BEFORE THE
MARYLAND STATE BOARD OF CONTRACT APPEALS

In The Appeals of Dick Corporation	)	
	)	**Docket Nos. MSBCA 2458 and 2459**
Under SHA Contract No. BA3335172	)	

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OPINION BY BOARD MEMBER DEMBROW

Appellant seeks reversal of the State's denial of a request for equitable adjustment based upon an allegation of differing site conditions arising from unanticipated subsurface conditions which delayed excavation and contract completion. Following extensive presentation of evidence, including numerous expert witnesses extending into a fourth (4^{th}) week of hearing on the record, as well as voluminous documentary, photographic and graphic exhibits, and the stipulated admission of deposition testimony offered by multiple deponents, the Board applies existing law, regulation, and decisional precedent in its determination to allow equitable adjustment in favor of appellant while disallowing certain of appellant's claims for damages based on modified total cost calculations.

Findings of Fact

1. In February 2001 the State Highway Administration (SHA) published an Invitation for Bids (IFB) for certain road work on a 2.7 mile section of the southwest portion of the outer loop of the Baltimore Beltway (Interstate 695) from MD-144 to I-95 in Baltimore County, Maryland, consisting of highway widening and resurfacing as well as reconstruction of bridges at Wilkens Avenue, Leeds Avenue and Benson Avenue, and also including the construction of five (5) noise walls and nine (9) retaining walls.
2. One of the components of the project, initially referred to as Retaining Wall 10, later renamed and hereinafter referred to Retaining Wall 8, was designed to be approximately 700 feet long with a foundation system comprised of eighty-seven (87) evenly spaced caissons, requiring excavation of a line of eighty-seven (87) equally spaced drilled vertical shafts thirty-six (36) inches in diameter and dozens of feet or more in depth, such drilled shafts being used to accommodate flanged H-beams set into concrete footers reinforced with rebar cages into and between which prefabricated concrete walls were inserted to form the backing of the vertical plane of the wall.
3. Another similar component of the project separate from, but near Retaining Wall 8, was Retaining Wall 6, which required 109 drilled shafts, also referred to as caissons.
4. Submitting a bid of $47,167,462.00, appellant, Dick Corporation (Dick), was the low bidder on the project, besting other bidders, Cherry Hill Construction, Inc., which submitted a bid of $52,075,495.27, Dewey Jordan, Inc., which submitted a bid of $52,612,058.39, and Lane Construction Corporation, which submitted a bid of $55,955,959.86. (Appellant's Exhibit No. 146.)
5. Because prime contractors' bids were required by SHA to itemize a single unit price for drilling shafts, appellant requested that its prospective excavation subcontractors

provide a single unit price, but only Dominion Caisson Corporation (Dominion) expressed its pricing structure to Dick in that format, while other potential excavation subcontractors instead provided one price for earth drilling and a second price structure for rock drilling.

6. In April 2001, McKinney Drilling Company (McKinney), a prospective subcontractor not actually used by appellant, offered to perform caisson excavation work for the drilling of 36" diameter caissons in the vicinity of the Baltimore Beltway (Interstate 695) at rate of $78 per linear foot, but also stated: "The removal of all boulders…which cannot be drilled with an earth auger will be performed as an extra over the above schedule of partial unit prices at the rate of $345.00 per hour." (Appellant's Exhibit No. 13.)

7. In March 2006, McKinney submitted to another highway contractor an unrelated quote for 42" caisson excavation in which the subcontractor's quote specifically provided: "Should rock and or boulder need to be removed, the work would be extended by an undeterminable amount of time and the cost could increase by 2 to 3 times the base price or more" and that rock excavation would be charged a rate of $1,250 per linear foot as compared to a rate of $358 per linear foot excavation of earth, and further provided that "[t]he removal of boulders…which cannot be drilled with an earth auger will be performed as an extra over the Base Bid and Unit price at the rate of $825.00 per hour." (Appellants Exhibit No. 142.)

8. On or about April 12, 2001, Dominion proposed to appellant to drill shafts for the project at a rate of $150 per linear foot for the 36" diameter caissons needed at regularly spaced intervals along the path of the eighty-seven (87) drilled shafts needed for Retaining Wall 8, totaling 1,950 linear feet of excavation required to construct that wall, for excavation costs of $292,500 for Retaining Wall 8, out of total excavation costs of $716,710, including other

excavation work unrelated to Retaining Wall 8. (State's Exhibit No. 3.)

9. On or about May 17, 2001, appellant entered into a conditional subcontract with Dominion according to which Dominion agreed to excavate the drilled shafts for Retaining Wall 8 for the stated price of $292,500, based upon drilling eighty-seven (87) caissons totaling 1,950 linear feet at a unit price of $150 per linear foot, such excavation being a portion of the subcontract agreement in the modified total amount of $697,210 for excavation work based upon unit pricing of between $30 and $260 per linear foot. (State Exhibit No. 18.)

10. The aforementioned subcontract for excavation services for this project also established a price of $75 per linear foot for the 2,174 linear feet of excavation for the drilled shafts required for Retaining Wall 6, for excavation costs of $163,050 for that retaining wall. (Appellant's Exhibit No. 21.)

11. Derived from the excavation subcontractor's price quotes, appellant's bid included an itemized line in the amount of $438,750 as the estimated cost of drilling the caissons for Retaining Wall 8, based upon a rate of $225 per foot for 1,950 linear feet of excavation. (Appellant's Exhibit No. 146, Line Item No. 4003.)

12. All of the other bidders on the project proposed lower costs for the portion of their bids representing the cost to drill the caissons required at Retaining Wall 8: Lane Construction proposing a charge of $292,500, Dewey Jordan $390,000, and Cherry Hill $234,000, compared to appellant's charge of $438,750. (Appellant's Trial Exhibit No. 13.)

13. Appellant's overall bid for excavation charges at Retaining Wall 8 was reasonable.

14. Appellant's bid included an additional line item in the amount of $700,000 as the cost of completing construction of Retaining Wall 8 after the drilling operation, for a total

charge of $1,138,750 for drilling and construction of Retaining Wall 8. (Appellant's Exhibit No. 146, Line Item No. 4060.)

15. With a total cost of construction of Retaining Wall 8 of $1,138,750, compared to Lane Construction's total cost of $1,392,500, Cherry Hill's cost of $1,384,000, and Dewey Jordan's cost of $1,090,000, appellant's cost for building Retaining Wall 8 was lower than two (2) of the four (4) competing bidders and higher than the low bid estimate for this work by the sum of $48,750, or about 4%. (Appellant's Trial Exhibit No. 14.)

16. Among the four (4) bidders, appellant was the low bidder for the excavation of the drilled shafts at Retaining Wall 8, but the high bidder for the drill and pour process components required at Retaining Wall 8, ranking appellant overall the second highest bidder for the total cost of constructing Retaining Wall 8.

17. Appellant's bid for construction of Retaining Wall 8 was reasonable.

18. The Notice to Proceed on the contract was made by the State and directed to appellant on or about July 9, 2001, with an initial completion date of May 26, 2004, later extended by agreement to October 19, 2004.

19. Section 2 of the General Provisions of the Contract, pertaining to Bidding Requirements and Conditions, stated the following:

> **GP-2.04 SITE INVESTIGATION**
>
> The Contractor acknowledges that he has investigated and satisfied himself as to the conditions affecting the work…The contractor further acknowledges that he has satisfied himself as to the character, quality and quantity of surface and subsurface materials or obstacles to be encountered insofar as this information is reasonably ascertainable from an inspection of the site, including all exploratory work done by the State, as well as from information presented by

the drawings and specifications made a part of this Contract. Any failure by the Contractor to acquaint himself with the available information may not relieve him from responsibility for estimating properly the difficulty or cost of successfully performing the work. The State assumes no responsibility for any conclusions or interpretations made by the Contractor on the basis of the information made available by the State. (See Volume I of the State's Rule 4 Submission at page 8.)

20. As mandated by the Code of Maryland Regulations (COMAR) 21.07.02.05, Section 4 of the General Provisions of the Contract, pertaining to Scope of Work, stated:

GP-4.05 DIFFERING SITE CONDITIONS

(a) The Contractor shall promptly, and before such conditions are disturbed, notify the procurement officer in writing of:

(1) Subsurface or latent physical conditions at the site differing materially from those indicated in this Contract; or

(2) Unknown physical conditions at the site of an unusual nature, differing materially from those ordinarily encountered and generally recognized as inherent in work of the character provided for in this contract. The procurement officer shall promptly investigate the conditions, and if he finds that such conditions do materially so differ and cause an increase or decrease in the Contractor's cost of, or the time required for, performance of any part of the work under this Contract, whether or not changed as a result of such conditions, an equitable adjustment shall be made and the Contract modified in writing accordingly.

(b) No claim of the Contractor under this clause shall be allowed unless the Contractor has given notice required in (a) above; provided however, the time prescribed therefor may be extended by the State.

(c) No claim by the Contractor for an equitable adjustment hereunder shall be allowed if asserted after final payment under this Contract. (See

Volume I of the State's Rule 4 Submission at page 23.)

21. Nine (9) foundation test borings were performed for SHA and the bidders on the project to evaluate the likely subsurface soil composition in the approximate vicinity of the line for drilling the eighty-seven (87) caissons required at Retaining Wall 8, each such test boring being approximately 1-3/8 inch in diameter, dozens of feet in depth, and about 75 feet apart from one another. (Appellant's Exhibit No. 214.)
22. The nine (9) foundation test borings at Retaining Wall 8 resulted in a total extraction of approximately seven (7) cubic feet of earth and rock, as compared to the necessary extraction of 12,000 to 14,000 cubic feet of earth and rock required to excavate the actual drilled shafts at Retaining Wall 8. (Trial testimony of Edward Dalton.)
23. According to the testimony of multiple experienced experts in geology and engineering, including SHA's own expert, Page Herbert, the nine (9) foundation test borings at Retaining Wall 8 did not definitively establish the certain presence of boulders or even the likelihood of boulders there, but simply the presence of rock cobbles or boulders which may or may not have posed a barrier to drilling by ordinary mechanical rig means.
24. The record of foundation test borings was made available to bidders and carefully reviewed by appellant's project director, Brian Contino, and appellant's excavation subcontractor, Dominion, through its principal, Richard Windham, a highly experienced and capable drilled shaft excavator, both of whom noted the presence of alternating layers of rock and soil, suggesting the presence of weathered, metamorphic, coreable ledge rock with soil seams at Retaining Wall 8.

25. Section 2 of the Special Provisions of the Contract, pertaining to Grading, included the following:

> **201.01.04 Rock.** The Contractor shall note that rock penetrated by power, soil auger, rock penetrated by split barrel sampler or rock refusal, was encountered in the borings at [the location of Retaining Wall 8]" and further, "[s]amples from foundation borings are available for review by contacting the Chief, Geotechnical Explorations Division, phone number (410) 321-3106. (See page 133 of SHA Contract No. BA3335172 contained in Volume 1 of SHA's Rule 4 File.)

26. No one on behalf of appellant or its excavation subcontractor personally examined the physical samples of foundation test borings for the project, though it is not a breach of any applicable professional standard of care not to review the actual boring samples for each job, unless the boring records may indicate the need for further, more detailed in-depth inquiry.
27. The physical soil and rock samples extracted from test borings nos. 5, 6 and 9 at Retaining Wall 8 included large, visible rock fragments. (Respondent's Exhibit No. 20 as further illustrated by Respondent's Exhibit No. 22.)
28. A learned illustrative depiction known as the 1979 Geologic Map of the Baltimore West Quadrangle describes the Baltimore Mafic Complex in the vicinity of Retaining Wall 8 as containing "Mount Washington Amphibolite…where massive commonly crops out as cobbles and boulders in a clay-rich red saprolite" but also indicates that south of U.S. Route 40, where this project is located, the amphibolite is "not commonly massive." (Respondent's Exhibit No. 27.)
29. SHA requirements set forth in the Special Provisions Section of Addendum Nos. 3 and 5 of the contract specifications provided with respect to excavation and drilling equipment that: "The excavation and drilling equipment shall have adequate capacity including power, torque, and downthrust and the excavation and overreaming tools shall be of

adequate design, size, and strength to perform the work show on the Plans or described herein." (Appellant's Exhibit No. 10, Pages 202 and 259.)

30. Special Provisions Section 428 also provided that drilled shafts "shall be excavated by augering, drilling, or hand excavation as necessary" and that "[w]hen the material encountered cannot be drilled using conventional earth augers or underreaming tools, the Contractor shall provide special drilling equipment including but not limited to rock augers, core barrels, rock tools, air tools, and other equipment as necessary to continue the shaft excavation to the size and depth required."

31. SHA requirements set forth in the Special Provisions Section of Addendum No. 5 of the contract specifications disclosed specifically at Section 428.03.02: "The Contractor is advised that boulders and/or cobbles were encountered in test holes for this project and that the presence of these materials may require special equipment." (Appellant's Exhibit No. 20, Page 258.)

32. The foregoing cautionary provision in the subject contract was regarded by appellant as nothing more than boilerplate, but in fact, the language referencing the likely presence of "boulders and/or cobbles" was unusual and unique to this particular roadwork contract.

33. The governing manual accepted in the industry published by the American Association of State Highway and Transportation Officials (AASHTO) in Section 2.5 of Standard Specifications for Terms Relating to Subgrade, Soil-Aggregate and Fill Materials, defines a "boulder" to be "a rock fragment, usually rounded by weathering or abrasion, with an average dimension of 305 mm (12 in.) or more." (Appellant's Exhibit No. 140.)

34. As compared to boulders' average dimension of 12 in. or more, AASHTO defines a "cobble" as "a rock fragment, usually rounded or semi-rounded, with an average dimension between

75 and 305 mm (3 and 12 in.)." (Appellant's Exhibit No. 140.)

35. The presence of boulders in drilled shafts to be excavated by a drill rig poses a much more challenging subsurface work site environment than the presence of mere cobbles within the earth and is also much more troublesome for excavation than encountering layers of coreable ledge rock.

36. Expert prediction of the likelihood of encountering subsurface boulders while excavating drilled shafts is ultimately a subjective judgment based upon objective evidence and observation for which competent experienced professionals may reasonably reach different conclusions as to expectations concerning ease of underground excavation.

37. In a Geotechnical Report dated October 2000 used by SHA to design the foundations for retaining wall structures for this project but not made available to bidders, URS Corporation described to SHA the geological borings in the vicinity of Retaining Wall 8 as "decomposed rock" and also stated: "These materials comprise silts and clays with varying subordinate fractions of sand and rock fragments…zones of coreable rock (boulders, rock ledges, etc.) were cut from within the decomposed rock profile…The boulders/ledge rock from within the decomposed rock profile was highly weathered, with recoveries generally less than 50 percent and RQDs [rock quality designations] less than 20 percent." (Appellant's Exhibit No. 5, Page 3.)

38. RQD value in test borings cannot alone definitively identify whether underground boulders are present as compared to coreable ledge rock, but because RQD represents the percentage of a five (5) foot core of earth that consists of a rock formation exceeding four (4) inches in length, an RQD of higher than 20% is indicative of the possible presence of a boulder because 20% or more of the five (5) foot cylinder of material extracted from the small boring test hole constitutes rock, and a boulder by definition must be at

least that size or larger; but likewise, RQD values of less than 20% is not necessarily indicative of a failure to encounter a boulder because even when less than 20% of the five (5) foot core, or less than 12 inches, constitutes rock, it is possible for the test boring to have pierced only a small portion of a much larger boulder.

39. The test boring logs for caisson excavation for construction of Retaining Wall 2 specifically noted the presence of a boulder at elevation 97.00 at boring no. 1 using the word, "boulder" in the Borings and Drive Tests Location Plan. (Appellant's Exhibit No. 212.)

40. The boring logs for caisson excavation for construction of Retaining Wall 6 noted the presence of "rock" at elevation 123.80 at boring no. 4 of Retaining Wall 6B and also noted "boulders visible in area" at boring no. 11 of Retaining Wall 6B. (Appellant's Exhibit No. 213.)

41. Other test boring records of the State Highway Administration (SHA) unrelated to the instant project expressly reflect the likely presence of boulders using words such as "boulder," "small boulders and rock fragments (fill)," "small boulders and concrete (fill)," "trace of rock fragments and boulders," "unable to drill through possible boulder," "cored boulders," "boulders – quartz" and other specific references to boulders. (Appellant's Exhibit Nos. 216, 217, 218, 219 and 220.)

42. In a separate unrelated project to improve a northwest portion of the Baltimore Beltway, the word, "boulder" or "boulders" appears 22 times in SHA's March 2003 boring logs, including 19 times in the actual boring recovery descriptions and three additional times in the boring and drive test notes, which state in each of those notes: "The foundation borings indicate the presence of boulders, cobbles, possible pinnacles and/or irregular rock profile at the project site." (Appellant's Exhibit No. 215.)

43. Nowhere in the boring logs, Borings and Drive Tests Location Plan, or Boring Notes for caisson excavation for Retaining Wall 8 does the word "boulder" appear. (Appellant's Exhibit No. 214.)

44. A computerized database search of 6,000 SHA foundation borings reveals just over 100 in which the word "boulder" does appear.

45. Much of the subsurface material at Retaining Wall 8 was able to be penetrated by a split spoon sampler requiring low blow counts to complete the test borings, indicating the likelihood of coreable rock, and for which the highest rock quality designation (RQD) values, used by foundation design engineers to evaluate bearing capacity, reflect RQDs of 37% at boring no. 2, 31% at boring no. 4, 20% at boring no. 5, 27% at boring no. 6, and 33% at boring no. 9, all of which readings were acquired at depths well below topsoil elevation and none of which were sufficiently high to cause alarm on the part of competent caisson excavators concerning impossibility of drilling shafts using common mechanical drilled rig means and methods, though the presence of subsurface boulders is almost always possible and in this instance is consistent with the five (5) above specified RQD findings. (Appellant's Trial Exhibit No. 2.)

46. Local experienced geotechnical experts with Engineering Consulting Services (ECS) testified that although it would not be surprising to encounter a boulder or two on any excavation site the magnitude of Retaining Wall 8, nothing recorded from the test core samples at that location suggested the presence of boulders, but instead, that the test borings reflected the likely presence of soil and highly decomposed ledge rock. (Trial testimony of Henry Lucas and Robert Hackman)

47. When bidding on the project, appellant and its subcontractor, Dominion, expected to be drilling through soil and weathered rock at Retaining Wall 8, using primarily

a rock auger, a tool which would have achieved satisfactory results if the subsurface condition had been consistent with Dominion and Dick's expectations at the time of their bids.

48. The hand-written worksheet compiled by Dominion as appellant's caisson excavation subcontractor, documents that Dominion anticipated it would encounter rock between caisson nos. 66 and 87 at Retaining Wall 8, noting "very possible rock drilling" and specifically noting the likelihood of drilling through 7 feet of rock in each of 30 holes, for a total of 210 linear feet of rock drilling compared to 1,740 feet of soil drilling, though a separate hand-written calculation of Dominion's bid line item no. 4003 pertaining the drilling of caissons for Retaining Wall 8 reflects that Dominion expected to excavate 270 feet of rock and an additional 1,680 feet of soil. (State's Exhibit 16.)

49. Dominion anticipated incurring job costs of $1,960 per day for non-rock drilling and $2,500 per day for rock drilling, including equipment, labor and overhead. (State's Exhibit No. 16.)

50. Commencing on July 31, 2003, the initial means and methods plan anticipated by Dominion as necessary to excavate the required eighty-seven (87) drilled shafts at Retaining Wall 8 was to engage large cylindrical rock augers mounted on a large mechanical drill rig, progressing excavation in sequence from shaft 1, the downstation end, to shaft 87, the upstation end.

51. During the first four (4) days of excavation prior to encountering a remarkable subsurface obstacle, only four (4) shafts were drilled.

52. Dominion estimated that excavation of the caissons required to construct Retaining Wall 8 could be accomplished by drilling about 60 holes at a production rate of one (1) hole per day, and about an additional 30 holes at a production rate of six (6) holes per day, for a total of about 65 days of drilling, or possibly 75 days of drilling according to

the trial testimony of Dominion's principal officer, Richard Windham. (Appellant's Exhibit No. 153, Bid Item No. 4003 and trial transcript 1141-1142.)

53. In contrast to the projected time allotment of its excavation subcontractor, appellant's initially stated work schedule anticipated only 33 days to excavate the eighty-seven (87) drilled shafts at Retaining Wall 8, apparently assuming that its subcontractor, Dominion, would employ two (2) drill rigs at the work site instead of only one (1), thus cutting the drill time in half.

54. Although appellant initially estimated total drilling time of only 33 days to excavate all eighty-seven (87) drilled shafts for Retaining Wall 8, ultimately that work actually took over a year, with five (5) of the shafts taking five (5) months, which delayed project completion.

55. Dominion's first record of encountering an unforeseen obstacle to the expeditious excavation of drilled shafts was a boulder observed on August 6, 2003, which was initially treated as a potentially isolated event and only a short-term barrier to swift work completion.

56. As Dominion continued to encounter what it considered to constitute pervasive boulder obstructions, Dominion modified its planned excavation means and methods by using different types of augers, including pilot augers, tapered boulder rooters, core barrels with varying size teeth and eutectic welding for enhanced abrasion, down-the-hole hammers, including a cluster hammer and hoe ram, and ultimately by lowering individual personnel into holes with jackhammers in an effort to fragment rock barriers to mechanical drilling by ordinary means using rock auger bits.

57. In the course of its attempt to fragment rock obstructions to excavation, Dominion used and broke a 36-inch drill bit which cost $22,000 to replace.

58. As a result of Dominion's decision to lower manual laborers into the drilled shafts to excavate using hand tools, and

also because of the inordinate time that was required to drill many of the shafts at Retaining Wall 8, additional casing was required on this job beyond what was originally expected by appellant or its excavation subcontractor and because some of the casings had to be left in the drilled shafts for long periods of time, additional casings were needed beyond the number initially anticipated, and the casings that were left in place for extended periods of time became difficult to extract for re-use.

59. Over the course of its tortuous endeavors to excavate the required holes, Dominion first employed a rubber-tired drill rig known as an LDH-80 and later, on September 9, 2003, used a heavier capacity drill rig known as the LLDH-100 and still later, on November 13, 2003, also engaged use of a track-mounted drill rig known as a Watson 2500.

60. It is not claimed by SHA that the above identified mechanical drilling rigs were not the appropriate equipment required by the terms of appellant's contract with SHA, though SHA does contend that using different boring drill bits and techniques may have achieved superior results in comparison to the means and methods that Dominion actually used; specifically, one of the State's witnesses contends that by using, in advance of rock augers, a longer and thinner core barrel with recessed teeth in order to cut through hardened rock and avoid displacing settled bodies of rock with an auger before subjecting them to the further protruded cutting teeth of a regular core barrel bit, superior drilling results would have been achieved.

61. No evidence was adduced by appellant to rebut respondent's aforementioned allegation through Marion Skouby, an out-of-state expert witness in drilled shaft excavation, that appellant could have employed superior drilling technique as more fully set forth above, but Dan Brown, another highly qualified expert in geotechnical foundation engineering, testified that Dominion's means and methods were reasonable,

substantiating Dominion's own defense of the propriety of its means and methods based in large part on the credible testimony of Dominion's principal, Richard Windham, who has thirty-seven (37) years of local professional experience in caisson excavation.

62. The record is lacking of any evidence regarding the amount of improved productivity that may have resulted from the use of differing boring drill bits and techniques as recommended by Mr. Skouby, and it is conceivable that any such evidentiary attempt may have been purely speculative and therefore inadmissible.

63. The selection of means and methods for excavating the drilled shafts required by the contract was within the sole determination and responsibility of appellant and its subcontractors, and not SHA.

64. Work on Retaining Wall 8 was initially delayed briefly due to the need to relocate fiber optic cable, which was not done until on or about July 3, 2003 and was required to be moved again on or about August 13, 2003.

65. In the course of modifying its original drilling schedule in order to place men in the holes using air tools to fragment rock barriers, Dominion determined no longer to drill shafts in sequential order from the downstation to the upstation holes, but instead to advance work using its drill rigs simultaneous with the lowering of manual laborers into encased shafts where obstructions prevented ordinary mechanical rig drilling.

66. The presence on the work site of Dominion's track-mounted drill rig disrupted the initially intended orderly sequential excavation of drilled shafts from the downstation to the upstation holes, in part because the location of the Watson rig blocked the quick and easy return of the LDH-80 and LLDH-100 to earlier initiated but uncompleted holes.

67. On or about August 15, 2003, Dominion first notified appellant of an unforeseen site condition at Retaining Wall

8, which notice was relayed by appellant to SHA on the same date.

68. On or about September 11, 2003, appellant's excavation subcontractor, Dominion, submitted to appellant a change order requesting $66,700 for additional work on Retaining Wall 6, asserting: "This contractor has been greatly impacted by unanticipated rock conditions over the last few months at [Retaining Wall 6]." (Appellant's Exhibit Nos. 45 and 47.)

69. On or about September 19, 2003, appellant submitted to SHA a change order alleging that unforeseen conditions encountered during construction of the caissons for Retaining Wall 6 caused extension of the duration of that work from 74 to 160 days and requested $179,490.94 for that additional work on Retaining Wall 6. (Appellant's Exhibit No. 47 and State's Exhibit No. 23.)

70. Appellant sent to SHA further notices of alleged unforeseen site conditions at Retaining Wall 8 on or about October 16 and December 1, 2003 and on or about December 17, 2003, SHA received from appellant its first formal request for equitable adjustment at Retaining Wall 8, such adjustment request being in the total amount of $864,341.94.

71. On or about December 20, 2003 a meeting was conducted to discuss the delay in the construction of drilled shafts for Retaining Wall 8 and the possibility of modifying drilling techniques or re-designing the foundation structure for that wall. (State's Exhibit No. 28.)

72. On or about December 21, 2004, SHA denied appellant's claim for additional compensation arising from differing site conditions, based in part on SHA's conclusions that the subsurface conditions encountered on the project did not differ materially from the conditions described in the contract documents. (Appellant's Exhibit No. 134 and State's Exhibit No. 53.)

73. On or about January 15, 2004, appellant submitted to SHA its first formal proposal to redesign a portion of the foundation of Retaining Wall 8 to avoid the use of drilled shafts as originally designed, and a meeting of several of the stakeholders occurred the following day to review, discuss, and consider that recommendation and request.
74. On or about February 6, 2004, appellant submitted to SHA a formal documented claim of an unforeseen site condition at Retaining Wall 8. (State's Exhibit No. 32.)
75. As drilling continued under the original design plan, on or about March 2, 2004, appellant requested an additional equitable adjustment in the amount of $431,260.
76. Contending that appellant's excavation contractors had actually encountered not boulders, but layers of amphibolite rock that had been broken into boulder size material by rock augers, on or about March 26, 2004, the Chief of SHA's Engineering Geology Division notified the District Engineer for SHA's District 4 that the underground rock occlusions at Retaining Wall 8 "are not boulders." (Appellant's Exhibit No. 90.)
77. On or about March 30, 2004, appellant determined that the caissons at Retaining Wall 8 were on the critical path and had pushed project completion from April 21 to May 16, 2005.
78. On or about April 8, 2004 appellant submitted to SHA another request for equitable adjustment in the amount of $639,052.
79. On or about April 15, 2004, the Chief Engineer for SHA District 4 issued his final determination that there was no differing site condition at Retaining Wall 8 and that appellant's request for equitable adjustment was therefore denied, specifically stating: "Since we do not agree with your assertion of a differing site condition at [Retaining Wall 8], additional compensation, as requested in your February 6, 2004 and April 8, 2004 letters, is respectfully denied. This is our final determination on this matter." (Appellant's Exhibit No. 90.)

80. On or about May 10, 2004 appellant noted a timely appeal of the final determination by correspondence to SHA's Chief Engineer for Operations.

81. By correspondence dated May 25, 2004, SHA notified appellant of SHA's approval of a non-compensable time extension of 170 calendar days, postponing the project completion date from October 19, 2004 to April 7, 2005. (Appellant's Exhibit No. 100.)

82. By e-mail dated June 7, 2004, appellant notified SHA that Dominion's hand crew achieved only 25 linear feet of caisson excavation during the entire previous month. (State's Exhibit No. 47.)

83. On or about August 4, 2004, appellant submitted to SHA another request for equitable adjustment in the amount of $1,144,517.

84. Beginning in July 2004 but subject to certain technical refinements not substantially completed until August 30, 2004, SHA authorized appellant to proceed with a modified re-design for the portion of Retaining Wall 8 between caisson nos. 38 and 57, using a spread footer structural system in place of the need for deep drilled shaft excavation, and by e-mail on or about September 9, 2004 SHA formally notified appellant of its approval of that design modification which was confirmed by written correspondence dated October 13, 2004, at which time appellant directed Dominion to demobilize and depart the work site. (Appellant's Exhibit No. 115.)

85. On or about September 23, 2004, appellant submitted to SHA a request for compensable time extension from October 19, 2004 to July 18, 2005 as well as its alternative reduced estimate of the cost to complete redesigned Retaining Wall 8 by eliminating the remaining median at a cost of $2,119,972.19 instead of a cost of $2,991,972.10 for completing redesigned Retaining Wall 8 without eliminating the remaining median. (Appellant's Exhibit No. 119.)

86. On or about October 25, 2004, an expert geotechnical firm, Engineering Consulting Services, Ltd. (ECS), provided to Dominion its analysis concluding the positive presence of nested boulders at Retaining Wall 8. (Appellant's Exhibit No. 129.)

87. On or about October 27, 2004, Johnson, Mirmiran & Thompson (JMT) provided to SHA its evaluation of appellant's claim in which JMT concluded that the borings for Retaining Wall 8 accurately reflected the likely subsurface conditions that appellant encountered there, and recommended that SHA deny appellant's claim for unforeseen boulders.

88. By expert geological examination in November 2004, appellant was advised that a portion of the rock encountered on the project was amphibolite, a broad category of weathered metamorphic rock ordinarily capable of being penetrated by a rock auger mounted onto a mechanical drill rig. (State's Exhibit No. 52.)

89. Evidence of the actual compressive strength of material found at Retaining Wall 8 was determined in November and December 2004, when Geotechnics, a geological testing laboratory retained by appellant, conducted compressive strength analysis of certain rock fragments excavated at Retaining Wall 8, and determined the compressive strength of that material to be highly variable but as high as 31,780 pounds per square inch (PSI), which is a strength of rock that was not reasonably foreseeable from review of the foundation test borings, is extremely hard and indicative of diabase rock or rock of a diabase parentage, meaning that it may be igneous, of volcanic origin, and represents an earth driller's worst case scenario in terms of encountering a natural, very dense rock barrier to mechanical excavation. (Appellant's Exhibit No. 132.)

90. On or about December 21, 2004, SHA's procurement officer issued his final decision denying appellant's claim for equitable adjustment.

91. On or about January 13, 2005, appellant noted timely appeal before the Maryland State Board of Contract Appeals.

92. Appellant asserts that it encountered boulders at every single caisson at Retaining Wall 8 from caisson nos. 1 through 60, claiming entitlement to additional costs for thirty-nine (39) of those caissons, with project records indicating that Dominion encountered the most significant presence of boulders at the location of thirty (30) caissons at Retaining Wall 8 for which appellant offered substantial photographic and other documentation in support of its claim for reimbursement for additional costs, namely, at caisson nos. 5, 10, 11, 12, 21, 22, 26, 27, 28, 30, 32, 33, 34, 35, 36, 37, 38, 45, 46, 47, 48, 49, 50, 54, 55, 56, 57, 58, 59 and 60. (Appellant's Trial Exhibit Nos. 7, 8, 9 and 10.)

93. No significant boulder obstructions were encountered in caisson nos. 61 through 87 at Retaining Wall 8.

94. Photographs taken in February and March 2004 of the interior view of the terminus of cylindrical excavation casings depict the presence of boulders in caissons at Retaining Wall 8. (Respondent's Trial Exhibit Nos. 33, 34 and 38.)

95. Notwithstanding respondent's assertion that there were no boulders at Retaining Wall 8, photographs taken in October and December 2004 of a broad, deep earthen wall that was excavated for the purpose of constructing the redesigned spreadfooter structure for the portion of Retaining Wall 8 between caisson nos. 38 through 57 convincingly depict the presence of nested subsurface boulders at various soil depths in that vicinity. (Respondent's Trial Exhibit No. 36, Appellant's Trial Exhibit Nos. 23, 46 and 54.)

96. Excavation superintendents as agents of subcontractor Dominion completed daily report logs which document the work being done, including number and type of equipment and personnel on the job site each day and the nature and extent of all delays, including pervasive boulder barriers to excavation. (Appellant's Exhibit No. 37.)

97. Between April 16, 2002 and January 31, 2005, upon receipt of various payments from appellant, Richard Windham as principal of and on behalf of subcontractor Dominion, executed a series of form "Requisition, Waiver and Release" documents provided to it by appellant which purportedly contained unconditional language acting as a waiver and release of all further liability, but those documents were specifically designated as "partial" and not "final" waivers and releases. (Appellant's Exhibit No. 22.)

98. Important last phases of the subject road improvement project to be performed by another of appellant's subcontractors was finishing paving work that included two primary elements, namely, "wedge and level," which is intended to remedy irregular surfaces of the roadway to achieve a smooth grade, and the other, application of "gap-graded surface mix," also known as "superpave," which is the final road coating.

99. Throughout the performance of this road construction project a vital component to maintain a safe flow of beltway traffic while the specified work was proceeding required that travel lanes be shifted away from road shoulder work areas so that shoulder area work could proceed prior to the final phases of asphalt paving, for which temperature limitations precluded work during cold winter weather, usually from mid-November to mid-March.

100. On or about May 21, 2001, appellant and its paving subcontractor, P. Flanigan & Sons, Inc. (Flanigan), entered into a conditional subcontract agreement according to which Flanigan agreed to provide certain paving work expected to be done in the early summer of 2004 for a total cost of $3,838,457, based in part on the use of an estimated 295 tons of surface superpave material at a cost of $65 per ton, plus other charges in addition to materials cost. (State's Exhibit No. 62.)

101. Notwithstanding the fixed price component of the subcontract agreement more fully described above, that agreement also provided that if the subcontractor is delayed in performance, appellant is required to pass-through to SHA any claim for additional costs associated with the delay and to remit to Flanigan such recoveries, after deducting a percentage collection fee.
102. Pursuant to the Changes Clause set forth in appellant's contract with SHA, appellant's subcontractors enjoy a conditional right to equitable adjustment in price and time of performance comparable to the right enjoyed by appellant as prime contractor.
103. For reasons of safety, convenience and quality of the final paving pass, Flanigan planned to pave in a fairly continuous fashion proceeding from north to south, interrupted only by bridge decks, as compared to staggering the sections of paving or reversing direction of paving passes.
104. SHA recommended that Flanigan mitigate paving delay by performing its work in a noncontinuous fashion not necessarily proceeding from north to south, but Flanigan declined for good cause to accept that recommendation and SHA did not press the issue.
105. Flanigan's planned paving work was delayed to calendar year 2005 primarily due to appellant's delay in completing excavation at Retaining Wall 8.
106. Between 2002 and 2003, Flanigan's asphalt paving plant operation costs for its Westport facility increased from $7.34 per ton to $8.26 per ton. (State's Exhibit No. 64.)
107. Between 2004 and 2005, Flanigan's asphalt paving plant operation costs for its Westport facility, which provided most of the paving material used on the instant job, decreased from $10.55 per ton to $10.39 per ton, but Flanigan's total plant operation costs increased from $8.72 to $9.44 per ton during the same time frame, due in part to

increasing costs of electricity, petroleum products and labor. (State's Exhibit 99.)

108. According to Flanigan, the start-up cost for Flanigan to open its Brooklyn plant in the summer of 2005 was $50,000. (Appellant's Trial Exhibit 79.)

109. Though Flanigan's aggregate costs are fixed for the year, its hauling costs increased from $50 per ton to $52 to $54 to $57 to $61 from time to time between 2001 and 2005, most of the hauling charges in 2005 being $57 per ton with some at $61 per ton.

110. According to Flanigan's production averages calculated in February 2006, the cost of producing only a small amount of asphalt at its Brooklyn plant in 2005 was $157.96 per ton, in comparison to a total production cost of $31.93 per ton and $27.61 per ton at its other plants at Westport and Monroe Street, respectively. (Trial Exhibit No. 99.)

111. As was consistently the case in past project invoices, Flanigan's paving charges on this project were established using a blended cost method based upon overall plant production costs rather than by using cost variations specific to a particular plant, so that charges are uniform irrespective of which plant actually provides paving materials for a given job.

112. By fax dated January 17, 2005, Flanigan notified appellant that it would not be able perform certain work needed for the Baltimore Beltway project that spring. (State's Exhibit No. 70.)

113. By correspondence dated March 28, 2005, Flanigan notified appellant of various price increases in the cost of materials, labor, hauling, equipment, overtime and production which had occurred since the time of its original pricing for road surface work initially contemplated to be performed in 2003 and 2004. (State's Exhibit No. 71.)

114. Flanigan's hourly rate for superpaving wedge and level increased from $50.00 per hour in the fall of 2004 to $61.00 per hour in 2005. (Appellant's Exhibit No. 141(B).)
115. In April 2005 Flanigan had contract backlogs of $42,290,539 in sales of paving materials, of which $1,618,015 was in paving materials designated for appellant's use on the instant project. (State's Exhibit No. 81.)
116. As a result of project delay, Flanigan as appellant's paving subcontractor, invoiced appellant $193,370.19 extra for price escalation for its superpave final grade, such sum including a mark-up of 19% in addition to the alleged price escalation of $162,495.96 for paving material and work. (Appellant's Exhibit No. 141(A).)
117. On or about June 22, 2005, appellant met with Flanigan and offered to remit $80,000 to $90,000 to compensate Flanigan for price escalation related to cost of paving material and associated items of cost inflation. (Trial Exhibit No. 84.)
118. On or about July 1, 2005 Flanigan agreed to accept from appellant an additional payment of 2.5% of the approximate $1.6 million in paving materials cost, amounting to $40,000, plus $50,000 for plant start-up, for a total of $90,000. (State's Exhibit Nos. 86 and 91.)
119. Appellant paid its paving subcontractor, Flanigan, the sum of $90,000 in response to Flanigan's request for approval of a change order based upon price escalations related to delayed project completion, appellant also agreeing to pass through the balance of Flanigan's claim to SHA and remit to Flanigan 95% of all sums recovered in excess of the $90,000 paid to Flanigan by appellant in advance of this claim. (Appellant's Exhibit No. 152 and State's Exhibit No. 91.)
120. Section 109 of the subject contract required appellant to schedule work pursuant to a critical path method (CPM) project schedule, including "a written narrative as part of the ICPM [initial critical path method] describing the original critical path, the sequence of work, number of

shifts per day, number of hours per shift, composition and number of crews, and the equipment to be utilized on each activity" as well as proposed revisions to the CPMR [critical path method of record] "whenever the activities differ from the accepted CPMR" and finally, that "[w]hen a delay or a disruption to the work is identified in the Written Narrative which the Contractor believes to be the responsibility of the Administration, the Contractor shall submit a revision to the CPMR within 30 calendar days after the submittal of the updates." (Contract, Pages 121 through 123.)

121. In order to plot progress on the job by simultaneously tracking the thousands of discreet tasks required to complete the project, appellant provided its CPM schedule updates using Primavera CPM software, which is commonly regarded in the industry as suitable and appropriate for such CPM scheduling needs.

122. The initial CPM allotted only 33 days for excavation of the drilled shafts at Retaining Wall 8, with a float of between 27 and 54 days to complete that work without impacting the project completion date by interfering with other critical path task accomplishment.

123. The first significant time impact occurred as a result of the late construction of a bridge which caused a 30-day delay in project completion; the second was a result of late footing excavation, which caused an additional 151-day delay in project completion, but that delay was fully recovered by resequencing that bridge work; the third was a result of late relocation of fiber-optic cable at Retaining Wall 8, which caused a 164-day delay in project completion, but that delay was fully recovered by an additional traffic switch at Retaining Wall 8; the fourth was a result of the late completion of caissons at Retaining Wall 8, which caused a 315-day delay in project completion, but 50 days were recovered from that delay by redesigning a portion of

Retaining Wall 8; the fifth was a result of extra pavement removal, which caused a 30-day delay in project completion; and the sixth was a result of late delivery of column extension, which caused a 51-day delay in project completion. (Appellant's Trial Exhibit No. 27.)

124. CPM schedule no. BB18 dated August 11, 2003 was the CPM schedule closest to the commencement of drilling activities on the job site, which occurred on or about July 31, 2003.

125. According to CPM schedule nos. BB18 and BB19, as of August 2003 both the delay at the Wilkens Avenue Bridge and at Retaining Wall 8 excavation were classified as being on the critical path, meaning that delay would result in delay of project completion.

126. In the fall of 2003, delay at Retaining Wall 6 was also classified as being on the critical path.

127. Caisson drilling at Retaining Wall 8 was ultimately completed almost a year later than the critical completion date of September 9, 2003 as shown on CPM Schedule No. BB18.

128. Overshadowing the delays related to Retaining Wall 6 and the Wilkens Avenue Bridge, which may have been averted by resequencing, the comparatively extreme excavation delay at Retaining Wall 8 was the controlling factor responsible for postponing the start of superpaving to July 25, 2005, regardless of the concomitant but less significant delays in completion of the Wilkens Avenue Bridge and with excavation at Retaining Wall 6.

129. Mr. Ockman, a registered professional engineer and highly qualified expert in CPM scheduling, testified that but for the late completion of the drilled shafts at Retaining Wall 8, the project would have completed on November 2, 2004, but the excavation delay postponed project completion for 315 days, to September 13, 2005, a delay which was reduced by 50 days due to the spreadfooter redesign of Retaining Wall 8, resulting in appellant's claim of compensable delay of a total of 265 days.

130. Excavation delay at Retaining Wall 8 delayed project completion 265 days, from October 2004 to August 2005.

131. For the nine caissons that were drilled primarily by hand, appellant required between 24 days and 115 days per caisson, completing only five caissons in the 5-1/2 months between April and mid-September 2004.

132. The total amount of the equitable adjustment sought by appellant for itself and its subcontractors was over $4 million as calculated using the modified total cost method. (Appellant's Exhibit No. 44.)

133. Appellant's audited claim for more than $1.7 million in time-related costs includes field office overhead of $943,713, home office overhead calculated using the Eichleay formula in the amount of $238,421, additional maintenance of traffic costs in the sum of $191,433, paving materials cost escalation of $174,017, extra surveying costs of $108,558, and additional engineering office costs of $6,623, plus $68,506 in additional mark-up at the 4.12% rate stipulated by the parties.

134. One of the drawbacks to the total cost method of calculating damages occasioned by a project delay is that a contractor's inefficiency or failure to mitigate damages tends to inflate the amount of its claim.

135. The total cost approach for computing damages is the methodology of last resort, which should only be applied if the following four (4) factors are satisfied: (1) the bid price is reasonable; (2) no better method to estimate damages is available (such as calculation of actual discreet costs or use of an available "measured mile" methodology); (3) the actual cost is reasonable; and (4) the bidder is not responsible for any of the additional costs. (Trial testimony of Daryl Oyer.)

136. The Eichleay formula is ordinarily a fair and accepted method of calculating unabsorbed home office expenses to be

included in claims for reimbursement for additional overhead costs when a construction project completion is delayed.

137. Part of the rationale for proper application of the Eichleay formula is that a contractor may be delayed from moving forward on future projects by virtue of delay occasioned from an ongoing project which is being delayed.

138. Appellant attempted to sell off its Bridge and Highway Division and in August 2004 determined to discontinue bidding bridge and highway work, wind down the division, reassign or lay off its employees, and sell its equipment.

139. Appellant actually sold its bridge and highway equipment in or about May 2005.

140. The decision to sell its Bridge and Highway Division was not included as a factor in appellant's claimed assessment for a full measure of Eichleay damages.

141. Severance payments, also referred to in some instances as retention payments, were included in appellant's claim for damages even though other of appellant's employees unrelated to the subject project also received severance payments.

142. The severance or retention payments made by appellant for which claim is made for reimbursement by the State as a portion of Field Overhead Adjustments amounts to $170,250 in payments made to eight (8) individual employees who received payments ranging from $8,126 to $54,481 each.

143. Appellant makes no claim for compensation beyond July 25, 2005.

144. For those caissons for which no liquidated claim of boulder delay is established by appellant, Dominion required on average 2.5 days per caisson excavation, that average including a production rate of 0.79 days per caisson to excavate caisson nos. 1 through 26, and 3.85 days per caisson to excavate caisson nos. 61 through 87. (Trial testimony of Prad Maraj.)

Decision

Appellant notes timely filed appeals challenging final determination by SHA not to allow equitable adjustment for cost overruns attributed by appellant to excavation delays occasioned by appellant's subcontractor encountering unusual and unexpected subsurface rock obstructions in the course of drilling vertical shafts required for the construction of retaining walls as part of a pavement widening roadway project on the Baltimore Beltway.

The starting issue for evaluation and resolution by the Board is whether a differing site condition exists under the factual scenario presented in some detail during the course of very elaborate proceedings of record in this appeal. First, however, it is worth noting the rationale for the differing site condition clause, which is mandatory in State construction contracts pursuant to COMAR 21.07.02.05. Maryland Technical Stone Erectors, Inc., MSBCA 1801 & 1837, 4 MSBCA ¶377 (1995); Guardian Management Company, MSBCA 1619, 4 MSBCA ¶311 (1992); Harmans Associates Limited Partnership, MSBCA 1517, 1518 & 1519, 3 MSBCA ¶301 (1992).

Two (2) bases of differing site conditions are traditionally recognized. Cherry Hill Construction, Inc., MSBCA 1547, 3 MSBCA ¶274 (1991); Hardaway Constructors, Inc., MSBCA 1249, 3 MSBCA ¶227 (1989); Erik K. Straub, Inc., MSBCA 1371, 3 MSBCA ¶214 (1989). The first, a Type I condition, is found when some latent condition at the work site differs materially from the conditions described in contract documents. The second form of differing site condition, known as a Type II condition, arises when unusual and unknown conditions are discovered which differ materially from the conditions ordinarily encountered and generally recognized as inherent in the sort of work being done.

Important public procurement policies are facilitated by the inclusion of the differing site conditions clause mandated by regulation to be included in state construction contracts and included in the contract here under review. If contractors were forced to calculate their bids based upon a worst case scenario

of potential problems at the work site, bids would be inflated to account for such problems and in the ordinary circumstance, the State would incur unnecessary expense while contractors would enjoy excessive profit, except in those unusual situations where improbable worksite problems were actually experienced.

To mitigate against this phenomenon of bid inflation, and to encourage entities to bid on state contracts, the differing site conditions clause is included in all state construction contracts to protect contractors from unlikely contingencies so that contractors may base their stated bid amounts upon reasonable expectations of the work required to be performed, rather than having to increase their estimates to account for potential but unexpected possibilities. As important as the differing site condition clause may be to cost savings in public procurement, its effectiveness in affording intended comfort and relief to contractors depends upon the clause being properly invoked when circumstances warrant. With this balancing of adversarial interests in mind, this Board must determine under the factual setting here presented whether appellant encountered a differing site condition and whether an equitable adjustment in contract price is therefore appropriate.

SHA denies that appellant encountered boulders at the subject work site, but this determination flies in the face of clear and convincing evidence adduced at the hearing, including plain photographic proof of the significant presence of boulders obstructing various points of excavation along the path of the drilled shafts required for Retaining Wall 8. By alternative pleading and argument, the State also contends that appellant should have anticipated the presence of boulders at the locations where excavation was delayed, but these contentions the Board finds to be inadequately founded if not disingenuous. The State did have substantial justification to question and ultimately to deny appellant's claim for equitable adjustment. However, while the Board respects the State's right to plead and argue alternative theories of defense, it reflects a significant

internal factual inconsistency for the State to assert on the one hand that there were no underground boulders at this work site, but on the other hand, that the contractor should have known in advance of excavation that there were a great many subsurface boulders hidden there.

The evidence before the Board is unambiguous in establishing that subsurface boulders were encountered at this work site. The closer and more problematic question presented is whether the contractor should have anticipated the presence of those boulders. The Board finds that the potential presence of some boulders at an excavation site the length and depth of Retaining Wall 8 is something that any reasonable person might anticipate; but this is not to imply that a reasonable contractor might anticipate the huge number and high strength of the boulder obstructions that were encountered in at least thirty (30) of the drilled shafts at Retaining Wall 8.

Prior and subsequent SHA site specifications for roadwork specifically reference the word "boulder" in describing soil conditions identified by test borings. Indeed, in this project the word "boulder" is used in boring logs and notes on portions of the job. But it is not used as a description of any of the underground exploration at Retaining Wall 8.

The State places great weight in its advance disclosure to bidders in Section 428.03.02 of the contract documents that "boulders and/or cobbles were encountered in test holes for this project," but that reliance is misplaced. This disclosure has an entirely different significance by including the word "or" than it would have had in the conjunctive had the word "and" appeared alone. A cobble is nothing more than a rock fragment that is between three (3) and twelve (12) inches in size. If the encountering of cobbles in the test borings was supposed to have provided contractors advance knowledge merely that cobbles would be encountered at the excavation site, of course there were cobbles encountered in the course of excavating thousands of cubic feet of earth from large holes dozens of feet in depth.

The contract narrative affording explicit notice only that "boulders and/or cobbles" were encountered in the test borings does not put the contractor on notice that boulders were identified at all, much less that large nested boulders with an extremely high compressive strength existed in great number and frequency in the area of excavation. For this Board to find otherwise would nullify the letter and purpose of the differing site condition clause.

With respect to a Type I differing site condition, the actual conditions encountered at Retaining Wall varied materially from what the contractor actually and reasonably anticipated from the contract documents; however, this Board is without sufficient factual foundation to be able to conclude that "subsurface or latent physical conditions at the site differ[ed] materially from those indicated in [the] contract," one of the six (6) accepted prerequisite determinations necessary to support a finding of a Type I differing site condition. Indeed, the various indications of subsurface conditions presented in this contract accurately reflected what lay underground. The instant dispute arose not because those indicators were wrong, but because they are imperfect predictors. They did not provide to contractors actual or constructive knowledge of the unusual and unexpected conditions actually encountered here. Although this Board is without sufficient factual foundation to support a finding that a Type I differing site condition was encountered in this instance, we do find satisfactory substantiation to conclude that a Type II differing site condition existed, and furthermore, reject the State's argument that current Board precedent precludes a finding of a Type II differing site condition only when a contract is silent with respect to indications of subsurface conditions. C.J. Langenfelder & Sons, Inc., MDOT 1000, 1003 & 1006, 1 MSBCA ¶2 (1980).

It is evident to the Board that such a proliferation of boulders as was encountered at this work site is not typical of subsurface soil conditions ordinarily anticipated to construct a

project like Retaining Wall 8. No witness testified that the site conditions were ordinary. Testimony from several witnesses did adduce and substantiate the contrasting view, namely, that no one, including the State, anticipated the nature and extent of the subsurface obstructions that became evident after excavation of Retaining Wall 8 began.

The test of what soil conditions should have been expected at this work site is determined in hindsight not from the perspective of an expert in geotechnical engineering, but instead, from the standpoint of what a reasonable general contractor should perceive and expect. Richard F. Kline, Inc., MSBCA 2092, 5 MSBCA ¶479 (2000). The Board finds in this regard that appellant and its excavation subcontractor did make a reasonable assessment of available subsurface information when appellant determined its bid, even in the absence of visual inspection of the physical boring samples, which is rarely done by general contractors or excavation subcontract specialists. Structural Preservation Systems, Inc., MSBCA 1440, 3 MSBCA ¶234 (1989). Indeed, appellant calculated a higher cost to excavate the caissons at Retaining Wall 8 than any other contractor bidding on the project. If appellant's bid was unreasonably low, then every bidder on this project committed the same error misinterpreting the State's boring logs. Based primarily upon the relatively low RQD values disclosed by test borings at the site, none of the contractors bidding on this job anticipated such a proliferation of boulders as that which was ultimately encountered. Appellant, like all of the bidders on this project, anticipated excavating through ledge rock and not boulders. For this reason, this Board concludes that a Type II differing site condition existed and that appellant is therefore entitled to an equitable adjustment of the contract price.

We turn now to the secondary but equally important question of how to calculate a fair amount for the State to allow as an equitable adjustment under the circumstances here presented by very elaborate proofs. While the Board determines that some

equitable adjustment is appropriate in this dispute, we find also that appellant's claim is excessive because it includes costs beyond those attributable to the differing site condition.

Predicate to this Board's calculation of SHA's further indebtedness to appellant is the determination of whether appellant's subcontractors, Dominion and Flanigan, released appellant and SHA from liability under this claim. In order to make such a determination in favor of the State, thereby extinguishing appellant's claim in the nature of subrogation of rights enjoyed by Dick's subcontractors, the Board must be satisfied that a clear and unequivocal waiver exists between appellant and its subcontractors. That is not the case here. The multiple waivers executed by the excavation subcontractor, Dominion, when Dominion's principal signed for receipt of funds paid to it by appellant, were expressly marked as "partial" and not "final." They were intended by neither party to operate as full or final waivers or releases of rights against the State.

Similarly, Dick's agreement with its paving subcontractor, Flanigan, was intended only to impact payment and performance obligations between appellant and that subcontractor. Through the $90,000 negotiated extra payment agreement, Dick was able to procure the paving materials and services it needed from Flanigan for late completion of this job, but that agreement specifically contemplated that appellant would pursue an additional claim against SHA for further equitable adjustment funds on behalf of Flanigan. The 2005 modification of the agreement between Dick and Flanigan was not intended to and does not compromise either the subcontractor's or appellant's rights against the State under Dick's claim for equitable adjustment for itself and its subcontractors. In sum, the claims stated by appellant for equitable adjustment on behalf of its subcontractors are allowable and are hereby allowed.

Next the Board addresses quantum calculation of the actual amount due, commencing with the Board's rejection of various aspects of appellant's request to employ a "modified total cost"

method of determining damages. All parties agree that the "total cost" method of calculating damages is disfavored and constitutes the analysis of last resort, to be used only if more precise methods of determining damages are not possible to employ. Under the "total cost" method, appellant is entitled simply to determine its total costs, subtract its contract bid price, and pass the difference on to SHA as an additional liability. It is premised on two assumptions which may or may not be fair or appropriate to a particular job, namely, that the contractor's original bid was reasonable, and that all excess expenses beyond contract price are attributable to the differing site condition. The "total cost" method rewards the contractor for cost overruns, presuming that a contractor has taken all reasonable steps to mitigate the additional costs transferred to the State. The "total cost" method of calculating damages is disfavored for these reasons.

The "total cost" approach is permissible only when a contractor can demonstrate: (1) that the contractor's costs are reasonable; (2) that the original bid was reasonable; (3) that the contractor is not responsible for the additional costs incurred; and finally, (4) that there is no practical means of proving actual costs. This Board is satisfied by a preponderance of the evidence that the above specified factor no. 2 is fully satisfied by the case at hand, but the sufficiency of proofs of the other three (3) factors is questionable. The "total cost" method for calculating damages is therefore of limited utility here and this Board will not allow it to be blindly engaged, but instead, adopts the approach posited by appellant for calculating damages only where that approach is the only reasonable and fair option and where adequate proofs have been admitted into evidence to warrant such reliance and credibility.

It is undisputed between the parties that, in comparison to the "total cost" method of determining damages, a far more preferable means of calculating recovery is, when possible, to identify each discreet cost for which a differing site condition

can be proven to have caused a reasonable outlay of additional expenses, and simply aggregate those discreet costs to determine the total amount of a fair equitable adjustment. It is equally undisputed that this theoretically preferred avenue of quantum calculation cannot be applied to the complex and numerous time and cost overruns here alleged.

The third option for quantifying damages, as advanced by the State, is not as accurate or favored as determining discreet costs, but preferable to the "total cost" approach where it is possible to apply. That is referred to as the "measured mile" method of determining damages. The "measured mile" technique of calculating quantum is based on the presence of an acceptable standard to determine the rate of productivity that the contractor likely would have enjoyed absent the differing site condition, disallowing the contractor a windfall occasioned by slow productivity unrelated to a differing site condition while permitting recovery directly resulting from a differing site condition. Corman Construction, Inc., MSBCA 1254, 3 MSBCA ¶206 (1989).

Appellant argues forcefully that the "measured mile" should not be adopted in this matter because the excavation of every one of the eighty-seven (87) caissons required at Retaining Wall 8 was detrimentally impacted by the unforeseen subsurface boulder conditions encountered by Dominion at some of the caissons. The Board appreciates that a differing site condition dramatically affected the progress of all of the work at Retaining Wall 8 and thereby delayed the entire highway project. But that sensitivity to the excavator's dilemma at several particular drilling locations cannot justify carte blanche approval of whatever length of delay is exhibited. Appellant has established by a preponderance of the evidence that unforeseen site conditions obstructed excavation which resulted in delay and associated costs at thirty (30) of the eighty-seven (87) caissons at Retaining Wall 8, as more specifically referenced in Finding of Fact No. 92 above.

It is also telling that appellant planned for excavation time of only thirty-three (33) days to complete all eighty-seven (87) drilled shafts at Retaining Wall 8, even though its own excavation subcontractor anticipated the need for 65 to 75 days. If the reason for cutting Dominion's time projection in half was appellant's original expectation for Dominion to use two (2) rigs instead of only one (1), why were two (2) rigs not engaged on this job site until September 9, 2004, though drilling actually commenced more than a month prior to that time? It is evident to the Board that appellant's bid did not plan for or allocate sufficient time to perform the required work, whether or not there was a differing site condition later identified. Appellant should not now be able to assert that its incorrect abbreviated work time projection establishes an entitlement to recovery of excessive costs.

Appellant initially expected to be able to complete the caissons at Retaining Wall 8 with a highly efficient drilling operation achieving a maximum production rate of six (6) holes per day for fully one-third of the drilled shafts required for excavation. But even under the best of conditions and in the absence of boulders, appellant fell well short of that goal. Dominion completed only four (4) holes in the first four (4) days of excavation, before noting any difficulty attributable to boulders or any other alleged differing site condition sufficient to warrant comment in its daily report logs. Ultimately, appellant's worst predicted rate of productivity became its best production rate, namely, about one caisson per day; with the problem caissons by contrast requiring literally months to complete.

In retrospective analysis of progress of excavation of the unclaimed caissons at Retaining Wall 8, according to credible testimony of Prad Maraj on behalf of the State, appellant achieved a drilling production rate of just better than one (1) day per hole for caisson nos. 1 through 26, nearly four (4) days per hole at caisson nos. 61 through 87, and an overall average

production rate of about 2.5 days per hole on all the unclaimed caissons for which there is insufficient evidence of delay attributable to a differing site condition. Using that overall average of 2.5 days per hole to accomplish excavation of eighty-seven (87) shafts would require 217 days of drilling, not 33 days as originally projected. Even using appellant's best actual production rate of .8 days per hole would have required seventy (70) days to complete this excavation, that duration being precisely the mid-point of the range projected by the excavation subcontractor. Thus, giving appellant the benefit of this discrepancy, by using the maximum actual productivity rate of .8 days per hole, this Board determines that appellant should not be entitled to any compensation for delay beyond its initial thirty-three (33) days of anticipated work through the period of seventy (70) days that the excavation work likely would have required in the absence of a differing site condition. In other words, the first thirty-seven (37) days of excavation work required at Retaining Wall 8 beyond the thirty-three (33) day CPM work duration anticipation is noncompensable. Or, stated in the corollary, appellant shall be entitled to equitable adjustment by additional compensation for costs commencing on the seventy-first (71st) day of drilling. Reducing appellant's claim for two hundred and sixty-five (265) days of delay by the thirty-seven (37) days which the drilling operation would have required absent the boulder obstructions reduces appellant's entitlement to 86% of the compensable time claimed. Although the Board hereby determines that the excavation delay at Retaining Wall 8 was responsible for pushing the final paving work into the following calendar year, only 86% of the direct and time-related costs are fairly attributable to the differing site condition.

To sum, with respect to appellant's claim for equitable adjustment caused by an alleged differing site condition said by appellant's CPM scheduling expert to have caused a delay of 265 days, this Board finds in favor of appellant on the question of whether a Type II differing site condition existed and further,

adopts appellant's time impact analysis methodology, but reduces appellant's claim for 265 days of compensable delay by 37 days, on the basis of the State's "measured mile" analysis, that 37-day period being the minimum additional CPM scheduling period that appellant should have reserved for caisson excavation beyond the 33 days actually reserved and therefore determined by the Board not to be attributable to the differing site condition, such a reduction of 37 days from appellant's claim of 265 days of delay amounting to a proportionate reduction of 14% of all affected aspects of the claim.

With respect to Retaining Wall 6, the Board concludes that insufficient evidence was presented to support a finding of either a Type I or Type II differing site condition. Appellant's proofs focused almost solely on problems at Retaining Wall 8, where objective pre-excavation indication of the possibility of encountering prolific underground boulders was scant. By contrast, the word "boulder" did appear in the test boring records in the vicinity of Retaining Wall 6, where boulders were observable from surface conditions. And the allegation of encountering an extreme number of very strong, large boulders is limited to conditions at Retaining Wall 8, not Retaining Wall 6. For these reasons, the Board rejects MSBCA Appeal No. 2458 pertaining to Retaining Wall 6, finding that no differing site condition existed, or in the alternative, that insufficient evidence was adduced to substantiate such a determination.

Finally, we employ the foregoing rationale and analysis to evaluate the various components of appellant's quantum claim in MSBCA Appeal No. 2459 for which the Board allows equitable adjustment for a differing site condition at Retaining Wall 8. Appellant's claim is itemized as follows:

Direct Costs	
RW8 Caissons Direct Costs	$959,911
Redesigned RW8 Construction	$311,629

Subtotal	$1,271,540
Time-Related Costs	
Engineer's Office	$ 6,623
Additional Survey	$108,558
Field Office Overhead	$943,713
Home Office OH – Eichleay	$238,421
Additional Maint. of Traffic	$191,433
Paving Escalation	$174,017
Mark-up/time-related costs (4.12%)	$ 68,506
Subtotal	$1,731,271
Less Cost of Shoulder Paving Delay	($159,521)
Subtotal	$2,843,290
Plus Stipulated Profit (10%) Markup	$284,329
Subtotal	$3,127,619

Reduced from appellant's earlier submitted Proof of Costs Statement totaling $4,019,721, the foregoing tabulation incorporates several adjustments made by stipulations resulting from Rubino & McGeehin's audit of appellant's claim. It also does not include appellant's claim for assessment of an additional $683,752 in interest liability from December 21, 2004 to date of submission of appellant's brief, an issue addressed below.

With respect to the first and largest line item above, using a modified total cost methodology, appellant seeks $959,911 in additional direct costs of drilling and constructing the caissons at Retaining Wall 8, of which $899,989 is audited and confirmed by Rubino & McGeehin. The additional $59,322 comprises $2,246

paid to Genstar, $15,451 paid to Genesis Steel, $1,868 paid to Winston Trucking, $22,050 paid in replacement cost of a broken drill bit, and $11,010 paid to ECS for geological evaluation, a total upon which Dick's stipulated 4.12% mark-up is applied.

The Board begins quantum calculation by allowing 86% of appellant's claimed direct costs of $959,911, resulting in a total recovery of $825,523 in direct costs. Incremental to that total the Board allows additional recoveries in full for the $2,246 cost overrun paid to Genstar, $15,451 to Genesis Steel, $1,868 to Winston Trucking and $22,000 for which there is testimony in the record on the replacement cost of the drill bit that was broken during Dominion's excavation efforts, for additional recovery of $41,565, or a total of $867,088 in reimbursement of direct costs, excluding the redesigned portion of Retaining Wall 8 between caisson nos. 38 and 57. Appellant's claim for reimbursement of $11,010 paid to ECS for geological evaluation is disallowed as a cost of claim preparation. Hensel Phelps Construction Co. 4 MSBCA ¶304 (1992); Fruin-Colnon Corporation and Horn Construction Co., Inc. (A Joint Venture), MDOT 1025, 1 MSBCA ¶165 (1987);

The second line of appellant's itemization is $311,629 in extra costs attributable to constructing the redesigned section of Retaining Wall 8 with the spreadfooter foundation. This Board allows redesign costs to be recovered by appellant in the entirety, but because only $273,276 of that figure musters support from the auditor, the Board allows an additional recovery of $273,276 for this item, for a grand total of $1,140,364 in direct cost recovery.

The next section of appellant's quantum claim is related to time-related costs totaling $1,731,271. These include the cost of appellant's engineer's office, an additional survey, field office overhead, home office overhead allocated under the Eichleay formula, additional maintenance of traffic costs, cost of paving escalation, and finally, mark-up at 4.12%.

As set forth above, the Board will allow 86% of all proven time related costs. Thus, 86% of the extra cost of $6,623 for the engineer's office will be allowed, or $5,696. Similarly, 86% of the $108,558 in survey crew overtime is allowed, or $93,360.

Appellant claims an additional $943,713 in field office overhead, of which $21,283 represents additional bond costs, which are allowed in full. Other components of this claim, however, are problematic. The Board denies appellant's claim for $170,250 in retention payments, finding by a preponderance of the evidence that these payments were actually severance payments made by an employer who was transferring or discharging employees from a division that was being phased out of existence. Appellant's claim for $253,082 in direct charge codes is similarly denied as inadequately proven, as is the $238,421 claim for home office overhead calculated using the Eichleay formula. Eichleay damages, the Board determines, are not appropriate for recovery under the particular backdrop here presented, where appellant's entire bridge and highway division was being liquidated at the same time that work on the Baltimore Beltway project was finally being concluded.

As to the claim of $191,433 in additional maintenance of traffic, the Board allows 86% of this amount, or $164,632. And finally, with respect to the $174,017 in price escalation claimed by appellant's paving subcontractor, Flanigan, the Board allows $90,000 of those costs as a sum fairly and fully to compensate appellant for the extra payment negotiated by compromise agreement and actually paid by appellant to Flanigan. Hence, the total recovery in this matter is itemized as follows:

Direct Costs	
RW8 Caissons Direct Costs	$ 867,088
Redesigned RW8 Construction	$ 273,276
Subtotal	$1,140,364

Time-Related Costs

Engineer's Office	$ 5,696
Additional Survey	$ 93,360
Field Office Overhead	$ 21,283
Home Office OH – Eichleay	$ 0
Additional Maint. of Traffic	$ 164,632
Paving Escalation	$ 90,000
Mark-up/time-related costs (4.12%)	$ 15,448
Subtotal	$ 390,419
Less Cost of Shoulder Paving Delay	($159,521)
Subtotal	$1,371,262
Plus Stipulated Profit (10%) Markup	$137,126
Subtotal	$1,508,388

Appellant's claim for equitable adjustment is hereby allowed in the total amount of $1,508,388.

Turning finally to the question of pre-decision interest, this Board is authorized by statute to award interest in accordance with *§15-222* of the *State Finance and Procurement Article* of the *Annotated Code of Maryland*, which states:

> "Award – Authorized. – Notwithstanding any provision of a procurement contract, the Appeals Board may award interest on money that the Appeals Board determines to be due to the unit or the contractor under a contract claim.
>
> Same – Accrual. – (1) Subject to Paragraph (2) of this subsection, interest may accrue from a day that the Appeals Board determines to be fair and reasonable after hearing all the facts until the day of the decision by the Appeals Board.

(2) Interest may not accrue before the procurement officer receives a contract claim from the unit or the contractor."

In the case at bar appellant seeks an award of pre-decision interest accruing at a daily rate of more than $1,000.

The assessment of pre-decision interest is not only permitted by statute but also appropriate to make a contractor fully whole by compensating for payments that the State was obligated to have made at an earlier time. For this reason it is not unusual for the Board to increment recovery in favor of an appellant by allowing interest accrual to relate back to the date of filing of a Complaint before the Board, or some period of time thereafter. P. Flanigan & Sons, Inc., MSBCA 2402, ____ MSBCA ¶____ (2005).

Broad discretion exists for this Board retroactively to grant or deny pre-decision interest. W.M. Schlosser Co., Inc., MSBCA 1373 & 1385, 3 MSBCA ¶269 (1990); Fruin-Colnon Corporation and Horn Construction Co., Inc. (A Joint Venture), MDOT 1025, 1 MSBCA ¶165 (1987); C.J. Langenfelder & Sons, Inc., MDOT 1000, 1003 & 1006, 1 MSBCA ¶2 (1980). In the instant contest the Board rules in favor of appellant on the question of whether the contractor conducted an adequate site investigation in advance of submitting its bid, despite argument and evidence by the State that if appellant or its excavator had properly examined the actual work site, they would have observed surface boulders a short distance away, and had they visually inspected the physical soil samples from the test borings at Retaining Wall 8, they would have recognized from the core samples the presence of subsurface boulders.

The State contends further that there was no differing site condition at all, and the State's independent geological engineering expert consultants at JMT confirmed the validity of that assessment, though this Board today finds that a Type II differing site condition did exist despite that evidence. Appellant prevails further in this decision on the question of

whether its excavation subcontractor engaged proper means and methods, despite unrefuted specific expert testimony to the effect that certain alternative means of excavation technique would have avoided the problems encountered.

The Board has also afforded appellant the great benefit of the doubt in allowing 86% of most of appellant's claims for direct and time-related costs, though the Board could just have easily justified adoption of a larger reduction of allowing only 30% of claimed costs, had the Board reasonably decided to use appellant's average productivity rate of 2.5 days per hole at Retaining Wall 8 instead of the maximum productivity rate of .8 days per hole. Or even worse for appellant, the Board could have used the average drill time for caisson nos. 61-87 as an appropriate "measured mile," at which rate of 3.85 days per caisson, appellant would be expected to require 335 days for excavation absent boulder obstructions, thus expiring well over the 265 days of compensable delay actually required to drill through the differing site conditions adjudicated and claimed by appellant to justify relief.

And the Board could also have adopted the State's argument that the delay at Retaining Wall attributable to a differing site condition was not the sole causation of appellant's extremely late completion of contract performance on this job, thereby eliminating all claims related to 2005 price escalation. In sum, the Board's ruling is generous to appellant on a number of points. All of the foregoing judgments inure to appellant's benefit and the State's loss. None of these determinations were or are obvious or known certainties, but rather, questions of close calls for which reasonable persons may reach very different decisions. Compounding the challenge in calculating damages in this matter is appellant's continuing claim quantum modifications, putting the State in the position of attempting to hit a moving target. How was the State supposed to have been able at an earlier date to make a proper calculation of the amount due under such uncertain circumstances and particularly in

response to appellant's evolving demands for a specific liquidated sum? In light of these factors this Board concludes not to permit the award of pre-decision interest in this claim. Using the same reasoning, the Board denies appellant's request for a finding that SHA did not have substantial justification for denying appellant's claim for equitable adjustment and correspondingly denies appellant's claim for costs, fees and expenses related to experts and other proofs.

Wherefore, it is Ordered this day of February, 2007 that Appeal No. 2458 is denied and Appeal No. 2459 is allowed in the total sum of one million five hundred and eight thousand three hundred and eighty-eight dollars ($1,508,388).

Dated:

_____
Dana Lee Dembrow
Board Member

I Concur:

_____
Michael W. Burns
Chairman

_____
Michael J. Collins
Board Member

Certification

COMAR 21.10.01.02 **Judicial Review.**

A decision of the Appeals Board is subject to judicial review in accordance with the provisions of the Administrative Procedure Act governing cases.

Annotated Code of MD Rule 7-203 **Time for Filing Action.**

(a) Generally. - Except as otherwise provided in this Rule or by statute, a petition for judicial review shall be filed within 30 days after the latest of:

(1) the date of the order or action of which review is sought;
(2) the date the administrative agency sent notice of the order or action to the petitioner, if notice was required by law to be sent to the petitioner; or
(3) the date the petitioner received notice of the agency's order or action, if notice was required by law to be received by the petitioner.

(b) Petition by Other Party. - If one party files a timely petition, any other person may file a petition within 10 days after the date the agency mailed notice of the filing of the first petition, or within the period set forth in section (a), whichever is later.

* * *

I certify that the foregoing is a true copy of the Maryland State Board of Contract Appeals decision in MSBCA 2458 and 2459, appeals of Dick Corporation under SHA Contract No. BA3335172.

Dated:

_____
Michael L. Carnahan
Deputy Clerk