toe drain," it is referring to something that is different from a toe trench drain. HDR notes that USBR's rendering of a toe drain is a wide, trapezoidal construction, which is different than the narrow, rectangular trench that it designed (app. supp. R4, tab 2010 at 53). HDR points to language in section 5.2.3.2 stating that a purpose of a toe drain is to collect seepage from the blanket drain (*id*.). In unrebutted testimony, Mr. Ferguson testified that, while there is such a drain in the dam at issue, it is separate from the toe trench drain in question (tr. 1/75-77).

86. HDR cites Chapter 8 (Seepage) of this USBR publication, which makes a clear distinction between a toe drain and a drainage trench. As in Chapter 5 cited above, Chapter 8 states that toe drains collect water from the embankment's internal drainage system and that they "typically" contain two stages. With respect to drainage trenches, USBR states that:

> Downstream drainage trenches running parallel to the toe of the dam can be used when downstream drainage of the foundation is needed beyond what is normally provided by a toe drain. In essence, the deeper trenches provide relief of pressures and a filtered outlet for seepage layers that are located at a greater depth than would be encountered with a typical toe drain. . . . As with a toe drain, a perforated or slotted collector pipe is typically included and set at the lowest possible elevation that will still allow downstream outfall.

(App. supp. R4, tab 2114 at 84)

87. The Board agrees with HDR that the single-stage drain that it designed is consistent with USBR's description of a drainage trench (*see* finding 26 (toe trench drain extended as far as 14 feet below the surface into the permeable layer)). It is notable, therefore, that USBR states that the trench provides drainage "beyond" that of a toe drain. It is also notable that USBR does not speak of the drainage trench as having two stages.

88. USACE has not responded to these contentions. Even though HDR's contentions are unrebutted, the Board is reluctant to accept them in full. USBR Chapter 5, despite the trapezoidal rendering of the toe drain, speaks of a toe drain as having either a trapezoidal or a rectangular geometry (app. supp. R4, tab 2010 at 54). Nevertheless, HDR has succeeded in identifying an inconsistency in the USBR guideline.

89. USBR Chapter 5 also discusses blanket drains. While it mentions

two-stage blanket drains, it does not contain a discussion of the advantages of two-stage drains compared to one-stage. (*Id.* at 48-52)

FEMA, Filters for Embankment Dams (Oct. 2011)

90. This FEMA manual is very similar to the USBR guideline, perhaps because the author of the USBR document is also one of the authors of the FEMA document (*compare* R4, tab 100 at 6, *with* tab 101 at 14). The FEMA guideline contains the same or very similar provisions as those quoted above from USBR Chapter 5 (R4, tab 101 at 32, 44, 65-68). However, it does not include the discussion in USBR section 5.3.3, Cost.

FEMA, Technical Manual: Plastic Pipes Used in Embankment Dams (Nov. 2007)[5]

91. Chapter 4 of this manual is entitled Drainpipes and Filters (R4, tab 101 at 499). In section 4.2.1, Zoning, it provides:

> Drainpipes have been designed in single and double stage configurations. A single stage system consists of one zone of filter material, usually sand, surrounding a drainpipe. The double stage system consists of a coarse drainage zone (gravel) surrounding the pipe and a filter (sand) zone surrounding the coarse element. . . .
>
> Single stage designs have been used on smaller jobs, such as low hazard potential dams in the interest of reducing costs and simplifying construction.

(*Id.* at 512)

92. This section further states:

> Two stage filter/drain combinations have higher permeability and will be more efficient in collecting seepage than single stage filters. For these reasons, single stage filters should be avoided and [sic] high hazard potential dams and two stage filters are preferred by designers. However, for economy and simplicity, sometimes single stage drainage elements are used in low hazard potential dams.

[5] This document begins at page 363 of R4, tab 101.

(*Id.* at 513)

93. The dam at issue is a high hazard dam (R4, tab 44 at 16).

94. Finally, section 4.2.1 states that "If single stage filters are used, slots should be no larger than the D_{50} of the filter" (R4, tab 101 at 514).

95. HDR sized the slots using the D_{50} of the filter, which means that 50% of the materials are finer than the opening and 50% are coarser (tr. 1/153).

Guidelines Conclusion

96. USACE has cited guidelines that establish that a two-stage toe trench drain provides superior performance to a one-stage drain and that the two-stage drain is the recommended or usual choice. However, the Board also finds that the guidelines are not entirely consistent, such as in the USBR discussion of toe drains and drainage trenches (findings 85-87). The guidelines do not prohibit or completely rule out a single-stage drain. Rather, they acknowledge that minimizing cost is important, and that a single-stage drain may function properly if there are low amounts of seepage. (Findings 79, 83-84)

97. In its post-hearing brief, USACE contends that the guidance from FEMA, USBR, and USACE "regarding TTD design all required a Two-Stage TTD" (gov't br. at 6) (emphasis added). The Board disagrees and finds that this is an overstatement or oversimplification.

98. The Board also finds that USACE has not cited any guidance stating that a two-stage blanket drain performs better and is recommended in favor of a one-stage blanket drain.

99. During the hearing, the parties focused on the toe trench drain. Based upon our review of the transcript, the parties referred to the toe trench drain through a variety of terms (for example, "TTD" or "toe drain") approximately 479 times, whereas the word "blanket" was used in reference to a drain only 44 times.

Expert Witnesses on Embankment Design

100. David Sykora, Ph.D., P.E., testified on behalf of HDR as an expert in geotechnical engineering for dams and embankments (tr. 6/15). Dr. Sykora opined that the guidance cited above (USACE, FEMA, USBR) did not bar the use of a single-stage drain. He concluded that the guidance permits the designer to make a site-specific analysis of conditions and allows the designer to optimize a system so that it is functional, constructable, and cost efficient (tr. 6/35; app. supp. R4, tab 2036 at 27).

101. Dr. Sykora's opinion was consistent with the testimony of Mr. Ferguson, who testified that HDR prepared a "site specific design" (tr. 1/78). He testified that this requires the designer "to consider many factors, amongst which are site geology, site conditions, and the properties of the materials you're dealing with" and to develop models and perform testing (tr. 1/164). Mr. Ferguson cited the costs and constructability that USACE requested HDR achieve, as well as HDR's seepage models that showed it would provide the required pressure reduction, as factors leading to selection of the one-stage toe trench drain (*id.* at 134, 154). Mr. Ferguson's testimony on these issues was credible and unrebutted.

102. Dr. Sykora performed calculations to assess the efficacy of the system designed by HDR. His calculations confirmed that the toe trench drain "sufficiently reduce[d] the seepage gradients at the downstream tail of the dam" (tr. 6/45). He concluded that HDR accurately calculated peak flows into the pipe and appropriately applied a safety factor of 10 when selecting the pipe, meaning that it calculated the peak flow and then used a number 10 times higher (app. supp. R4, tab 2036 at 75-76, 139).

103. The Board finds that Dr. Sykora's testimony on this issue was unrebutted. The Board also observes that the analysis of Mr. Talbot from the independent technical review panel is consistent with the testimony of Dr. Sykora and Mr. Ferguson (findings 23-24).

104. USACE submitted an expert report dated October 6, 2020 and testimony from Thomas L. Brandon, Ph.D., P.E. (R4, tab 75). Dr. Brandon's analysis is largely based on his review of technical guidelines, including those discussed above. He did not perform any independent analysis of HDR's single-stage design to determine if it would have provided sufficient pressure reduction. Dr. Brandon's report acknowledges guidance stating that a single-stage filter offers the advantage of lower cost and is easier to construct than a two-stage filter (*id.* at 2). However, he read the design guidelines as providing "no leeway at all" to select a single-stage filter, and he opined that, if HDR believed a single-stage filter was appropriate, it should have submitted a written justification (tr. 4/59-60, 67).

105. Dr. Brandon seemed to have read only a limited number of documents and spent only 20-30 hours preparing his October 6, 2020 report. The value of his testimony was limited by his lack of preparation. He testified that he did not adequately re-familiarize himself with his report and he contradicted himself as to whether he had read Dr. Sykora's report. This may have been because USACE did not enter into a contract with him until shortly before the hearing began, which also deprived HDR of the opportunity to depose him. (Tr. 4/58, 70, 78-80, 87, 6/152-53) He did not interview any of the USACE employees involved in the decision to approve the single-stage toe trench drain, nor any other USACE employee (tr. 4/88).

106. Dr. Brandon's report undercut USACE's position somewhat with respect to the iron-rich groundwater clogging the pipes. He stated that "there isn't a standard design procedure to definitively deal with it" but opined that the narrow slots specified by HDR "would exacerbate the problem" (R4, tab 75 at 6).

DECISION

The Board has held that under FAR 52.236-23, the Architect-Engineer clause, a designer is obligated "to exercise its architectural skill, ability and judgment with reasonable care and without negligence." *Brunson Assocs., Inc.*, ASBCA No. 41201, 94-2 BCA ¶ 26,936 at 134,152; (*see* finding 5). The clause does not impose on designers "strict liability for mistakes, ambiguities, or so-called 'defects' in the specification it prepared." *Ralph M. Parsons Co.*, ASBCA No. 24347, 85-1 BCA ¶ 17,787 at 88,899.

In *Ralph M. Parsons*, the Board cited Corpus Juris Secundum (C.J.S.), as containing "what has been perceived as the 'applicable law' within the meaning of the 'Responsibility of the Architect-Engineer' clause." *Id.* The current version of C.J.S. provides:

> An architect must exercise such care, skill, and diligence as others who are engaged in the profession would ordinarily exercise under similar circumstances. . . . [I]n the absence of an express agreement to the contrary, an architect, like a physician or lawyer, does not guaranty, imply, or warrant a perfect plan or favorable or satisfactory results. It follows that an architect's work can be inaccurate or imperfect without being an actionable deviation from the standard of care.

6 C.J.S. Architects § 16 (Dec. 2024 Update) (footnotes omitted).

C.J.S. and precedent equate the standard of care for architects with other professions. *E.g.*, *Bonadiman-McCain, Inc. v. Snow*, 183 Cal. App. 2d 58, 70, 6 Cal. Rptr. 52 (1960) ("The engineer's undertaking in respect to the plans he prepares is comparable to that of an architect . . . ."); *City of Mounds View v. Walijarvi*, 263 N.W.2d 420, 424 (Minn. 1978). Similarly, the Architect-Engineer clause makes no distinction between the standard for an architect and that for an engineer. Thus, while HDR is an engineering firm, the Board considers precedent involving architects as applicable to this appeal.

The Board's decisions and those of many other jurisdictions provide that a designer can commit an error without departing from the professional standard of care.

As the Supreme Judicial Court of Maine held in a 19th century case, "[a]n error of judgment is not necessarily evidence of a want of skill or care, for mistakes and miscalculations are incident to all the business of life." *Coombs v. Beede*, 36 A. 104, 105 (Me. 1896). Similarly, the Supreme Court of Minnesota explained that:

> Architects, doctors, engineers, attorneys, and others deal in somewhat inexact sciences and are continually called upon to exercise their skilled judgment in order to anticipate and provide for random factors which are incapable of precise measurement. The indeterminate nature of these factors makes it impossible for professional service people to gauge them with complete accuracy in every instance. Thus, doctors cannot promise that every operation will be successful. . . . Because of the inescapable possibility of error which inheres in these services, the law has traditionally required, not perfect results, but rather the exercise of that skill and judgment which can be reasonably expected from similarly situated professionals.

City of Mounds View, 263 N.W.2d at 424. In *Bonadiman-McCain*, a California court stated:

> The services of experts are sought because of their special skill. They have a duty to exercise the ordinary skill and competence of members of their profession, and a failure to discharge that duty will subject them to liability for negligence. Those who hire such persons are not justified in expecting infallibility, but can expect only reasonable care and competence. They purchase service, not insurance.

Bonadiman-McCain, 183 Cal. App. 2d at 70 (citations omitted).

USACE states in its brief that the "seminal case" for architect-engineer liability is *Parsons Main, Inc.*, 02-2 BCA ¶ 31,886 (gov't br. at 18). In those appeals, the Board identified three elements that the government must prove under the Architect-Engineer clause: "(1) Did the construction contractor substantially comply with the [Architect-Engineer]'s design in the manner intended by the A-E? (2) Did the [Architect-Engineer] exercise its skill, ability and judgment negligently, instead of with reasonable care, with respect to the design? (3) Was the [Architect-Engineer]'s defective design the proximate cause of damage to the Government?" *Parsons Main, Inc.*, ASBCA Nos. 51355, 51717, 02-2 BCA ¶ 31,886 at 157,537.

First Prong of *Parsons Main*: Compliance with the Design

USACE contends that it has met the first prong of the test because Barnard constructed the test section (finding 32; gov't br. at 18). The Board disagrees. We will assume without deciding that constructing a 300-foot test section of a 9.3-mile toe trench drain could be enough to satisfy the test. But we believe that for a 300-foot test section to suffice, it would have to be built and operated as designed by HDR. That never happened. When the test was conducted the reservoir had not been constructed and filled, which meant that the "driving force" of water from an elevated reservoir was not present (finding 32). The purpose of the test was not to determine if the single-stage toe trench drain was sufficient to relieve the pressure (*id.*), and USACE and Barnard did not attempt to simulate operational conditions. And while the test did cause water to flow through the pipe (albeit backwards), the water was exposed to atmospheric oxygen (finding 37). As a result, it likely had higher levels of oxygen, and higher levels of iron oxide, than if the system had been operated as designed, and would have been more likely to clog the pipes.

Accordingly, we have found that the test was not a reasonable approximation of operational conditions (finding 38). The test did not demonstrate that HDR's single-stage toe trench drain would risk dam failure, nor did it demonstrate that the drainpipes would become clogged in an unreasonably short amount of time.

USACE also has not presented any evidence that the single-stage blanket drain was ever built or tested.

USACE has failed to prove the first prong of the *Parsons Main* test.

Second Prong of *Parsons Main*: Reasonable Care

After consideration of the record, including six days of testimony, the Board concludes that HDR acted with reasonable care and judgment. This is not to say that a single-stage toe trench drain was the optimal choice for the project from a purely engineering perspective (finding 96). However, one major aspect of exercising professional judgment is weighing the optimal engineering solution versus what the client is willing to pay for and making reasonable tradeoffs. The record demonstrates that, in addition to the guidelines that recommend a two-stage drain (finding 96), HDR had to weigh the site conditions, including the geology and the properties of the site materials, the amount of projected seepage (findings 83, 101), and the budget and demands of a sophisticated client (findings 18-20, 27, 54-57).

HDR's client, USACE, primarily was the Jacksonville District, but there were dozens of highly sophisticated people that HDR had to contend with. The Philadelphia and Louisville Districts also made appearances along with USACE's consultant,

Gannett Fleming (findings 28, 51). The SFWMD was a constant presence, along with its consultant, Ardaman & Associates (findings 11, 17-20, 28). The record demonstrates that at least some employees or representatives of USACE were skeptical of the need for a toe trench drain (findings 18, 20, 27). The record also demonstrates that a single-stage toe trench drain is expensive and complex and that a two-stage drain is even more expensive and complex (finding 15). The contractual requirement for HDR to design within USACE's budget (finding 6) and USACE's budget constraints placed limits on what HDR could do. HDR could not force USACE to choose a more expensive drain or to obtain more funds. *See Coombs*, 36 A. at 106 (describing the problems that ensued when a client required his architect to adhere to a budget for the construction of a home but demanded a house that was worth much more than that budget).

The Board's review of precedent establishes that expert testimony is often crucial in a professional negligence claim. *E.g., Ralph M. Parsons*, 85-1 BCA at 88,896-98. Even though the single-stage toe trench drain was never built, and despite the absence of a clear-cut event demonstrating a defective design such as a collapse of the dam, USACE perhaps could have proved that HDR was negligent through expert analysis. Both parties presented expert testimony, but it was so lopsided in favor of HDR that it was impossible for USACE to meet its burden of proof.

A. The Geologist/Geochemistry Experts

USACE had the right idea when it tasked its geologist with determining how quickly the single-stage toe trench drain pipes with 0.9 mm slots would clog (finding 40). But the geologist acknowledged in her testimony that she had made errors (finding 45). HDR presented persuasive, unrebutted testimony from an expert who demonstrated that the USACE geologist had vastly overstated the clogging rates (findings 42-43). Accordingly, USACE's geologist failed to prove that HDR negligently designed an embankment with a pipe that would become clogged in an unreasonably short period of time.

The Board acknowledges that USACE had multiple concerns about the original pipe specified by HDR. USACE decided to change from a single-stage drain to a two-stage drain sometime after the Philadelphia District opined that the pipes specified by HDR were too thick, would be custom-made and might have manufacturing defects, and would be too difficult to clean with water jetting (finding 51). While this is merely theoretical because there were no reported manufacturing defects and there is no evidence that anyone attempted to waterjet the pipes specified by HDR, we do not disregard these concerns. But the record shows that USACE switched to a pipe that addressed these perceived shortcomings and that was also less expensive (finding 59). USACE's overstatement of the rate at which the pipes would clog, combined with the

switch to a pipe that would be easier to clean, together mean that USACE cannot demonstrate that the single-stage drain would have become clogged in a short period of time.

B. The Embankment Experts

USACE also could have presented an analysis and calculations as to whether the single-stage toe trench drain would have sufficiently relieved pressure in the embankment, but it failed to do so. The Board heard testimony and evidence on this topic from HDR's designer of record, Mr. Ferguson, who testified that seepage would be low and that HDR's computer models showed that the single-stage drain would be sufficient (finding 13). The Board received the report and testimony of HDR's expert, Dr. Sykora, whose calculations showed that HDR's design was sufficient (finding 102). The Board found both Mr. Ferguson and Dr. Sykora to be credible witnesses. HDR also submitted into evidence documents authored by the late Mr. James Talbot, an expert on seepage, who had calculated that HDR's design was sufficient (findings 23-24). By contrast, the Board found the testimony of USACE's expert, Dr. Brandon, to be unhelpful based on his lack of preparation, his failure to perform his own calculations, and failure to interview any witnesses (findings 104-05). In sum, the evidence with respect to whether the single-stage drain would have worked on this specific site was almost completely one-sided in favor of HDR.

USACE bases almost its entire case upon its interpretation of various design guidelines. USACE admits that the guidelines are not mandatory (at least in its opening brief), and it has shown a willingness to waive them when it deems it appropriate (findings 56, 73). As we have found, USACE incorrectly asserts that the guidelines prohibit single-stage toe trench drains (finding 97).

USACE's dam expert, Dr. Brandon, based his opinion on these guidelines and comparable resources (finding 104). Dr. Brandon made the best argument USACE has left, which is that, even if the guidelines do not completely bar single-stage toe trench drains, the guidelines discourage them to the point that HDR should have created a record where it provided a clear explanation as to why it had selected a single-stage drain instead of a two-stage drain (*id.*).

There are several problems with this argument. USACE did not call as witnesses any of the USACE or SFWMD employees involved in the toe-trench drain discussions with HDR (findings 21, 29). Perhaps if they had testified that they were misled somehow by HDR we would have a different case. But the record is clear that they were aware that they were discussing an issue that could result in failure of the dam and that their decision required a weighing of risk versus cost (finding 20). The record is also clear that they pushed for at least partial elimination of the toe trench drain (findings 20, 27). Dozens of technical experts from USACE, SFWMD, Gannett

Fleming, or Ardaman & Associates examined the design (finding 28) and the Board believes that it is reasonable to assume that at least some of these people were competent and had read the relevant guidelines. The most reasonable interpretation of what happened is the one HDR has offered: based on USACE's budget, the low amount of seepage, the types of soil at the site, HDR's computer modeling and calculations, and the location of the pipes below groundwater (to prevent formation of iron oxide), the single-stage drain was a reasonable solution for this project.

USACE also has failed to prove that it was professional negligence for HDR to design a single-stage blanket drain. As we have found, USACE devoted very little attention to the blanket drain in terms of testimony at the hearing, expert opinion, or other documentary evidence (finding 99). USACE seems to have proceeded based on an underlying assumption that if it proved that the two-stage toe drench drain was necessary this would also prove the necessity for a two-stage blanket drain, but it failed to prove its toe trench drain claim. Accordingly, USACE's blanket drain claim suffers from a complete failure of proof.

USACE has not proven the second prong of the *Parsons Main* test.

Third Prong of *Parsons Main*

Having ruled that USACE failed to meet the first two elements of the test, the Board will not reach the third element of the test.

CONCLUSION

For the foregoing reasons, the appeal is sustained.

Dated: January 15, 2025

Michael N. O'Connell

MICHAEL N. O'CONNELL
Administrative Judge
Vice Chairman
Armed Services Board
of Contract Appeals

(Signatures continued)

I concur

OWEN C. WILSON
Administrative Judge
Acting Chairman
Armed Services Board
of Contract Appeals

I concur

THOMAS P. McLISH
Administrative Judge
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. 62723, Appeal of HDR Engineering, Inc., rendered in conformance with the Board's Charter

Dated:

PAULLA K. GATES-LEWIS
Recorder, Armed Services
Board of Contract Appeals