DELTA RESOURCES, INC.,	)	**AGBCA No. 93-151-1**
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Appellant	)	
	)	
Appearing for the Appellant:	)	
	)	
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DECISION OF THE BOARD OF CONTRACT APPEALS

July 26, 1995

OPINION OF ADMINISTRATIVE JUDGE SEAN DOHERTY

This appeal by Delta Resources, Inc., is from a Soil Conservation Service (SCS)[1] Contracting Officer's (CO's) final decision dated January 13, 1993. The decision denied claims of $1,032,813 under SCS Contract No. 50-4423-1-1867, Ellison Creek Watershed No. 5A, Yazoo County, Mississippi. The decision extended contract time 50 days, thereby reducing liquidated damages charged by $9,250. The contract was for construction of a concrete, Type C grade control structure, 2,370 feet of earth dikes and two corrugated metal pipe structures.

[1] Through reorganization of the U.S. Department of Agriculture in 1994, the SCS is now the Natural Resources Conservation Service. The record in this case was complete prior to the reorganization and, therefore, the term SCS is used herein.

Appellant appealed the full amount of its claim to the CO; however, in the course of litigation the claim was reduced to $397,380.23, an extension of time of 134 days, and full remission of liquidated damages of $15,910. Appellant asserts uncompensated changes in three areas; first, that a well point system of drainage should have been provided at Government expense; second, that on-site backfill was unsuitable or was required to be replaced although placed according to contract specifications; and third, that the Government required location of a bypass channel other than as planned by Appellant. Appellant asserts such changes so extended the contract as to excuse liquidated damages charged. Alternatively, Appellant asserts liquidated damages were improperly withheld after substantial completion.

The Board has jurisdiction pursuant to the Contract Disputes Act (CDA) of 1978 (41 U.S.C. §§ 601-613). A hearing was held November 17-18, 1993, at Jackson, Mississippi. Prior to the hearing, November 5, 1993, the parties entered into a joint statement of issues and stipulation of facts and costs (Stip.). Review of the record supports the facts as stipulated and referred to by stipulation number.[2]

FINDINGS OF FACT

1. The SCS awarded Contract No. 50-4423-1-1867 April 10, 1991, to Delta Resources, Inc., for the construction of a concrete, Type C grade control structure, 2,370 feet of earth dikes and two corrugated metal pipe (CPM) structures, Ellison Creek Watershed, No. 5A, Yazoo County, Mississippi (Stip. 36; Appeal File (AF) 769, 775). Note: Relevant contract clauses are referenced or included at Findings of Fact (FF) 165-168, 172, 176-177.

2. On May 30, 1991, SCS issued the notice to proceed, which Delta received on June 3, 1991 (Stip. 37; Transcript (Tr.) 31; Appellant's Supplemental Appeal File (App. Supp.) page (p.) 3).

3. On May 31, 1991, Delta entered into a written agreement with the owner of the land located adjacent to the Ellison Creek Project 5A, known as Exum Farms (Tr. 106, 503; AF 404-405). The owner of Exum Farms agreed to allow Delta to connect a temporary bypass channel to a tributary located on his land adjacent to Ellison Creek. The owner also agreed to hold harmless both Delta and SCS from erosion caused by high water runoff. (Stip. 39.) Delta agreed to leave Exum Farms' property in its original condition prior to construction activities insofar as possible (AF 405; Tr. 503).

4. On June 4, 1991, Delta submitted its dewatering plan, including the location of the bypass channel. Delta intended to begin the upstream end of the bypass channel at Station 316+50, and to

[2] In the main, the stipulations are as written by the parties. In some instances, minor editorial changes have been made.

continue in a straight line, approximately 329 feet, to the Exum Farms tributary located adjacent and parallel to Ellison Creek. This adjacent creek was almost directly east of and was a tributary to Ellison Creek. (Stip. 40; Tr. 31, 32; AF 402-403.) The connection of the bypass to the tributary would have been some 600 feet upstream of Ellison Creek (Tr. 503). An additional 500 feet of the adjacent creek (tributary) would have been affected by Delta's proposal (Tr. 504).

5. By letter dated June 7, 1991, the CO's Representative (COR) disapproved Delta's bypass channel plan because it would require work "outside the work limits." The COR advised Delta to place the bypass channel pursuant to the contract drawings, which indicated an approximate location for the channel. (Stip. 41; Tr. 33.) The Board notes that the Government job diary of June 6, 1991 (AF Supplement A (AF Supp. A) 13-14, 78) states the reason to be a high risk of erosion of the existing creek. The Contractor was so advised in a meeting at the time (Tr. 103, 502-503).

6. On June 8, 1991, Delta resubmitted, with objection, its revised dewatering and bypass channel plan. Delta's revised plan called for excavating a bypass channel 548 feet long. Delta advised SCS that Delta's bid was based upon Delta's disapproved route and the "excavation quantity would be exactly what [Delta] bid on the project." Delta also proposed using sump pits and pumps to dewater the excavation. (Stip. 42; see Tr. 507; AF 398-401.)

7. By letter dated June 17, 1991, SCS approved Delta's revised dewatering and bypass channel plan. (Stip. 43; Tr. 35, 396-397.)

8. Ground water was expected by the parties before the project started (Tr. 109, see 86-88, 248). Ground water came into the site from the side of the excavation above a layer of shale (Tr. 246, 248). There was no dispute regarding the fact of seepage that was there from the start (Tr. 511-512).

9. The project was similar to others in the area with conditions common to the geographic area (Tr. 248). Other similar projects built in the same area under similar conditions were done successfully without well point systems. In the one instance that a well point system was used in the area, it was found ineffective and discontinued (Tr. 553-561).

10. On June 11, 1991, Delta began the excavation for the structure (Stip. 44, Tr. 508). Joint Exhibit (J. Ex. 1) illustrates excavation prior to diversion of the stream running through the site (Tr. 407-408, 449; see J. Ex. 41).

11. On June 20, 1991, SCS noted that the excavated slopes were bleeding and sliding (Stip. 45; see J. Ex. 2 illustrating the condition in the bypass area; Tr. 408).

12. On June 21, 1991, SCS noted a slope failure of approximately 500 cubic yards (cu. yds.) on the east side of the excavation [of the bypass channel] (Tr. 51-55; 410-411; J. Exs. 5-6). The same

day, about six other smaller slides occurred on the east side of the bypass channel (Stip. 46). A Government job diary entry for the day attributes the cause to the added weight of excavated material stockpiled for future use and equipment operating in the area (AF Supp. A 28).

13. Appellant encountered difficulty disposing of spoil material from the bypass channel (AF Supp. A 29, 31) and on the west side of the structure (AF Supp. A 46, see 67, 85).

14. Delta completed the construction of the bypass channel on June 25, 1991 (Stip. 50).

15. Ellison Creek ran in a north to south direction, taking an abrupt right angle turn to the east just south of the structure location. The bypass channel was excavated approximately parallel and to the east of the structure, creating essentially an island between the bypass channel and the structure; thereby cutting off ground water in that area, i.e., the west slope of the bypass channel and the east slope of the structure excavation (Tr. 49-50; AF 981-982). Compare, however, the testimony of the same witness (Tr. 60, 90, 91) asserting problems on the east side of the structure.

16. Seepage on the east side of the structure was considered likely to be less as the sand lenses from which seepage flowed were much thinner or absent along that side (Tr. 661).

17. On July 1, 1991, at a site meeting between Delta and SCS, Delta advised SCS that SCS had laid out the work limits incorrectly, and that the Exum Farm tributary (see FF 3) adjacent to Ellison Creek was within the work limits. The COR stated that he had just found out that the tributary was inside the work limits. (Stip. 51; Tr. 55-56, AF Supp. A 82.)

18. On July 16, 1991, Delta reached the shale material at elevation 212 on the west side (Stip. 53; Tr. 56).

19. Seepage came into the excavation continually but was initially handled by digging a drainage ditch to a sump and pumping water from the sump (Tr. 59-61; 413, 508-509, J. Ex. 8, see J. Ex. 7, 43 and Tr. 412). Joint Exs. 10 and 44 are July 25, 1991 photographs showing drainage to the sump, a vertical wall in the excavated material and some indication of seepage (Tr. 62-68, 71, 415, 451; see J. Ex. 12. See also Appellant's Exhibit (App. Ex.)

2, illustrating the location of separate areas of seepage (Tr. 77-80). The area was generally stable (Tr. 451).

20. On July 26, 1991, Delta submitted Billing No. 1 (Stip. 54). This invoice included Pay Item #6 (Removal of Water), which stated the total expenditure to date was $123,311.72, and requested payment of $77,220. The invoice also contained a note.

> NOTE: Original costing was based on 329 foot diversion channel yielding 12940 cubic yards to be excavated. Actual routing of channel was 548 feet which yielded 21553 cubic yards to be excavated. This is the cause of the substantial variation between cost incurred and payment requested.

21. Appellant's bid for Bid Item #6, Removal of Water, Specification No. 11, was a unit price of $117,000 (AF Volume (Vol.) 6, p. 770).

22. On July 27, 1991, Delta excavated down to the subgrade for the structure. Delta continued pushing excavated materials to the stockpile area and dressing the stockpile. Delta cut a drainage ditch around the upstream end of the excavation. SCS noticed small water flows from a gravel bed at the top of the shale material (Stip. 55; Tr. 69; AF Supp. A 66).

23. The excavation was accomplished with heavy equipment without difficulty that would have occurred with an unstable base (J. Exs. 10-14; Tr. 416-436).

24. Photographs (J. Ex. 13 from July, J. Ex. 21 from October 1, 1991) show a crane sitting above a vertical cut in the excavation, illustrating continued stability (Tr. 418, 421, 430). Loose material was pushed in to form an incline or bench along the west slope of the excavation to a point where mats were placed as a base for the crane (J. Exs. 45, 52; Tr. 452-453, 461; see FF 49).

25. Joint Exs. 14 and 17 show some seepage adjacent to the vertical cut on the east side with the area remaining stable (Tr. 420, 424, 427).

26. On July 28, 1991, it rained approximately 0.30 inches. The following day, July 29, 1991, SCS noted that there was some water in the bottom of the excavation but that most water was collected in the perimeter drain ditches. (Stip. 56; AF Supp. A 66; J. Exs. 12-13.) The ditches were not graded to drain (Tr. 418).

27. On August 3, 1991, SCS expressed its concern about using sand under the U-Frame concrete slab. Delta responded that it would backfill along the edge of the U-Frame with CL or ML [material designations under the Unified Soil Classification System][3] (see AF Vol. 6, p. 870) to keep water from seeping under the slab. Delta continued dressing spoils on the west side (Stip. 57). The Contractor was able to continue working in the area without being affected by water seepage (J. Exs. 15-16; Tr. 421-423).

28. On August 5, 1991, Delta continued to work the spoil stockpile. Delta placed the sand filter material for the structure's subgrade. (Stip. 58.)

29. Water was allowed to accumulate at the Contractor's option to compact subgrade sand (Tr. 82-83; J. Exs. 15-16; Tr. 101) and later to cure the poured slab (Tr. 92-93; J. Ex. 19; AF 185; AF Supp. A 73; see Tr. 423). Allowing such accumulation of water did not result in the slopes sliding (Tr. 423; see J. Ex. 17; Tr. 424).

30. Seepage was not a problem for workers placing forms and steel for concrete (Tr. 453; J. Ex. 45).

31. On August 10, 1991, Delta worked the spoils from the east side in order to dry the materials for use as backfill later. Delta continued placing steel reinforcement for the concrete slab. Delta pumped water out of the hole after 0.2 inches of rain from the night before. (Stip. 59.)

32. August 13, 1991, Delta used a 6-inch pump to lower ponded water in the reservoir in case of rain (AF Supp. A 122) and used pumps following a .03 inch rain on August 14, 1991 (AF Supp. A 96).

33. On August 15, 1991, Delta poured the concrete slab of the structure (Stip. 60). Delta had not at the time pumped water from the side of the structure or cleared the trenches (AF Supp. A 124). The forms for the concrete were supported by staking into the ground and embankment, indicating stability and not indicating muck (J. Exs. 18, 19, 45, 46, 47; Tr. 425-426, 453-454; see AF Vol. 2, pp. 324, 326). The Contractor continued at least into October to brace concrete forms with the braces extended to stakes in the slopes. There was no apparent effort to remove water collecting in the bottom of the excavation or below the braces. (Tr. 431-432; J. Exs. 21, 22.)

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[3] The contract referred to Unified Soil Classification System designations as given. Common designations are found in the parties' stipulations Nos. 3 - 5 as follows: CL = Sandy Clay; ML = Clayey Silt or low plasticity silts; ML/CL = Clay-Silt Mix; SM = Silty Sand or Clayey Sand; SM,SC = Silty and Clayey Sands.

34. In August 1991, Delta requested SCS to incorporate the well point system to alleviate the ground water seepage problem. SCS refused to do so, stating that there was not a ground water problem. (Stip. 61.)

35. On August 19, 1991, Delta placed sand under the U-Frame and compacted ML or CL material on the outside edges of the U-Frame. SCS observed water problems due to flows from pea gravel at the top of the shale material. The COR suggested that Delta control groundwater by shaping the excavation hole and digging a trench to route the water around the work until the fill was placed (Stip. 62). The Government job diary (AF Supp. A 101) for August 19, 1991, refers to water covering the bottom of the excavation and to mud and rain the previous day, Sunday. That rain was apparently not measured (see FF 117 below).

36. Rainwater could be controlled by collecting through trenching and pumping (Tr. 147, 243-244, 427).

37. Delta's supervisor for the work was replaced about August 20, 1991. At that time, excavation was to grade and the dewatering channel had been dug. ML material was stockpiled, separated from other wet material, graded, rolled and shaped to prevent standing water on or around the pile. Surrounding areas were dressed to drain away from the stockpile (Tr. 35-36, 98, 99, 106).

38. Removing muck from the subgrade was a continuous problem to production and created spoil that was a problem to dispose of (Tr. 100). The subgrade was, however, stable enough to support heavy equipment and seep water could have been pumped out of the hole (Tr. 455-456; J. Ex. 48). Washed-in silt or sediment could have been removed as the subgrade remained solid (Tr. 471). The Contractor, however, continued to over-excavate in the removal of the material to a depth of as much as 9 feet of vertical cut into the shale subgrade for a total of some 19 feet of vertical cut (Tr. 473-474; J. Ex. 56, see J. Ex. 60; Tr. 478).

39. On August 22, 1991, Delta advised SCS of problems with underground "feeder" springs, particularly at the upstream end of the grade-control structure. SCS told Delta how and where to cut feeder trenches to catch the bleed water and to drain or pump the ground water to a sump hole at the lower end of the excavation. (Stip. 63; see AF Supp. A 105, 127.)

40. On August 23, 1991, Delta cleaned mud from the U-Frame slab and drained water to the sump hole at the lower end. The bench on the west slope continued to become saturated with seep water. Delta continued to raise objections about the ground water problem. SCS stated the water problem could be corrected by constructing trenches. Delta

continued to pump the water from the bottom of the hole. (Stip. 64.) Delta attempted to force water to the sump hole with a trackhoe (AF Supp. A 105).

41. A rough trench was dug at the back of the west slope bench on which the crane rested. The trench was rough and accumulated water without an outlet (Tr. 456; J. Ex. 49).

42. At the time ditches were blocked, causing ponding and saturation, and soaking fill that had been placed without adequate protection (AF Supp. A 128).

43. On August 24, 1991, ground water continued to collect in a drainage ditch on the west side and began overflowing. The ground water ran across the bench and into the excavated hole. Delta cleaned out the drainage ditch and cut a trench for drainage. (Stip. 65; see AF Supp. A 106.) There were areas of saturation that had not been sloped to drain (AF Supp. A 127; Tr. 457-458; J. Ex. 50).

44. The area was incorrectly graded to direct surface rain water into the structure area. Loose uncompacted material spilled over the side. That loose material was not stable. (Tr. 458-460; J. Exs. 50-51.)

45. On August 24, 1991, Delta wanted to talk about the springs and water seepage into the excavation. SCS again advised Delta to build trenches to route the water around the structure as Delta had done on the west side of the excavation. (Stip. 66.)

46. After 1.1 inches of rain on August 26, 1991, Delta pumped the water from the hole in 3 1/2 hours using a 611 hydraulic pump (Stip. 67). The site was muddy with approximately 12 inches of water at 6:50 a.m. (AF Supp. A 108).

47. On August 27, 1991, SCS observed that the springs flowing into the hole had not just started, but had been active since the Contractor excavated at the base of sand, near elevation 212 (Stip. 68). The statement stipulated to is found in the Government job diary (AF Supp. A 132) and continues, stating the Contractor took no corrective action except to pump water and noting a need to direct water away from the work.

48. On August 28, 1991, a mud slide on the west side bench [crane access incline; see FF 24] slid down the excavated slope onto the poured-in-place concrete slab. Slides occurred at several other small areas. A drainage trench constructed on the back side of the bench continued to collect mud and overflow, allowing water to run across the bench. Delta excavated a ditch to divert surface water at the top of the west bank and the bench area. (Stip. 69; see App. Supp. p. 40; AF Vol. 1, pp. 189-190. See FF 117, rainfall recorded as 1.1 inch August 26; .1 inch August 27; and .65 inch August 28.)

49. The slide material was uncompacted material pushed off the slope to make a bench on which water had been allowed to collect and saturate the soil (AF Supp. A 110, 135). Joint Exs. 52-55 illustrate the circumstance depicting the bench with mats for the crane; above the cut the surface is stable but rilled from surface water (rain) running over it. Below the mats the uncompacted soil washed into the excavation following rain. (Tr. 458-468.) Sediment was also washed into the excavation from an adjacent area (Tr. 469-471; J. Ex. 55; Tr. Vol. 1, pp. 191, 193).

50. On August 31, 1991, 2.25 inches of rain fell leaving about a foot of water covering the poured slab and causing erosion of the bench (AF Supp. A 113). Incomplete diversion of surface water had resulted in mud flowing into the work area (AF Supp. A 116).

51. On September 1, 1991, Delta requested a meeting with SCS to discuss the problems occurring on the job site. A meeting was scheduled and held on September 5, 1991. (Stip. 70.)

52. Joint Ex. 37, September 4, 1991; J. Ex. 38, December 30, 1991; and J. Ex. 39, illustrate damage at the point the bypass enters the tributary, indicating erosion of 4-to-5 feet and the undermining of trees (Tr. 445-447). Diversion 500 feet further up the tributary would have resulted in such erosion over that area (Tr. 448).

53. At the September 5, 1991 meeting, Appellant's representative asserted the need for a well point system because there were four or five seeps coming out of the banks and because the borings had not indicated how much precipitation there would be, causing ground water to flow in. He indicated the Government had asserted alternative drainage could be used but he felt a well point system was needed. (See Stip. 71.)

54. At the meeting the SCS state design section head responded that a well point system had not been thought necessary and that it would be costly; if conditions warranted one it would be paid for but was not then considered necessary (see FF 172). See FF 165, Construction Specification 11, Removal of Water § 8.a.(4).

55. At the September 5, 1991 meeting, SCS stated that it would allow a well point system if there was a massive failure of slopes around the excavation or some other condition greatly influencing the construction operation (Stip. 73; see AF Supp. A 180).

56. On September 9, 1991, SCS informed Delta of the dispersiveness of the soil along the excavated slope. SCS directed Delta to cut off the underground seep water to stop the slides and slumping. Delta cleaned out the seep trenches. Delta had operators working the water pumps from dark to daylight to pump water. (Stip. 74.)

57. On September 10, 1991, SCS advised Delta that unless it cut off water into the hole, any fill

would turn to muck. Delta requested use of a mud slab to act as a subgrade for the concrete U-Frame. SCS told Delta to submit the request in writing. (Stip. 75; AF Supp. A 181, AF Supp. C 530.)

58. On September 10, 1991, Delta submitted a written request to use a flowable fill mud slab as a subgrade for the headwall of the structure. Delta advised SCS that the ground water seepage was making existing subgrade material unacceptable. SCS approved the use of the flowable fill as a means of stabilizing the subgrade. (Stip. 76.) No effort was being made to control entering water (AF Supp. C 531).

59. On September 12, 1991, SCS approved the use of a mud slab conditioned upon the submittal of supporting data, which Delta provided. Delta removed mud from the U-Frame area, and placed forms around the area for pouring of the flowable fill. (Stip. 77.)

60. On September 13, 1991, Delta began placing the mud slab for the U-Frame subgrade. Delta used a trackhoe to work on the seep trench along the west bench to drain the underground seepage water downstream. Delta dressed out the dirt in the spoil area and around the trailers. (Stip. 78.)

61. On Saturday, September 14, 1991, Delta had two workers servicing equipment and manning the water pumps (Stip. 79).

62. On Sunday, September 15, 1991, Delta had one worker pumping water (Stip. 80).

63. On Monday, September 16, 1991, Delta used a trackhoe and a D-6 [or] -8 dozer to work on the seep-collection ditch on the west bench. SCS suggested that Delta lower the mud and water at the lower end of the structure to allow water to drain downstream. (Stip. 81.) Delta continued having trouble installing drainage for seeps (AF Supp. A 184).

64. On September 17, 1991, Delta began placing forms for the U-Frame concrete slab on top of the flowable fill subgrade. Delta continued to use a trackhoe to remove dirt from the seep trench to allow drainage from the west bench. SCS observed water on top of the mud slab subgrade. (Stip. 82.)

65. On September 18, 1991, Delta began placing the U-Frame slab area. Delta continued to use a trackhoe and dozer (with the same operator) to work on the seep trench along the west bank to drain to the downstream end of the structure. Delta began dressing up the site in preparation for rain. The seep trench along the west bank collected sand and water, causing it to overflow and saturate the bench. SCS told Delta to remove the water

from the mud slab. (Stip. 83.) Saturation was noted as was the likelihood of slides due to leaving the seep-trench full (AF Supp. A 185-186).

66. On September 21, 1991, Delta used a rubber tire backhoe to open up the low spot for good drainage throughout the work area. Delta also used a D-4 dozer to dress out the drainage areas. (Stip. 84.)

67. On Sunday, September 22, 1991, Delta continued pumping water from the hole (Stip. 85).

68. On Monday, September 23, 1991, Delta used a trackhoe to remove muck from the hole at the upstream end in preparation for constructing wall segment A floor slab. SCS directed Delta to remove all backfill that had mud underneath it, and excavate down to solid material, then place "flowable fill." (Stip. 86; see App. Supp. 56.)

69. On September 27, 1991, Delta used a trackhoe to excavate the drainage ditch. Delta poured an additional 96 cubic yards of flowable fill for the area in front of the U-Frame and wall segment A. (Stip. 87.)

70. The Government job diary for September 27, 1991 (AF Supp. A 164) includes an entry that the Contractor could not or would not properly slope the ditch to drain (see J. Exs. 20-21; Tr. 204-205, 508-509). The vertical excavated wall remained stable for 4 1/2-to-5 months, although a trench dug above it collected water and mud that ran over into the excavation, because the water and mud had no other outlet (Tr. 428-429, 465, 472, 480; J. Exs. 53, 56, 61). Erosion into rills of the slope above the ditch indicates surface runoff (Tr. 480) as does erosion of fill after a rain (J. Exs. 62, 63; Tr. 481-483).

71. On Saturday, September 28, 1991, Delta placed an additional 40 cubic yards of flowable fill on the east side (Stip. 88).

72. On Sunday, September 29, 1991, Delta continued pumping water (Stip. 89).

73. On Tuesday, October 1, 1991, Delta poured flowable fill on the right side for wall segments A and B, a total of 88 cubic yards to provide the subgrade for the floor slab (Stip. 90). Rilling of the surface of the excavation was apparent and was caused by surface runoff and rainfall runoff (J. Ex. 21; Tr. 430).

74. On October 4, 1991, Delta used a trackhoe and tandem dump truck to remove mud excavated from the upstream end of the structure. Delta placed the excavated mud in low spots on the east side of the work area. (Stip. 91; see Tr. 124.) Material was pushed into

pooled water making more mud prior to removal, rather than first pumping the water (Tr. 433; J. Ex. 23; AF Vol. 1, p. 196).

75. Delta started backfilling October 30, 1991, obtaining passing compaction for the lower lifts of the fill. Later the area failed after more fill lifts were placed and water wet the area. Fill placed and compacted became saturated and would then be unsuitable for placement of more fill (Tr. 260-262). The work was removed and replaced. (Tr. 124-131.)

76. On Monday, November 4, 1991, Delta used a trackhoe and two tandem dump trucks to haul muck from the upstream area of the structure. SCS noticed water bleeding from under the flowable fill, approximately 3 feet below the subgrade. An SCS inspector suggested Delta place sand in the bottom of the excavated hole to bridge over the unsuitable sub-grade. SCS advised Delta to cut a channel across the new backfill "so seep won't pond on the fill." Delta advised SCS of its concern of the excavated bank sloughing off. (Stip. 92; see App. Ex. 1.)

77. On Tuesday, November 5, 1991, Delta placed backfill on the west side where the bank slid and where Delta excavated to catch the seepwater in accordance with SCS's prior directions. Delta built up the west side slope and cut off the seep out of the west bank. (Stip. 93.)

78. On Wednesday, November 6, 1991, Delta began excavating the right side of the U-Frame. Delta used a trackhoe and two tandem dump trucks to remove excavated muck from the hole. Delta removed muck from the left sump hole at wall segment A. (Stip. 94.)

79. On November 7, 1991, Delta's trackhoe was still removing muck from the downstream end of the excavated hole (Stip. 95; Tr. 277; App. Ex. 1).

80. On November 8, 1991, Delta continued its concrete operations in the U-Frame area. Delta's trackhoe and D-4 dozer continued to remove muck from the downstream end of the structure in the splash-basin area. (Stip. 96; Tr. 146.)

81. On November 9, 1991, Delta used a trackhoe and a D-4 dozer to continue excavating muck from the east side and the downstream end of the structure. By noon, Delta had cleaned out the hole. (Stip. 97.)

82. On November 11, 1991, SCS observed that the excavation kept getting bigger and deeper every time Delta removed muck. SCS suggested that Delta use a trackhoe to excavate the muck from the downstream end to the upstream end, allowing drainage for

seep water. Delta used a D-4 dozer, trackhoe, and tandem dump truck to excavate muck from the east side of the structure. (Stip. 98; see AF Supp. A 233; Tr. 150, 208; J. Ex. 23.)

83. If the material had been dry there would have been no need to remove it, but it is not possible to place wet fill, compact it, and get a satisfactory base (Tr. 209, see Tr. 211; J. Ex. 23).

84. On November 12, 1991, Delta's trackhoe and D-4 dozer worked on the excavation along the east and west side, and two tandem dump trucks continued hauling muck (Stip. 99; Tr. 151, 210; J. Ex. 24). Heavy equipment was able to operate in the area, indicating stability (Tr. 434).

85. On November 13, 1991, Delta used a trackhoe to load muck from the east side. Delta also delivered a Volvo, off-road rock truck (six-wheel drive), with driver, to help remove mud from the excavated hole. The Volvo rock truck and two tandem dump trucks continued hauling mud from the east side. (Stip. 100.)

86. On November 13, 1991, SCS advised Delta to install additional rock riprap dams in the bypass channel to slow erosion (Stip. 101).

87. On November 14, 1991, Delta's trackhoe and rock truck continued mucking out the downstream end of the structure. [The Board understood the parties to interchange the words "mud" and "muck" and to refer to the term "mucking out" as removal of such materials.] Delta's D-4 dozer dressed out the site along the structure. Delta began placing drainfill at elevation 201.2 on the west side. (Stip. 102; see AF Supp. A 275; App. Ex. 1.)

88. On November 15, 1991, Delta's trackhoe and rock truck completed the installation of the drainfill along the west side of the structure, all in accordance with the specifications. Delta's trackhoe also excavated mud from the downstream end of the structure. (Stip. 103; see AF Supp. A 276; see Tr. 390.) Materials were piled along the west bank, indicating stability (Tr. 475-476; J. Ex. 58).

89. Appellant's superintendent testified rain was not a problem, referring to a 3-inch rain November 20, 1991, as just needing pumping out and a day or two to dry (Tr. 158). Appellant removed muck November 20 through 22, followed by pumping water December 2 and 3, 1991 (Tr. 228-229). Joint Ex. 59 illustrated the result from the rain, including a gully washed in the fill, and sediment washed into the splash-basin area or pushed in with a bulldozer. The area was unnecessarily over-excavated. (Tr. 476-478.) Additionally, review of the record indicates periods when mud was created at times that rain was indicated in the record (Tr. 228-231; see Tr. 397).

90. On November 22, 1991, Delta used a trackhoe, rock truck, and JD-850 to remove muck from the upstream area near the headwall and the D-4 dozer to clear mud from the U-Frame area (Stip.

104; see Tr. 159-161).

91. On sheet 6 of the contract plans, the "earthfill placement details" state the moisture limits for all earthfill from optimum moisture to plus of optimum moisture. The required percentage of maximum compaction for all earthfill was specified at 95 percent. (Stip. 28.)

92. On November 25, 1991, Delta placed CL earthfill from the borrow pit in front of the structure in the U-Frame area. SCS ran a density test on the CL earthfill at elevation 203, measuring the density at 95.1 percent compaction with a moisture content of 20.8 percent. [It is noted there was expert testimony indicates it is impossible in the soils involved to achieve 95 percent compaction with water content above 18.5 percent (Gov't. Ex. 8, pp. 9-10), but see Tr. 655 indicating an upward limit of 20 percent; see also FF 101]. Delta compacted the fill to about elevation 204.5 across the front of the structure. SCS advised Delta that water was percolating up on the perimeter of the earthfill. SCS advised Delta to remove 2 feet and recompact, which Delta did. Delta's trackhoe and rock truck removed mud from the west side of wall segment A and the U-Frame. (Stip. 105; see Tr. 213; J. Ex. 26; App. Ex. 1.)

93. Material placed and compacted became saturated and was removed and replaced (Tr. 158-167, 213-216, 261-262; see generally AF Supp. A 202-282, AF Supp. B 283-373). Joint Ex. 26, November 25, 1991, shows removal of previously placed fill and illustrates the progressive rilling of the embankment caused by rainfall runoff into the site (Tr. 437; see J. Ex. 30; Tr. 439).

94. On November 26, 1991, Delta continued placing CL material. Delta continued placing dirt work in front of the headwall, attempting to seal off seep from a pea gravel zone. (Stip. 106.)

95. On November 27, 1991, Delta poured concrete in the downstream structural walls. Delta continued to bring in CL material for earthfill in order to attempt to seal off water seeps. (Stip. 107.)

96. On December 2 and 3, 1991, Delta pumped water from the hole (Stip. 108). One pump became buried in silt (AF Supp. A 254, 255).

97. On December 4, 1991, Delta used heavy equipment in the work area, mixing water with dirt, making mud or muck (J. Ex. 64; Tr. 484).

98. On December 5, 1991, Delta placed the S[C]P/SM (see AF Vol. 6, p. 871 reference to Unified Soil Classification and illustration [SM] at AF Vol. 6, pp. 984-985) earthfill to an elevation of 208 in front of the U-Frame area. Delta placed approximately ten sacks of cement on the west slope near station 320+15 to stop a water seep, then placed CL material on top and compacted to a 2:1 slope. (Stip. 109; AF Supp. A 257; Tr. 167, 214; J. Ex. 27.)

99. On December 6, 1991, Delta's trackhoe and rock truck removed mud from the west outside area of the U-Frame (Stip. 110; see Tr. 168, 214; J. Ex. 28).

100. On December 7, 1991, Delta used a 690 trackhoe and Volvo to remove mud from the northeast side of the structure (Stip. 111). The Contractor placed uncompacted fill alongside the structure and work was stopped (AF Supp. B 1, 361).

101. On December 9, 1991, SCS and Delta ran compaction tests on the CL backfill: Delta's test measured 98.6 percent compaction with a moisture content of 20.3 percent using an optimum moisture content of 18.4 percent; SCS's test measured 95.7 percent compaction with a moisture content of 21.8 percent using an optimum moisture content of 19.0 percent. Delta continued mud removal from the east side of the structure using its hydraulic water pump. (Stip. 112.) The material removed had been removed and replaced previously, on November 22, 1991, because it had become saturated (Tr. 170).

102. On December 11, 1991, Delta hauled CL material to the east side of the structure. Delta's trackhoe mucked out the upstream area of the headwall on the east side. (Stip. 113.) The sump hole was not pumped out, allowing the water level to rise under the slab (AF Supp. B 287; J. Ex. 29; Tr. 217).

103. On December 12, 1991, Delta used a 3-inch pump on the east side to pump out the seep water. Delta used a trackhoe, dozer, and rock truck to remove mud from the east side of the structure. Delta continued placing CL material. (Stip. 114; it is noted App. Ex. 1, the apparent source of this Stipulation, refers to the pump as a 4" pump.)

104. On December 13, 1991, Delta used the downstream hydraulic pump to pump out the water from the hole. Delta used a dozer to open up the drainage ditches. Delta used a trackhoe to dig mud out of the pit. (Stip. 115; AF Supp. B 289.)

105. On December 16, 1991, Delta used a trackhoe, D-4 dozer, and a rock truck to remove mud from the filled areas (Stip. 116).

106. On December 17, 1991, Delta used a trackhoe, D-4 dozer and rock truck to remove and haul the mud out of the east side of the structure. Delta placed SP/SM backfill material. (Stip. 117.) Fill was contaminated with mud and not compacted until the end of the day without regard to the requirement of compacting lifts (AF Supp. B 293).

107. On December 18, 1991, Delta placed drain fill and earthfill on the east side. Delta continued forming concrete along the walls. Delta stripped mud from the east side of the structure. Delta's trackhoe and rock truck continued to muck out the east side. (Stip. 118; Tr. 185, 218; J. Ex. 30.) Joint Ex. 30 illustrates a seepage area above fill being placed, allowing the seepage to flow into the fill.

108. On December 20, 1991, Delta used a trackhoe and rock truck to remove mud from the downstream end of the structure. Delta placed SP/SM earthfill along the east side of the structure. (Stip. 119.)

109. On December 30, 1991, Delta removed water and mud from the east side of the structure, using a trackhoe and a rock truck. Delta placed CL backfill material on the east side. (Stip. 120; Tr. 184.)

110. On January 2, 1992, Delta placed CL on the east side and in the middle of the U-Frame area. Delta used a D-4 dozer to shape the CL area for drainage. (Stip. 121.) The area was not compacted because the compactor was not working (AF Supp. B 302).

111. On January 6, 1992, Delta used a trackhoe and rock truck to remove muck from the splash-basin (Stip. 122).

112. On January 7, 1992, Delta used a trackhoe and rock truck to haul mud from the splash-basin area. Delta continued placing SM material on the east side of the structure. (Stip. 123; Tr. 219; J. Ex. 31.)

113. On January 9, 1992, fill at the south end was not getting compacted and was falling into the excavated area (AF Supp. B 309, 369).

114. On Sunday, January 12, 1992, Delta had one worker pumping water (Stip. 124).

115. On January 14, 1992, Delta aerated the soil stockpile to dry it out in preparation for placing the on-site ML backfill material (Stip. 125; Tr. 235-236, 240-241). It was suggested that mud be removed before the placing of fill (AF Supp. B 314). There could also have been aeration in the fill (Tr. 214). Joint Ex. 65, January 15, 1992, shows ponded water on the stockpile (Tr. 485).

116. By January 20, 1992, Delta had placed all lower backfill material, consisting of SM, S[C]P/SM or CL earthfill, up to an approximate elevation of 220. Delta placed this backfill in accordance with the contract documents. This backfill material is not in dispute. (Stip. 126.) However, the Government job diary for this date states compaction was in question and dry material was being sought (AF Supp. B 320). Testimony also indicated obtaining compaction was difficult (Tr. 192-194; see Stip. 133; FF 114).

117. From August 1991 to January 20, 1992, SCS measured rain at the project site on the following days in the amounts listed (Stip. 127):

8/8/91	Trace amounts
8/10/91	0.2 "
8/13/91	Trace amounts
8/14/91	0.03"
8/16/91	Trace amounts
8/19/91	0.8 "
8/26/91	1.1 "
8/27/91	0.1 "
8/28/91	0.65"
8/29/91	0.15"
8/31/91	2.25"
9/9/91	1.3 "
9/19/91	.5 "
9/24/91	Trace amounts
9/25/91	2.85"
10/6/91	.25"
10/23/91	.83"
10/24/91	.05"
10/28/91	.32"
10/29/91	.15"
10/30/91	.24"
103191	.13"
11/1/91	1.05"
11/8/91	.15"
11/20/91	3 "
11/22/91	.12"
12/2/91	1.4 "
12/3/91	1 "
12/9/91	.25"

12/10/91	.35"
12/13/91	.11"
12/14/91	1.5 "
12/30/91	.14"
1/3/92	.1 "
1/8/92	.4 "
1/9/92	.06"
1/13/92	1.5 "
1/14/92	.65"
1/18/92	.26"
1/20/92	1 " plus snow

118. On January 20, 1992, Delta used a D-4 dozer to clean muck from the top of the SM backfill to dress up for preparation of placing ML backfill. Delta began placing ML material on the west side of the structure. (Stip. 128.)

119. ML backfill began in the area of elevation 219.5 to 220 (Contract Drawings 6, 7, and 30 of 30, AF Vol. 6, pp. 984-985, 1008). Borings taken before construction indicated the water table on the west side to be at approximately elevation 227 to 228 and on the east side at elevation 222 (Tr. 574). Appellant's witnesses indicated seepage was below elevation 219 on the east and north sides and that much if not most of the seepage on the west side was also below elevation 219 (App. Ex. 2).

120. Ground water would only be on the excavated slope and, if controlled there, could not extend across the ML backfill (Tr. 574-576).

121. Norwood King was Delta's quality control supervisor who tested the compaction of the backfill. Mr. King used a sand cone test pursuant to the American Society for Testing and Materials ("ASTM") Method D 1556. (Stip. 129.)

122. Jim Michael was SCS's inspector who tested the compaction of the backfill using the drive-cylinder test pursuant to ASTM Method D 2937. Both the sand cone test and the drive cylinder tests are specified in the contract as allowable tests for compaction of the earthfill. (Stip. 130.)

123. Throughout the project, Mr. King properly performed the testing of the backfill material in accordance with ASTM Method D 1556 (Stip. 131).

124. On January 21, 1992, Appellant attempted mixing spoil material that was too wet to

compact, creating more mud. Attempts to compact with a roller failed as the roller would not go over areas that wet. A tiller was used to level ruts to allow work in the area. (AF Supp. B 321.)

125. From January 20, 1992 to February 1, 1992, Delta placed the ML backfill material on the west side of the grade control structure (Stip. 132).

126. From January 20, 1992 until February 1, 1992, Delta had difficulty obtaining the specified 95 percent compaction for the ML backfill. Eventually, however, Delta obtained the specified compaction and moisture requirements of the ML backfill on the west side, as verified by the testing procedures of Mr. King and Mr. Michael. (Stip. 133.)

127. On January 23, 1992, equipment bogged down in wet fill (AF Supp. B 323).

128. On January 24, 1992, the Contractor was pushing muck into the splash-basin from the toe of the slope. (AF Supp. B 324.)

129. On January 29, 1992 the Contractor was having difficulty getting compaction and was missing areas with the equipment (AF Supp. B 329).

130. On or about January 30, 1992, SCS requested that Burns Engineering, Inc., SCS's outside consultant, verify the accuracy of the proctor curve used by both parties. Burns issued Report No. 91157-8, on February 5, 1992, with Compaction Test Report, which found the maximum dry density to be 114.4 pcf, the optimum water content to be 13.0 percent, the plasticity limit to be 15 percent, the liquid limit to be 28 percent, and the plasticity index to be 13. The test also classified the soil as CL material. (Stip. 134.)

131. On February 3, 1992, Delta began placing the ML backfill material on the east side of the structure (Stip. 135). To accomplish the work Delta removed mud from fill on the east side (AF Supp. B 334) as the fill had become saturated (Tr. 221; J. Ex. 33). Material was pushed into water, creating mud that was then excavated (J. Ex. 67; Tr. 487-488).

132. On February 4, 1992, Delta requested that it be authorized to use the off-site borrow material in place of the on-site ML material. SCS advised Delta that it would not pay Delta for the use of the off-site borrow. (Stip. 136.) The Government's stated reason at the time was that Delta had not taken steps to keep material dry (AF Supp. B 335; App. Supp. 76).

133. On February 6, 1992, water was pumped following a day of rain (AF Supp. B 337).

134. On February 7, 1992, mud was removed and Burns Engineering tested compaction, finding failures (AF Supp. B 338, 371, see AF Supp. C 543). Material was being moved from the stockpile to the fill without an effort to dry the material (Tr. 490-491).

135. As a result of discrepancies between test results by SCS and Delta on the east side ML backfill, SCS directed Delta to stop placing ML backfill on February 10, 1992 (Stip. 137).

136. On February 10, 1992, SCS noticed fractures in the slope of the ML backfill placed on the west side of the structure (Stip. 138; J. Ex. 35; Tr. 442-443). Mud was being removed from the splash-basin (AF Supp. B 341, 372; Tr. 443).

137. By letter dated February 11, 1992, SCS directed Delta to remove and replace the ML backfill on the east side of the structure (Stip. 139). Burns Engineering was on site taking density tests February 11 and 12, 1992, at the time fill was being placed over mud (AF Supp. B 342-343).

138. On February 13, 1992, SCS advised Delta of a fracture located on the west side ML earthfill. SCS advised Delta that on February 21, 1992, Burns Engineering would, on February 21, 1992, perform borings and tests at that area. (Stip. 140.)

139. On February 21, 1992, Burns Engineering conducted two borings on the west side and one boring on the east side. The same day, SCS directed Delta to proceed with the removal and replacement on the east side ML backfill. Delta began removing the east side backfill. (Stip. 141.)

140. On February 24, 1992, Delta gave SCS written notice that Delta considered the on-site ML material unsuitable as backfill. Delta again requested to use the off-site borrow area as backfill for the east side. (Stip. 142.) On February 25, 1992, about one half of the material was removed; .48 inches of rain fell by 10 a.m., and the area had become saturated as rain could not drain off (AF Supp. C, p. 549).

141. On February 26, 1992, SCS advised Delta that it could use off-site borrow to replace the east side ML backfill material (Stip. 143).

142. On February 28, 1992, Burns Engineering submitted its Report No. 91157-10 based upon its borings on February 21, 1992. Burns ran a new proctor on the west side material measuring a maximum dry density of 111.5 percent and an optimum moisture content of 14.3 percent. (Stip. 144.)

143. On March 2, 1992, water was being pumped from the U-Frame area and some fill removed but the area was not graded to drain water (AF Supp. B 375).

144. On March 3, 1992, Delta wrote SCS stating that the ML soil located in the off-site borrow area was unsuitable based upon Delta's testing of same. Delta's letter also informed SCS that Delta considered SCS to have suspended its work (see FF 146). (Stip. 145.)

145. On March 4, 1992, the site had not been properly graded and would catch and hold rain water and saturate material (AF Supp. B 377). It is not appropriate to put fill on saturated material (Tr. 261).

146. By letter dated March 11, 1992, SCS denied that it had suspended Delta's work. SCS informed Delta that SCS would consider a request for a winter shutdown until warmer weather (no later than April 14, 1992) and would grant a 63-day time extension. (Stip. 146.)

147. On March 19, 1992, the area was unprotected from water running into the fill area, saturating that area (AF Supp. B 392). The area was not graded away from the structure, rather water ponded to at least 9 feet in depth in the excavation during the period of inactivity (Tr. 491-493; J. Exs. 71-72).

148. On March 24, 1992, the Contractor removed equipment from the site. The site was unprotected from water. (AF Supp. B 397.)

149. On March 30, 1992, SCS advised Delta that the borrow material was at an acceptable moisture content to successfully compact the backfill. SCS stated that the on-site ML material might be replaced with off-site ML, CL, or SC backfill material. SCS threatened to default Delta unless Delta resumed work by April 1, 1992. (Stip. 147.)

150. In response to SCS's threat of default, on April 1, 1992, Delta resumed work on the project. Delta began removing the on-site ML material on the east side. (Stip. 148.)

151. On April 4 through April 8, 1992, uncompacted fill was being removed (AF Supp. B 408, 410-412, 453, see 454-455; AF Supp. C 553-554, 602-604).

152. On April 9, 1992, Delta began placing SC material from the off-site borrow pit on the east side in place of the excavated on-site ML material (Stip. 149).

153. On April 9, 1992, SCS directed Delta to remove and replace the west side ML backfill material. SCS's daily report states that when Mr. Harrison told Delta to remove and replace the west side backfill, he told Delta that a modification would be forthcoming. (Stip. 150; AF Supp. B 413.)

154. From April 9 through April 24, 1992, Delta removed and replaced the ML backfill on both the east and west sides of the grade control structure. Delta used SC backfill material in place of the excavated on-site ML material. Delta did not have any difficulty compacting the new off-site backfill material. (Stip. 151.)

155. The material taken out had become saturated and was not suitable as a result of water coming in (Tr. 260-262).

156. On April 25, 1992, Delta began placing the lime-treated backfill and riprap around the structure (Stip. 152).

157. On May 12, 1992, Delta began to fill the bypass channel. By May 15, 1992, water from Ellison Creek was flowing through the new Type C grade control structure. By this date, Delta had completed the majority of its work. (Stip. 153; see AF Supp. B p. 449)

158. On June 3, 1992, SCS conducted a pre-final inspection of the work (Stip. 154).

159. On June 24, 1992, SCS conducted a final inspection of the site. On June 26, 1992, SCS issued final acceptance. (Stip. 155; Tr. 543.)

160. On July 23, 1992, SCS issued Modification No. 2, which extended the contract time by one calendar day. SCS issued the modification to fill a crack that was caused due to settlement of the structure during earthfill operations in April 1992. With this extension, the contract completion date became February 11, 1992. (Stip. 156.)

161. Delta filed its "Claim for Equitable Adjustment" on September 9, 1992 (Stip. 157).

162. On January 13, 1993, the CO issued a final decision. SCS unilaterally granted Delta a 50-calendar-day non-compensable time extension due to additional adverse weather associated with the June 3, 1991 notice to proceed, thereby extending the contract completion date to April 1, 1992. (Stip. 158.)

163. SCS is currently withholding $15,910 in liquidated damages, for a total of 86 days, measured from April 1, 1992, until final acceptance on June 26, 1992 (Stip. 159).

164. Review of expert evidence indicates general agreement that the area consisted of layers of earth, of which one, located above the bottom of the excavation permitted ground water to drain into the excavation and further that the amount of subsurface water coming into the site was a factor of the area of that layer intersected by excavation. The intersected area varied

from 6 to 12 inches to much thinner or absent. (Tr. 266, 653, 658-667; Gov't. Exs. 8, 11, 12; Appellant's expert testimony submitted pre-hearing.) The Appellant's expert estimated from 700 to 1,500 gallons per day of seepage (Tr. 653). The Government expert estimated 400 gallons per day of seepage (Tr. 661). On the basis of our review of all of the evidence regarding seepage we find the Government's estimate more credible primarily due to the intermittent nature of the layers leaving areas of no seepage, whereas the higher estimates did not account for such areas.

165. The original contract also contained SCS's standard construction specifications for the Removal of Water, Section II, dated April 1986, as amended by Special Provision, Section II, Subpart 8, "Items of Work and Construction Details," dated July 12, 1990. Pertinent sections are set out below. [Section 5 and 6 of the specification were not included in the parties' Stipulation but are included here as relevant] (Stip. 25; AF Vol. 6, pp. 855-858):

CONSTRUCTION SPECIFICATION
11. REMOVAL OF WATER

1. SCOPE

The work shall consist of the removal of surface water and ground water as needed to perform the required construction in accordance with the specifications. It shall include (1) building and maintaining all necessary temporary impounding works, channels, and diversions, (2) furnishing, installing and operating all necessary pumps, piping and other facilities and equipment, and (3) removing all such temporary works and equipment after they have served their purposes.

2. DIVERTING SURFACE WATER

The Contractor shall build, maintain and operate all cofferdams, channels, flumes, sumps, and other temporary diversion and protective works needed to divert streamflow and other surface water through or around the construction site and away from the construction work while construction is in progress. Unless otherwise specified, a diversion must discharge into the same natural drainage way in which its headworks are located.

Unless otherwise specified, the Contractor shall furnish to the Contracting Officer in writing, his plan for [diverting surface water before beginning the construction for] which the diversion is required. Acceptance of this plan will

not relieve the Contractor of responsibility for completing the work as specified. (Bracketed contract language was omitted from the parties' Stipulation.)

3. DEWATERING THE CONSTRUCTION SITE

Foundations, cutoff trenches and other parts of the construction site shall be dewatered and kept free of standing water or excessively muddy conditions as needed for proper execution of the construction work. The Contractor shall furnish, install, operate and maintain all drains, sumps, pumps, casings, well points, and other equipment needed to perform the dewatering as specified. Dewatering methods that cause a loss of fines from foundation areas will not be permitted.

Unless otherwise specified, the Contractor shall furnish to the Contracting Officer, in writing, his plan for dewatering before beginning the construction work for which the dewatering is required. Acceptance of this plan will not relieve the Contractor of responsibility for completing the work as specified.

4. DEWATERING BORROW AREAS

Unless otherwise specified in Section 8, the Contractor shall maintain the borrow areas in drainable condition or otherwise provide for timely and effective removal of surface and ground waters that accumulate within the borrow areas from any source. Borrow material shall be processed as necessary to achieve proper and uniform moisture content for placement.

* * * * *

5. EROSION AND POLLUTION CONTROL

Removal of water from the construction site, including the borrow areas shall be accomplished in such a manner that erosion and the transmission of sediment and other pollutants are minimized.

6. REMOVAL OF TEMPORARY WORKS

After the temporary works have served their purposes, the Contractor shall remove them or level and grade them to the extent required to present a sightly appearance and to prevent any obstruction of the flow of water or any other

interference with the operation of or access to the permanent works.

Except as otherwise specified, pipes and casings shall be removed from temporary wells and the wells shall be filled to ground level with gravel or other suitable material approved by the Contracting Officer.

7. MEASUREMENT AND PAYMENT

Method 1 Items of work listed in the bid schedule for removal of water, diverting surface water, dewatering construction sites, and dewatering borrow areas will be paid for at the contract lump sum prices. Such payment will constitute full compensation for all labor, equipment, tools, and all other items necessary and incidental to the completion of the work.

8. ITEMS OF WORK AND CONSTRUCTION DETAILS

Items of work to be performed in conformance with this specification and the construction details therefor are:

a. Bid Item 6, Removal of Water

(1) This item shall consist of all work necessary for diversion of the surface water and dewatering of the construction site for installation of the grade control structure and rock riprap.

(2) During construction of the grade control structure, the channel flow shall be diverted around the structure through a bypass channel or by other diversion methods submitted by the Contractor and approved by the Contracting Officer's Representative. The approximate alignment of the bypass channel is shown on the drawings.

(3) The by-pass channel to be constructed shall be of sufficient size (minimum 10' bottom width) to by-pass the normal channel flow without severely restricting the capacity of the existing channel. The by-pass channel shall be constructed in a manner that will not produce excess sediments and erosion within the by-pass area. Upon completion of construction of the grade control structure, the Contractor shall fill the by-pass channel to the field

level in a manner that will blend in with the surrounding area and have complete and satisfactory drainage. As necessary to compensate for settlement of fill in the by-pass channel outside of the limits of the specified earth fill, the backfill of the by-pass channel shall be slightly mounded above normal field elevation. Additional materials needed to completely refill the by-pass channel to normal field elevation may be obtained from the stockpile of materials excavated as specified in Construction Specification 21.

(4) The removal of standing or flowing water will be required during excavation and during placing of earth fill, filter material, geotextile and rock riprap. During placement of concrete, the foundation area of the structure shall be dewatered so that the water level is maintained below the concrete until seven days after placement of the concrete. It is not anticipated that a well point system will be required.

(5) The Contractor shall submit to the Contracting Officer's Representative for approval a detailed plan for diverting stream flow and dewatering of the foundation area. Approval of the Contractor's proposed method of removal of water shall not relieve the Contractor of his responsibility under the contract for successful completion of the work.

(6) No additional payment will be made for excavation of the bypass channel and earth fill required to backfill the bypass channel. Compensation will be considered as included in the lump sum payment for removal of water.

(7) Measurement and payment will be made by Method 1.

166. The original contract also contained SCS's standard construction specifications for Excavation, Section 21, dated April 12, 1984, as amended by Special Provision, Section 21, Subpart 12, "Items of Work and Construction Details," dated July 12, 1990 (Stip. 26). The provision placed responsibility for unnecessary over-excavation on the Contractor (AF Vol. 6, p. 860).

167. The original contract also contained SCS's standard construction specifications for

Earthfill, Section 23, dated April 12, 1984, as amended by Special Provision, Section 23, Subpart 10, "Items of Work and Construction Details," dated July 12, 1990. (Stip. 27.) That specification included at section 7 a requirement for reworking or removal and replacement of defective fill (AF Vol. 6, p. 867).

168. Operations were to be conducted so as to minimize erosion of soils and all temporary measures were to be restored to as nearly original conditions as practicable (AF Vol. 6, p. 792; clause H.19; p. 844 at 5. Pollution Control).

169. On February 12, 1991, SCS held its first pre-bid site visit for potential bidders. SCS's project engineer and the COR conducted the site visit, during which Delta and other interested contractors investigated the site and reviewed the contract. (Stip. 29.)

170. At the February 12, 1991, site visit, Delta's representative raised questions concerning the reference in the plans of the "approximate location of the bypass channel," as shown on sheets 3 and 4 of the contract drawings. The COR advised the contractors that the actual location of the bypass channel would be left up to the Contractor's discretion. (Stip. 30.)

171. At the site visit, Delta also raised a question about the need for a well point system (Stip. 31).

172. On February 21, 1991, SCS issued an Amendment to Solicitation No. SCS-8-MS-91, which provided a clarification of Bid Item No. 6, as follows (Stip. 32; AF Vol. 6, p. 773):

> (1) Bid Item No. 6, Removal of Water-Paragraph 4 states that a well point system is not anticipated to be required. Does this statement mean that if job conditions require a well point system that it will be paid for by the Government? Yes-the contract will be modified to incorporate the system.

173. Pursuant to the above Amendment, Delta's bid did not include the cost of a well point system. Delta believed that if ground water was encountered that impacted its performance, SCS would modify the contract to provide a well point system to dewater the excavation. (Stip. 33.)

174. Delta submitted its bid on March 12, 1991, in the amount of $875,987 for all bid items. (Stip. 34.)

175. The original contract time was 252 calendar days upon receipt of the notice to

proceed. The original contract time was calculated based upon anticipated adverse weather that would be expected during the contract period of time, if notice to proceed was issued on April 1, 1991. (Stip. 35.)

176. Contract clause H.8, Permits and Responsibilities (FAR 52.236-7) (APR 1984) (AF Vol. 6, p. 785) placed responsibility for materials and work performed on the Contractor until completion and acceptance.

177. Contract clause F.3, Liquidated Damages--Construction (FAR 52-212-5) (APR 1984) (AF Vol. 6, p. 779) states in part:

> (a) If the Contractor fails to complete the work within the time specified in the contract, or any extension, the Contractor shall pay to the Government as liquidated damages, the sum of $185.00 for each day of delay.

DISCUSSION

The parties entered a joint statement asserting five issues to be tried, in addition to stipulating numerous facts. The issues identified were whether SCS's refusal to pay for a well point system constituted a compensable change, whether on-site ML materials were suitable, separately whether Appellant is entitled to an equitable adjustment for replacing the backfill on the east and west of the structure, and whether Appellant is entitled to compensation for the revision of its proposed placement of the bypass channel. In conjunction with the other claims, Appellant also contests the assessment of liquidated damages.

The contract was for construction of a grade control structure to control the flow of water in a creek (FF 1). Essential to such work was the management of water bearing on the construction process, whether from the creek, the ground, or from rain. Creek water was diverted by construction of a bypass channel. Disputes regarding the bypass are discussed below.

The principal claims involve the excavation and fill required to perform the construction. It is undisputed that water was encountered and was the cause of delay. Appellant, throughout the proceeding, adamantly asserts that it did not encounter a differing site condition. There was no evidence or argument that a differing site condition existed. Rather, ground water was expected by the parties before the project started (FF 8), as was rain presumably. The Board concludes the water encountered was therefore what would normally and reasonably be encountered in such work. We also find on the basis of our discussion following that the substantial weight of evidence compels the conclusion that Appellant failed to adequately implement reasonable efforts to control ground or rain water.

The contract placed responsibility for control of water on the Contractor (FF 165) except that if a well point system were needed the contract was to be modified to incorporate such a system at Government expense (FF 172). The issue was then whether one was needed. Appellant asserted a need, relying on allegations not found sufficiently credible to include in the Board's findings of fact and therefore cited to the record, that very substantial volumes of ground water were encountered (500 to 600 gallons per hour (Tr. 69); i.e., 14,400 gallons per day from a 1-to-4-foot layer of porous material intersected by the excavation (Tr. 38-39)). The record factually does not support such assertions. Credible evidence suggest a range of from 400 to 1,500 gallons per day (FF 164). We find the lower estimate more accurate, because the estimates rely on a continuous layer of porous material over the entire site, whereas evidence indicates an intermittent layer (FF 16, 164, see 15, 53, 98, i.e., findings supporting, if not specifically addressing, the conclusion of intermittent areas of seepage). Appellant's witnesses who testified most expansively regarding seepage illustrated separate areas rather than a continuous layer on Appellant's Exhibit 2 (FF 19).

Appellant argues large areas of embankment sloughed into the excavation and embankments were saturated to the point workers sank to their knees if they walked thereon, again relying on testimony not considered sufficiently credible to base a finding of fact on at Tr. 71, 73, 78 and Stip. 69 (FF 48). The material that slid from the embankment was loose material pushed onto the embankment by Appellant to form a bench for a piece of heavy equipment (FF 24). The materials that washed into the excavation did so following rain (see FF 117 listing rain) when water accumulated on the bench, saturating the material (FF 44, 48-49, see 65). The embankments said to be unstable supported staking and bracing of forms for the structure walls from August into October of 1991 (FF 33). Far from being unstable, vertical cuts in the excavation remained stable throughout the construction period (FF 19, 25, 38, 70). Deliberately allowing water to accumulate did not result in instability or sloughing (FF 29).

The record indicates water entering the contract area from whatever source could have been managed by preventing the flow of surface (rain) water into the excavation and by installing and maintaining ditches within the excavated area to sumps and pumping therefrom (FF 19, 22, 26, 31, 32, 36, 37, 38, 40, 48, 50, 60, 63, 66). The record is, however, replete with evidence of water accumulating to the detriment of the work without adequate available precautions being taken (FF 35, 38, 40, 42, 43, 44, 47-50, 63, 65, 70, 74, 75, 78-83, 89, 93, 101-102, 106, 115, 124, 127, 134, 143, 145, 147-148).

Review of the record fails to disclose evidence that a well point system was needed or even that it would have worked. Clearly it would not have corrected problems of surface drainage or undrained fill material included in the construction as noted in the findings cited above.

The amendment to the solicitation (FF 172) for provision of a well point system if needed did not obligate the Government to correct the Contractor's self-imposed problems. Guy F. Atkinson Construction Co., ENG BCA Nos. 5911, 6109, 95-1 BCA ¶ 27,483. This is to be contrasted with the situation in which the Government breaches its duty to cooperate, requiring the Contractor to operate under conditions not contemplated by the contract. John Glenn, ASBCA Nos. 31260, 31628, 37901, 91-3 BCA ¶ 24,054; or where the Government fails to disclose superior knowledge. Kimmins Contracting Corp., ASBCA Nos. 42762, 42948, 94-3 BCA ¶ 26,990.

The contract called for placement of ML backfill above elevation 219.5-220 (FF 119). Appellant commenced placing such material on the west side January 20, 1992 (FF 118) and on the east side February 3, 1992 (FF 131). The material became saturated and unsuitable as a result of water coming in (FF 155). Seepage was not shown to be a factor regarding such material as the fill was in the main above seepage levels and seepage would only appear on the surface of excavated slopes (FF 119, 120). It is noted Appellant did not claim well points were needed during the placement of the ML fill [App. Reply Brief, p. 15).

The Government directed that the fill be replaced (FF 137, 139, 153). Appellant removed the ML material and replaced it with SC backfill without difficulty (FF 154). Appellant asserts the Government is liable for replacement as Appellant, at least on the west side, eventually achieved specified compaction and moisture requirements after experiencing difficulty (FF 126). Accepting that compaction was at one time achieved, the conclusion drawn therefrom by Appellant is not supported by the factual record. There followed evidence of Appellant removing mud as fill had become saturated (FF 131, 134, 136, 140) and later compaction failures (FF 134), material being included that had not been dried (FF 134), fill being placed over mud (FF 137), rain not drained from the site (FF 140, 143, 145, 147) and during a period of inactivity, water accumulating to a depth of 9 feet in the excavation (FF 147). Finally, the material taken out had become saturated and was not suitable as a result of water coming in (FF 155). Appellant was responsible for material and work performed until completion and acceptance (FF 167, 176). The Government had the authority and right to insist upon correction of defective work. Better Roads of Lake Placid, Inc., ASBCA No. 39133, 93-2 BCA ¶ 25,580, aff'd without decision, 11 F.3d 1074 (Fed. Cir. 1993); Cooper Mechanical Contractors and Continental Engineering, IBCA Nos. 2744-2749, 2692, 2706-2713, 2714, 92-2 BCA ¶ 24,821.

Appellant ultimately used off-site material, arguing the on-site material was unsuitable as specified. Allowing Appellant to use off-site material was a benefit to Appellant, which did not prove the specifications were defective. One Way Construction, Inc., AGBCA No. 93-193-1, 94-3 BCA ¶ 27,275. We do not find Appellant's factual evidence persuasive. We also

consider Appellant's argument contrary to its assertion that there was no differing site condition. Most persuasive, however, is the parties' stipulation that specifications were met with on-site material at least for a period of time on the west side (FF 126). Appellant has not shown the soil encountered was unusual for the area or that its use was impossible or commercially impracticable. See Oconto Electric, Inc., ASBCA Nos. 40421, 40422, 93-3 BCA ¶ 26,162.

The contract contemplated, and Appellant built, a bypass channel to route Ellison Creek around the grade control structure during construction (FF 14, 165). The Contractor was obligated to provide and obtain approval of a detailed plan for diverting the stream flow (FF 165). Appellant's first plan was disapproved (FF 5). That plan was based on excavating due east approximately 329 feet to a tributary of Ellison Creek. The plan would have affected 500 feet of that adjacent tributary. (FF 4.)

The Contractor submitted a second plan with objection (FF 6). The revision was approved (FF 7). The revised plan required excavation of 548 feet (FF 6). The Government stated in a letter that the reason for disapproval was that Appellant's proposal required work outside the work limits (FF 5). Appellant was, however, also advised at the time that disapproval was also because of the high risk of erosion (FF 5). Appellant's proposal would have affected an added 500 feet of the adjacent creek (FF 4). The result would have been substantial erosion and the undermining of trees (FF 52). The contract specifically stated the bypass channel was to be constructed in a manner that would not produce excess erosion within the bypass area (FF 165, see 168). The Contractor had been advised it would have discretion in the placement of the bypass channel (FF 170). That did not relieve the Contractor of the obligation to meet the remaining contract requirements.

Were we to conclude, which we do not, that the Government failed to allow the Contractor reasonable discretion in the construction of the bypass, Appellant has failed to prove damages. Appellant was obligated to return the bypass to as nearly original condition as practicable (FF 165, 168). The amount claimed assumes no excess erosion and no cost for an additional 500 feet of drainage Appellant would have been obligated to restore. There was no support given for the rates used and the underlying assumptions were not supported by evidence (see FF 20). Appellant's initial claim was that its plan would have required 4,583 cu. yds. of excavation and 5,500 cu. yds. of backfill but that the bypass relocation required excavation of 8,152 cu. yds. and backfill of 22,166 cu. yds. at a cost of $50,661 (AF 267). In its brief, Appellant relied on an estimated initial excavation and fill of 7,000 cu. yds. and as-built excavation of 12,000 cu. yds. at a cost per yard of $1.75 for excavation and $2 for fill (5,000 cu. yds. x $3.75 = $18,750). The prices used were Appellant's bid price for items 7. Excavation, common and 8. Earthfill, class A, on-site. (App. Brief p. 67, see Tr. 332-334, submission of Frank M.

Stewart, p. 6-7; AF 770). Appellant's underlying computations were not referenced and it is noted Mr Stewart's statement also states the additional excavation and backfill associated with the revised location was 8,613 cu. yds. of material. Using Appellant's claim figures and assuming equal erosion in the added length of the tributary, the Government computed the cost of Appellant's initial plan to exceed the revision (Gov't Ex. 9; Tr. 552-555; see FF 20).

Appellant objected to the work before performance. The work was discrete from other contract work. Appellant was in an ideal position to collect data on cost, yet Appellant states the claim on generalized conclusions. Appellant computes cost on the basis of bid prices for other work without evidence that such prices are reasonable for the work or that its original bid was realistic. Appellant has the burden of proving its affirmative claim and establishing its entitlement by the preponderance of the evidence. Circle, Inc., ENG BCA No. 6048, 95-1 BCA ¶ 27,568; Dore & Associates Contracting, Inc., AGBCA No. 92-236-1, 95-1 BCA ¶ 27,517; McGee Landscaping, Inc., AGBCA No. 91-172-1, 93-3 BCA ¶ 25,946.

The Government withheld $15,910 in liquidated damages for a total of 86 days, measured from April 1, 1992 until June 26, 1992 (FF 163). There was no dispute regarding the propriety or authority for liquidated damages (see FF 177). Appellant, rather, asserts justified delay associated with its claims. Appellant claims 60 days relative to the well point claim and 74 days relative to the backfill claims. Not having found the claims supported by the factual record, we do not find Appellant entitled to such time extensions. Appellant also asserts substantial completion by May 15, 1992, and that continued assessment of liquidated damages to June 26, 1992, was therefore inappropriate. The parties stipulated "By this date, [May 15, 1992] Delta had completed the majority of its work" (FF 157). Additional work was reported in Government job diaries (AF Supp. B, 449-514; AF Supp. C, 586-620). The Government did not, however, offer testimony or argument that, absent such work, the project would not function as intended or otherwise demonstrate the project was not substantially complete. We conclude, therefore, it was improper to assess liquidated damages after May 15, 1992. Labco Construction, Inc., AGBCA No. 90-115-1, 94-2 BCA ¶ 26,910.

DECISION

Appellant's claims for increased payment are denied. Assessment of liquidated damages is reduced by $7,770 (May 15 to June 26 = 42 days x $185 = $7,770).

_____
SEAN DOHERTY
Administrative Judge

Concurring:

_____
ROBERT M.M. SETO
Administrative Judge

Concurring with Separate Opinion:

_____
EDWARD HOURY
Administrative Judge

Issued at Washington, D.C.
July 26, 1995

CONCURRING OPINION BY ADMINISTRATIVE JUDGE EDWARD HOURY

While I concur with the majority that the appeal should be denied except for the liquidated damages portion, I have a somewhat different view of the salient facts and arguments presented by the parties.

The contract required erosion control work including the construction of a reinforced concrete channel to direct and control a section of Ellison Creek, flowing from north to south at the structure location. Construction required a temporary diversion of Ellison Creek, excavation and dewatering to allow the concrete pours for the channel in the creek bed, backfill and grading around the structure, then removal of the diversion to allow Ellison Creek to flow through the channel.

Appellant had expertise in demolition and hazardous waste control (Ex. 2 to Gov't Trial Brief), but had no experience with construction of the type of reinforced concrete structure required by the contract (Ex. 4 to Gov't Trial Brief). Appellant's bid of $875,987 was significantly lower than the next low bid. Appellant was so advised, but verified its bid when requested to do so (Ex. 3, 5, 6 to Gov't Trial Brief; AF 748-755).

THE WELL POINT DEWATERING CLAIM

Facts

The contract made Appellant responsible for diverting surface water by construction of diversions, protective works, cofferdams, channels, flumes, sumps, etc., as needed (FF 165 ¶ 2).[4] Appellant was also responsible for dewatering the construction site including installation and operation of drains, sumps, casings, and "well points"[5] (FF 165 ¶ 3). While it was not anticipated that a well point system was needed (FF 165 ¶ 8(a)(4), SCS agreed to install one at Government expense if conditions required (FF 172). Appellant's bid included $117,000 for dewatering (FF 21; AF 248), but did not include any cost for installing a well point system

[4] Finding of Fact (FF) references are to the majority opinion.

[5] A well point system is a system of interconnected piping installed in the ground and connected to vacuum pump(s). The pipes are designed to draw and collect ground water (subsurface water) and remove such water by the operation of the vacuum pump(s). (Tr. 515-520.)

(FF 173).

Two soil borings on each side of the proposed structure indicated clayey silt (ML) from 0-14 feet, silty clayey sand (SM) from 14-24 feet, and clay shale at 24 feet on the right side of the structure, facing downstream. On the left side surficial silt was found from 0-12 feet, medium silty sand (SM) from 12-26 feet, and shale at 26 feet. The water level was 11 feet on the right side and 15 feet on the left, approximately 25 feet above the design elevation of the bottom of the proposed structure. (Stip. 4.) The borings also indicated a pervious sand layer of varying thickness up to 1 foot that covered the shale (FF 164). Both parties expected seepage (FF 8).

On June 11, 1991, Appellant began excavation for the structure prior to diverting Ellison Creek (FF 10). While there was seepage and unstable slopes, these occurred in the diversion area (FF 11, 12). The diversion was completed June 25, 1991 (FF 14). Appellant reached shale in the structure excavation on July 16, 1991 (FF 18). On July 27, 1991, the subgrade for the structure was reached (FF 22). On August 15, 1991, Appellant poured the concrete slab (FF 33), and began backfilling on October 31, 1991 (FF 75), prior to completion of its concrete work (FF 80).

Appellant's professional engineering witness calculated the seepage rate into the excavation to have been 700-1,500 gallons per day. The Government's expert placed the rate at 400 gallons (FF 164). The difference appeared to be based upon the average thickness of the permeable layer that the Government expert estimated to be 6 inches (FF 16; Tr. 667). Even Appellant's claimed rate could have been controlled by pumping only 60 minutes per day (Tr. 520, 661; J. Ex. 10, Tr. 414-415).

With so little ground water to pump, a well point system would not have been warranted and would only have had a negligible effect on the seepage because the well point pumps would not have had enough water to pump (Tr. 515-520). A well point system is designed to control extraordinary amounts of ground water seepage, but will not control runoff into the excavation from rain or a poorly constructed diversion. (Tr. 524.)

The structure excavation was very stable even in November-December 1991, when Appellant alleged there was excessive seepage (J. Ex. 10; Tr. 413-415). Heavy equipment was being operated at the bottom of the structure without any difficulty and concrete forms and supports were anchored to the subgrade at essentially the same time that Appellant was complaining about excessive water (J. Ex. 11, Tr. 415-416; J. Ex. 45, Tr. 452-453; J. Ex. 48, Tr. 454-456; FF 30). Moreover, while a mud slide into the concrete slab did occur, the slide was caused by Appellant's faulty construction procedures and inadequate rain water protection measures (FF

48-49).

Much of the water about which Appellant complained was rain water that resulted from drainage trenches that were not properly graded to drain or that had no outlet (J. Ex. 20, Tr. 428; J. Ex. 49, Tr. 456; J. Ex. 50, Tr. 457; J. Ex. 51, Tr. 458-459; J. Ex. 54, Tr. 468; J. Ex. 55, Tr. 471). Rather than pumping out water, Appellant at times pushed dry material into the excavation to soak up rain water runoff that had been allowed into the stockpile (as late as January 15, 1992) and/or excavation (J. Ex. 64, Tr. 483-484; J. Ex. 65, Tr. 484; J. Ex. 67, Tr. 487; FF 74). There is considerable evidence of Appellant's inadequate dewatering efforts (FF 26, 41, 42, 43, 47, 48, 50, 73, 89). Seepage was not a significant problem (FF 16, 19, 23, 24, 25, 27, 30, 70).

Appellant requested the Government to install a well point system. The Government did not consider a well point system to be necessary (FF 34, 53-54), and such a system was never installed. Appellant seeks $251,172.34 in increased costs allegedly resulting from the Government's refusal to install a well point system (App. Brief, p. 41).

Discussion

The question the Board must address is where Appellant's responsibility to dewater ends and the Government's begins. The contract placed responsibility on Appellant to control the water from the diverted creek, control rain water runoff into the structure excavation, and control a reasonable or foreseeable amount of ground water seepage. Both parties expected some seepage.

Appellant has avoided relying on the contract's Differing Site Conditions clause, which allows the Government to receive lower bids for its work because contractors need not include contingencies for extraordinary or unforeseeable conditions, being assured by the clause that the Government will pay increased costs if such conditions are encountered (AF 782-783). Foster Construction v. United States, 193 Ct. Cl. 587, 613, 435 F.2d 873, 887 (1970). Whether Appellant may recover nevertheless depends on whether the water seepage conditions at the site were so extraordinary and unforeseeable as to have required the Government to install a well point system. The $117,000 included by Appellant in its bid to dewater the site must be presumed to have covered all ordinary and foreseeable expenses.

The facts indicate that there simply was not enough ground water seepage to warrant installation of a well point system. The structure excavation was generally stable, and much of the water about which Appellant complained resulted from inadequate rain water control

measures and not ground water seepage. For these reasons, Appellant has failed to prove that conditions at the site warranted use of a well point dewatering system.

I concur this portion of the appeal should be denied.

REPLACEMENT OF BACKFILL AND DEFECTIVE SPECIFICATIONS

Facts

The contract required backfill of the structure excavation. The specifications provided that a portion of the excavated material be used as fill, requiring that the selected materials be stockpiled for future use, graded and shaped for adequate drainage. (Spec. 21; AF 862-863.) Acceptable on-site excavated material was to be used before off-site material was utilized. During the course of the work, the Government was authorized to test the fill. Fill placed at densities not conforming to the specifications was required to be reworked, or removed and replaced (Spec. 23; AF 865-871; Inspection of Construction clause, FAR 48 CFR § 52.246-12, July 1986; AF 777-778).

Backfill from the bottom of the structure excavation up to an approximate elevation of 220 feet was accomplished with silty sand (SM) and/or sandy clay (CL) material. Appellant completed this backfill operation on January 20, 1992, and such backfill is not in dispute (FF 116). While this backfill was not in dispute by Appellant, it was clearly too wet for purposes of placement of additional backfill. (AF 320; Stip. 128.) From elevation 220 to ground level, Appellant was required to backfill with clayey silt (ML) compacted to at least 95 percent of maximum density. This backfill was to be placed in layers called lifts with a maximum thickness of 9 inches. (Stip. 28; AF 865-869.)

Appellant used a "sand cone" test to measure the compaction of the backfill. The SCS used a "drive cylinder" test. Both tests were accepted methods for determining compaction. (FF 121-122.) From January 20 until February 1, 1992, Appellant had difficulty achieving 95 percent compaction, but eventually was able to meet it on the west side of the structure (FF 26). On February 3, 1992, Appellant began backfilling the east side of the structure (Stip. 135). The stockpiled ML material had not been adequately graded to drain and stockpiled material used as backfill was frequently very wet (J. Ex. 65, Tr. 484-486; J. Ex. 66, Tr. 487; FF 124, 127, 131, 132, 134).

Appellant contends that while the original ML backfill could be compacted to 95 percent, it became plastic at any moisture content more than 2 percent above optimum (Tr. 655-656).

Although no actual pre-contract soil testing for plasticity was done by SCS, SCS had extensive experience with the soils in this region and concluded the expense of testing was not warranted (Tr. 640-641). SCS did not place an upper limit on the water content because knowledgeable persons simply know that there is an upper limit on the amount of water that can be put into the soil without sacrificing the ability to achieve 95 percent compaction (Tr. 650-651). Further, the range of acceptable moisture was not as narrow as implied by Appellant because moisture content can also be less than optimum (Tr. 648-649), and the required compaction could have been achieved at moisture contents of 3 to 4 percent above optimum (Tr. 651).

Appellant requested permission to use off-site borrow material for the backfill. The Government informed Appellant that it could use off-site borrow but that SCS would not pay any extra costs. It was SCS's opinion that on-site was suitable and any wetness of such material was due to Appellant's failure to control moisture contrary to the contract. (AF Supp. B 335.)

Many of the drive cylinder compaction tests performed by SCS on west side structure backfill between January 21 and February 1, 1992, showed less than 95 percent compaction (AF Supp. B 321-332). Tests performed on east side backfill by the SCS between February 4 and February 7, 1992, also failed compaction (AF Supp. B 335, 337, 338). Tests conducted by the parties at the same time and next to each other indicated 89.5 percent compaction for SCS and 95.8 percent for Appellant. The maximum soil density being used by SCS was 114.1 pounds per cubic foot. (AF Supp. B 338, 371.)

Burns Engineering, Inc., a geotechnical consulting firm, was called in by SCS. Burns ran three nuclear gauge compaction tests on Appellant's fill, all of which failed. Appellant achieved 98.1 percent compaction using the sand cone test at the same time (AF Supp. B 338, 371). SCS requested Burns to advise SCS regarding the validity of its tests. Burns' test indicated a maximum dry density for the material of 114.4 pounds per cubic foot, closely corroborating the 114.1 value used by SCS. The lower value was more favorable to Appellant because it resulted in higher compaction values. (AF 497-498; Gov't Trial Brief, Ex. 8, opinion 3).

On February 10, 1995, the SCS directed Appellant to stop placing fill on the east side of the structure because compaction requirements were not being met (AF Supp. B 341, 372). Nuclear density compaction testing by Burns indicated compaction of 92.4 and 93 percent (AF Supp. B 342). Moreover, fractures were noticed on the west side backfill (Stip. 138). On February 11, 1995, the SCS directed Appellant to remove and replace the backfill on the east side (FF 137). Appellant hired Law Engineering to conduct sand cone and drive cylinder compaction tests on the east side. Appellant did not reveal the test results to SCS (AF Supp.

B 343).

The backfill on the west side continued to fracture and slide parallel to the structure axis (AF Supp. B 349). By letter dated February 19, 1992, Appellant was advised of the fracture and the fact that the SCS had requested Burns to investigate the cause (AF 369). The Burns investigation disclosed that 7 of 20 soil samples failed to achieve 95 percent compaction using a favorable dry density of 111.5 pounds per cubic foot for the calculation. More than seven failures would result if greater dry densities were used than 111.5. Dry densities at the site varied from 111.5 to 114.4 pounds per cubic foot. (AF 424, 480-488; Gov't Trial Brief, Ex. 8, opinion 3.)

An undisturbed sample from the borings was sent to the SCS South National Technical Center for shear tests and slope stability analysis. The report of the center concluded that there was a "significant potential for instability of the 2:1 backslope and that 95 percent compaction was essential for adequate safety factors. (AF 429, 424-460.)

On February 21, 1992, Appellant began removing the east side backfill (FF 139). On February 24, 1992, Appellant advised that it considered the on-site ML material unsuitable as backfill and requested permission to use off-site borrow (FF 140). The SCS allowed use of the off-site material, because the material on-site was too wet to meet compaction requirements (Stip. 142; AF 365-366). On March 3, Appellant advised that the off-site borrow was not suitable and that its work was in a state of suspension as a result (AF 357-360). SCS advised that it disagreed with Appellant's assessment of the off-site material, and that it had not suspended Appellant, but that it would consider a request for a winter work shutdown. Appellant did not request a shutdown. (AF 352-354; Stip. 146.)

During most of March 1992, the work site had essentially been abandoned by Appellant, who left it unprotected, causing saturation (FF 145, 147, 148). SCS threatened to terminate the contract for default unless Appellant resumed work by April 1, 1992. On April 1, 1992, Appellant began placing silty clay (SC) off-site material on the east side. (FF 152.)
On April 9, 1992, SCS directed Appellant to remove and replace the west side backfill, advising that a contract modification would be forth coming (FF 153). From April 9-24, 1992, Appellant completed the placement of the SC backfill on the east side, and the removal and replacement of the backfill on the west side, without having any difficulty with compaction (FF 154). The material removed had become saturated from water at the site (FF 155).

Appellant seeks $32,872.41 for removing and replacing the east side backfill and $94,585.48 for the west side (App. Brief, p. 64). Appellant asserts that it was required to replace the material after it had achieved the required 95 percent compaction; that the Government

cannot simply substitute a different set of test results for Appellant's; and that if the Board were to find that Appellant failed to meet 95 percent compaction, Appellant is nevertheless entitled to an equitable adjustment because of defective specifications, since the on-site ML material could not have been readily compacted to 95 percent. Appellant also asserts that the Government breached its implied duty to cooperate by refusing to allow the use of off-site borrow.

Discussion

Appellant is correct that the Government cannot simply substitute its drive cylinder compaction tests for Appellant's sand cone tests. Both tests are accepted tests for determining compaction. However, neither the drive cylinder test nor the nuclear density test was shown by Appellant to have imposed a stricter standard. See Southwest Welding & Mfg. Co. v. United States, 188 Ct. Cl. 925, 951-953, 413 F.2d 1167, 1183-1184 (1969).

The Government's test methods were verified by an independent source (Burns), whereas Appellant declined to disclose whether its independent source (Law) verified its compaction results. Moreover, the Government's independent source also found through the use of nuclear density testing that Appellant failed to achieve the required 95 percent compaction. Given these facts, the west side slope fracture, and the contract clauses allowing replacement of defective fill, the Government was within its contractual rights to insist that the defective backfill be removed and replaced. The Government may insist on strict compliance with its specifications, S.S. Silberblatt Inc. v. United States, 433 F.2d 1323 (Ct. Cl. 1970), unless there is substantial compliance with the specifications and replacement of defective work would cause economic waste, Granite Construction v. United States, 962 F.2d 998 (Fed. Cir. 1992), cert. denied, 113 S. Ct. 965 (1993). No waste has been shown.

As concluded by the majority, under the Permits and Responsibilities clause, Appellant remains liable for the work performed until acceptance by the Government (FF 176). In March 1992, Appellant essentially abandoned the work site without adequate drainage protection. The work site became saturated. The backfill removed had become saturated. Therefore, even if Appellant had achieved 95 percent compaction on the placed backfill, Appellant remained liable for the work until completion and acceptance by the Government.

Based upon the evidence presented, Appellant has failed to prove the existence of a design defect in the compaction of the ML material. Appellant's compaction problems appear to have been due to the fact that adequate measures were not taken to protect the fill material stockpile. Further, the evidence indicates that SCS did not prevent Appellant from using off-site material. SCS only stated that it would not pay extra for Appellant to do so. The specification required use of on-site materials prior to use of off-site.

For these reasons, that portion of the appeal dealing with the replacement of backfill should

be denied.

THE BYPASS CHANNEL

Facts

The "approximate alignment" of the bypass channel, which would divert the Ellison Creek water around the structure location during construction, was shown on the drawings. The bypass channel was to be constructed in a manner that would not produce excessive sediments and erosion within the bypass area (FF 165 ¶ 8a(2) and (3)). At the pre-bid site visit, potential bidders including Appellant were advised that the location would be left to the contractor's discretion (FF 170). All operations were to be conducted to minimize erosion of soils and all temporary measures were to be restored as nearly as practicable to original conditions (FF 168).

On June 4, 1991, Appellant submitted its dewatering plan, including the location of the bypass channel. Appellant intended to begin the diversion upstream (north) of the structure at station 316 + 50, routing the bypass channel due east, a distance of 329 feet, to an existing tributary located adjacent to Ellison Creek (Stip. 40). The bypass waters would then run through the tributary a distance of 600 additional feet before reconnecting to Ellison Creek south of the proposed structure (AF 402-405). The total path of the diversion was 929 feet.

The SCS considered the increased flow through the 600 feet of tributary would cause severe erosion and destroy vegetation (AF 13). The SCS advised Appellant in writing to place the bypass as shown on the drawings because the proposed location was outside the work limits. Appellant was also advised orally regarding SCS's erosion concerns (FF 5; Tr. 448). On June 8, 1991, Appellant submitted a revised plan with objections (FF 6).

Appellant's revised plan showed the bypass channel routing to be in a southeasterly direction, 548 feet long, to a point in the tributary about 100 feet north of where the tributary joined Ellison Creek. The total length of the diversion was 648 feet. This plan was approved, and Appellant completed the bypass channel June 25, 1991. (FF 14; Stip. 42.) Even this plan resulted in considerable erosion (FF 52).

Appellant seeks recovery of $18,750 for increased costs based upon the SCS's alleged wrongful rejection of Appellant's original 329- foot bypass channel. Appellant estimated that the approved 548- foot channel required 5,000 more yards of excavation and fill at a combined cost of $3.75 per yard (5,000 yards x $3.75 per yard = $18,750).

Discussion

At least a part of the reason SCS rejected Appellant's 929 foot diversion plan and accepted the 648 foot plan was concern for erosion. The contract required Appellant to minimize such erosion, and there is little doubt that significant erosion would have occurred over the greater length of Appellant's rejected plan (FF 52).

I concur with the majority's Discussion for the bypass channel and with the liquidated damages portion of the appeal.