In the United States Court of Federal Claims

Nos. 15-885C, 16-925C
(Reissued: March 17, 2022)[1]

* **NOVA GROUP/TUTOR-SALIBA, A Joint Venture,** **Plaintiff,** **v.** **THE UNITED STATES,** **Defendant.** *	**Contract Disputes Act; Construction; Type I Differing Site Condition; Type II Differing Site Condition; Defective Specifications; Design Specifications; Suspension of Critical Path Work; Excusable Delay; Constructive Acceleration; Damages; Overtime; Lost Productivity; Modified Total Cost Approach; Equipment Expense; Reopening the Record to Admit an Exhibit Post-Trial; FAR 52.244-4; FAR 52.243-4(d).**

Gerald Scott Walters, Smith Currie & Hancock, LLP, 245 Peachtree Center Avenue, NE, 2700 Marquis One Tower, Atlanta, GA 30303-1227, and Brian S. Wood, and Sarah K. Carpenter, Smith Currie & Hancock, LLP, 1025 Connecticut Avenue, NW, Suite 600, Washington, DC, 20036, for Plaintiff.

Joseph H. Hunt, Robert E. Kirschman, Jr., Steven J. Gillingham, and Adam E. Lyons, United States Department of Justice, Civil Division, Commercial Litigation Branch, P.O. Box 480, Ben Franklin Station, Washington, D.C. 20044, for Defendant. David M. Marquez, Naval Litigation Office, Office of General Counsel, United States Department of the Navy, 720 Kennon St., Room 223, Washington Navy Yard, D.C. 20374, and Melissa L. Baker, Andrew J. Hunter, and Kristin B. McGrory, United States Department of Justice, Civil Division, Commercial Litigation Branch, P.O. Box 480, Ben Franklin Station, Washington, D.C. 20044, of Counsel.

POST-TRIAL OPINION AND ORDER

WILLIAMS, Senior Judge.

These consolidated Contract Disputes Act ("CDA") cases come before the Court following a trial on liability and damages. Plaintiff Nova Group/Tutor-Saliba ("NTS"), a joint venture raises two claims. First, Plaintiff seeks $1,881,900 for a constructive change due to the Government's

---

[1] The Court issued this opinion under seal on February 28, 2022 and directed the parties to file any proposed redactions by March 14. Because the parties requested no redactions, the Court reissues the opinion as is.

questioning of its design of a pier at the Puget Sound Naval Shipyard. The Government's issue with the design caused a stoppage of critical path work, an independent review after the Government previously approved that design, and an ensuing acceleration of work. Second, Plaintiff seeks $10,498,284.85 for extra work caused by differing site conditions or defective specifications. For the reasons stated below, the Court grants Plaintiff's design-related claim in part and denies its differing site conditions/defective specifications claim.

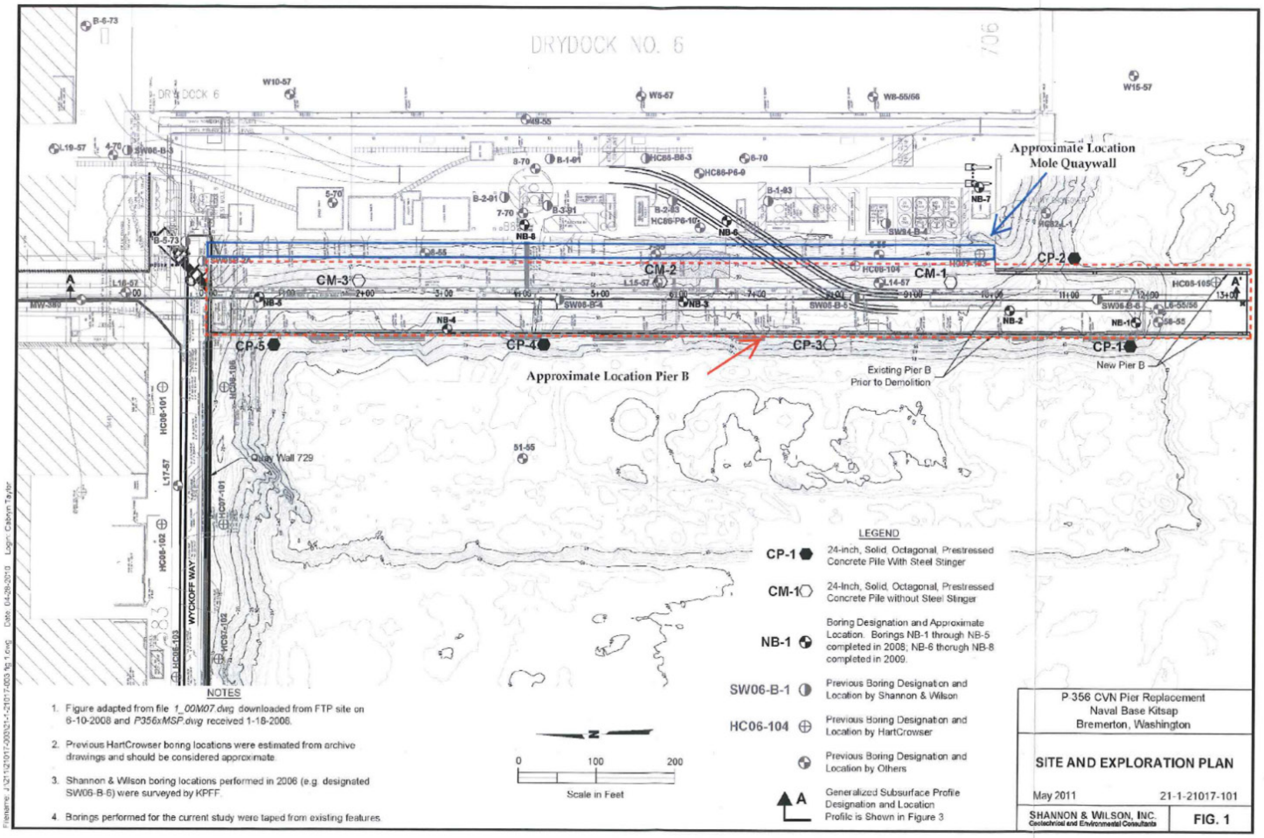
Findings of Fact[2]

The Pier B Project

The P-356 Carrier Vessel Nuclear ("CVN") Maintenance Pier Replacement Project ("Project") at the Puget Sound Naval Shipyard and Intermediate Maintenance Facility was a design and construction project for the replacement and upgrade of various waterfront substructures at Naval Base Kitsap, Bremerton, Washington. JX 2.1; DX 2.5. The Project involved the demolition of the existing Pier B ("Old Pier"), a 60-foot wide and 1,175-foot long pier, and the design and construction of an 85-foot wide and 1,325-foot long replacement pier ("Pier B") for the berthing of CVN-class aircraft carriers, supporting vessels, and submarines for repair operations. JX 2.536, .2618; Tr. 78.

The Old Pier extended south into Puget Sound from the east-west shoreline. See JX 2.1216; PX 39.36. Pier B was to partially overlap the area of the Old Pier. While Pier B would share its western border with the entire Old Pier, it was to be longer to the south, and wider to the east. See PX 39.36; Tr. 82-84. The Project also contemplated that the contractor would join Pier B and a new parallel structure to the east, the Mole Quaywall, to create a contiguous surface. JX 2.537, .1220; compare JX 2.1219 with JX 2.1220. The drawing below indicates the location of Pier B (outlined in red) as compared to the Old Pier:

[2] These findings of fact are derived from the record developed during a 12-day trial. Additional findings of fact are in the Discussion. The Court uses "PX" to cite Plaintiff's exhibits, "DX" to cite Defendant's exhibits, "JX" to cite joint exhibits, and "Tr." to cite testimony. The Court does not correct grammatical errors in quotations from the record.



PX 39.36.

In addition to work on Pier B, the Project required that the contractor construct a new Mole Quaywall -- a continuous steel-coated sheet pile bulkhead with solid prestressed concrete piles, approximately 22-feet, 6-inches wide by 1,000-feet long, that would buttress the west side of Dry Dock 6, which ran parallel to the Old Pier. Under this Project, the contractor was also to demolish and replace portions of Quaywall 729 -- "a two-level reinforced concrete structure consisting of a concrete deck, columns, and framing members, supported by timber piles." JX 2.536; Tr. 79-80, 88; Tr. 1947-48.

The Shannon & Wilson 2006 Report

Prior to seeking proposals for the Project, the Navy hired a construction engineering firm, KPFF Consulting Engineers ("KPFF"), and its geotechnical subcontractor, Shannon & Wilson, Inc. ("Shannon & Wilson"), to conduct a preliminary geological study. DX 2.1, .5; Tr. 456. On April 24, 2006, Shannon & Wilson provided its conclusions to KPFF in its Preliminary Geotechnical Report ("2006 Report"). DX 2.1; Tr. 541.

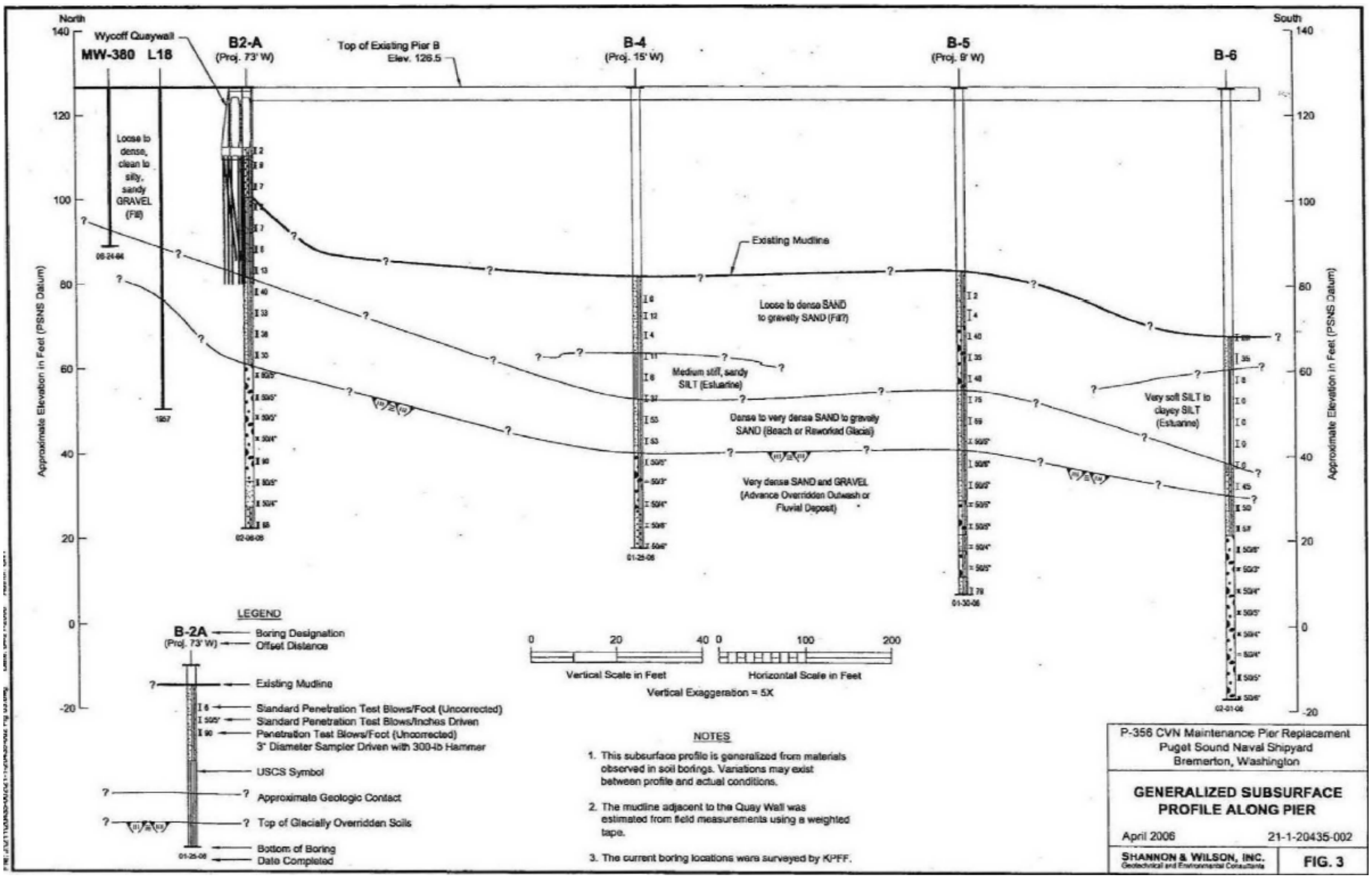
The 2006 Report contained "the results of the geotechnical baseline information for the use by design-build (DB) contractors, and conceptual geotechnical engineering recommendations for use by KPFF Consulting Engineers (KPFF) in evaluating potential structure configurations for the project." DX 2.5. The 2006 Report specified: "[t]he recommendations provided in this report should not be used for final design." DX 2.7. In addition, the 2006 Report expressly stated that it "was prepared for the exclusive use of KPFF and NAVFAC NW," and that it "should be made available to prospective DB contractors for information on factual data only, and not as a warranty of subsurface conditions such as those interpreted from the subsurface profile and presented in the discussion of subsurface conditions." Id.

For its evaluation and findings regarding Pier B, Shannon & Wilson relied on "existing subsurface information from previous projects performed at or near the project site," as well as drilling and sampling five borings during a two-and-a-half-week field exploration. DX 2.7-.8, .37. "[T]he subsurface explorations were performed along the east side of the existing Pier B," and "no borings were performed overwater in the slip between the drydock mole and the pier, or to the south of the existing pier." DX 2.9.

Based on the data, the 2006 Report concluded that the subsurface beneath the proposed new Pier B was comprised of four layers in descending order: (1) fill deposits; (2) estuarine deposits; (3) beach deposits; and (4) glacial-overridden deposits (advance outwash and fluvial deposits). DX 2.10-.11, .38. The fill and estuarine layers were uncompacted. DX 2.12. These layers were comprised of soft soils -- "loose to dense, sand to gravelly sand and sandy gravel soil" in the fill layer and "sandy, clayey silt, to clayey silt" in the estuarine layer. DX 2.10. The beach layer consisted of "dense to very dense sand to gravelly sand," with thicknesses ranging from five to 20 feet along the Old Pier. DX 2.11. The glacial layer, below elevations of 30 to 60 feet, was comprised of sand and gravel, and "based on [Shannon & Wilson's] observations during drilling, these very dense deposits likely contain[ed] cobbles." Id. The 2006 Report used the Unified Soil Classification System, which defines "dense" as 30 to 50 "blows" per foot and "very dense" as more than 50 blows per foot. DX 2.128.[3] Gary Horvitz, Vice President and a Senior Principal Geotechnical Engineer at Hart Crowser, Inc., explained that "very dense" was "defined by the standard penetration test resistance" and meant "that the blow count is greater than 50 blows per foot, so it's a very high-strength, competent material." Tr. 1756-58.

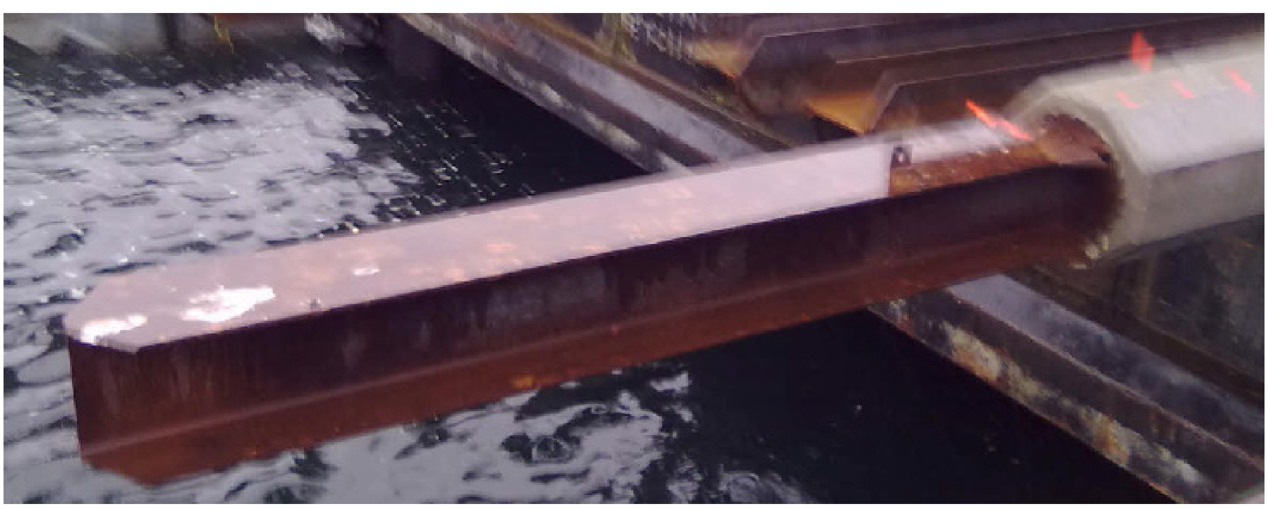
The 2006 Report contained the following diagram depicting Pier B's subsurface profile:

[3] Blows per foot is a geotechnical measurement that means the number of times a hammer weight needs to be dropped to penetrate one foot. See DX 2.130-36.



DX 2.38.

The 2006 Report anticipated that the contractor would need to drive concrete displacement piles, which "would be difficult to penetrate a sufficient distance into very dense glacial soils" and would likely require stingers to help penetrate the denser soils. DX 2.12. A stinger is an "H-beam that has been cast into [the pile] that may be 10 feet or 5 feet into it," and extends 10 feet below the pile. Tr. 434. The stinger is "smaller in diameter [than the pile] by 10 to 12 inches." Id. The purpose of the stinger is to make it easier to penetrate the soil. Tr. 502-03. The following is a photo of a typical stinger used at Pier B:



JX 49.135; Tr. 447.

The 2006 Report warned that, "any pile installation for the proposed pier would encounter moderate to hard driving conditions in the existing fill deposits and soft to moderate driving conditions in the existing estuarine deposits, and hard driving conditions in the dense to very dense beach deposits and glacial soils." DX 2.12; Tr. 542. In general, hard driving involves repeated hits at a pile with a high-quality hammer.[4] Tr. 407-08 (Mr. Brenner understanding "hard driving" to mean "hit[ting] a pile 60 to 70 times to make it go a foot").

In addition to hard driving, the 2006 Report stated that "[o]bstructions, such as large cobbles, boulders, or miscellaneous construction debris could be encountered within the fill and underlying soft estuarine deposits" and reiterated that cobbles or boulders could be encountered in the glacial deposits. DX 2.13. There was also "an existing riprap layer along the slope east of and below the [Old Pier]" and "[c]oncrete debris" on the slope east of the Old Pier. DX 2.13. The 2006 Report advised that "the contractor should develop remedial measures to mitigate the impact of obstructions," and that obstructions included cobbles and boulders. DX 2.13; Tr. 544.

The RFP

On November 7, 2007, NAVFAC issued Request for Proposals ("RFP") number N44255-08-R-6000, for the Project. JX 1.7. The RFP informed bidders that NAVFAC sought a contractor "to demolish the existing Pier Bravo and design and construct a new ship repair wharf, including the replacement of approximately 300 lineal feet of quay wall (Structure 729), the strengthening [of] the sheet pile wall west of the Dry Dock 6 mole, and the demolition of Pier 8." Id. Award of a firm-fixed price contract with a maximum funding limitation of $142,000,000 would be made to the successful bidder. JX 1.9.

The RFP included the following clauses to be incorporated into the Contract: FAR 52.236-2, Differing Site Conditions (April 1984), 52.236-15, Schedules for Construction Contracts (April 1984), 52.242-14, Suspension of Work (April 1984), 52.243-4, Changes (June 2007), 52.249-10, and 52.236-21, Specifications and Drawings for Construction (February 1997) - Alternate 1 (April 1984). JX 1.52-.54, .64.

The contractor had to submit its design at various stages for review, including at 70 percent and 100 percent. JX 1.335. The RFP put bidders on notice that "Government review or approval of any portion of the proposal or final design shall not relieve the contractor from responsibility for errors or omissions with respect thereto." JX 1.337.

Regarding the scope of work for Pier B, the RFP stated in pertinent part:

1. Demolish the existing 60-foot wide by 1197-foot-long Pier B . . . . [and] the existing 30-foot-wide by 104-foot long reinforced concrete platform and prestressed concrete piling supporting Substation 78. . . .;
2. Demolish all mechanical and electrical utilities to and on the existing Pier B. . . .;
3. Provide a new 85-foot-wide by 1,325-foot-long pier identified as Pier B (solid prestressed concrete piles and/or prestressed concrete cylinder piles -- metal pipe

[4] See Tr. 555 (explaining that when hard driving, "you would [typically] do the WEAP [Wave Equation Analysis of Piles] analysis to figure out a proper hammer that's strong enough, have enough energy to drive the pile"). WEAP is "a wave equation analysis that is done on a particular set of soil conditions and with a particular pile and equipment to model its performance." Tr. 111.

piles shall not be used in-water to support the pier), including prestressed concrete fender piles, prestressed concrete reaction piles, reinforced concrete and/or prestressed concrete deck system, corner fender units, rubber fender units, supporting members, and associated hardware. . . .;

. . .

10. Provide a new concrete Quaywall 729 structure (approximately 30 feet wide by 580 feet long) . . . . [and] [s]eparate the Quaywall 729 structure from Pier B with a seismic joint that has a minimum width of 1 foot 6 inches;

. . .

14. Provide a new concrete Mole Quaywall structure (approximately 22 feet 6 inches wide by 1000 feet long) . . . . [and][s]eparate the Mole Quaywall structure from Pier B with a seismic joint that has a minimum width of 1 foot 6 inches. . . .;

JX 1.456-57.

The contractor had responsibility for the design subject to specified design requirements:

> The Contractor shall design and construct all new waterfront substructures and transitions to existing structures that are to remain, that are required for the project, and as identified on drawings provided in Part 6 of this RFP, except for identified prescriptive elements that shall be constructed as indicated in the Prescriptive Specifications in Part 5 of this RFP and on the Prescriptive Drawings in Attachment B of Part 6 of this RFP. Each substructure and transition shall meet all loading requirements for dead (gravity); soil pressure; static (live, crane, etc. including impact where applicable); environment (seismic, wind, current, berthing, and mooning); and long term (creep, shrinkage, temperature). Each substructure and transition shall also meet structural design requirements as specified in the performance technical specification of Paragraph H1010 in Section H10 of Part 4 of this RFP and the prescriptive specifications in Part 5 of this RFP.

JX 1.489; Tr. 117 (Mr. Fedrick stating "[t]his project and many other projects that are design-build projects, the design responsibility is that of the contractor and not the responsibility of the owner; in this particular case, the Navy."). The prescriptive elements in the RFP included the design of Quaywall 729 and the design of a "typical section" of the Mole Quaywall, both of which the Navy's subcontractor BergerABAM had designed. JX 1.488-90, .499; Tr. 120; Tr. 1945; Tr. 2326. The RFP provided that the contractor was to determine where the piles would be placed and stated that "[a] variation of more than 1 percent from the vertical for plumb piles, or more than 2 percent from the required angle for batter piles, is not permitted." JX 1.333, .570.

The RFP directed that the contractor was to "[r]emove existing piles" by employing Best Management Practices ("BMPs") "to minimize disturbance of [the] contaminated layer of sediment underlying deposited clean sediment." JX 1.471. These BMPs included "cutting or breaking [an] existing pile at the mudline where feasible to maintain sediment stability" and reinforcing the sloping surface and subsurface layers under the new Pier B project. JX 1.471; see also Tr. 1805; Tr. 1761.

In addition to the design and build requirements for the Pier B project, the RFP required the contractor to develop the following items:

a. Geotechnical engineering report, including soil borings as needed for final design

b. Requirements for indicator test piles[5]

c. WEAP [Wave Equation Analysis of Piles] analyses for proposed pile hammers and pile types

d. Use of dynamic pile analysis and CAPWAP (Case Pile Wave Analysis Program) during the installation of indicator test piles

e. Pre-construction survey of any settlement-sensitive structures near pile driving or fill placement included in this project

f. Piles to be pulled versus cut-off of at the mudline for Government review.

JX 1.461.

Although a "geotechnical engineering baseline study" was included with the RFP and provided observations and recommendations for Pier B, the Mole Quaywall, and Quaywall 729**,** the contractor was required to develop a post-award "[g]eotechnical engineering report" after performing "a detailed and complete geotechnical engineering investigation, including additional borings as needed for the final project design and construction." JX 1.461, .464, .2354; JX 2.541, .544. The contractor's geotechnical engineering report was to be a final design submittal. JX 1.505, .555, .565. The RFP directed that the contractor's geotechnical engineering report be "based upon Government-provided subsurface investigation data and all additional field and laboratory testing accomplished at the discretion of the Contractor's Geotechnical Engineer." JX 1.505. KPFF was NTS' geotechnical engineer and used Shannon & Wilson to prepare the required post-award geotechnical engineering report ("2009 Report"). JX 10.1; <u>see also</u> JX 4.4, .10.

Additionally, the RFP required the successful bidder to develop and conduct an indicator pile program, in which the contractor would drive at least five indicator piles in the area of the proposed Pier B and three in the area of the Mole Quaywall. JX 1.560. Specifically, the RFP stated:

> Install indicator piles unless noted otherwise. The load capacity of piles, as determined by pile driving formulas or geotechnical analysis, shall be verified by dynamic pile driving analyzer (PDA) performed on each indicator pile, including Case Pile Wave Analysis Program (CAPWAP). Indicator pile installation procedures shall be as directed by the Contractor and shall use the same hammers and other pile installation equipment as for the production piles. The indicator pile procedures shall include underwater inspection in accordance with Paragraph Hl0 1.3.4. Results of the indicator pile program and final pile installation criteria shall be submitted to the Contracting Officer prior to ordering or installation of the production piles. The Contractor shall select the number of indicator piles to be

---

5 The terms "test pile" and "indicator pile" were used interchangeably throughout this litigation. Tr. 496.

installed for each structure, however the numbers shall be at a minimum the following:

a. Pier B - a total of five indicator piles spaced evenly along the Pier, with a minimum of two piles of each size used

b. Mole Quaywall - a total of 3 indicator piles along the structure

c. Quaywall 729 - indicator pile requirements determined by the Contractor. If used, local demolition may be required to install the indicator piles.

d. Craneway on the West Mole of Dry Dock 6 - indicator pile requirements determined by the Contractor. If used, the Contractor shall avoid damage to existing features, including underground utilities and tie rods providing lateral support to the existing steel sheet pile wall along the West Mole of Dry Dock 6.

After inspection, all indicator piles of precast/prestressed concrete shall be removed and stored by the Contractor until 30 days after the installation of all production piles is completed. Precast/prestressed concrete piles shall be cut off and removed without damage and shall be accessible to the Contracting Officer at all times.

JX 1.559-60.

The GEBS

The Solicitation included as Attachment J, an October 23, 2007 geotechnical engineering report, prepared by Hart Crowser, entitled, "Geotechnical Engineering Baseline Survey" (the "GEBS"). JX 1.2351-602; Tr. 1735. Hart Crowser was "the geotechnical engineer acting as a subconsultant to BergerABAM, who was under contract to the Navy to develop [the] design for the Mole Quaywall and to provide design-build RFP products for the Pier B design-build portion of the project." Tr. 1735. The scope of Hart Crowser's work included performing additional explorations for the project and developing geotechnical engineering documents, such as the GEBS, in support of the design of the Project. Id. Hart Crowser completed nine new soil borings[6] and collected and analyzed soil samples. JX 1.2362. Hart Crowser's role with respect to Pier B involved "demonstrat[ing] to the Navy how the pier might be built," while recognizing that the contractor was "free to do the final design how they see fit based on whatever is prescribed in the contract documents." Tr. 1737.

The GEBS was the "final milestone" of Hart Crowser's recommendations -- "all of the up-front work, including exploration, testing, analyses, and development of those recommendations, were done prior to that date." Id. The purpose of the GEBS was to provide NAVFAC and its Contractor "with subsurface information, interpretation, and geotechnical engineering recommendations for the development of the design-build RFP documents for the P-356 Maintenance Pier." JX 1.2362

---

6 See Tr. 2353 ("Borings are where a subsurface investigation is performed consisting of drilling a hole into the ground, and then at discrete and distinct elevations, taking samples to test the relative density or stiffness of the subsurface materials at prescribed depths; also, to obtain physical samples of the soil for visual observation as well as laboratory testing.").

Garry Horvitz, senior principal geotechnical engineer and Vice President of Hart Crowser and the firm's principal in charge of the Pier B replacement project, signed the GEBS and oversaw its preparation. Tr. 1728-36; JX 1.2353. As the principal in charge, Mr. Horvitz had "the last say on the technical aspects of the project and the budgets that [Hart Crowser] prepare[d]." Tr. 1736. Mr. Horvitz explained that the designer of record was not required to follow the recommendations in the GEBS. Tr. 1740. He testified:

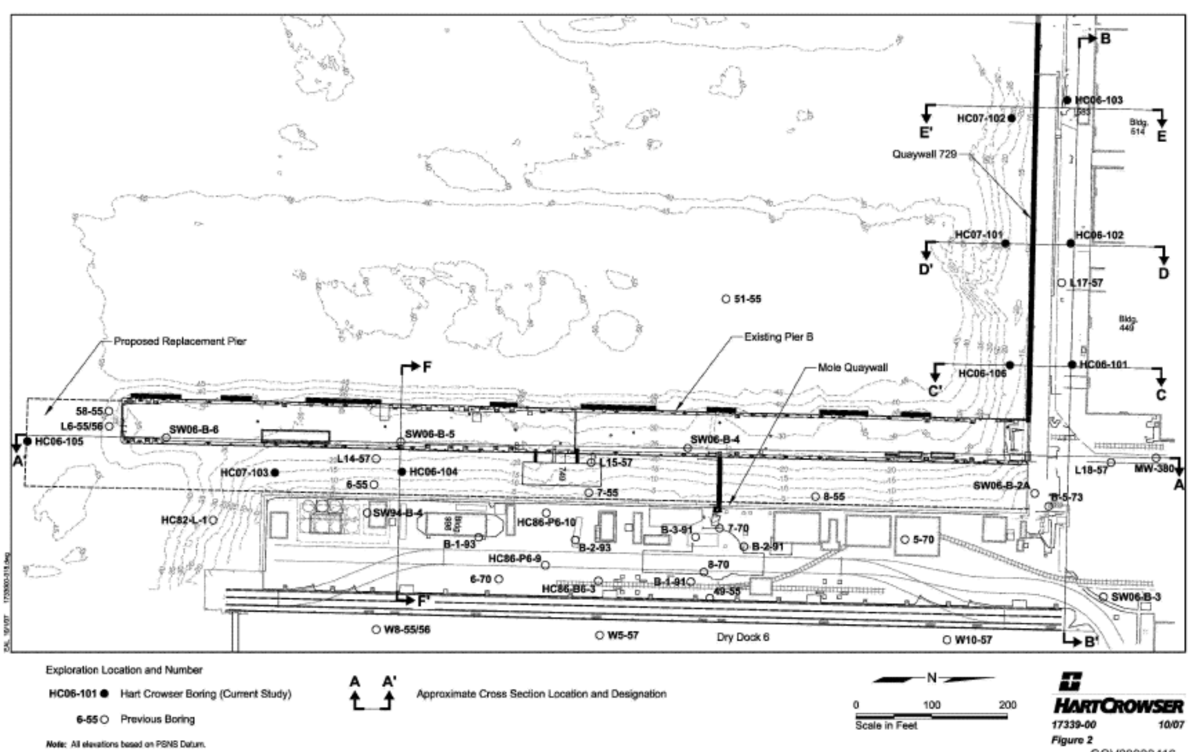
> So we asked the Navy, 'Do we have to rely on the design recommendations that are in the report?' And the Navy said, 'No. You're going to be stamping the design. It's your design. Take the factual information, and do what you will with it.'

Tr. 1742.

<u>Site and Subsurface Conditions Described in the GEBS</u>

The GEBS' conclusions regarding site and subsurface conditions were based on 48 hollow-stem auger borings: "nine new soil borings performed by Hart Crowser, five older borings previously performed by Hart Crowser, [and] thirty-four borings performed by others." JX 1.2365. Of the nine new borings performed by Hart Crowser, six "were performed in front of and behind Quaywall 729, and were executed with the intent of determining the extent and elevation of the fill and the native soil interface along the quaywall" and three "were performed to determine maximum pile lengths and fill density along the existing Pier B and Mole Quaywall." JX 1.2365.

The GEBS diagram below shows the location of the borings in relation to the location of the proposed Pier B:



JX 1.2416.

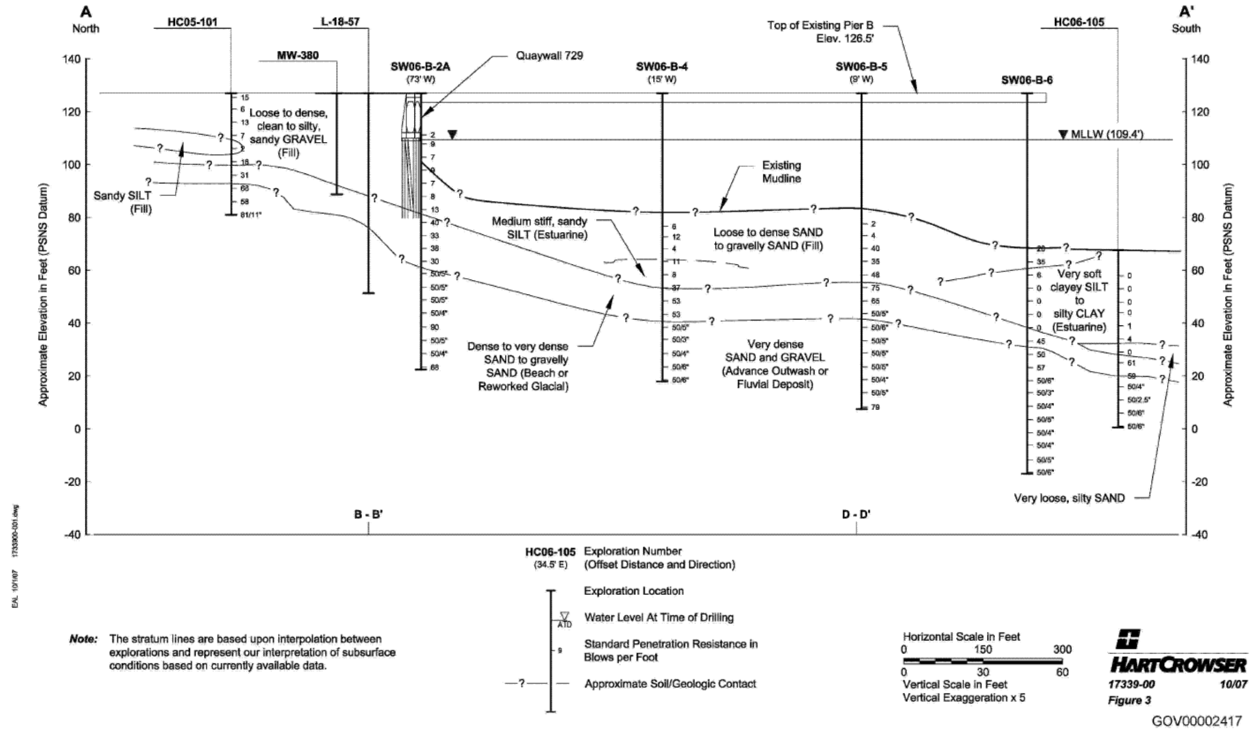
The GEBS instructed that the contractor should perform additional exploration it deemed necessary, stating:

> The Contractor should review the existing soil explorations and determine if they are adequate to complete the design of the proposed project. If the quantity or location of the soil explorations is insufficient, the Contractor should include additional soil explorations in their scope of work.
>
> To date we have only been able to advance a limited number of borings along the mole quaywall due to logistical constraints. It would be beneficial to conduct additional borings along the length of the mole quaywall once the site is open for construction.

JX 1.2367-68; see Tr. 1748.

Like the 2006 Report, the GEBS indicated the presence of four layers of soil under the Old Pier, from top to bottom: fill, estuarine, beach, and glacially overridden soils. JX 1.2365. The GEBS stated that the fill layer was "loose to dense, wet, gray, clean to slightly silty, gravely SAND to sandy GRAVEL," and that estuarine deposits were "very soft, wet, gray-brown to gray-green, organic, clayey SILT and silty CLAY with a trace of sand and sea shells." JX 1.2366-67. The GEBS stated that the beach deposits were "dense to very dense, wet brown, trace to slightly silty, slightly gravelly to very gravelly SAND," and noted that "[t]his material is competent and would support a portion of the foundational loads." JX 1.2367. Finally, the GEBS described the glacial soils as consisting of overridden material in the "material forming the upper portion of the glacial soils," while "the majority of the glacial soils consist of very dense, wet, gray brown, slightly silty to silty, gravelly SAND to sandy GRAVEL," which is "competent and would support foundational loads." Id.

Just as the 2006 Report, the GEBS indicated uncertainty as to the density, material, and estimated elevations in soil areas outside the borings. JX 1.2367-68. The GEBS provided the following diagram of the subsurface layers under Pier B based on former borings, including the 2006 borings and new borings driven by Hart Crowser:



JX 1.2417.

Mr. Horvitz explained why the diagram included question marks:

> Geotechnical engineers do that to point out the fact that the information that we have is very specific to the particular location of the boring. And we are doing our best to interpret or interpolate what the conditions are between borings. But, you know, Mother Nature can be fickle. And sometimes between two borings, that line that we draw may be higher. It may be lower. We really don't know.
>
> And there was a time when geotechnical engineers got sued a lot because they didn't put those question marks on there, and people would take that at that -- take that line as the gospel.

Tr. 1751.

Mr. Sarieddine, Shannon & Wilson's vice president, who prepared the 2009 Report, agreed the question marks in the GEBS meant "unknown." Tr. 567. KPFF's owner, Mr. Johnson also understood the question marks to mean unknown conditions. Tr. 788. The Government's geotechnical expert, Rudolph Frizzi, had the same understanding testifying that "a question mark is unknown." Tr. 2335.

This interpretation of the question marks is also reflected in the GEBS itself:

> Please note that there is uncertainty in the estimated elevations for each soil unit; the Contractor should consider adding additional borings along the western edge of the pier. We recommend the Contractor add an appropriate cutoff length to the overall pile length for contingency purposes to minimize delays and costs associated with building up concrete piles in the field.

> . . .
>
> Given the uncertainty in the elevation rise of the glacial soils toward the north, we recommend that the Contractor conduct further explorations to determine what reductions in pile length[7], if any, are possible.

JX 1.2370-72. Additionally, when discussing subsurface data indicated by the GEBS, the contract stated that "[v]ariations may exist in the subsurface between boring locations." JX 2.1041; see also Tr. 789; Tr. 2354-55.

The GEBS also addressed pile drivability:

> Pile driveability is, to a large degree, a function of soil conditions and pile hammer. The soil conditions encountered in our explorations generally consist of fill, estuarine deposits, beach deposits, and glacially overridden soils at depth. Difficulties during pile driving may be encountered as a result of obstructions that may exist throughout the areas where piles are anticipated to be specified. Such obstructions may consist of riprap and other larger size material for piling driven near the upper portion of the submerged mole slope along the west side of the mole. In this area, it is likely that shallow obstructions could be pushed aside with the piling to allow for pile driving at the design location. If deep obstructions are encountered, the pile may need to be moved.

JX 1.2381 (emphasis added).

The GEBS' Geotechnical Engineering Recommendations

At the outset, the GEBS recommended that existing piles under Pier B "remain in place (i.e., broken off at the mudline)" to maintain seismic stability. JX 1.2369. With respect to the type of piles, it stated:

> We understand that 24-inch prestressed, solid, octagonal concrete piles are preferred for much of the replacement of Pier B. . . . [W]e recommend that the piles be driven to and tipped[8] a minimum of 5 feet *into* the glacial soils or practical pile

---

[7] Pile length affects the ability of a pile to carry its load, a characteristic called "capacity." Tr. 1948-49. The more capacity a pile is designed to carry, the fewer number of piles are necessary to support a structure. Tr. 1949. Mr. Sarieddine described "axial pile capacity", stating:

> It's the capacity -- the piles -- to carry the load, it -- the pile gets capacity from the sides, friction along its length, and the tip at the bottom. And to get the capacity needed to carry that load, that's how you determine how deep you have to take the pile.

Tr. 477. Mr. Johnson also testified to his understanding that "there is a capacity that the pile can have if it is driven to the certain tip elevations and within a certain amount of embedment into the -- the glacial -- the glacial till or the -- the bearing strata." Tr. 674.

[8] The term "tipped" refers to the depth of the soil at which the lowest portion of the pile would be driven. See Tr. 1773.

> refusal. Assuming an approximate, practical pile refusal of 5 feet, piles should be driven to a minimum of elevation 37 and 29 feet (PSNS Datum), for Stations 0+00 to 8+25 and 10+00, respectively, or 5 feet of embedment into the glacial soils as shown on Figure 3. Tip elevations can be linearly interpolated between Stations 8+25 and 10+00, with approximately a drop of 1 foot in pile tip elevation per 22 feet south of Station 8+25. Note, practical pile refusal is a function of the hammer selected by the Contractor, and therefore must be estimated during construction with observation of the actual equipment and pile driving behavior.

JX 1.2371 (emphasis added).[9]

These statements are not determinations of practical pile refusal. See Tr. 1768. Mr. Horvitz testified:

> Q. [By Counsel for Defendant] Okay. And the language, "We recommend that the piles be driven to and tipped a minimum of 5 feet into the glacial soils," is this telling the design-build contractor that the piles have to be driven 5 feet into the glacial soils?
>
> A. No. What we're really saying there is we were anticipating that he would need to do that to get the piles fixed enough, turn around and get the capacity that he needed.
>
> Q. And what is the effect of adding "or practical pile refusal"?
>
> A. Well, it means that, you know, our anticipation is that if he's going to get 5 feet of penetration into that material, he's likely going to get capacity. But if he gets capacity above that elevation, say in the beach deposits, whatever reason, we're okay with that.
>
> Q. The next sentence states, "Assuming an approximate, practical pile refusal of 5 feet, piles should be driven to a minimum of elevation 37 and 29 feet, for Stations 0 plus 00 to 8 plus 25 and 10 plus 00, respectively, or 5 feet of embedment into the glacial soils as shown on Figure 3."
>
> Are you setting tip elevations for the Pier B replacement project in that sentence?
>
> A. We're not setting elevations. We are anticipating that that's what would be required. You're not going to know exactly how deep the piles have to go until after you've done some additional work in the form of indicator piles. At this point in the process, that's our best estimate. 'Cause essentially somebody has to come up with the budget, figure out how long the piles need to be.

Tr. 1767-68. The GEBS did not set pile tip elevations for Pier B. JX 1.2384.

Mr. Horvitz further explained:

---

[9] The final underlined sentence emphasizing that practical pile refusal depended on hammer size and "must be estimated during construction with observation of the actual equipment and pile driving behavior" is repeated in the RFP three times. JX 1.2371 (twice), .2373.

> Q. [By Counsel for Defendant] In your experience, or would you have interpreted this language to have required the tip -- or the piles to be driven to Elevation 37 and 29 feet based on this paragraph?
>
> A. Well, the -- the intention at the time was to tell the reader what we anticipated would have to be done.
>
> Q. Does that mean that you would have read this to reflect you had to drive the piles to those particular elevations?
>
> A. No. Which is why we have the term "practical refusal" in there.
>
> Q. Would you read this language to mean that the budget is fixed for the rest of the project based on these tip elevations?
>
> A. No, not at all.
>
> Q. And why do you say that?
>
> A. Because this is our estimate of what we think might happen at this stage in terms of what we know. But what the actual budget . . . is based on any additional exploration information that was done. It would depend on the analysis that the contractors, geotechnical and structural engineers do, how they interpret the data. The same way we threw out the existing data or recommendations on Pier D and did it ourselves, we would certainly expect that the design-build contractor's design team would do the same thing. So there's -- in my mind, there was never any intention of being something sacred about that language.

Tr. 1768-69.

In terms of equipment, the GEBS analyzed how piles were driving with a Delmag 46-23 hammer and a Delmag 62-22 hammer, but explained that "[o]ther hammer types with variable energy settings may also be used." JX 1.2386. The GEBS concluded that "the results indicate that either of the [Delmag] hammers can be used to achieve the desired ultimate pile capacity of 1,000 kips," or 10,000 pounds. JX 1.2389-90.

Hart Crowser "performed preliminary wave equation analyses using the computer program Wave Equation Analysis of Piles (WEAP) to predict axial pile driving stresses and penetration resistances during driving with different hammers." JX 1.2386. The GEBS included the results of this WEAP analysis but expressly stated "The Contractor should perform their own WEAP analyses and submit the results for approval." JX 1.2355, .2390.

Under "Additional Considerations," the GEBS stated:

> The output produced by the wave equation analyses depends on the pile, hammer, and soil input parameters. We selected input parameters based on the results of *in situ* tests, laboratory tests, pile parameters supplied to us by BERGER/ABAM Engineers, and manufacturer-supplied hammer information. <u>Actual field conditions, project requirements, and hammer type and performance may vary from what we have assumed and, therefore, the actual driveability and driving stresses may differ from what we presented above.</u> Finally, our analyses did not include possible effects of pile installation such as interruptions to driving and subsequent pile setup.

JX 1.2390 (emphasis added).

The GEBS stressed the value of an indicator pile program:

> Based on past experiences within the PSNS and other Navy facilities, indicator piles with dynamic pile testing provide extremely useful information to supplement soil explorations and analysis for evaluating pile capacity and drivability. The purpose of the indicator pile program is to verify the location of the top of the glacial soil bearing layer(s) to aid in selection of pile tip elevations and lengths, and to verify design shaft friction. The benefit of an indicator program with dynamic pile testing over soil explorations is that the indicator piles may be used to assess pile capacities and safety factors and drivability through dense zones of soil, and to identify possible unforeseen circumstances.

JX 1.2391 (emphasis added). Again in discussing general pile installation recommendations, the GEBS stated "It is very important for driven piles that indicator piles be installed before construction of any particular segment. Subsequently, production piles can be ordered for the segment taking into account the results of those indicator piles." JX 1.2380; see also Tr. 1136-37; Tr. 2355-56. The GEBS reiterated that "[w]e strongly recommend a minimum indicator pile program for Pier B consisting of ten indicator piles . . . ." JX 1.2392.

The Prebid Site Visit

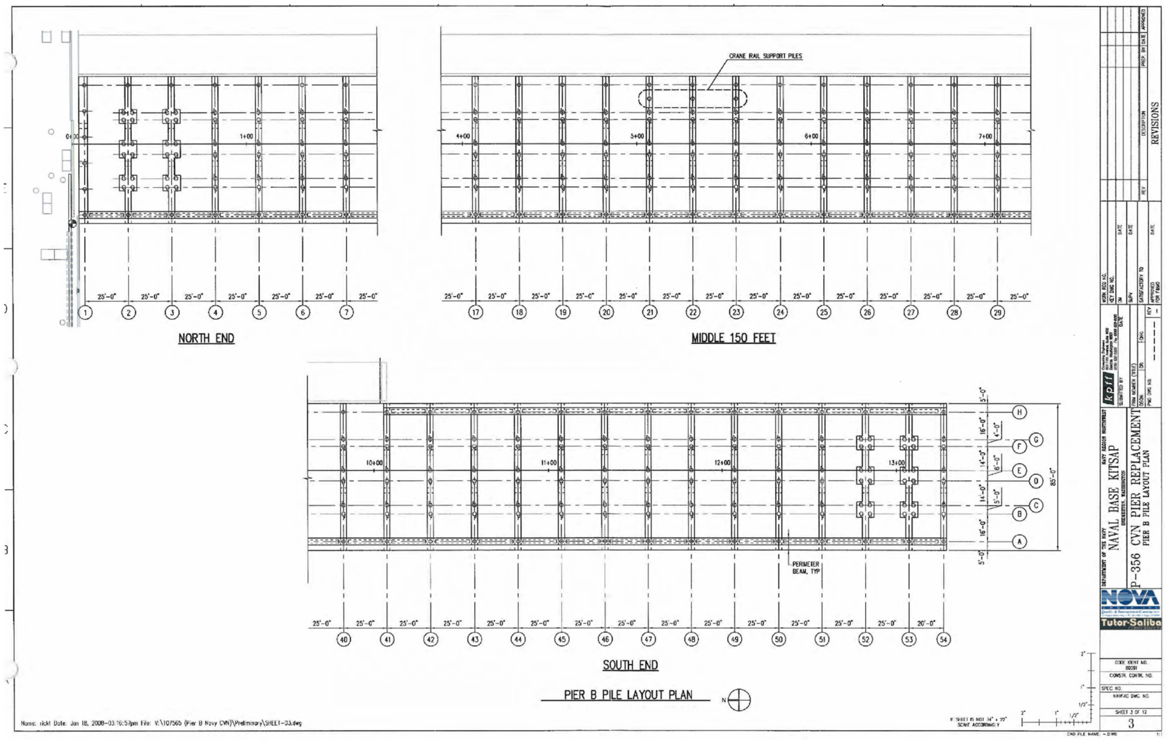
On November 27, 2007, interested bidders, including NTS' former president, chairman, and CEO, Ronald Fedrick, NTS' project manager, Dana "Dan" Fox, and KPFF's owner, Richard Johnson, attended a site visit. JX 1.9; Tr. 77; Tr. 595-96. At the visit, NTS' team members were allowed to walk up and down the Old Pier. Tr. 121; Tr. 596.

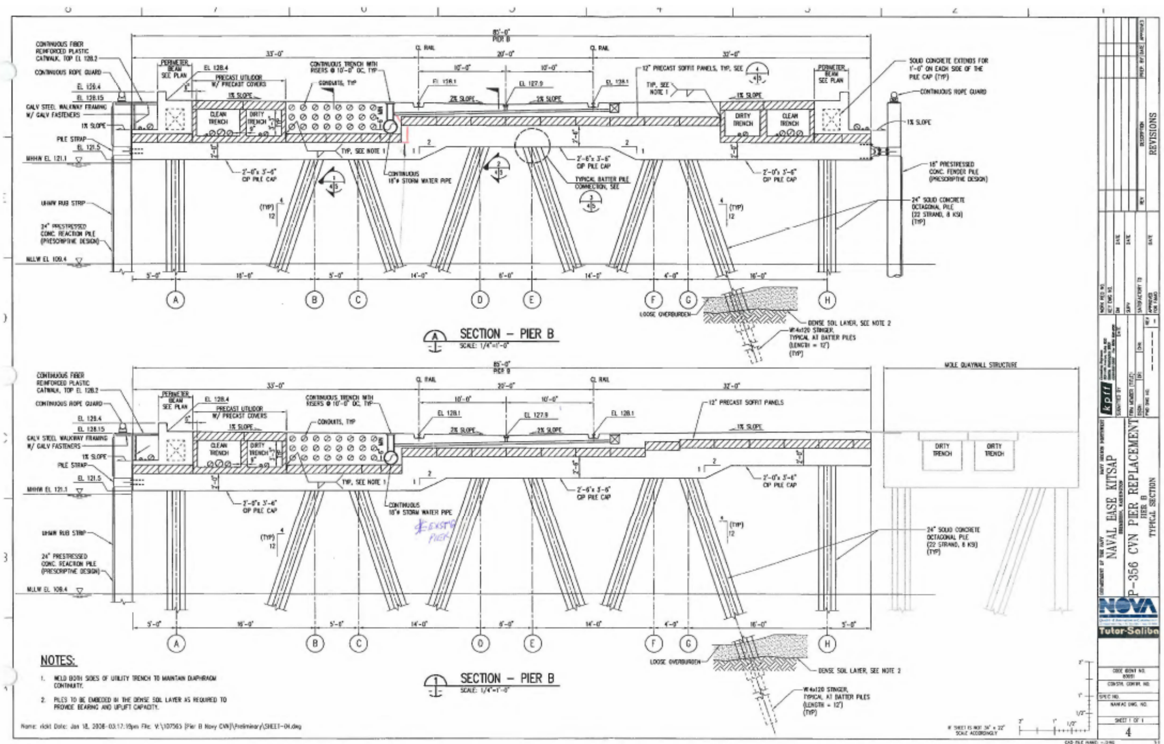
NTS' Bid for the Pier B Project

To prepare its bid, NTS "secured the professional services of KPFF Consulting Engineers as the lead engineer . . . ." JX 4.3; see also Tr. 585. KPFF, as NTS' potential subcontractor, would be tasked with leading the design team that was also comprised of Sparling, Notkin Engineering, and Shannon & Wilson. JX 4.4. For Shannon & Wilson, Ming-Jiun "Jim" Wu served as the principal in charge on the Pier B Project. Tr. 458. Mr. Wu also served as the principal in charge on the 2006 Report. Id.; DX 2.32.

NTS submitted its bid on January 22, 2008. JX 4.3. As part of its technical proposal, NTS provided its "basis of design" -- a "sketch" of its final design with "a general summary of the highlights of the design and how [NTS] intend[ed] to complete the project." Tr. 2451; see also Tr. 2520; Tr. 670.

In its Basis of Design, NTS proposed a transverse batter pile system which "would consist primarily of concrete pier bents spaced at 25 feet on center with eight 24-inch-diameter octagonal solid concrete piles per bent carrying the vertical and lateral loads." JX 4.198. Its design provided for 54 east-west bents, with Bent 1 starting on the north end of Pier B and Bent 54 ending at the south end of Pier B, and eight north-south rows, labeled Rows A through H:





JX 4.211-12. Pier B piles in Rows A and H, as well as all piles in Bent 1, were designed as vertical (or plumb) piles. Id.; JX 50.1-.5; JX 53. Pier B piles in Rows B, C, D, E, F, and G were designed

in an east-west batter configuration.[10] JX 4.211-12; JX 50.1-.5; JX 53. Plumb piles are vertical piles "driven straight down into the ground without an angle to it," while a batter pile "is driven at an angle to provide a triangulated bracing to a structure." Tr. 584.

In the Basis of Design, NTS outlined its plan to avoid interferences from preexisting piles from the Old Pier:

> The Design/Build team will develop a computer model of all existing and planned pile locations to identify potential interferences. We will survey existing pile locations after the existing Pier Bravo deck is removed. Where potential interferences are identified, the structural plan for Pier Bravo will be modified as needed. Possible modifications include, but are not limited to, adjusting the skew angle on batter piles, changing the direction of the skew, adjusting the pile location (for plumb piles), or adjusting the location of a bent line. In all cases, we will conduct an analysis of the modified structure to ensure continued compliance with all project requirements.

JX 4.195.

<u>Contract Award and Pre-Design Work</u>

On May 2, 2008, NAVFAC awarded NTS Contract No. N44255-08-C-6000 at a firm-fixed price of $122,877,000. JX 2.1-.3. The Contract required NTS to begin performance within 15 calendar days and complete the Project within 1,345 calendar days after award. JX 2.1.

<u>The Indicator Pile Program</u>

In order to complete its design, NTS conducted its indicator pile program between November 10 and December 9, 2008. JX 2.541; JX 10.15, .171-73. The Contract required NTS to install, at minimum, "five indicator piles spaced evenly along the Pier, with a minimum of two piles of each size used" and three indicator piles along the Mole Quaywall, and the GEBS "strongly recommend[ed] a minimum indicator pile program for Pier B consisting of ten indicator piles." JX 2.649, .2640. The placement of the indicator piles was left to the contractor's discretion. JX 2.649. NTS did not drive indicator piles in the footprint of the Old Pier, although the Old Pier encompassed approximately 75 percent of the area where NTS planned to drive piles. Tr. 170; PX 34.4. As Mr. Fedrick testified during his deposition, NTS chose the location of the indicator piles based on where the piles "would be in the permanent structure" to avoid added expense. Tr. 229.[11]

NTS' subcontractor, ACC, ultimately drove eight indicator piles between November 10 and December 9, 2008. JX 10.15, .171-73; Tr. 142; Tr. 495, 550. ACC drove five Pier B test piles -- CP-1, CP-2, CP-3, CP-4, and CP-5 -- and three Mole Quaywall test piles -- CM-1, CM-2, and

---

10 Mr. Fedrick described the design stating that "we have B and C, which are two batter piles that basically face each other; and then D and E, two batter piles that face each other; and F and G, two batter piles that face each other, which is what we talk about were the transverse batters." Tr. 134.

11 The Court recognizes that on direct examination at trial, Mr. Fedrick testified that NAVFAC "wouldn't allow us to cut holes in the existing deck because they had to do a radiation survey on the deck." Tr. 146. The Court does not credit this testimony, as Mr. Fedrick acknowledged this information came out of the trial preparation process. Tr. 227-28. The Court credits Mr. Fedrick's deposition testimony.

CM-3. JX 10.172; Tr. 142-43. None of the Pier B test piles were driven within the footprint of the new Pier B. JX 10.26; Tr. 497-98. The Mole Quaywall test piles were within the footprint of the new Pier B, but because the new Pier B is wider to the east than the Old Pier, the Mole Quaywall test piles were still outside the footprint of the Old Pier. JX 10.15-16, .26; Tr. 331; Tr. 497-98.

NTS only drove plumb piles for the test program, although its design primarily used batter piles. Tr. 549; Tr. 1819. This was because, as Richard Davis, a senior construction specialist at BergerABAM, and Mr. Fedrick testified, it is not common to drive batter piles as part of a test pile program. Tr. 1820; Tr. 167. Plumb piles and batter piles behave differently. Tr. 2005; Tr. 428-29. According to Mr. Sarieddine, "for the plumb piles, if we drive the piles, doesn't matter where it ends. If it ends in refusal, we got enough base to carry the load." Tr. 486. Batter piles, however, "require uplift" and "deeper embedments." Tr. 486-87. According to Mr. Branlund, a senior project manager at BergerABAM,

> [t]rying to drive a new batter pile through an existing field of batter piles is a lot more difficult than trying to drive a plumb pile straight down. Plus the plumb pile system behaves in a different manner so that skew issues and things like that aren't -- aren't important.

Tr. 2005. Reading from an email that he wrote, Mr. Branlund also testified that "batter piles are temperamental with regard to inclination and skew. . . . Selecting a plumb pile scheme would have been a whole lot easier to install and a lot more forgiving with respect to the problems with location." Tr. 2030. NTS drove test piles with and without stingers because the Pier B design incorporated plumb piles "that did not require stingers and batter piles that did require stingers." Tr. 503.

The results of the indicator pile program were:

Table 3. Summary of Case Method Results

Pile	Test	Approx Penetration Below Mud-line ft	Blow Count blow/set	Ram Stroke (STK) ft	Average Max. Transfer Energy (EMX) kip-ft	Average Max. Comp. Stress (CSX) ksi	Max. Tension Stress (TSX) ksi
CP-1	Drive	60	122/9"	9.9	112	5.5	1.4
CP-2	Drive	58	86/12"	9.7	110	5.3	1.6
CP-3	Drive	36	56/10"	10.2	122	5.1	0.9
CP-4	Drive	47	91/6"	9.8	98	4.7	1.6
CP-5	Drive	26	46/4"	6.9	52	3.4	1.3
CM-1	Drive	49	97/11"	10.3	114	5.0	1.6
CM-2	Drive	32	68/8"	9.8	103	4.5	1.5
CM-3	Drive	35	72/7"	10.3	111	4.7	1.3

JX 10.173.

These results were based on using a Delmag 80-23 hammer. JX 10.172. ACC "elected to use a Delmag 80-23 hammer in lieu of the recommended Delmag D62-22 or Delmag D46-23 to ensure the piles could be driven to the desired elevation . . . .” PX 36.11. Mr. Fedrick testified that the Delmag 80 hammer has “about a 30 percent greater capacity than what the Navy geotechnical report said we should have to anticipate.” Tr. 144. Mr. Branlund confirmed that the Delmag 80 was a stronger, higher capacity hammer than the Delmag 46 and Delmag 62. Tr. 2024-25. Although Hart Crowser evaluated pile driving with the Delmag D46-23 and Delmag D62-22 and determined that the results indicated that either of the hammers could be used “to achieve the desired ultimate pile capacity,” Hart Crowser made clear in the GEBS that other types of hammers could be used and might even be preferable for some contractors. JX 1.2389-90.

The three test piles driven in the Pier B footprint did not have stingers and reached refusal in the beach deposits, indicating the beach deposits were a competent bearing layer. Tr. 554-55 (Mr. Sarieddine stating that the beach deposits “turned out better than we expected” for piles without stingers); Tr. 941-42.

Four test piles driven outside the Pier B footprint contained stingers. JX 10.15; Tr. 509. Although the stingers attached to the tip of the test pile reached the glacial soils, the concrete test pile itself stopped in the beach layer. JX 10.15; Tr. 506, 509, 554.

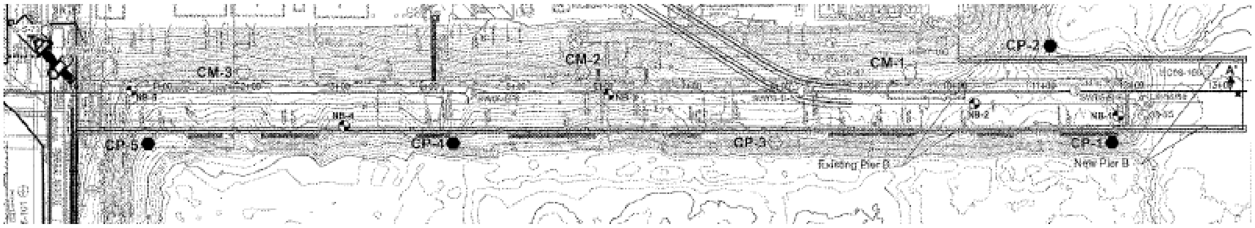
The Shannon & Wilson 2009 Report

The Contract required NTS to “[s]ubmit a written Geotechnical report based upon Government-provided subsurface investigation data and all additional field and laboratory testing accomplished at the discretion of the Contractor’s Geotechnical Engineer” and “include a cover letter identifying any recommendations of the report proposed to be adopted into the design that are interpreted by the Contractor as either conflicting with, or being modifications to, the Geotechnical or Pavement related requirements of this RFP.” JX 2.593-94; Tr. 482.

On February 25, 2009, Shannon & Wilson produced the required geotechnical report. JX 10.1; Tr. 480-82. No cover letter was included, indicating NTS did not make any recommendations that conflicted with the requirements of the RFP. Tr. 483. This 2009 Report presented the results of Shannon & Wilson’s “geotechnical study completed for the new Pier B structure only” and contained “the results of the geotechnical field explorations performed along Pier B alignment and the results of laboratory tests performed on samples collected from these borings.” JX 10.5. It also included “the results of a test pile program performed for the project and . . . geotechnical engineering recommendations for design and construction of Pier B.” Id.; Tr. 1134.

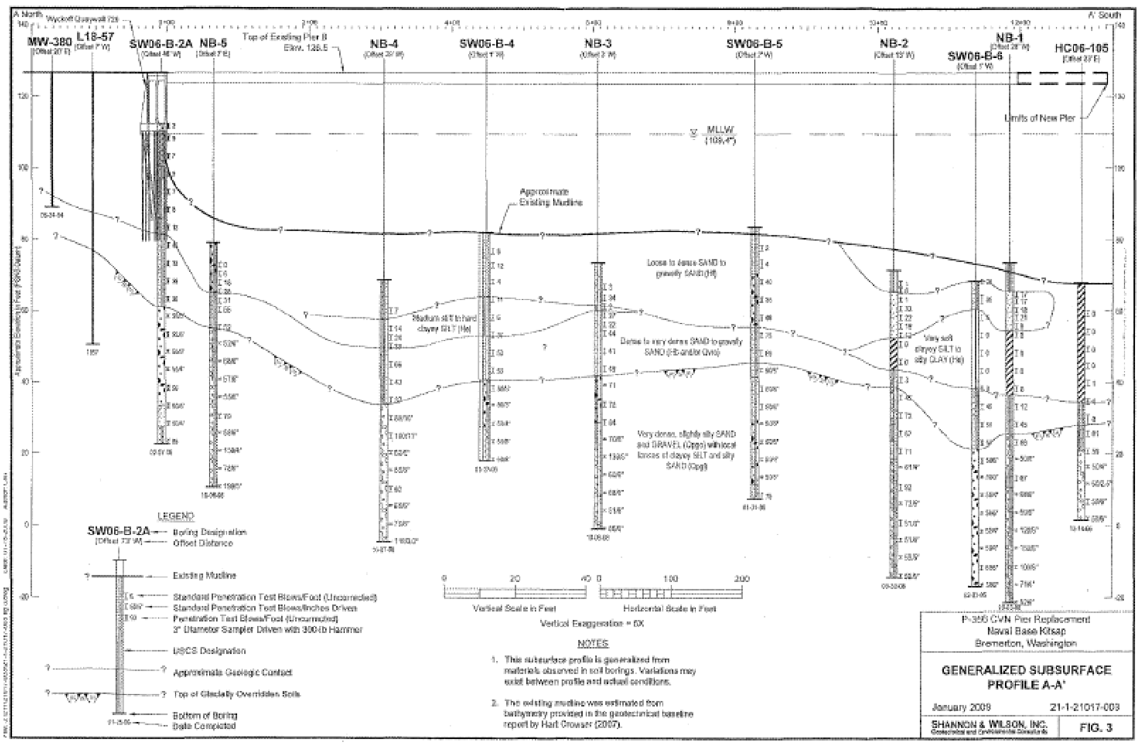
At the outset, the 2009 Report stated that “[t]he analyses and recommendations contained in this report are based upon site conditions as they presently exist, and further assume that the explorations are representative of the subsurface conditions along the proposed pier alignment,” with the primary assumption being “that the subsurface conditions everywhere are not significantly different from those disclosed by the explorations.” JX 10.6. The report included four sections: 1) field explorations and geotechnical laboratory testing, 2) regional geology and subsurface conditions, 3) engineering studies and recommendations, and 4) construction considerations. JX 10.7-.22.

In terms of field explorations, Shannon & Wilson conducted nine borings, five of which were “completed along the Pier B alignment.” JX 10.7. These five borings, identified as NB-1 through NB-5, were completed prior to test piles being driven. JX 10.27. The locations of the borings are shown below:



JX 10.26. NB-3, NB-4, and NB-5 were drilled on the edges of the Old Pier, while NB-1 and NB-2 were drilled through the middle of the Old Pier. Id.; Tr. 2354; Tr. 2528. NB-1 and NB-2 were "taken through manholes in the deck, which by the nature of their location would not be installed close to the bents or where the existing piles were located." Tr. 2528.

With these extra borings, Shannon & Wilson updated the subsurface profile provided in the GEBS as follows:



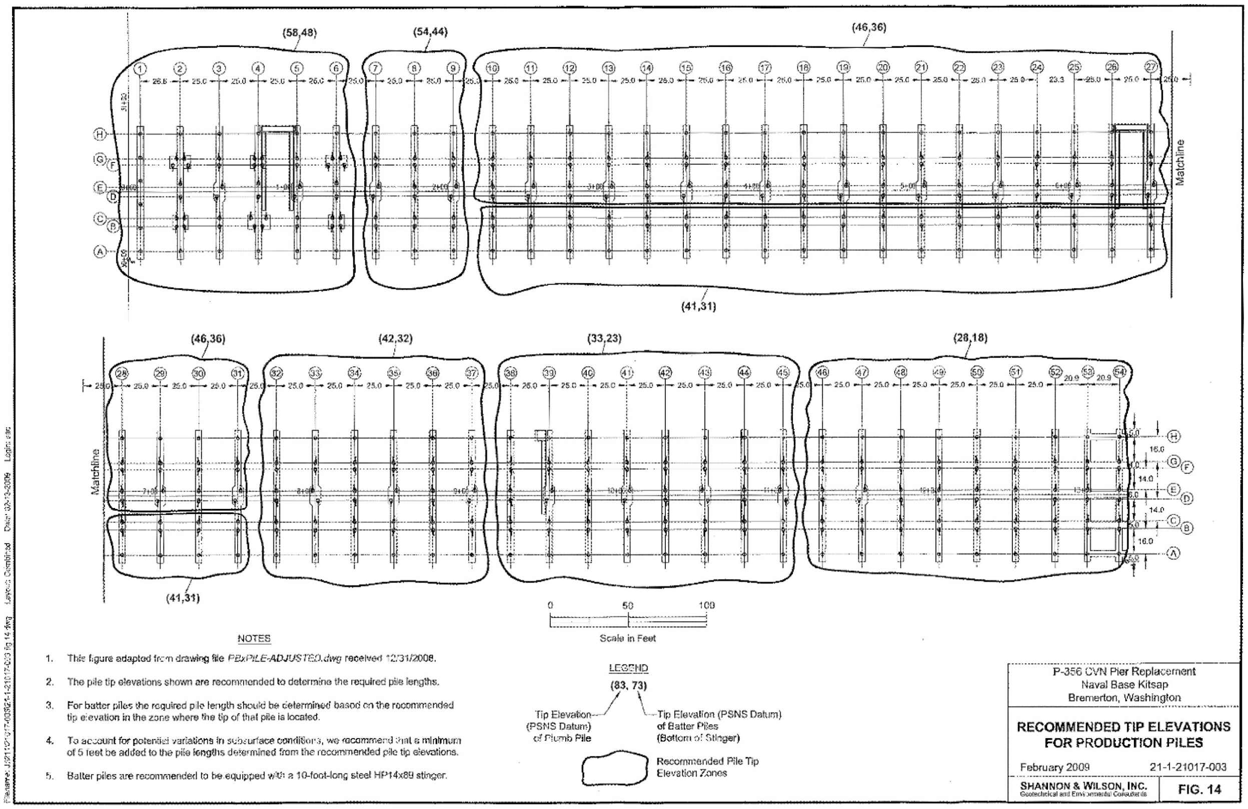
JX 10.27.

In its recommendations, premised on its analysis of the new and former borings and ACC's execution of the test pile program, Shannon & Wilson stated:

> In general, the pile tip elevations recommended for piles with stingers are ten feet lower than those [for] piles without stingers. In addition to the pile tip elevations given in Figure 14, we recommend ordering piles with a minimum five additional feet to account for unknown variations in the elevation of the competent bearing soils which, if deeper than expected, could potentially require built-up extensions on piles that prove to be too short.

JX 10.16.

The referenced Figure 14, a diagram of the recommended pile tip elevations for Pier B in the 2009 Report, is reproduced below:



JX 10.38.

The 2009 Report described subsurface conditions and potential pile driving as follows:

> [P]iles supporting the proposed pier would be installed through some fill material, the dense beach deposits, and into the very dense glacial deposits. Based on the anticipated subsurface conditions underlying the Pier B alignment, and the driving conditions encountered during installation of the test piles, moderate to hard driving conditions would likely be encountered in the beach deposits, and hard driving conditions would be expected in the glacial deposits. As discussed earlier, we recommend that the batter piles that will experience uplift (tension) loads be fitted with 10-foot-long steel HP 14x89 stingers.
>
> Riprap may be encountered in front of the Quaywall 729, near the north end of Pier B. The proposed concrete piles may have difficulty penetrating through riprap. We recommend that the contractor be prepared to drill, spud, or use some other appropriate methods to penetrate through the riprap layers prior to pile driving.

JX 10.19.

<u>LiDAR Survey</u>

As stated in its Basis of Design, NTS, through a subcontractor recommended by KPFF, conducted a LiDAR survey to develop a three-dimensional computer model of the existing piles under the Pier B footprint to identify potential interferences. JX 4.195; Tr. 154-58. The survey was conducted during the design process, after the Old Pier was demolished, with the exception of the subsurface piles left in place. Tr. 216. The top of the pier had been removed and the piles were cut off at the mudline, but any parts of the piles below the mudline were left in place.

Because NTS was planning on driving "450, 470 new piles around a[n] existing thousand piles that were cut off" and many of the existing piles were likely not "exactly where they're supposed to be," the LiDAR survey was intended to inform NTS exactly where the existing piles were located. Tr. 158. However, the survey could only image above the mudline -- the subsurface positions of piles under the mudline had to be extrapolated. Tr. 232; Tr. 771. The results of the survey did not cause KPFF to alter or modify its Basis of Design submitted to NTS. Tr. 683-84.

NTS' Driving Difficulties at the Mole Quaywall

On February 12, 2009, NTS' subcontractor, ACC, commenced pile installation at the Mole Quaywall. See PX 25. ACC drove 13 plumb and 30 batter piles at the Mole Quaywall in February 2009, but the vast majority of the pile driving started in June 2009. PX 25.1-.2.

Unlike Pier B, where the design was to be done by the contractor, the Government designed pile elevations at the Mole Quaywall and set these elevations at 38 feet for batter piles and 44 feet for plumb piles. Tr. 815-16. After the indicator pile program, BergerABAM changed the design tip elevations at the Mole Quaywall to vary in elevation depending on locations, with pile tips designed to go deeper and shallower than the original elevation of 38 feet and 44 feet. Tr. 820-21; Tr. 1950-51; PX 25. BergerABAM tended to design longer piles, because it was cheaper to cut off piles that were too long than build up piles that were too short. Tr. 1952.

ACC could not drive some of the piles in the Mole Quaywall as deep as designed, resulting in excessive cutoffs. Tr. 1992-93; Tr. 819-21 (Mr. Elgenson noting that most of the as-built tip elevations were "higher than what was required" by the Government's design); Tr. 192; JX 57.4. Additionally, ACC was not able to drive the piles within the prescribed tolerance. Tr. 821. On August 14, 2009, NTS completed the Mole Quaywall pile installation. PX 25.

NTS Finalizes Its Pier B Design

While beginning performance on the Mole Quaywall, NTS was still working on its Pier B design. As required under the Contract, NTS had to provide NAVFAC with its design in stages. JX 2.397. Robin Zylstra, the Construction Manager for NAVFAC, explained the process:

> Designs -- certainly for a project this large, they are very iterative. You would have the concept design and have that submitted and reviewed. You might go to 35 or 50 percent review, make comments, 70 percent, 100 percent. We also had incorporated into this project RFP fast track designs, elements that we knew needed to go quickly, get started early. We allowed them to submit on those. We would review those and comment on those separately.

Tr. 2456.

In March 2009, NTS submitted its Fast Track No. 2 design submittal to NAVFAC on the design of the Pier B piles. JX 24.3. On April 27, 2009, the Government returned the design with a directive to "Revise and Resubmit" Fast Track No. 2, explaining that the Government required revisions due to a concern that Pier B batter piles did not remain elastic during the transverse contingency-level earthquake ("CLE") event. Id. On May 5, 2009, KPFF provided the Government "supplemental information demonstrating the elastic behavior of Pier B piles during the transverse CLE event." Id. In May 2009, NTS submitted a revised Fast Track No. 2 design submittal, which the Government "Approved with Comment" on June 4, 2009. Id.

NAVFAC's approval of this fast track design allowed NTS to proceed with Pier B pile installation before final design approval. Tr. 2457-58. NTS accelerated construction of the first half of the piles, with the second half to be produced after completion of the Pier B design "so that that production activity for the piling and the installation activity could go on as the rest . . . of the design was progressing" and meet the required end date. Tr. 667-68.

In May 2009, NTS submitted a 70 percent design submittal and on July 28, 2009, its 100 percent Pier B design to NAVFAC. Tr. 2001; PX 14.1. BergerABAM reviewed NTS' submittals on behalf of the Government for conformance with the RFP documents on technical and engineering aspects of the design. Tr. 1954, 1958.

On October 26, 2009, NAVFAC approved NTS' Final Design Submittal, but provided final comments for NTS to address. JX 65; Tr. 2457, 2542. On November 12, 2009, NTS submitted its final conformed design submittal to NAVFAC with responses to NAVFAC's final comments. JX 26.1.

ACC Raises Concerns About Excess Cutoffs For Pier B Piles

On August 19, 2009, four days after completing work on the Mole Quaywall, ACC began to install plumb piles at Pier B. PX 21. As with the Mole Quaywall, NTS representatives observed pile installation at Pier B. Tr. 179, 2721-22; Tr. 830; Tr. 1477.

On August 20, 2009, ACC began to install batter piles. PX 175.47. The first batter pile ACC drove reached refusal "roughly 15 feet" above cutoff grade. Id. On August 24, 2009, ACC's Project Manager, James D. Carroll, informed Mr. Elgenson that "[t]o date, all driven Pier B piles have excessive cutoff lengths, and ACC is concerned that this will be a problem over the entire length of the Pier." Id. On September 2, 2009, Mr. Elgenson, Tutor Perini's senior project manager, responded to ACC "that longer than usual pile cut offs are a result of existing unknown geotechnical conditions and can be expected in this type of work" and that NTS did not believe the scope of work had changed or that extra work was involved entitling ACC to additional compensation. DX 23.1-.2. Instead, NTS directed ACC to review the plan sheets and pile driving sequencing and stated that using "a shear with [a] crane for assistance" removing the excessive cutoffs was "acceptable and typical industry standard." DX 23.1.

To account for these geotechnical conditions and in response to the pile driving problems at the Mole Quaywall, Shannon & Wilson revised its design pile tip elevations for Pier B between February and October 1, 2009. Tr. 520, 560; see also PX 171; PX 172; DX 24. Piles in rows H and G primarily were to be driven shallower between bents 10 through 31, and the remaining design changes planned for piles to go deeper. Compare JX 10.38 with DX 24.1.

Pile Driving Issues

The majority of the Pier B piles were driven by ACC, NTS' subcontractor. ACC was in charge of driving all of the piles for NTS, including at both Pier B and the Mole Quaywall. Tr. 150-51; Tr. 349. The record shows that NTS had problems with ACC during the project. Although ACC's proposal contemplated using a template to drive piles and ACC used the template when driving test piles, it did not use that template when driving Pier B piles. Mr. Fedrick testified as to why ACC did not use the template:

> With the complexity of the opposing batter piles on here, if you can imagine trying to capture all eight of those piles, or even four of the eight piles, and have a system which can be taken apart, put back together again. And we sat there, and I worked with the operations manager of ACC on this for several weeks. And there was just, unfortunately, no logical design we could come up with, with some basis to do that. They had a concept at bid time. And it, quite frankly, just didn't pan out.

Tr. 151. ACC was "going out of business," and NTS was forced to finish "a good portion of [ACC's] work" -- including the additional 28 piles driven to correct pile misalignment. Tr. 152, 252. On the portion of the work NTS completed, it used a template. Tr. 152-53.

ACC did not have had a trapezoidal spotter or moon beam when driving piles, which would make adjusting piles to account for skew more difficult, and its equipment "was not always functional" requiring alternative methods to align the piles for skew. Tr. 2489-90; see also Tr. 1810-13; Tr. 2778-79.

NTS was dissatisfied with ACC's performance. Tr. 251; DX 70.1. Mr. Davis, a Senior Construction Specialist at BergerABAM, stated that he spoke with ACC personnel and got the impression that the crew was not "the A-team" but they were "experienced enough" to do the project. Tr. 1809. Mr. Brenner, a former ACC employee, similarly testified ACC's team was experienced, but he indicated there were problems with management. Tr. 361. Mr. Brenner considered ACC's management representative a "sand sweeper," meaning he had experience in street paving projects, not marine projects, and believed its project manager was in over his head. Tr. 399-400. Mr. Brenner also testified:

> Q. [By Counsel for Defendant] You also thought that when Danny [ACC's barge foreman] ran into problems on Pier B pile driving, he didn't get support from ACC management, right?
>
> A. Yes.
>
> Q. And because he didn't get support, when Danny had problems, his answer to that was to just keep driving, right?
>
> A. Yes.

Tr. 400-01.

<u>NTS Claims Differing Site Conditions at Pier B</u>

Sometime between Mr. Elgenson's September 2, 2009 letter dismissing ACC's concern about excessive pile cutoff lengths -- stating that "longer than usual pile cutoffs can be expected in this type of work"-- and December 2009, NTS changed its position and formed the view that its subcontractor, ACC, was encountering differing site conditions, as noted in the Remarks section of a contractor production report. DX 23.1-.2; Tr. 963-64. The earliest remark to this effect in the record was on December 8, 2009 in a daily contractor production report, PX 114.43.[12]

Specifically, according to that report, NTS "continued remediation of excessive length of piling on pier B due to [Differing Site Conditions]" PX 114.43. Plaintiff's witness, Gary Elgenson, the Senior Project Manager at Tutor Perini Corporation, stated that this was not an

---

[12] NTS kept records of activities via daily contractor production reports, which it submitted each day to NAVFAC. PX 114; JX 2.355; Tr. 831, 833.

isolated incident and was reported in other contractor production reports. Tr. 833-34; see PX 114.49. However, in the September 2, 2009 letter to ACC, Mr. Elgenson stated:

> You state that the pile cutoff lengths are longer than anticipated and require the use of a concrete pile shear and crane assistance for removal. It is the Joint Venture's position that longer than usual pile cut offs are a result of existing unknown geotechnical conditions and can be expected in this type of work. We consider the use of a shear with crane for assistance as an acceptable and typical industry standard. The Joint Venture does not believe that that the scope of your work has changed, and there were discussions during the bid process that specifically included this topic.

DX 23.1.

Mr. Elgenson testified as follows:

> Q. [By Counsel for Plaintiff] Based upon your observations of the pile driving and your examination of those records for the Mole Quaywall, how did the pile driving compare to what was designed here, the design as shown?
>
> A. We had difficulty driving the piles to the tip elevations that are indicated in the plans. And there was a requi -- basically that there was excessive cutoff of piles as a result of that.
>
> . . .
>
> Q. Based on those observations and the examination of the documents, how did the pile driving at Pier B compare to the pile driving that you described at the Mole Quaywall?
>
> A. It was similar, in that we were unable to drive the piles to the specified tip, which was, we -- the spec -- or were required to drive the piles to 5 foot into the glacial till or practical refusal, and then we were unable to do that.

Tr. 817-18, 830.

In meeting notes from a December 17, 2009 production meeting, NTS described its "Pier B Pile Driving Issues" under a section discussing old business:

> Pile Driving Criteria- Due to the inability to drive piles to tip, KPFF is reviewing the pile driving criteria with Shannon & Wilson and Bert Miner to mitigate costs associated with excessive pile cut off. Broken Batter Pile- ACC advised that getting back on a batter pile for a restrike/redrive is very difficult. ACC will provide more information on the broken pile when it becomes available. Bert Miner believes the pile broke 60 feet down. **9-2**[[13]]: NTS will follow the driving criteria in the specifications. . . . **10-1**: NTS and ACC will stay with pile driving criteria that is specified in the specs. NTS is casting piles with extra dowel tube length added in to keep from coring and/or exposing stands. **10-2**: ACC has moved to the end of

[13] These bold numbers in NTS' meeting notes refer to dates.

> pier B to drive H row piles. Moving to the end should give the engineers better length data. **10-3**: KPFF is reviewing tip elevations to determine the uplift capacity of the piles. The uplift capacity will decide if a pile will need to be removed and a new pile driven in it's place. NAVFAC requested [pile-driver analyzers] to be performed on the pier B piles due to the low penetration elevations. **10-4**: Restrikes to be conducted on three piles. Meeting was held on the pile driving issues- meeting minutes to be distributed. **10-5**: . . . ACC is waiting to cut piles until KPFF has given official word to do so. . . . **11-2**: A representative from Shannon and Wilson is now on site counting the blows during the pile driving. The representative will be to able make an onsite determination on the piles. Many piles are . . . out of tolerance, way more then [sic] anticipated. KPFF will need to redesign the pile cap for the areas where the piles go out of the design tolerance. . . . **12-2**: Butt elevations have an extreme variation, most are high. . . . NTS will be compiling the costs related to pier B driving issues.

PX 116.6; <u>see also</u> Tr. 180-81.

A total of 104 piles reached refusal more than 12 feet higher than NTS' designed elevations. PX 132.4; <u>see also</u> PX 21; PX 22. Additionally, 278 piles did not penetrate through the beach layer into the glacial layer, but not all of these piles were designed to penetrate through the beach layer. PX 132.4. On March 4, 2010, NTS completed installation of the original Pier B piles. Tr. 218; <u>see also</u> Tr. 2624. NTS and its subcontractor, ACC, drove a total of 456 piles at Pier B. PX 132.3.

<u>NTS Observes that Batter Piles were Driven Out of Tolerance</u>

KPFF designed the Pier B batter piles to have a small amount of skew to prevent the driven piles from interfering with each other or existing piles from the Old Pier. Tr. 754. The amount of skew "varied from place to place" depending on the circumstances of a particular location, e.g., locations with existing piles sometimes required a "little bit more than typical amount" of skew. Tr. 755. By February 2010, NTS observed that some of the batter piles driven as part of the Pier B construction were out-of-tolerance "in terms of the skew angle that was utilized." Tr. 756; Tr. 421-22. This resulted in reducing Pier B's capacity "to take load in the east-west direction" and "necessitated a fix." Tr. 756-57.

On March 25, 2010, NTS sent a letter to its subcontractor, ACC, and informed ACC that various batter piles had rotated past allowable skew angles:

> During recent survey operations to determine batter and skew angles, it became apparent that multiple batter piles are rotated beyond the allowable skew angle. Preliminary engineering calculations suggest that these out of tolerance, excessive skew angles will result in the batter piles being overloaded and thus subject to failure.
>
> Please consider this letter as notification that all costs for the replacement, supplemental engineering, and other costs associated . . . will be tracked and back charged to ACC's account.

JX 13.1.

To correct the issue, NTS' lead engineer, KPFF, "adopted a fix that added 28 new piles to the pier" which brought "the load capacity back" into Pier B. Tr. 756-57. The design -- referred to as Delta 12 -- also required NTS to construct new crossover beams to tie the 28 new piles into the existing structure and strengthen pile caps "affected by the skew tolerance problems," which included "additional bumpouts, rebar changes, [and] pile connections." Tr. 2495-96; see also JX 26.7; Tr. 756-58. Mr. Johnson, the owner of KPFF, the designer of record, testified that the Delta 12 redesign addressed issues that arose due to the construction of Pier B, not the design. Tr. 762.

On May 6, 2010, KPFF submitted to the Government the design calculations for the Delta 12 redesign. JX 26; Tr. 758-59. On May 27, 2010, the Government approved the Delta 12 redesign. JX 16.1. The redesign work was not implemented until later in the Project. Tr. 2557. In the time between the approval of Delta 12 and the performance of the redesign work, NTS continued to perform bent work at Pier B. Tr. 2557-58.

BergerABAM Raises a Concern with the Pier B Design

On November 6, 2009, NTS informed NAVFAC that NTS had installed two piles that had not achieved specified compressive strength requirements. PX 61.1. NTS' letter stated in part:

> [NTS] drove two 24 inch concrete octagonal piles on October 7, 2009 that did not have a compressive strength of 8,000 psi. The two concrete piles (B-55 and B-60) . . . were subsequently driven on October 7th, B-55 at C-5 and B-60 at E-6.
>
> The casting yard cannot hold all of the piles we cast and thus we store piles on three barges where the piles aged past the 16 days and 8,000 psi required for driving. We tried a new concrete mix on the casting days of August 11th and August 14th and we found that the concrete mix did not perform as we had anticipated and we ceased use of that concrete mix. The piles cast on both days did not meet strength at 28 days and we subsequently took these piles off of the ready to drive list. Our error was that we did not immediately return those piles to the beach or segregate the piles onto the bottom layers of a barge as a reject layer. What further complicated the matter is that the two piles driven with low breaks were replacement piles and had low casting numbers, B-55 and B-60, compared to the other 14 piles with casting numbers ranging from B-157 to B-173. We are currently reviewing the procedures we have in place for numbering replacement piles and for releasing concrete piles that are over 8,000 psi and 16 days and we will advise you when we have finished our review.
>
> The concrete piles driven at C-5 and E-6 have been accepted by KPFF. . . .

Id. NTS enclosed a letter from KPFF stating that NTS could leave these piles in place as support for Pier B based on its calculations. PX 61.11-.43; Tr. 726-28; Tr. 2543-45.

In its November 17, 2009 response, NAVFAC's consultant, BergerABAM, began questioning the k-factor of the understrength piles. JX 23. "K-factor" -- "k" representing slenderness -- is a term used in calculating the capacity of piles or "any particular element" that is in compression. Tr. 705; Tr. 2076-77. BergerABAM observed that KPFF had used a k-factor of 0.5 for its Pier B piles, which BergerABAM questioned. Tr. 1977. Mr. Branlund, a senior project manager at BergerABAM, brought Dr. Schneider[14] into the Project to evaluate whether the

[14] Dr. Schneider is a senior project manager at BergerABAM, and he has a master's degree and Ph.D. in civil engineering from the University of Washington. Tr. 2068-72. Dr. Schneider is licensed in Washington and California in structural engineering. Tr. 2071.

understrength piles created a stability issue. Tr. 2075. In conducting his evaluation, Dr. Schneider did not review the RFP materials, the Project specifications, or NTS' design submittals. Tr. 2120-21. Instead, he relied on Mr. Branlund to provide him with an understanding of the Project and the necessary design calculations. Tr. 2121.

NAVFAC advised NTS that BergerABAM's review of KPFF's calculations raised further concerns about the Pier B pile design, in particular, the values used for the effective length factor in the design, and requested that NTS provide a written response. JX 23.1. On November 24, 2009, NTS responded and attached a letter and report from KPFF. PX 62.1. NTS explained that it had "reviewed the underwater video inspection records for piles C-5 and E-6 and . . . both piles [were] acceptable." PX 62.1. KPFF stated that "the slenderness (K) factor we have used in our analysis is correct for this type of structure . . ." PX 62.2. KPFF further stated:

> The value of the slenderness factor "K" normally is obtained from commonly available tables like the one enclosed or by using the more accurate Moreland Alignment charts. These allow a graphical determination of K for a pile of constant cross section by summation of rigidity of all members rigidly connected to that joint and lying in the plane in which buckling of the pile is being considered, in a multibay frame system such as the Pier B structure. By using the charts, we have determined K to be equal to 0.50 to 0.505. Knowing the difference to be negligible, we chose to use K=0.5 for a fix-fix condition.

Id.

Although KPFF asserted that the k-factor of 0.5 was correct in the context of the entire Pier B structure, BergerABAM remained concerned because the Uniform Facility Criteria ("UFC") -- which was included in the Basis of Design -- stated that the k-factor should be 0.7. Tr. 1979-81. In BergerABAM's view, an incorrect k-factor could indicate that the structure itself would be unstable and could collapse or "show severe structural distress," which in turn would raise a global stability issue. Tr. 1976-77. "Global stability for a structure is its ability to maintain its configuration and shape under the imposed loads, vertical and/or lateral, that it's designed for without . . . becoming unstable." Tr. 1976.

According to American Concrete Institute ("ACI") Code 318-05, Section 10.13.6, there are three methods -- referenced here as A, B, and C -- for determining the global stability of a structure. JX 22.4. The engineer performing the work, in this case, KPFF, chooses which of the three methods to utilize. Tr. 738-39. Method A uses a computer, analytical model to precisely depict the entire structure. Tr. 739. Methods B and C are more conservative approximations that can be done on a spreadsheet without a computer model. Id. BergerABAM's senior project manager, Dr. Schneider, explained that each method is "trying to achieve the same basic goal, which is to look at the slenderness of the system. The reason they are broken up as to A, B, and C depends on how you magnify the moments." Tr. 2082.

On December 1, 2009, BergerABAM provided NAVFAC a response to KPFF's letter, stating:

> . . . . Global stability of the pier in the longitudinal direction relies on the piles to resist lateral deformations by frame behavior. However, as the buckling load is approached, these columns lose stiffness and, hence, their ability to prohibit sidesway. Because pile stability has been considered with an effective length factor

> of K=0.5 only, and the effective length factor for sidesway uninhibited must be larger than 1.0, there is a concern that global stability of Pier B has not been considered properly.
>
> . . .
>
> Ultimately, we feel, Pier B as designed, is a sway frame in the longitudinal direction, and as such, should meet appropriate design requirements for slenderness and stability. This is not evident in the design calculations submitted. KPFF should be clearer about design procedures being used, requirements being satisfied, and be more explicit about their final design process of the piles.

PX 63.3-.5.

On December 15, 2009, KPFF replied via NTS stating that it also "performed the calculations using Items B and C of the ACI provision" and "all three methods resulted in a value less than 2.5." PX 64.4. KPFF reiterated that the original design was correct and met the requirements of the RFP as previously submitted and approved. PX 64.6.

On January 12, 2010, NAVFAC sent a January 7, 2010 letter from BergerABAM identified as the "official Government response." PX 65.1. In its letter, BergerABAM disagreed with KPFF's calculations supporting the finding that the design was correct. PX 65.2-.7. BergerABAM recognized that "ACI 318-05 Section 10.13.6 permits the use of either of three methods [A, B, or C] for gravity load stability assessment" but asserted that method C was the "most appropriate consideration" and that "only alternative (c) checks the margin against the limit state of gravity load buckling" which "is a necessary step in the design of any structural system." PX 65.3. BergerABAM further suggested that the inputs used in KPFF's calculations, including the pile lengths and "creep factor," how the material behaves under sustained, long-term loading, were incorrect and recommended that KPFF reevaluate and "revise" its calculations. PX 65.4, .7; Tr. 2112.

In NTS' January 18, 2010 response, KPFF refuted each of BergerABAM's critiques and provided additional calculations and analysis in response to BergerABAM's requests, even though it deemed this unnecessary to demonstrate compliance with RFP or code provisions. PX 66.9. KPFF concluded:

> We have now responded to two complete rounds of review comments from BergerABAM, and have clearly and amply demonstrated with multiple approaches in both rounds that KPFF's structural design of Pier B is in compliance with the requirements of the RFP and the reference codes and standards.
>
> . . .
>
> The net result of these additional investigations and review has been no change to KPFF's original, approved structural design of Pier B.

<u>Id.</u>

After a series of correspondence between KPFF and BergerABAM in late January 2010, NAVFAC accepted the two understrength piles on February 15, 2010, but noted that the pile connection type for these piles still needed to be addressed. PX 153; <u>see</u> PX 67; PX 68.

On March 8, 2010, NAVFAC notified NTS that, "[b]ased on the attached BergerABAM correspondence dated 12 February 2010, the Navy has concerns that the final approved design . . . may not be in conformance with the RFP" and "other concerns that are surfacing when reviewing . . . the approved design." JX 24.1. NAVFAC directed NTS to address these concerns by submitting "archived analytical models" and "detailed example calculations" justifying NTS' design. Id.

Upon receiving NAVFAC's March 8, 2010 letter, NTS was very concerned -- Mr. Elgenson viewed the letter as a "bombshell" because "the design had already been approved" and "[NTS] basically had to stop work." Tr. 902; Tr. 197 (Mr. Fedrick describing it as a "very, very scary moment"); Tr. 1529 (Mr. Fox stating NTS "needed to stop the critical path activities until we could get this issue resolved"). After receiving NAVFAC's March 8 letter, NTS stopped "critical construction activities" on Pier B, and stopped placing concrete. Tr. 2555; Tr. 198.

NTS informed the Government at morning project meetings that after March 8, 2010, NTS was not pouring concrete or performing critical construction activities and was stopping all critical path activities until the global stability issue was resolved. Tr. 1529-30. Between March 8 and May 7, 2010, NTS performed some non-critical work in connection with Pier B bent construction, including setting pile collars and temporary deck forms at a few select locations, but stopped most critical construction. JX 60.6; Tr. 1318; Tr. 1618-19; see also Tr. 2507-08, 2555; Tr. 2621.

KPFF Hires Gerwick to Conduct An Independent Review

In light of this ongoing dispute regarding global stability, KPFF retained Ben C. Gerwick, Inc. ("Gerwick") on February 22, 2010, to perform a third-party independent review of KPFF's global stability calculations of ACI 318-05, Section 10.13.6 (a). Tr. 747-48, 794; see also PX 173.1. Henrik Dahl, a Senior Project Manager, prepared the Gerwick Report, which discussed information reviewed, including KPFF's design calculations and drawings, pertinent parts of the RFP, as well as the GEBS and site bathymetry drawings. Tr. 1060, 1073-74; JX 25.5, .8. Gerwick prepared an independent model to compare with KPFF's assumptions. Tr. 1089-90. To ensure the production of an independent model, Gerwick's modeler was denied access to KPFF's model. Tr. 1090-91.

Gerwick's independent review modeled a different approach to verify ACI 318-05, Section 10.13.6 (a) compliance, and the results of Gerwick's model were within 10 percent of KPFF's model, which, in Mr. Dahl's view, showed that KPFF's model was done correctly. Tr. 1091; JX 25.8. The Gerwick Report concluded that "KPFF's method of evaluating the strength and stability of Bremerton Pier B as a whole under factored gravity loads" and was in compliance with ACI 318.05, Section 10.13.6 (a) "with a considerable margin," i.e., "in the range of 30 percent." JX 25.8; Tr. 1091-92. In Gerwick's view, KPFF's model for global stability was more conservative than ACI 318-05, Section 10.13.6 (a) required, and from an engineering standpoint, provided a greater safety margin in the design. Tr. 1092.

On April 2, 2010, in response to the Gerwick Report, NAVFAC Design Manager Matt Butler sent a series of emails to NTS. See JX 14. Mr. Butler stated that "the most significant part of the structural pier substructures is going to have to be completely re-designed and resubmitted for Navy review." JX 14.1. Because he did not "want to spend the next two or three months reverse engineering what is behind the numbers [NTS] or a third or fourth party say are just fine," he requested NTS "open [the design] for examination" and provide the Navy with the "same program and to the same input data" so the Navy could make its own evaluation. Id.[15]

Ultimately, in its May 24, 2010 review comments, BergerABAM agreed that NTS' Delta 12 redesign -- which addressed the skew issue -- resolved the Pier B stability issue. JX 16.7. Specifically, in reviewing the redesign, BergerABAM commented: "As a result Pier B, with the addition of 28 new battered piles satisfies the stability requirements of ACI318-05, Section 10.13.6, since technically it is sufficient to satisfy only Section 10.13.6a." Id. KPFF interpreted these statements as a concession that ACI 318-05, Section 10.13.6 (a) was satisfied with the addition of the 28 additional piles necessitated by the Delta 12 redesign. Tr. 760-61. None of the prior discussions between KPFF, BergerABAM, and the Government had included adding 28 piles to satisfy global stability requirements. Tr. 761.

The Global Stability Design Issue Led to Schedule Slippage.

On February 5, 2010, NTS provided NAVFAC a CPM Schedule Update, stating that, as of the end of January 2010, the Project was only six days ahead of the Contract completion date -- that the Project had six days of "float" in the schedule. JX 62.105-50; Tr. 1252. On February 11, 2010, Janet Olson, the contracting officer ("CO"), sent a letter to NTS regarding the "significant decline in the available float in the schedule." JX 12.1. CO Olson stated in part:

> 107 days of float have been lost in the last 4 months, which causes the Government concern for the overall completion of the project.
>
> While I recognize that you are actively working on maintaining the project schedule to complete Pier B and associated activities by the contract completion date, I feel it necessary at this time to inform you that should the float go negative you will be required to submit a recovery plan demonstrating how you will improve progress without additional cost to the Government in accordance with Federal Acquisition Regulation 52.236-15, Schedules for Construction Contracts.

Id.

On March 5, 2010, NTS submitted a "Recovery Schedule" to NAVFAC. JX 62.151-.282. However, three days later, on March 8, 2010, after receiving NAVFAC's letter expressing concern with its design, NTS stopped most critical construction until May 27, 2010. Tr. 197-99, 254-55; Tr. 1618-19; Tr. 1318. This work stoppage resulted in between 62 to 64 working days of further delay. Tr. 2621.

NTS' Acceleration

In early June 2010, NTS began to accelerate performance. This included making arrangements to move a crawler crane onto a barge to perform Pier B pile cap work and purchasing additional false work. JX 62.435. NTS' crews "worked extra hours every week for an extended period of time" to expedite the work and "had to bring in extra equipment" to support the larger crew size. Tr. 904; see PX 81.

---

[15] This included providing the archived analytical models that NAVFAC had requested on March 8, 2010. JX 14.2; Tr. 1880-81. Sometime after April 2, 2010, KPFF provided NAVFAC with archived analytical models. Tr. 792-93; Tr. 1986.

On July 21, 2010, NAVFAC sent a letter to NTS informing it that "there is . . . again a significant decline in the float available in the schedule." JX 15. According to CO Olson, "100 days of float have been lost in the last 4 months, which causes the Government significant concern for the overall completion of the project." Id. CO Olson reminded NTS that "should the float go negative you will be required to submit a recovery plan . . . ." Id.

On October 4, 2010, NTS delivered a work plan to the Government for the Pier B crossbeam piles. Tr. 1511. As of that date, NTS had not started installing the additional 28 piles and crossbeams -- which were intended to address excessive pile skewing. Tr. 756; JX 26.7. On November 12, 2010, CO Olson sent NTS a letter expressing concern that "float is once again declining" and the "activity durations and completion dates of many activities appear to be unrealistic." JX 17. On December 2, 2010, Dan Fox, NTS' project manager,[16] responded, stating that NTS was "evaluating options for re-sequencing work on Pier B" to accelerate work. JX 18.1. He also noted that NTS had mitigated Pier B schedule impacts by working overtime which allowed NTS to maintain the project schedule. Id. On December 2, 2010, CO Olson responded acknowledging that NTS had hired nine additional employees and planned to increase crews to accomplish the contract work. JX 27.1.

On January 7, 2012, the Government commenced an inspection, and on January 26, 2012, confirmed that the "work has been inspected and found acceptable with final inspection punch list items." JX 28.

NTS' REAs

REA 5

On November 18, 2010, NTS submitted REA 5 seeking $1,079,189.55 for costs incurred as a result of differing site conditions encountered at the Mole Quaywall, including costs for cutting and handling and disposal of long piles, grouting and coring dowel holes, exposed pile strands and disposal of debris, false-work, reinforcing steel modifications, and additional inspection. PX 28.4-.8; PX 176; see also Tr. 1484.

On June 19, 2013, NAVFAC issued Contract Modification Number A00057 providing NTS an equitable adjustment in the amount of $675,000 in settlement of REA 5. JX 2.3791. The reason code indicated in Modification Number A00057 was the differing site condition clause, although NAVFAC did not believe there were actually differing site conditions. JX 2.3790; Tr. 1634-35. The CO noted in a June 4, 2013 Non-Competitive Pre-Negotiation Business Clearance Memorandum that "[t]he Government does not see this as being a differing site condition nor an issue of defective specifications as is implied in the contractor's Serial Letter 233." DX 89.3.

NAVFAC's decision finding merit in part of REA 5, states:

> Due to the Government providing the pile tip elevations, the Government is responsible for the costs associated with additional pile cutoffs, grouting, and disposal to include all associated labor, materials, equipment, supervision and

[16] In late February 2010, NAVFAC removed Mr. Elgenson as NTS' project manager. Tr. 914 (explaining that NAVFAC issued a letter that "referenced a contract specification where they could have any personnel removed"); Tr. 219-20; Tr. 1503 ("My understanding is the government, as part of the contract, had the ability, if they chose, to change out management on our . . . side . . . and they did."). In early March 2010, Dan Fox became the new Project Manager. Tr. 1504.

> associated markups. With the revised request from the Contractor the Government does now see some merit with some alignment issues that are due to the over length piles, which is addressed in the technical analysis.

DX 89.3 (emphasis added).

REA 14

On April 1, 2011, NTS submitted REA 14 for $1,881,900 for costs incurred to mitigate the 64-work-day stoppage on Pier B -- "the Global Stability Delay." PX 73. On February 5, 2013, CO Olson denied REA 14. PX 93.1. On June 26, 2014, NTS sent a certified claim requesting a contracting officer's final decision for REA 14. See JX 21. On September 4, 2014, Eileen Mitchell, Chief of the NAVFAC Contracting Office, issued a final decision denying NTS' REA 14 claim. Id.

REA 9

On October 11, 2011, NTS submitted REA 9 seeking $10,498,284.85 for costs incurred as a result of differing site conditions encountered at Pier B, including engineering and redesign work, cutting and handling of long piles, additional time for disposal of long piles, grouting dowel holes, coring dowel holes, exposed pile strands and disposal of debris, false-work, reinforcing steel modifications, precast concrete plank modifications, and additional inspection. PX 33.

On February 5, 2013, CO Olson denied REA 9. PX 34.17. On October 31, 2013, NTS submitted a certified claim requesting a contracting officer's final decision for REA 9. See PX 36. On August 12, 2015, CO Mitchell issued her final decision denying REA 9. JX 20.

Discussion

Jurisdiction and Legal Standard

Plaintiff brings this action under the Contract Disputes Act ("CDA"), 41 U.S.C. § 7104(b)(1), appealing the contracting officer's final decisions on its claims. The Tucker Act, 28 U.S.C. § 1491(a)(2), confers jurisdiction on the Court of Federal Claims "to render judgment upon any claim by or against, or dispute with, a contractor arising under section 7104(b)(1) of title 41 [of the Contract Disputes Act] . . . on which a decision of the contracting officer has been issued under section 6 of that Act." In accordance with the CDA, the Court reviews the contracting officer's decision de novo. 41 U.S.C. § 7104(b)(4).

Contract interpretation is reviewed as a matter of law, and the Court gives no deference to the interpretation adopted by the agency. Lockheed Martin IR Imaging Sys., Inc. v. West, 108 F.3d 319, 322 (Fed. Cir. 1997). Where the United States is a party to the contract, the Court of Federal Claims applies general rules of contract interpretation, giving the terms of the contract "their customary and accepted meaning." Scott Timber Co. v. United States, 333 F.3d 1358, 1366 (Fed. Cir. 2003) (citing Alaska Lumber & Pulp v. Madigan, 2 F.3d 389, 392 (Fed. Cir. 1993)).

NTS' Differing Site Conditions Claims

NTS' subcontractor, ACC, experienced pile driving difficulties at Pier B from the start of the Project in August 2009. DX 20.2. NTS originally advised its subcontractor, ACC, that these difficulties were to be expected in this location and soil type and denied ACC's differing site condition claim. However, NTS later changed its position and claimed that ACC's inability to drive 136 piles to their designed tip elevations -- resulting in excessive cutoffs and lack of alignment -- was caused by "unknown subsurface conditions," and "a Differing Site Condition at the Pier B structure." PX 33; PX 71; JX 13; Tr. 756. NTS alleges that it encountered a Type I or Type II differing site condition at Pier B. For its Type I Claim, NTS argues that it encountered unspecified conditions and obstructions that were not disclosed in the contract documents. For Type II, NTS alleges that it encountered an "unknown physical condition," causing "shallow and erratic pile refusals." Pl.'s Post-Trial Br. at 142-43.

In addition to the piles failing to reach expected elevations, NTS claims that the differing conditions allegedly "caused piles to move during pile-driving and fall outside the specified tolerances." Pl.'s Post-Trial Br. at 130. When piles are "out of tolerance" or "out of alignment," they can reduce the load capacity of the entire pier, and because the piles did not go where they were supposed to, they could not "conform to [NTS'] design that was approved." Tr. 757; Tr. 214.

Alternatively, NTS alleges that the Government furnished defective specifications "as to the site conditions that would be encountered and the method by which piles at Pier B should be designed and installed." Compl. (16-925C) ¶ 103.

NTS Failed to Demonstrate a Type I Differing Site Condition.

Type I differing site conditions are "subsurface or latent physical conditions at the site which differ materially from those indicated in th[e] contract." 48 C.F.R. § 52.236-2(a)(1); Meridian Eng'g Co. v. United States, 885 F.3d 1351, 1356 (Fed. Cir. 2018). Plaintiff alleges it encountered undisclosed obstructions, likely boulders and cobbles, and variable elevations at which piles reached refusal in the beach deposits -- resulting in excessive pile cutoff and a lack of alignment. Pl.'s Supp. Reply at 4; Pl.'s Post-Trial Br. at 123-24. Plaintiff did encounter difficult pile driving. During performance, 104 of the 456 Pier B piles reached refusal more than 12 feet above NTS' design depths, 186 pile tops "were more than 6 inches out of their horizontal position," and 35 pile tops "were more than 18 inches in misalignment." PX 132.4. However, it was NTS who determined these design depths, not the Government, and Plaintiff has not established that its pile driving difficulties were due to differing site conditions.[17]

In order to recover for a Type I differing site condition, the contractor must prove by a preponderance of the evidence that:

> [1] the conditions indicated in the contract differ materially from those actually encountered during performance; [2] the conditions actually encountered were reasonably unforeseeable based on all information available to the contractor at the time of bidding; [3] the contractor reasonably relied upon its interpretation of the

[17] NTS suggests that because the Government granted an equitable adjustment of $675,000 for differing site conditions at the adjacent Mole Quaywall under Contract Modification A00057, NTS is entitled to an equitable adjustment for pile driving difficulties at Pier B. Pl.'s Post-Trial Br. at 131; JX 2.3791. However, the Government did not deem the situation at the Mole Quaywall to be a differing site condition. DX 89.3. There is a significant difference in what transpired at the Mole -- the Government provided the design and pile tip elevations for the Mole Quaywall, while NTS designed and chose the pile lengths and arrangement for Pier B. JX 2.574, .1356, .1358, .1360.

> contract and contract-related documents; and [4] the contractor was damaged as a result of the material variation between expected and encountered conditions.

Comtrol, Inc. v. United States, 294 F.3d 1357, 1362 (Fed. Cir. 2002) (citing H.B. Mac, Inc. v. United States, 153 F.3d 1338, 1345 (Fed. Cir. 1998)); see also Stuyvesant Dredging Co. v. United States, 834 F.2d 1576, 1581 (Fed. Cir. 1987).

To recover for a Type I differing site condition, a contractor must first prove, as a threshold matter, that the contract contained some identification of the conditions to be encountered at the site. Renda Marine, Inc. v. United States, 509 F.3d 1372, 1376 (Fed. Cir. 2007) (citing H.B. Mac, 153 F.3d at 1345 and P.J. Maffei Bldg. Wrecking Corp. v. United States, 732 F.2d 913, 916 (Fed. Cir. 1984)). Such indications "'need not be explicit or specific' so long as they provide sufficient grounds by which the contractor can justify his 'expectation of latent conditions materially different from those encountered.'" Neal & Co. v. United States, 36 Fed. Cl. 600, 617 (1996) (citing P.J. Maffei, 732 F.2d at 916).

"When determining whether site conditions were reasonably foreseeable to the contractor, both the contract and any other information available to the contractor are considered." CCI, Inc. v. McHugh, 608 F. App'x 937, 940 (Fed. Cir. 2015) (citing Int'l Tech. Corp. v. Winter, 523 F.3d 1341, 1349 (Fed. Cir. 2008)). Contract documents "include not only the bidding documents (Invitation for Bids, drawing specifications and other documents physically furnished to bidders) but documents and materials mentioned in the bidding documents as well." McCormick Const. Co. v. United States, 18 Cl. Ct. 259, 263 (1989); W.M. Schlosser, Inc. v. United States, 50 Fed. Cl. 147, 153 n.8 (2001).

NTS claims that the contract documents did not indicate it would reach refusal in the beach layer or encounter refusal at "unpredictably" varying elevations, and instead indicated that pile driving conditions would be predictable and manageable. Pl.'s Post-Trial Br. at 124, 127; Pl.'s Resp. at 2 ("NTS came away from its review of [documents and information furnished by the Government before Contract award] with the reasonable conclusion that, although pile driving conditions would be hard, they would still be predictable and manageable."); see also Tr. 1130-31 (Mr. Boirum opining that "it was anticipated that, for instance, all of the piles would be able to penetrate through the beach deposits and terminate in the glacially consolidated materials below that."); Tr. 880-81 (Mr. Elgenson stating that the GEBS "told us that we should be able to drive the piles . . . within 5 foot or drive to 5 foot into the glacial till").

The GEBS Did Not Represent that Piles Could Be Driven Into Glacial Soils.

Plaintiff argues that the GEBS indicated that piles could and should be driven five feet into the glacial soils. In so arguing, NTS misinterprets the GEBS. The GEBS provision on which NTS relies states:

> We understand that 24-inch prestressed, solid, octagonal concrete piles are preferred for much of the replacement of Pier B. . . . [W]e recommend that the piles be driven to and tipped a minimum of 5 feet *into* the glacial soils or practical pile refusal. Assuming an approximate, practical pile refusal of 5 feet, piles should be driven to a minimum of elevation 37 and 29 feet (PSNS Datum), for Stations 0+00 to 8+25 and 10+00, respectively, or 5 feet of embedment into the glacial soils as shown on Figure 3. . . . Note, practical pile refusal is a function of the hammer

<u>selected by the Contractor, and therefore must be estimated during construction with observation of the actual equipment and pile driving behavior.</u>

JX 1.2371 (emphasis added). Hart Crowser's <u>recommendation</u> was phrased in the alternative -- that the contractor drive piles "5 feet into the glacial soils <u>or practical pile refusal</u>." JX 2.2619 (emphasis added). The use of the connector "or" indicates an alternative, <u>i.e.</u>, either five feet into the glacial soils <u>or</u> some other unspecified depth that equates to practical pile refusal. The GEBS indicated that practical pile refusal could be different than "five feet into the glacial soils" and could instead be an undetermined depth until practical pile refusal was achieved during construction upon the the driving of a pile. <u>Id.</u>

Garry Horvitz, the Vice President and Senior Principal Geotechnical Engineer at Hart Crowser, who oversaw production of the GEBS, testified that the above paragraph in the GEBS did <u>not</u> provide determinations of practical pile refusal. Mr. Horvitz further explained that adding "or practical pile refusal" meant that although Hart Crowser anticipated the contractor would achieve capacity in the glacial soils, it could achieve capacity in the beach layer and "we're okay with that." Tr. 1767. NTS' geotechnical expert, Ralph Boirum, acknowledged that "the language 'until practical pile refusal' softens the prior language '5 feet into the glacial till.'" Tr. 1185.

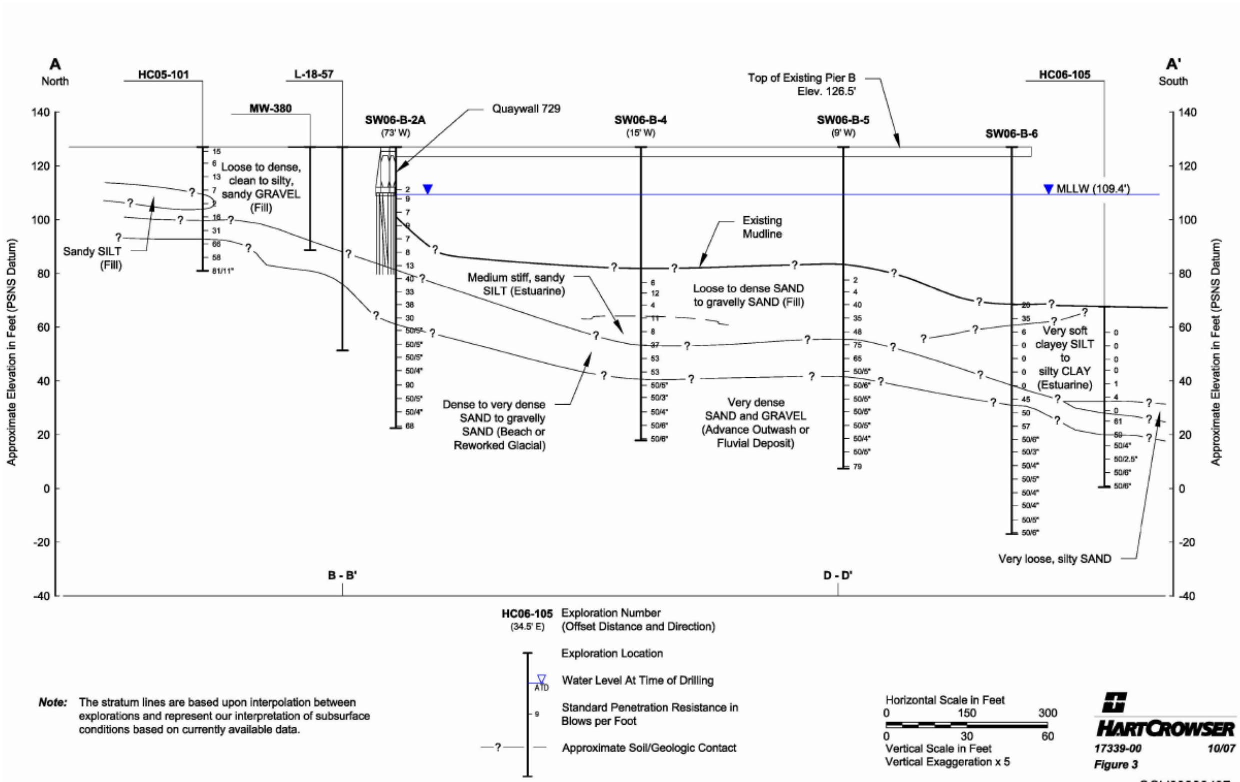
Contrary to Plaintiff's arguments that the GEBS repeatedly indicated "that practical pile refusal would occur in or at the glacial soils," Hart Crowser did not define in the GEBS what practical pile refusal would be for the Pier B Project. <u>See</u> Pl.'s Resp. at 63; Pl.'s Post-Trial Br. ¶ 12. Rather, Hart Crowser put forth an assumption, and based on that assumption, spelled out minimum elevations stating "[a]ssuming an approximate, practical pile refusal of 5 feet," "piles should be driven to a minimum of elevation 37 and 29 feet." JX 2.2619. Hart Crowser made clear that the contractor would need to make its own determination regarding practical pile refusal during construction, expressly stating "practical pile refusal is a function of the hammer selected by the Contractor, and therefore must be estimated during construction." <u>Id.</u>

In sum, as the GEBS stated, the depth at which piles would meet practical pile refusal was not definitized.

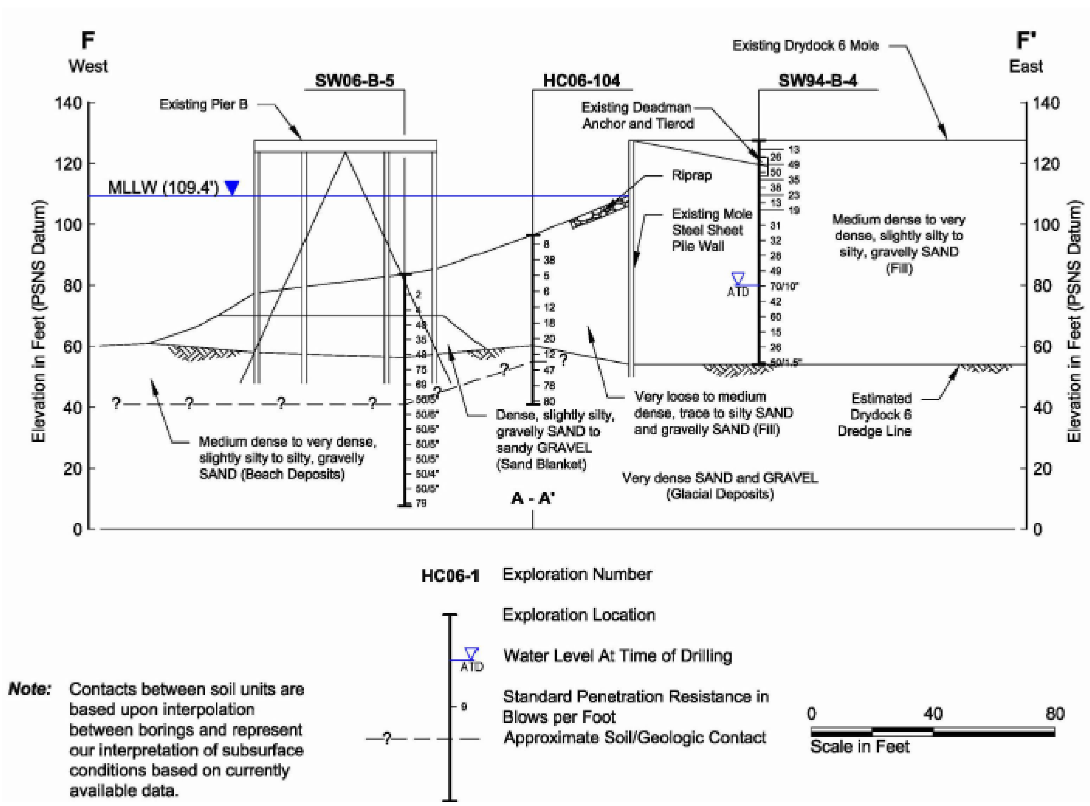
<u>The Contract Documents Indicated Uncertain Subsurface Conditions.</u>

The GEBS expressly advised potential contractors that it only provided limited information about the subsurface conditions via data from borings and indicated that there was uncertainty regarding subsurface conditions in areas between borings. While the borings allowed Hart Crowser to determine the subsurface conditions at the boring locations themselves, borings are only 3.5 inches in diameter and gave insights into a relatively small area. Tr. 548.

The following diagrams in the GEBS showed generalized north-to-south and west-to-east cross sections with question marks indicating uncertain and unknown subsurface conditions in an array of locations between borings:



JX 2.2665.



JX 2.2670.

Witnesses from both parties testified that the question marks between boring locations in these diagrams in the GEBS meant that the subsurface conditions between the borings were unknown. Tr. 564 (Mr. Sarieddine stating "it's typical in our profession to [insert question marks] because we know the conditions at the boring locations. We didn't know in between."); see also Tr. 333; Tr. 788; Tr. 1751; Tr. 2333.

Ronald Fedrick, NTS' former chairman and CEO and Rule 30(b)(6) representative, acknowledged that NTS had to make assumptions about how deep the pile elevations would be and how much cutoff it would have, because "there's nothing more variable than geotechnical conditions." Tr. 108; see also Tr. 1765. Mr. Fedrick testified:

> A. So what we did is add 5 feet in length to be able to allow for the variability of the soil conditions there.
>
> It's a lot -- well, when we have to do a buildup is when the pile goes to a depth, and all of a sudden now it can't reach the top of the structure, so we have to build on top of a pile. And, generally speaking, it's more expensive to do that than to cut off a pile, assumedly it's not too big of a piece of cutoff.
>
> Q. [By Counsel for Plaintiff] And for this project, did -- did you assume that you would have to cut off some of the piles?
>
> A. We assumed we'd have to cut off, I think, half of the piles on the project.
>
> Q. Half of the -- not half of the pile lengths, but half of the total number of piles?
>
> A. Half the total number of piles.
>
> Q. Okay. And how much on each pile did you assume that you would have to cut off?
>
> A. You know, again, we're assuming 2- or 3- or 5-foot cutoff.
>
> Q. So, at most, 5 feet?
>
> A. At most, 5 feet.

Tr. 108-09.

In explaining why NTS chose 5 feet, Mr. Fedrick testified:

> A. And what [JX 2.2665 and JX 2.2670] are indicating is [the drafters of the GEBS] really don't know where that bottom is at. And they've done a boring here, and they know that location; done a boring here, and they know when it's at that location. And, you know, they've done a boring here, and they know what that location is.
>
> So in between those borings, we really don't know. We know what it's at there. So the logical assumption that we would make at bid time is we're drawing, like I said before, straight lines between those, but then we're adding 5 feet to them because, you know, we don't want to be 5 feet short. It's much more economical for us to add 5 feet to a pile and cut off 5 feet, let's say, than it is for us to have to add 5 feet after it's been installed and it comes up 5 feet shor -- it comes, you know --

> . . .
>
> THE WITNESS: -- below that piece. And the --
>
> THE COURT: . . . Why -- why 5 instead of --
>
> THE WITNESS: Why 5 feet?
>
> THE COURT: -- [instead of] 3 or 10 or 20?
>
> . . .
>
> THE WITNESS: So what -- what we envision there is that the worst case we'd ever see would be something like 15 feet, you know, of variability, and maybe -- and with suspicions, more like 3 to 5 feet. Because they do have a lot of information in between here. And just like is shown in here, this is kind of what we'd expect. So what we do is we just grab -- and I'll say it's -- it's a number and it's 5 feet. And that number is based on, I'll say, the experience of building numerous piers and wharfs for United States Navy.

Tr. 333-35.

The contract documents expressly informed the contractor that it should conduct additional explorations:

- Within "The Need for Additional Explorations" section of the GEBS, Hart Crowser recommended that:

  > The Contractor should review the existing soil explorations and determine if they are adequate to complete the design of the proposed project. If the quantity or location of the soil explorations is insufficient, the Contractor should include additional soil explorations in their scope of work.
  >
  > To date we have only been able to advance a limited number of borings along the mole quaywall due to logistical constraints. It would be beneficial to conduct additional borings along the length of the mole quaywall once the site is open for construction

  JX 1.2367-68.

- Within the "Subsurface Data" subsection of the "Contract Drawings" section, the RFP warned that the GEBS "is included for the Contractor's information only and is not guaranteed to represent fully all subsurface conditions" and that "[d]epending on the proposed design by the Contractor, the Contractor shall perform, at its expense, such additional subsurface exploration, investigation, testing, and analysis as its Designer of Record deems necessary for the final design and construction of the foundation systems." JX 1.248.

- Within the "Engineering Systems Requirements" section, the RFP stated that "[t]he Contractor shall perform a detailed and complete geotechnical engineering investigation, including additional borings if needed, for the final project design and construction." JX 1.490.

<u>The Contract Documents Described an Indicator Pile Program that Contractors Were to Use in Formultating their Design.</u>

The contract required contractors to conduct an Indicator Pile Program post award to assess pile capacities, drivability through "dense zones of soil" and "possible unforeseen circumstances." JX 2.2639. The contract documents described the Indicator Pile Program, stating:

> Based on past experiences within the PSNS and other Navy facilities, indicator piles with dynamic pile testing provide extremely useful information to supplement soil explorations and analysis for evaluating pile capacity and drivability. The purpose of the indicator pile program is to verify the location of the top of the glacial soil bearing layer(s) to aid in selection of pile tip elevations and lengths, and to verify design shaft friction. The benefit of an indicator program with dynamic pile testing over soil explorations is that <u>the indicator piles may be used to assess pile capacities and safety factors and drivability through dense zones of soil, and to identify possible unforeseen circumstances</u>.

<u>Id.</u> (emphasis added).

NTS understood the Indicator Pile Program described in the contract and recognized in its technical proposal that it was responsible for incorporating its indicator pile results into its design:

> During design development the indicator piles will be installed and dynamically tested. Due to the critical timing for incorporating the indicator pile results into the design we plan to utilize non-production piles (sacrificial) for the concrete indicator piles. We anticipate completion of the test pile program in 46 calendar days. Results will be shared with the owner for review prior to incorporation into the design and used to confirm the load capacity of the piles.

JX 4.197. Further, as Mr. Fedrick testified, NTS' proposal stated that its tip elevations and pile lengths would be based on the indicator pile program, not the bidding documents. In its Basis of Design, NTS expressly anticipated potential interferences from preexisting piles from the Old Pier B and planned to modify the structural plan for Pier B "[w]here potential interferences are identified." JX 4.195.

Knowing that it would base its design and tip elevations on the results of its indicator pile program, NTS chose to test only eight piles -- the contractual minimum, even though the GEBS "strongly recommended a minimum indicator pile program for Pier B consisting of ten indicator piles." JX 1.2392. NTS did not test any piles in the footprint of the Old Pier, where NTS would encounter preexisting piles and densified soil, even though Mr. Fedrick described the preexisting piles in the footprint of the Old Pier as a "major risk." Tr. 157; <u>see also</u> Tr. 142; Tr. 494. Instead, NTS' subcontractor used LiDAR imaging to conduct a survey of the preexisting piles, but this survey did not indicate the position of these piles under the mudline.

<u>The Contract Documents Indicated that the Beach Layer Deposits Were Dense or Very Dense and that Hard Driving Was to be Expected.</u>

The GEBS stated:

> **Beach Deposits**. This material consists of dense to very dense, wet, brown, trace to slightly silty, slightly gravelly to very gravelly SAND. Some boring logs identify

> seams of coarse gravels. This material is competent and would support a portion of the foundation loads.

JX 2.2615.

Three boring logs described in the GEBS indicated the presence of cobbles, -- i.e. obstructions which could adversely affect pile driving. PX 132.6; Tr. 918. The 2006 Report, cited in the GEBS' Appendix D, "Summary of Previous Geotechnical Explorations and Data," stated that "[b]each deposits consisting of dense to very dense sand to gravelly sand were encountered below the fill and estuarine deposits." DX 2.11. Mr. Frizzi explained that "dense to very dense" meant the soil "has a high resistance to penetration." Tr. 2331; JX 2.2665. The 2006 Report futher explained that, "[i]n our opinion, any pile installation for the proposed pier would encounter . . . hard driving conditions in the dense to very dense beach deposits and glacial soils." DX 2.12.

Contrary to Plaintiff's argument, the contract documents did not indicate a "predictable" level of drivability and variation within the beach layer. The GEBS made clear that the beach layer varied from "dense to very dense," indicating that NTS could encounter differing levels of density throughout the beach layer causing it to reach refusal at varying elevations. The 2006 Report stated that the beach layer would be "medium dense to dense" once, "dense" four times, and "dense to very dense" three times, and that the glacial layer would be "dense" twice, "dense to very dense" once, and "very dense" 19 times. DX 2.10-.30.

NTS' witness, Mr. Brenner, a former pile driving consultant to NTS and former employee of ACC, testified that driving would be difficult:

> Q. [By Counsel for Plaintiff] Okay. As for your mention of looking at geotechnical information, based on that examination did you form any understanding about the subsurface conditions that ACC intended to -- or expected on the project?
>
> A. It was going to be -- in a scale of 1 to 10 for hard driving or easy, it was going to be an 8.
>
> Q. Okay. Did you form any expectations about how -- whether that work could be done?
>
> A. It's -- it's always got to be done, yes. I mean, it was -- there were no expectations of not being able to do it.

Tr. 352-53; see also Tr. 555; Pl.'s Resp. at 64; Tr. 1177.

The Contract Documents Indicated Possible Subsurface Obstructions.

Under the section on "Pile Driveability" in the GEBS, Hart Crowser stated that "[d]ifficulties during pile driving may be encountered as a result of obstructions that may exist throughout the areas where piles are anticipated to be specified" and "pile[s] may need to be moved" if "deep obstructions are encountered." JX 1.2381.

The contract itself warned of obstructions. Part 4 of the contract, "Performance Specifications," stated:

> **H10 1.2.2.4** - Riprap Material, Pile Stubs, and Other Debris

> The Contractor and Designer of Record shall be aware that unknown sizes of riprap material, pile stubs, or other debris may exist at the planned locations of piles and/or sheet piles at the locations for Pier B, the Mole Quaywall, and Quaywall 729. It may be necessary for the Contractor to remove and/or spud through riprap, pile stubs, or other debris, or use a similar method to penetrate through the obstructive material to enable installation of the prestressed concrete piles, fender piles, reaction piles, and/or sheet piles without damage and at no additional cost to the Government. . . .

JX 1.555; JX 2.644.

When discussing prescriptive elements for "soil anchors"[18] for Quaywall 729, the contract documents stated:

> A Geotechnical Engineering Baseline Study [is] in Attachment J of Part 6 of this RFP document. Subsurface soil data logs are shown on the drawings in Attachment B, Part 6 of this RFP and in the Geotechnical Engineering Baseline Study. <u>While the foundation information is representative of subsurface conditions at the respective locations, local variations in the characteristics of the subsurface materials may be anticipated. Local variations which may be encountered include, but are not limited to, variation in the soil classifications, the presence of cobbles, boulders, existing timber piles or existing timber elements.</u> Such variations will not be considered as differing materially within the scope of the Contract Clause "Differing Site Conditions."

JX 2.1135 (emphasis added). Defendant contends that this clause waives any of NTS' claims regarding cobbles and boulders. Def.'s Post-Trial Br. at 121-23. The Court disagrees. This provision concerned Quaywall 729, not Pier B. This clause, however, does inform the contractor that cobbles and boulders were reasonably foreseeable in pile driving in the Pier B area. Quaywall 729 was adjacent to and just north of the Pier B structure and thus, local variations under Quaywall 729 would have put NTS on notice that these variations could exist in the subsurface of the neighboring Pier B.

NTS argues that the GEBS did not make clear disclosures that the beach deposits under Pier B might contain obstructions. However, the GEBS references the 2006 Report, which indicated obstructions, including "large cobbles, boulders, and miscellaneous construction debris" above the beach layer and boulders in the lower advance outwash deposits. DX 2.13. The 2006 Report stated that "[o]bstructions, such as large cobbles, boulders, or miscellaneous construction debris could be encountered within the fill and underlying soft estuarine deposits." <u>Id.</u> Even the borings -- which are only 3.5 inches in diameter -- detected three instances of cobbles. PX 132.6; Tr. 548.

<u>The Contract Documents Indicated the Presence of Pre-Existing Piles and Soil Densification.</u>

NTS had to avoid preexisting piles during performance, a condition disclosed in the contract documents. JX 2.587. The preexisting piles from the Old Pier were within the footprint of the new Pier B, and could have adversely affected pile driving. <u>Id.</u>; Tr. 2341; Tr. 439; <u>see also</u> Tr. 529-30, Tr. 1829-30. None of the borings driven into the footprint of the Old Pier were close

---

[18] Soil anchors are "like tieback anchors on a retaining wall," but are steel rods or strands embedded in a hole drilled in the soil and filled with concrete grout. Tr. 617.

to where the preexisting Old Pier B piles were located, preventing Hart Crowser from determining the effects that such preexisting piles in the Old Pier had on the subsurface conditions. Tr. 2528-29. As Defendant's geotechnical expert, Rudolph Frizzi, pointed out, "there wasn't any boring data right underneath the middle of Pier B," which made it "clear" that there "wasn't information [of the subsurface conditions] . . . underneath Pier B, the former Pier B." Tr. 2354-55.

Under "Pile Installation and Construction Considerations," the GEBS stated that "[p]ile spacing within groups of driven piles or adjacent to existing piles should be no less than 3-pile diameters on center." JX 1.2380 (emphasis added); Tr. 2337-38 (Mr. Frizzi testifying that he believed this sentence was included to warn bidders that there was densified soil around the preexisting piles that could impact driving). Mr. Brenner testified that densification is not permanent in soft soils, but in hard soils, a process call "setup" occurs in which the soils around the piles become "much stronger" over time. Tr. 386; Tr. 407; see also JX 2.2615. The densified soil could extend as far as 10 feet around the pile, and could cause pile driving issues. Tr. 425, 439; Tr. 2341-42, 2368-69; Tr. 1815, 1829-30; Tr. 2017.

NTS' subcontractor, KPFF, conducted a LiDAR-imaging survey to determine the location of preexisting piles so NTS could avoid hitting them. PX 132.5; Tr. 1186; Tr. 156-57. However, the LiDAR survey only showed "the inclination of the pile from pile cutoff at the pile cap to the waterline," which does not account for the pile below the mudline. Tr. 1814. Mr. Davis, a senior construction specialist at BergerABAM, stated:

> Q. [By Counsel for Defendant] Is there anything about the use of LiDAR that concerns you as to whether it would show where the pre-existing piles really were in the subsurface?
>
> A. Well, it -- you get a survey that takes a relatively short section of a pile and -- and you get an inclination and a direction from that survey, which you -- you probably have 20, maybe 25 feet of pile that you get information on. But you got another 60 to 80 feet of pile that's below the water and -- below the -- the surface soils that you're assuming that that direction and angle are exactly the same for the remainder of the pile that you can't survey.
>
> Q. . . . In your experience, are piles below the subsurface always in the same angle as what you can observe above the subsurface?
>
> A. No. They're -- they sometimes can be, but more often than not, they're a bit different. And the reason I know that is because I've been on projects where we've put inclinometer tubes inside of piles, that you drive the pile, and you send this "rabbit" down that gets our south-east-west directions at incremental places along the pile so that you can actually tell -- you can actually plot the course of that pile and the shape of it that's below the surface that you can't see.

Tr. 1827-28. The LIDAR survey fell short of ascertaining where preexisting piles were located under the surface of Pier B.

Based on this record, NTS has not established a Type I Differing Site Condition. The contract documents did not indicate that the Contractor would uniformly be able to drive piles five feet into the glacial layer or that its piles would reach refusal in "predictably" varying elevations.

NTS Failed to Demonstrate a Type II Differing Site Condition.

Proving a Type II differing site condition is more difficult than proving a Type I differing site condition. Randa/Madison Joint Venture III v. Dahlberg, 239 F.3d 1264, 1276 (Fed. Cir. 2001) (citing Charles T. Parker Constr. Co. v. United States, 193 Ct. Cl. 320, 333 (1970)); Fru-Con Const. Corp. v. United States, 44 Fed. Cl. 298, 312 (1999) ("Plaintiff's burden in establishing a Type II differing site condition is relatively heavy." (citation omitted) (quotation omitted)).

To prove Type II differing site conditions, a contractor must show by a preponderance of the evidence: "unknown physical conditions at the site, of an unusual nature, which differ materially from those ordinarily encountered and generally recognized as inhering in work of the character provided for in the contract." Int'l Tech. Corp., 523 F.3d at 1348 n.4 (citing 48 C.F.R. § 52.236-2(a)). As the Federal Circuit has recognized, "the unknown physical condition must be one that could not be reasonably anticipated by the contractor from his study of the contract documents, his inspection of the site, and his general experience if any, as a contractor in the area." Randa/Madison Joint Venture, 239 F.3d at 1276 (quoting Perini Corp. v. United States, 381 F.2d 403, 410 (Ct. Cl. 1967)); All Power, Inc. v. United States, 60 Fed. Cl. 679, 685 (2004) ("A Type II differing site condition depends on the existence of three elements -- (1) the condition must be unknown to the contractor; (2) unusual; and (3) materially different from comparable work."); Kiewit Constr. Co. v. United States, 56 Fed. Cl. 414, 417 n.8 (2003); Lathan Co., Inc. v. United States, 20 Cl. Ct. 122, 128 (1990).

NTS posits that it "was not required to prove the precise cause of the differing site conditions at Pier B," and generally describes the condition as subsurface obstructions. Pl.'s Post-Trial Br. at 143; Tr. 2912. The essence of Plaintiff's claim is that piles reached refusal at higher elevations than Plaintiff anticipated and assumed in its design. NTS' geotechnical expert, Ralph Boirum, testified that during pile driving in Pier B, NTS hit undisclosed logs, cobbles, and boulders in the beach layer, which caused piles to reach refusal at higher-than-designed elevations and to be out of alignment.[19] Tr. 1147-48. Although Mr. Boirum believed the obstructions were likely logs, cobbles, or boulders, he testified that there is no way to tell what type of obstructions NTS hit. Tr. 1150.

---

[19] Based on Plaintiff's proffer, the Court admitted Mr. Boirum as an expert in "[g]eotechnical investigation, including the preparation, analysis, and presentation of soil borings; the preparation of geotechnical reports; geotechnical designs, including the designs of pile foundations; the development, performance, and analysis of test pile programs; the development and draft specifications for driven piles, including recommendations for means, methods, and equipment; monitoring, inspection, and evaluation of pile installation; and the geology and subsurface conditions in the Pacific Northwest, including the Puget Sound area." Tr. 1128.

Mr. Boirum spent 22 years at Shannon & Wilson before moving to HWA GeoSciences, where he currently serves as the principal of the firm. Tr. 1105-06. He has served as a consultant on over 6,000 projects, most of which were in the Puget Sound region. Tr. 1109-10. Mr. Boirum has a bachelor's degree in Civil Engineering and a master's degree in Geotechnical Engineering, both from the University of Illinois in Champaign-Urbana, and he has completed the coursework for a Ph.D. in Geotechnical Engineering at the University of Washington. Tr. 1107. He holds a professional engineer's license in Washington, Alaska, and Illinois, and was previously licensed in Oregon. Id.

In pressing its Type II differing site condition claim, Plaintiff relies on the testimony of Mr. Horvitz, Vice President and Senior Principal Geotechnical Engineer at Hart Crowser:

> Q. [By Counsel for Defendant] Did you anticipate that obstructions would be encountered during pile driving?
>
> A. No. The only obstructions that I can think of -- and trying to think back on it -- would have been interferences with existing piles. Had no reason to believe, based on the geology, that there would be anything in particular buried out there. It's always the possibility that something might be buried in the fill that was placed, but just based on natural conditions, in situ conditions, we weren't predicting that there was going to be anything particular in the way of obstructions.

Tr. 1762-63.

Potential obstructions were, however, disclosed in the contract documents. A condition cannot be unknown if it was described in the contract documents.

NTS' geotechnical engineering expert, Mr. Boirum, admitted that the presence of cobbles and boulders would be obvious in the Puget Sound area:

> Q. [By Counsel for Defendant] And the presence of cobbles and boulders in the Puget Sound area would be known to anyone that walks the beach, right?
>
> A. Certainly.
>
> Q. And the beach deposits in Puget Sound virtually always contain cobbles and boulders, right?
>
> A. Most of them do, yes.
>
> Q. Virtually always, correct?
>
> A. Well, at some depth or location, yes, I would say that pretty much always have them.

Tr. 1171.

The Government's geotechnical expert, Rudolph Frizzi, testified that NTS' pile driving problems and out-of-alignment piles were the result of various known and disclosed factors, including existing piles from the Old Pier, densified soil around the existing piles, and cobbles and boulders.[20] Tr. 2341, 2370-73, 82, 85; see DX 130.2-.3, 130.20-.23. Mr. Frizzi testified that

---

[20] The Court admitted Mr. Frizzi as an expert in geotechnical engineering. Tr. 2323. Mr. Frizzi is the managing principal at Langan Engineering and Environmental Services, where he has worked since 1987. Tr. 2289. He has been involved in hundreds of projects and thousands of geotechnical investigations, most of which involve coastal areas and hundreds of which have involved indicator pile programs. Tr. 2292-97, 2306-07. He has served as an expert consultant in geotechnical engineering on approximately 80 matters and has served as a testifying expert on geotechnical engineering. Tr. 2309-10.

Mr. Frizzi has a B.S. in Civil Engineering from Ohio State University and a master's degree in Civil Engineering with a specialization in geotechnical engineering from the University of Illinois, as well as a Diplomate of Geotechnical Engineering from the Association of Geoprofessionals. Tr. 2299-2300. Mr. Frizzi holds a professional engineer's license in civil contract documents did indicate the possibility of obstructions, because the GEBS "identified the presence of the former Pier B piles" and "identified obstructions in the soils, fill soils." Tr. 2342-43.[21] Mr. Frizzi researched "readily available geologic information" regarding the Kitsap County region, where the Pier B site is located, and came across a 1957 report by J.E. Sceva, "The Geology and Groundwater Resources of Kitsap County, Washington," ("Sceva Report") which discussed the geology in the region. Tr. 2339-40; DX 130.8; DX 1. He noted that the publicly-available Sceva Report shows cobbles and "larger size material that exists above the glacial till." Tr. 2341; DX 1.18-.26.

The record as a whole establishes that cobbles and boulders were not unusual in the Puget Sound region and should have been anticipated as potential obstacles to driving piles. As Mr. Boirum observed, the "glacial till always contains scattered cobbles and boulders" and "[m]arine beach deposits in Puget Sounds also often contain cobbles and boulders." PX 133.2; PX 132.4-.6; Tr. 1171. Besides the Government's disclosure of such conditions in the contract documents, NTS knew it was encountering refusal in the beach layer during its Indicator Pile Program before it determined final design elevations. Tr. 554-55. Hisham Sarieddine, the Vice President at Shannon & Wilson, testified:

> Q. So after the test pile program, Shannon & Wilson was aware that you were encountering pile refusal on the beach deposits, right?
>
> A. Correct.
>
> Q. And the beach deposits can be a competent bearing soil; is that right?
>
> A. It turned out to be better than we expected. Again, refusal for the piles without stingers. That's -- I guess that's an important point.
>
> Q. Okay. But beach deposits can be a competent bearing soil?
>
> A. At this case, they turned out to be better than we expected to be, yes.

Tr. 554-55; <u>see</u> Tr. 543. Thus, prior to setting the final tip elevation design, NTS determined the beach deposits were competent bearing soils. JX 2.2615; Tr. 554-55. According to Mr. Horvitz, competent bearing soils meant "that the material is, for all intents and purposes, as far as designing pile foundations, is incompressible. And if capacity could be reached in those materials, we would not necessarily ask anybody to go deeper with the piles." Tr. 1757.

---

engineering in Ohio, California, New York, New Jersey, Connecticut, Pennsylvania, Virginia, South Carolina, Florida, Texas, Colorado, North Dakota, and Wyoming. Tr. 2296, 2300-01.

[21] While Mr. Frizzi stated that the documents put NTS on notice that it might encounter cobbles or boulders, he opined that it was less likely these caused NTS' pile driving difficulties because obstructions were not encountered in most of the borings or during the indicator pile program. DX 130.3. Instead, Mr. Frizzi opined that where greater variation or pile misalignment occurred, NTS' decision to use a batter pile design rather than a plumb pile design made it more likely that NTS would hit existing piles from the Old Pier, and that NTS should have driven more than the minimum number of piles during its subsurface investigation, tested driving batter piles at the work site, and driven test piles within the footprint of the Old Pier to mitigate potential high refusal or misalignment. Tr. 2346, 2350-53, 2355; <u>see also</u> DX 130.2.

In sum, NTS was aware of a number of factors that could cause premature or inconsistent refusal, including densified soils around preexisting piles, riprap, debris, logs, cobbles, and boulders. Plaintiff has not demonstrated that any of these potential causes for hard driving or the piles reaching refusal in the beach layer were unknown or unusual in the region or materially different from comparable work. NTS cannot recover for a Type II differing site condition.

Defective Specifications

In what it characterizes as a defective specifications claim, Plaintiff alleges that the contract documents furnished by the Government were "incorrect, misleading, and defective as to site conditions that would be encountered . . . *and* the method by which piles at Pier B should be designed and installed." Pl.'s Resp. at 78. Specifically, Plaintiff alleges it was "misled by unachievable, latent defects in the plans and/or specifications" regarding: 1) hammer size selection, 2) permissible tolerances for pile verticality and batter angle, 3) prohibitions on pre-drilling piles, and 4) prohibitions on removing existing piles. Pl.'s Post-Trial Br. at 147-49. NTS seeks the same relief under its defective specifications theory, as under its differing site condition theory, i.e., $9,217,741.37 plus interest for extra costs incurred due to additional design and construction work due to difficult pile driving. Pl.'s Post-Trial Br. at 198.

In this Court's view, Plaintiff's allegations regarding misleading contract documents do not give rise to a defective specifications claim. "When the government provides a contractor with defective specifications, the government is deemed to have breached the implied warranty that satisfactory contract performance will result from adherence to the specifications, and the contractor is entitled to recover all of the costs proximately flowing from the breach." Essex Electro Eng'rs, Inc. v. Danzig, 224 F.3d 1283, 1289 (Fed. Cir. 2000). This stems from the longstanding principle that "if the contractor is bound to build according to plans and specifications prepared by the owner, the contractor will not be responsible for the consequences of defects in the plans and specifications." United States v. Spearin, 248 U.S. 132, 136 (1918) (citations omitted); see also J. L. Simmons Co. v. United States, 412 F.2d 1360, 1362 (Ct. Cl. 1969).

Here, however, what Plaintiff denominates a defective design specification claim is merely a recasting of its differing cite condition claim. First, Plaintiff identifies hammer size recommendations as a design defect. Specifically, Plaintiff contends that it relied upon recommendations in the GEBS suggesting certain pile hammers -- Delmag 46-32 and Delmag 62-22 -- in preparing its pricing proposal, but that in performing the contract, it "discovered that the pile hammers recommended by the GEBS were inadequate and that pile-driving required a larger hammer than indicated in the GEBS." Pl.'s Post-Trial Br. at 147-48. Plaintiff asserts that "[e]ven with the more powerful hammer, NTS was unable to drive most of the piles." Id. at 148. The GEBS, however, provided NAVFAC's contractor "with subsurface information, interpretation, and geotechnical engineering recommendations for the development of the design-build RFP documents for the P-356 CVN Maintenance Pier" -- it did not require the use of specific equipment. JX 1.2362. Although the GEBS mentioned two hammer sizes the contractor could use, NTS was permitted to choose whatever hammer size it wanted. This GEBS recommendation was not a design specification. See J. L. Simmons Co., 412 F.2d at 1362 ("[I]n [design] specifications, the defendant set forth in precise detail the materials to be employed and the manner in which the work was to be performed, and plaintiff was not privileged to deviate therefrom, but was required to follow them as one would a road map."). The predicate for this claim was the differing site condition, not a constraint on hammer size. As NTS noted in its certified claim, "[d]espite the larger hammer, most of the piles encountered refusal conditions above the Glacial Soil deposits as a result of Differing Site Conditions." PX 36.10 (emphasis added).

Second, Plaintiff argues that the contractual tolerances for pile verticality and batter angle were unattainable and that NTS was forced to perform substantial additional work and "modify its design and install 28 additional piles." Pl.'s Post-Trial Br. at 149. NTS points to Subsection 3.34 of Contract Specifications Section 31 62 13.99 which "limited variations in pile verticality for plumb piles to no more than one (1) percent from vertical" and "variations of batter piles to no more than two (2) percent from the pile axis in elevation and not more than one (1) degree in plan." Pl.'s Post-Trial Br. at 148-49; JX 1.910. NTS claims that "[t]hrough no fault of NTS or its pile driving subcontractor, ACC, numerous piles were driven out of the specified tolerances at the Mole Quaywall and Pier B." Pl.'s Post-Trial Br. at 149. NTS has not, however, pointed out anything defective about the tolerance requirements -- its claim is that it could not meet those tolerances due to differing site conditions in the soil.

Plaintiff's geotechnical expert, Mr. Boirum, testified that piles were out of tolerance because they hit obstructions:

> Q. [By Counsel for Plaintiff] In your opinion, were the tolerances required in the contract consistently achievable given these subsurface conditions?
>
> A. Well, the out of tolerances that were -- the ones that were substantially out of tolerance were because they hit something. I mean, it's -- I don't believe that there's any reason why the piles would have been out of tolerance with the methods and equipment the contractor used if some kind of an obstruction wasn't hit.

Tr. 1169-70.

Third, Plaintiff argues that contract prohibitions on pre-drilling "prevented NTS and ACC from being able to drive piles through or by obstructions to design elevations and within specified tolerances." Pl.'s Post-Trial Br. at 150. Specifically, NTS alleges "pre-drilling would have reduced or eliminated the problem of piles reaching refusal at elevations higher than designed." Pl's Post-Trial Br. at 149. Again, the prohibitions on predrilling were only problematic because NTS had pile driving problems due to alleged differing site conditions.

Fourth, Plaintiff argues that to "the extent that old Pier B piles caused new Pier B piles to reach refusal at elevations higher than indicated in the GEBS and/or designated by NTS and/or caused Pier B piles to be driven out of alignment, these difficulties are the responsibility of the [G]overnment for requiring the old Pier B piles [to] remain in place." Pl's Post-Trial Br. at 150. Again, the gravamen of this claim is not the requirement that old Pier B piles remain but rather Plaintiff's pile-driving difficulties due to differing site conditions. While the presence of the Old Pier B piles may have caused or exacerbated this difficulty, that does not render the requirement to maintain Old Pier B piles a design defect.

All of Plaintiff's four defective specifications claims are intertwined with its differing site conditions claims. The Federal Circuit has recognized that although differing site conditions and defective specifications claims are distinct in theory, they collapse into a single claim where the defective specifications and differing site condition claims are intertwined. See Meridian Eng'g Co. v. United States, 885 F.3d 1351, 1361 (Fed. Cir. 2018) (finding that Meridian's defective pipe specification claim was "so intertwined" with its DSC claim as to constitute a single claim) (citing

Comtrol, Inc. v. United States, 294 F.3d 1357, 1362 (Fed. Cir. 2002)). Here, NTS' defective specification claims regarding hammer size, pile tolerances, prohibitions on pre-drilling, and prohibitions on removing existing piles are "so intertwined" with its differing site condition claims that they collapse into a single claim. As such, this Court treats Plaintiff's allegations regarding defective specifications as part and parcel of its differing site conditions claim.

The Court Has Jurisdiction Over NTS' Constructive Change Claim.

Defendant argues that the Court lacks jurisdiction over NTS' constructive change claim because Plaintiff's counsel withdrew an exhibit from evidence, PX 74, that detailed its REA 14 claim, and failed to establish that NTS presented this claim to the CO. Def.'s Resp. at 144-47. The REA 14 claim stems from the Government's requirement that NTS and its designer, KPFF, defend the Pier B design as to global stability after the Government approved that design. This Government conduct caused NTS to stop critical path work from March to May 2010, until the design issue was resolved, and then NTS accelerated work to meet the Government's original project deadline. Tr. 903; JX 16.1; JX 23; JX 24; Tr. 1529-30.

On April 1, 2011, NTS submitted REA 14, claiming a constructive change and seeking $1,881,900 representing costs incurred due to the global stability dispute. REA 14 is contained in two exhibits -- PX 73, Plaintiff's REA 14 Transmittal Letter, and PX 74 titled REA No. 14 Global Stability Delay Explanation of Scope, which detailed the basis for REA 14.

Given Plaintiff's withdrawal of PX 74, Defendant asserts that by citing documents "not in evidence, or which are wholly silent as to the issues NTS now argues it presented to the contracting officer," NTS failed to establish that this Court has jurisdiction over its REA 14 claim. Def.'s Resp. at 146. The Government avers that it "does not dispute that NTS presented *something* to the contracting officer regarding its REA 14 claim," but that "[i]t is not clear . . . either from NTS's arguments in its post-trial briefing or the evidentiary record developed at trial, what, exactly, that something is, let alone that it was a proper claim." Id. at 145.

It is undisputed that Plaintiff withdrew PX 74 (REA No. 14 Global Stability Delay Explanation of Scope) and PX 75 (Global Stability: Schedule Perspective) during trial. Id. at 145. Plaintiff submits that "[t]hese exhibits were ultimately withdrawn because NTS . . . believed that the evidence was in the record elsewhere, and NTS sought to simplify the evidentiary issues that were coming up during trial." Tr. 3053. However, the evidence was not in the record elsewhere. In PX 73, the transmittal letter, NTS briefly summarized REA 14 stating "[t]his REA with a requested cost of $1,881,900.00 is submitted to the Government to recover extra cost[s] resulting from NTS's mitigation of the 64 work day stoppage on Pier B, the Global Stability Delay." PX 73.1. The only detailed explanation of REA 14 was contained in the exhibit that Plaintiff withdrew, PX 74.

Plaintiff's Motion to Reopen the Record

NTS filed a post-trial motion to reopen the record and admit PX 74 into evidence arguing that it indicates the scope and timing of Plaintiff's claim. Pl.'s Supp. Br. at 7-11.[22] Defendant asserts that NTS cannot justify reopening the evidentiary record because NTS' failure to introduce

---

[22] NTS included this motion in its Supplemental Brief. Pl.'s Supp. Br. at 7-11. NTS did not seek to admit PX 75, the Global Stability Schedule Perspective.

PX 74 was inadvertent, and admission of PX 74 now would prejudice the Government. Def.'s Supp. Br. at 2-3.

The Court of Federal Claims addressed the standards for reopening the record post trial in Dairyland Power Co-op. v. United States, 103 Fed. Cl. 640 (2012). There, the Court stated that although reopening the record "is to be encouraged to afford the fullest possible hearing (particularly in nonjury cases)," there are three factors a trial court must consider: "1) the probative value of the evidence proffered, 2) why the evidence was not offered earlier, and 3) the likelihood of undue prejudice to the opposing party." Id. at 642 (quoting Michael H. Graham, Handbook of Federal Evidence § 611:5 (6th ed. 2009) and citing Precision Pine & Timber, Inc. v. United States, 596 F.3d 817, 833-34 (Fed. Cir. 2010)).

Application of these factors here warrants reopening the record and admitting Exhibit PX 74. As to the document's probative value, PX 74 details the scope of the claim presented to, and denied, by the contracting officer. PX 74 speaks specifically to the following topics: Basis of Request, Design Approval Process, Schedule Impact and Time Impact Analysis, Overview of Cost Impacts to the Project, Impact Cost Pricing, and Benefits to Project, and PX 74 is not elsewhere in the trial record. Although PX 156, Plaintiff's request for a final decision on REA 14, which was admitted into the record, stated that REA 14 was attached, it was not included in the version of PX 156 that was admitted into evidence. PX 74 is the only trial exhibit which explains Plaintiff's global stability delay claim and delineates the costs associated with the claim. As such, the exhibit clearly has probative value.

With respect to the second Dairyland factor -- why the evidence was not offered earlier -- NTS stated it believed "that the same information was sufficiently before the Court in its REA 14 transmittal and the COFD," and that the Government "had stipulated to the REA 14 claim costs for KPFF." Pl.'s Supp. Br. at 9. While Plaintiff cites Paragraph 14.a. of the Stipulations, which lists one cost element of REA 14, i.e., the agreed-upon quantum of KPFF costs in the amount of $115,937.71, the other costs that comprise the $1,881,900 claim are not there. May 25, 2018 Stipulations ¶ 14.a. NTS' justification for not offering the evidence earlier does not hold water.

Finally, with respect to Dairyland factor 3 -- prejudice from admitting the evidence -- Defendant argues:

> had NTS put this document into evidence, the Government could have examined Ms. Mitchell to have her confirm that she did not understand that PX 74 showed some basis prior to March 8, 2010 for NTS's REA 14 claim. NTS did not put the document into evidence, however, and we did not have the opportunity to establish it does not show what NTS claims. That is prejudice.

Def.'s Supp. Br. at 3.

Defendant's claim of prejudice is unpersuasive. PX 74 clearly and expressly references costs beginning in November 2009:

> By letter dated February 8, 2011, KPFF Consulting Engineers submitted a request for additional compensation in the amount of $115,938 for work to validate KPFF's design approach. KPFF claims the costs incurred for its professional staff in the period November 2009 – November 2010 totaling $78,940. KPFF also claims $36,997 for work performed by sub-consultant Ben C. Gerwick, Inc. Consulting Engineers in the period January – April 2010. The documentation provided by

> KPFF in support of its request for additional compensation is included at Attachment H.

PX 74.7. The document speaks for itself, and a claim of prejudice based on a witness' inability to convey her purported "understanding" of such a document fails.

Although Plaintiff erred in withdrawing PX 74, Defendant has been on notice of PX 74 and its contents since the inception of this dispute. Indeed, the transmittal letter in PX 73 along with the details of the claim in PX 74 were sent to the Government on April 1, 2011, and were addressed in the COFD. In her final decision, the CO summarized NTS' claim, stating:

> In refuting the Administrative Contracting Officer's denial, your summary of claims is as follows:
>
> ". . . NTS respectfully requests that the Navy reconsider the fact that it constructively changed the work at Pier B when it issued its untimely and unanticipated Notice of Non-Compliance on 08 March 2010 alleging that NTS did not comply with the 'global stability' (K factor) requirements of the RFP. No reasonably prudent contractor would continue with critical construction in the face of such a notice from the Navy. Instead, NTS properly completed those construction tasks that were appropriate and immediately redirected its design staff to defend and/or reconcile the non-compliance allegations brought by the Navy's A/E, Berger/Abam. The Navy was well aware of NTS' redirection of construction activities and design personnel until the matter was resolved. Immediately after resolution, NTS resumed construction but, in the absence of a time extension from the Navy for the delay it imposed by its unfounded notice of non-compliance, NTS had no choice other than to accelerate."

JX 21.1-.2 (quoting NTS' letter to NAVFAC asking for reconsideration of REA 14, PX 95).

Further, PX 74 was attached to the Complaint as Exhibit 4. The Government in its Answer admitted Exhibit 4 to the Complaint was a copy of NTS' quantification of REA 14 that was submitted to the contracting officer. While attachments to pleadings are not in evidence, it would place form over substance to refuse to admit this document when Defendant has been responding to it throughout all phases of this litigation. See Veloz v. Foremost Ins. Co. Grand Rapids, Michigan, 306 F. Supp. 3d 1271, 1281 (D. Or. 2018) ("pleadings are not evidence"); Globe Refin. Co. v. Landa Cotton Oil Co., 190 U.S. 540, 546 (1903).

The Court grants NTS' motion to repoen the record and admits PX 74 into the record.

Costs Incurred Prior to March 8, 2010

In the alternative, Defendant contends that NTS failed to establish this Court's jurisdiction over claims for costs incurred prior to March 8, 2010. Def.'s Resp. at 146-47. Defendant argues that NTS' claim is based on the Government's March 8, 2010 letter questioning the Pier B design and only encompasses work occurring after March 8, 2010, not subcontractor work performed prior to March 8. Def.'s Resp. at 145-46; Def.'s Supp. Br. at 1. This argument is not supported by the record. The contracting officer's final decision reflects that NTS requested costs incurred prior to March 8, 2010 in its certified claim and that the contracting officer was aware that NTS was claiming these costs. JX 21.1-.2.

The contracting officer's final decision states that NTS requested damages of $1,881,900, which includes $115,937.71 for work performed by KPFF and its sub-consultant, Gerwick, to validate KPFF's design between November 2009 and November 2010, and quotes NTS' claim, which states that NTS "redirected its design staff to defend and/or reconcile the non-compliance allegations brought by the Navy's A/E Berger/Abam." JX 21.2; JX 34; PX 74; PX 77. This redirection occurred between November 2009 and March 2010.

Finally, there is no basis for the Government's suggestion that NTS' claim may not have been "a proper claim." Def.'s Resp. at 145. To establish jurisdiction in this Court, a plaintiff must first submit a certified claim to a contracting officer for a final decision within six years of the claim's accrual and then must appeal any adverse final decision to this Court within 12 months. 41 U.S.C. § 7103(a)(4)(A); 41 U.S.C. § 7104(b)(3). As reflected in the contracting officer's final decision, NTS submitted a certified claim to the contracting officer for $1,881,900 pursuant to FAR 52.243-4 within six years after the accrual of the claim. JX 21.1. CO Mitchell correctly describes NTS' June 26, 2014 letter, PX 156, as a "certified claim." CO Mitchell denied this claim on September 4, 2014, and Plaintiff filed the present suit on August 17, 2015, within 12 months of the denial. JX 21; Compl. (15-885C).[23]

<u>NTS Performed Work Beyond the Contract Requirements at the Government's Direction.</u>

NTS seeks compensation for a constructive change claiming that it performed work beyond the scope of the Contract because NAVFAC required a reevaluation of its design when BergerABAM questioned the global stability of Pier B. "A constructive change occurs where a contractor performs work beyond the contract requirements without a formal order, either by an informal order or due to the fault of the Government." <u>Kiewit Infrastructure W. Co. v. United States</u>, 972 F.3d 1322, 1329 (Fed. Cir. 2020) (quoting <u>Int'l Data Prods. Corp. v. United States</u>, 492 F.3d 1317, 1325 (Fed. Cir. 2007)); <u>see</u> Pl.'s Supp. Br. at 2 (Jan. 31, 2022). For a claim to succeed under the theory of constructive change, a plaintiff "must show (1) that it performed work beyond the contract requirements, and (2) that the additional work was ordered, expressly or impliedly, by the government." <u>Bell/Heery v. United States</u>, 739 F.3d 1324, 1335 (Fed. Cir. 2014).

After approving NTS' Pier B design, the Government and its consultant, BergerABAM, required NTS and its designer, KPFF, to defend the Pier B design's k-factor and global stability calculations over the course of four months, culminating in NTS stopping critical path work from March to May 2010. JX 23; JX 24; Tr. 1529-30. To resolve this design issue, NTS commissioned an independent, third-party review from Ben C. Gerwick, Inc ("Gerwick"). JX 25. Ultimately, the Government determined the issue was resolved by NTS' Delta 12 redesign that addressed the unrelated skew angle problem. JX 16.7. Once the dispute was resolved and critical path work could resume, NTS accelerated work to meet the Government's original project deadlines, and deemed this extra work to be a constructive change to the Contract. Tr. 903-04.

---

[23] NTS claims that PX 73 is the certified claim in post-trial briefing, but neither PX 73 nor PX 74 include any contractor certification. Pl.'s Post-Trial Br. at 120-21. Rather, PX 156 -- the June 26, 2014 letter -- constitutes the certified claim because it is asking the CO for a final decision and contains the required CDA certification by Mr. Fox.

The global stability dispute is centered on compliance with the ACI code. Section 10.13.6 of ACI 318-05 is used to check the global stability of a sway frame structure, like Pier B, and prescribes three methods to comply with the Code's stability requirements: A, B, or C. Tr. 737-38. NTS' subcontractor chose method A. NAVFAC approved the design, but later between November 2009 and May 2010, BergerABAM questioned KPFF's k-factor and KPFF's use of method A of ACI 318-05, Section 10.13.6. According to KPFF's former owner, Mr. Johnson, method A was the most precise method. Tr. 739. He explained:

> Well, for a project like this, I would choose A. A is the one -- we -- we have a computer model, three-dimensional computer model that depicts the -- the entire structure. The structure has batter piles and plumb piles. It has a sloping ground condition that varies from one end of the structure to the other.
>
> So the complexity of the -- of the project demands a precise approach to doing this. And so A is the most precise method. It also requires you to have the analytical horsepower to get that done, and so which we do have. And rightfully so for a significant project, you would be applying that type of methodology for more complex and more significant structures.
>
> As -- the other ones are approximations. They are things that you can do on a spreadsheet without a computer model. And they're more conservative. And they yield reasonable answers, and at times are useful when you don't have a full-blown computer model of a structure and you don't have the -- the capacity to do one or you don't have the -- the ability under your current scope to do something like that. So they'll -- those types of methods can be used in those circumstances.

Tr. 739-40.

The Government had reviewed and approved the design at intervals during performance after NTS furnished the Government with a concept design at approximately 30% and 70% and 100%, as well as certain Fast Track Design Submittals for discrete items of work. Tr. 696-97, 699; PX 14, JX 64, JX 65. However, after the Government approved NTS' design using method A, BergerABAM asserted that method C was the only appropriate method.

In response, each party retained a third party to review Plaintiff's calculations. KPFF hired Henrik Dahl[24] from Gerwick. PX 173.1; Tr. 747-48. Mr. Dahl was admitted as a percipient expert witness to analyze KPFF's longitudinal stability calculation under ACI Code Section 10.13.6. Tr. 1094-95. Mr. Dahl determined that KPFF's model was compliant with the code "with a considerable margin," which meant the design was "more conservative in regard to stability." Tr. 1092.

Dr. Schneider, a senior project manager from BergerABAM, retained Dr. Charles Roeder, a retired professor of civil engineering from the University of Washington, to perform a separate

[24] Henrik Dahl is a licensed professional engineer in California and Washington and is Chief Project Manager at COWI North America, formerly known as Ben C. Gerwick, Inc. Tr. 1057-59. As Chief Project Manager, Mr. Dahl is the project manager for large marine projects, including design-build projects. Tr. 1060-61. Prior to May 2010, Mr. Dahl was involved in the design of about 55 marine structures, about half of which included the design of prestressed, precast concrete piles. Tr. 1061-63.

analysis of KPFF's calculations. Tr. 2159-60. In his original draft report, Dr. Roeder found that although method C was a "much more rational method for addressing this gravity load stability" than method A, there was no reason why method A would not be "an acceptable method for addressing the issue by the ACI provisions." PX 92.5. Dr. Roeder concluded in this draft that KPFF had "a strong argument that they have done their job," and he commented to Dr. Schneider in an email that "every thing I read tells me that ACI regards 10.13.6.a as an acceptable method." PX 92.5, .1.

In response, Dr. Schneider emailed Dr. Roeder inquiring whether Dr. Roeder's report's language could be "tempered" and commented that he (Dr. Schneider) had no confidence in KPFF's ability to "accurately predict results from the analytical model and interpret the code." DX 142.1-.2; Tr. 2186. In response to Dr. Schneider's email, Dr. Roeder altered his report and did an about face to conclude that KPFF's k-factor was "clearly inadequate" and method A was "inappropriate." DX 78.3-.4. Dr. Roeder did not testify, and his changing his conclusion in response to Dr. Schneider's request, completely undermines the reliability of his final opinion. Thus, although Dr. Roeder's final report ultimately stated that KPFF should not have used method A, the Court discounts the final report as unreliable because Dr. Roeder was directed by Dr. Schneider to "temper" the language and altered his conclusion to accommodate that request. Tr. 2186.

The Government's requirement that NTS and KPFF justify the Pier B design after its approval caused NTS to stop critical path work. It was only after NTS' design was modified to add the additional 28 piles in the Delta 12 redesign to address a different issue -- the skew angle issue -- that the Government put the issue of global stability to rest, permitting work to proceed. Both sides agree that the designer of record, KPFF, should have had the discretion to choose which method to use for the design. Tr. 740-41; Tr. 2126 (Dr. Schneider testifying in deposition that "[n]avigating the code is always at the discretion of the engineer of record. It can often be a matter of opinion."). And both KPFF's third-party examiner, Gerwick, and BergerABAM's third-party examiner, Dr. Roeder (in his original, untainted opinion), agreed that KPFF did not commit error. Tr. 1091-92; PX 92.5. The Court finds that the designer of record had the discretion to use any of the three methods in the ACI provision, that KPFF's design complied with method A, and that BergerABAM erred in concluding that KPFF was required to use method C instead of method A. Thus, the Government's challenge to NTS' and KPFF's previously approved design was unwarranted, and the reasonable costs that flowed from the Government's conduct are compensable.

The Government contends that NTS hiring Gerwick was beyond what the Navy required and that Gerwick's costs are not recoverable because NTS never sought approval from the Navy. Def.'s Post-Trial Br. at 135-36. The Government points to FAR 52.244-4, Subcontractors and Outside Associates and Consultants, which states:

> Any subcontractors and outside associates or consultants required by the Contractor <u>in connection with the services covered by the contract</u> will be limited to individuals or firms that were specifically identified and agreed to during negotiations. The Contractor shall obtain the Contracting Officer's written consent before making any substitution for these subcontractors, associates, or consultants.

JX 2.8 (emphasis added). This FAR clause does not cover this situation. The services the Government was requesting were not "services covered by the contract," but instead extra work by an independent consultant, Gerwick, to re-evaluate KPFF's design, despite the Government having previously approved the design. The Government's suggestion that NTS' design failed to conform with the RFP and the ACI Code necessitated Gerwick's involvement.

NTS' Acceleration

NTS alleges that the Government's "questioning of NTS's design for global stability caused an excusable delay to critical path activities on the Project" from March 8 to May 27, 2010, resulting in a "62 to 64-day delay," which required NTS to accelerate work in order to meet the project's deadline. Pl.'s Post-Trial Br. at 163. Critical path work includes "items of work [that] are given no leeway and must be performed on schedule; otherwise, the entire project will be delayed. . . . A delay, or acceleration, of work along the critical path will affect the entire project." R.P. Wallace, Inc. v. United States, 63 Fed. Cl. 402, 408 n.10 (2004) (quoting Haney v. United States, 230 Ct. Cl. 148, 168 (1982)).

Constructive acceleration "occurs when the government demands compliance with an original contract deadline, despite excusable delay by the contractor." Zafer Taahhut Insaat v. Ticaret A.S., 833 F.3d 1356, 1362 (Fed. Cir. 2016) (citing Fraser Constr. Co. v. United States, 384 F.3d 1354, 1361 (Fed. Cir. 2004)). The Federal Circuit in Fraser defined the elements of constructive acceleration as follows:

> (1) that the contractor encountered a delay that is excusable under the contract; (2) that the contractor made a timely and sufficient request for an extension of the contract schedule; (3) that the government denied the contractor's request for an extension or failed to act on it within a reasonable time; (4) that the government insisted on completion of the contract within a period shorter than the period to which the contractor would be entitled by taking into account the period of excusable delay, after which the contractor notified the government that it regarded the alleged order to accelerate as a constructive change in the contract; and (5) that the contractor was required to expend extra resources to compensate for the lost time and remain on schedule.

Fraser, 384 F.3d at 1361; see also Zafer, 833 F.3d at 1362.

In Fraser, the Federal Circuit recognized that it is acceptable to use "different formulations" "in setting forth the elements of constructive acceleration," citing Norair Eng'g Corp. v. United States -- a case where the five Fraser requirements had been compressed into "three essential elements -- excusable delay, an order to accelerate, and acceleration with attendant costs." Fraser, 384 F.3d at 1361 (citing Norair Eng'g Corp. v. United States, 666 F.2d 546, 548 (Ct. Cl. 1981)). In a similar vein, in 2007, the Federal Circuit affirmed a Court of Federal Claims' decision applying the following factors for constructive acceleration:

> (1) excusable delay; (2) knowledge by the government of the delay; (3) a statement or act of the government that can be construed as an acceleration order; (4) notice by the contractor that the order is a constructive change (causation); and (5) incurrence of additional costs as a result of the acceleration.

Ace Constructors, Inc. v. United States, 70 Fed. Cl. 253, 280 (2006), aff'd, 499 F.3d 1357 (Fed. Cir. 2007) (citing John Cibinic, Jr. & Ralph C. Nash, Jr., Administration of Government Contracts 451 (3d ed. 1995)).

In the present case, recognizing that different formulations of the standards for constructive acceleration are acceptable, this Court applies the standards articulated in Norair. The Fraser standard requiring the contractor to submit a time extension request would not be appropriate here since the evidence established that the Government was insisting on compliance with the original schedule despite the delay caused by the global stability dispute. See JX 12; JX 15; JX 17; JX 27.

Excusable Delay

NTS states that the Government's March 8 letter questioning its design's conformance with the RFP "constituted a constructive stop work order" and that "no reasonable contractor would have proceeded with critical construction work given the government's loss of confidence in the design . . . because of the risk of proceeding with work and the costs associated with having to correct any work performed pursuant to an allegedly defective design." Pl.'s Post-Trial Br. at 164-65. The record establishes that during the delay period, NTS only performed non-critical path activities. While the global stability issue was being resolved, Plaintiff could "no longer conduct the critical activities on the Pier B." Tr. 1529. According to Mr. Fox, NTS' Project Manager, "critical path bent, you know, putting all of the falsework and the other components required to -- to place concrete and pour caps" had to be halted. Id. Plaintiff was only able to continue with minimal work. Tr. 1618. Plaintiff could not "proceed to place concrete that was going to become permanent, that you couldn't remove or change." Tr. 1619.

NTS began to perform some critical construction activities beginning on May 7, 2010 at a slower than planned pace. However, NTS did not resume work until May 27, 2010, the date the Government stated the Delta 12 redesign satisfied its global stability concerns. JX 16.1; Tr. 2575-76; Tr. 1262. NTS began implementing its acceleration plan during the May 28 through June 22, 2010 period, and continued accelerating through November 2010. Tr. 1262.

Defendant disputes that its March 8, 2010 letter caused a delay and, instead, posits that NTS stopped work to complete the Delta 12 redesign that corrected the skew angle issue. Def.'s Post-Trial Br. at 138-43. Defendant argues that the March-to-May 2010 delay was either caused by the Delta 12 redesign, or concurrent with the Delta 12 redesign delay, which would have prevented NTS from completing work even absent the global stability issue. The record does not support Defendant's contention. Mr. Fedrick testified:

> Q. [By Counsel for Defendant] There's some work you can do without knowing where these 28 additional piles are going to be placed?
>
> A. There is a tremendous amount of work you can do without knowing where those 28 piles are going to go.
>
> . . .
>
> Somewhere in the middle of May, we started placing concrete again. And the reason we did that was based on the fact that we had a comfort level. And if you read the e-mails from Matt Butler, from Rob Zylstra, obviously we're now getting comfort level with the fact that the Navy is going to be accepting A and not C. Has nothing to do with the skew issue. The 28 additional piles are for our skew issue.

Tr. 265-66; see also PX 69.1, Tr. 304.

Mr. Fedrick elaborated on work that continued despite the skew angle issue:

> Q. Could you -- could you just describe for the Court what exactly the work was that NTS could continue to do on the Pier B bent caps or Pier B with -- even while the skew angle issue was continuing to be resolved?
>
> A. Well, the skew angle issue is an issue where our as-built location of the piles was not as we designed them to be. So what we did do is we still drove piles; we still placed formwork; we still installed rebar. And with the skew angles, we still placed concrete. Unlike the global stability issue, where we halted our concrete.
>
> Q. Okay. So you were -- you were able to form and pour bent caps in Pier B even with the skew angle issue, or were you able --
>
> A. Yes.

Tr. 313.

The Court finds that the March 8-to-May 27, 2010 delay was the result of the Government's March 8 letter expressing "concerns that the final approved design . . . may not be in conformance with the RFP when considering global stability and the observed out of tolerance piles." JX 24.1. An excusable delay "arises from unforeseeable causes beyond the control and without the fault or negligence of the Contractor," including "acts of the Government in either its sovereign or contractual capacity." FAR 52.249-10(b)(1). Here, months after approving the design, the Government informed NTS that it believed the design might be out of conformance with the RFP, an unforeseeable act given the Government's prior approval. Because the entire design was called into question, it was reasonable for NTS to stop critical path work until the issue was resolved. NTS' reaction that the Navy's March 8 letter questioning its design was a "bombshell" and a "very, very scary moment" underscored its reasonable concern about the Project's path forward. Tr. 902; Tr. 197.

The Government further contends that delays due to the Delta 12 redesign and global stability were concurrent, which would preclude Plaintiff from recovering. Def.'s Post-Trial Br. at 143. "Where both parties contribute to the delay, neither can recover damage[s], unless there is in the proof a clear apportionment of the delay and the expense attributable to each party." Blinderman Constr. Co. v. United States, 695 F.2d 552, 559 (Fed. Cir. 1982) (quotation omitted). However, the record indicates that the Delta 12 redesign delay occurred after the global stability issue delay, not concurrently. This is evident from the fact that NTS was able to start some critical construction work on May 7 -- 20 days before the Delta 12 redesign was even approved -- once it felt assured the global stability issue would be resolved based on emails from the Government. PX 134.13; PX 74.2. The Government approved the Delta 12 redesign on May 27, 2010, but work on the redesign was not performed until later. JX 16.1; see Tr. 2557. The Court is persuaded by Plaintiff's expert's opinion that there were two separate acceleration periods: Acceleration Period 1 covering June through November 2010 resulting from the global stability issue, and Acceleration Period 2 covering December 2010 through the completion of bent construction in early 2011, related to the skew issue. Tr. 1294-95, 1324.

NTS' damages expert, John Anderson, attributed 57 working days of delay, March 8-May 27, 2010 to the global stability issue.[25] PX 147.21; Tr. 1318. Mr. Anderson made his

---

[25] The Court admitted Mr. Anderson as an expert in four areas: "[c]onstruction project scheduling and schedule analyses, including but not limited to CPM schedule analysis; (2)

determination by taking the total number of calendar days during the delay period, 80, and removing any days NTS would not have normally worked, such as weekends. Tr. 1257-58. Defendant's damages expert, Mark Boe, acknowledged "delay of 62 days between NTS' February 2010 and May 2010 schedule updates," but stated that the delay only absorbed float and did not delay the project beyond the Contract's deadline.[26] DX 126.34.

In Mr. Anderson's view, Mr. Boe's method of calculating delay failed to address whether the delays concerned critical path work and were related to the design issue. PX 147.20. In his rebuttal expert report, Mr. Anderson opined:

> Boe did not provide an independent opinion concerning the number of delay days caused by the contract change due to Global Stability Design Review. Boe acknowledged that the critical path during the global stability design review flowed through bent construction. He further stated that work on the pier was not fully suspended. He provided no further opinion as to what level of progress relative to the planned schedule was achieved, if any, relative to a full suspension. I agree a small amount of work continued on bent construction during the suspension period, mostly involving installation of collars. This was probably offset at least in part by the delay in ramping up to full production after the lifting of the suspension. It is my opinion that the work accomplished during the Global Stability Design Review

---

construction project delay, including but not limited to impact caused by multiple delaying events; (3) acceleration of construction activities; (4) loss of productivity analyses." Tr. 1233. Mr. Anderson is a director at Berkeley Research Group, providing consulting services related to construction, construction productivity, delay, and delay analysis. Tr. 1205-06. He is a licensed civil engineer in California specializing in construction, construction management, scheduling and delay, and lost productivity associated with construction. Id. Before becoming a construction consultant, Mr. Anderson worked as a design engineer for piers, wharfs, and coastal structures, and as a project manager for a marine contractor. Tr. 1213-15. He has performed dozens of critical path method ("CPM"), forensic schedule, acceleration, and loss-of-productivity analyses throughout his career. Tr. 1218-24.

Mr. Anderson has a B.S. and master's degree in Civil Engineering from the University of California at Berkeley. Tr. 1206.

[26] The Court admitted Mr. Boe as an expert in the areas of critical path scheduling, forensic schedule analysis, analysis of lost labor productivity, and construction damages. Tr. 2604. Mr. Boe is a delay analyst and claims consultant with Capital Project Management, Inc. Tr. 2599. He has approximately 35 years of construction scheduling experience -- first while serving in the Coast Guard on active duty for 10 years and as a delay and disruption consultant after that. Tr. 2600. Throughout his career, he has consulted on hundreds of scheduling matters, varying from marine projects, lab building, state and federal prisons, embassy-type projects, to medical facilities. Tr. 2600-01.

Mr. Boe has a bachelor's degree in Civil Engineering from the Coast Guard Academy and a master's degree in Civil Engineering and Construction Management from the University of Illinois. Tr. 2599. He holds a professional engineer's license in Washington and Pennsylvania. Id. Mr. Boe is also a planning and scheduling professional with the Association for the Advancement of Cost Engineers. Tr. 2599-2600.

delay was relatively insignificant in terms of the effect on the schedule and within the level or precision expected from a forensic delay analysis for this matter.

> Boe concluded that an overall schedule delay of 62 days occurred in the period of February 28, 2010 to May 27, 2010, however he does not directly attribute this project delay to specific impacts or the critical path. Accordingly, it is difficult to compare his results to mine, in which I determined the number of delay days associated with the Global Stability Design Review to be 57 working days (80 calendar days).

PX 147.20-.21.

Mr. Anderson thoroughly explained his rationale for the 57-working-day delay:

> On March 8, 2010 NAVFAC issued a notice of non-compliance regarding the global stability (k-factor) of the pier. In response, NTS retained an outside engineering firm to perform an[] independent review of pier's structural design. While the structural design review was being performed, NTS substantially ceased work on bent construction. Some minor work continued on bents already started such as Bents 3 and 5. Temporary deck forms and pile collars were also set on a few selected bents. Work during this period was sporadic and confined to locations that would not be affected by potential changes in the ongoing design review.
>
> At the end of March 2010, the critical path of the project went through bent construction for Bent 5. The critical path continued through bent construction for Bents 10, 18 and Bent 24. After the bent construction, the path continued through setting of the precast planks and block-outs, placement of the concrete deck and then electrical/utility testing. The critical path then continued through final inspections and punch-list. The critical path of the project continues to follow the logic of the baseline schedule as originally submitted but was delayed as a result of the loss of production on the bents. A loss of 8 days during the month of March 2010 was reported, reducing the early completion duration from 103 working days to 95 working days.
>
> During the month of April, the lack of progress on bent construction continued to delay the project such that the early completion duration was reduced from 95 working days to 70 working days.
>
> On or about May 7, [2010], confidence in the design was reached such that NTS started to ramp up work on the bents with increased manpower, equipment, false-work, and overtime. On May 13, the concrete for Bent 3 was placed. On May 19, the concrete for Bent 5 was placed. On May 27, 2010 formal written acknowledgment was received that the structural design of the pier was in conformance.

> The Project Schedule Narrative for the end of May was published on May 27, 2010. It claimed that the skew/design issue for the bents is nearly closed and individual bent redesign for out of position piles is proceeding. The critical path at the end of May continued through bent construction, followed by installation of the precast panel, placement of the concrete deck, utilities, and the final inspection. The critical path was similar to prior months.
>
> At the end of May, 24 days of delay occurred which reduced the early completion milestone duration from 70 working days to 46 working days, setting the anticipated completion for the project at November 15, 2011. In total for the period of February 28, [2010] through May 27, [2010], a total of 57 working days was lost relative to the anticipated completion schedule.

PX 134.12-.13 (footnotes omitted); see JX 60; JX 58; JX 61. The Court finds Mr. Anderson's method of calculating delay persuasive and attributes 57 working days of delay to the Government's questioning Plaintiff's global stability design.

Government Knowledge of the Delay

The Government was aware of this delay. Dan Fox, NTS' project manager, testified:

> Q. [By Counsel for Plaintiff] Did the government know that NTS was not pouring concrete or placing -- or performing critical path work at the Pier B bents after March 8th?
>
> A. Yes. We -- we certainly discussed it in our morning meetings. We certainly showed it on our schedule that way. It was very -- it was very clear that we weren't proceeding with -- and I -- I actually had had this conversation with the government staff that we were -- we were stopping all critical path activities until we could get this resolved.

Tr. 1529-30; see also Tr. 1588-90, PX 114.

The Government acknowledges that "the Navy was aware of a significant decrease in work on critical path activities on Pier B," but attributes this delay to the Delta 12 redesign. Def.'s Resp. at 164-65; Tr. 2507-08. As explained above, the record demonstrates that the delay was due to the global stability issue, not the Delta 12 redesign. As this Court has previously stated, "[i]ndeed, it would have been strange for the Government not to have known of a work stoppage for over two months followed by acceleration prompted by the Government's warnings about schedule slippage." Nova Grp./Tutor-Saliba v. United States, 125 Fed. Cl. 469, 474 (2016). Government representatives were at the site daily and often attended daily production meetings in which the superintendent and crews discussed "what work they were going to perform that day and what work needed to be performed." Tr. 1526-27; Tr. 2449, 2490-91.

Statements by and Acts of the Government That Can be Construed as Acceleration Orders

As Mr. Anderson summarized, "NTS never requested a time extension because NTS understood that the government required the project to be completed ahead of the contract completion date, and NTS intended to complete the project ahead of the contract completion date." PX 147.7; see JX 12; JX 15; JX 17; JX 27. Marc Javorski, Tutor-Saliba's project manager, credibly testified as to his understanding that the Government would not allow time extensions:

> Q. [By Counsel for Plaintiff] In your dealings with the government, Mr. Klein or Mr. Hill or others, did you form an understanding as to the government's position regarding delays on the project?
>
> A. Yes.
>
> Q. What was your understanding?
>
> A. The understanding was that delays wouldn't be tolerated. There were -- there were hard milestones to be met. No time extensions.

Tr. 2199; see Tr. 2200.

Even after the global stability issue was resolved, the Government continued to press NTS to complete the project within the originally scheduled time frame, despite NTS' critical path work stoppage from March 8 to May 27, 2010. Specifically, after NTS began work again, in a July 21, 2010 letter, CO Olson warned NTS:

> It has been brought to my attention that there is a again a significant decline in the float available in the schedule. As of March 2010 there were 108 days of float available. As of July 2010 there are now only 28 days of float for activity GEMIL1220 which is the projected early completion milestone. 100 days of float have been lost in the last 4 months, which causes the Government significant concern for the overall completion of the project.
>
> While I recognize that you are actively working on maintaining the project schedule to complete Pier B and associated activities by the contract completion date, I feel it necessary at this time to provide you another reminder that should the float go negative you will be required to submit a recovery plan demonstrating how you will improve progress without additional cost to the Government in accordance with Federal Acquisition Regulation 52.236-15, Schedules for Construction Contracts.

JX 15; see also JX 12; JX 17; JX 27.

Meeting notes from August 5, 2010 and a September 3, 2010 letter from Mr. Fox to CO Olson, both of which occurred during NTS' acceleration efforts, indicate that NTS was required to accelerate to mitigate delay. PX 124.10; PX 71.3 (NTS letter describing REA 14, stating the Government's "concern that the design was not in conformance with the RFP required all work on Pier B to be stopped until these issues were resolved" and the resulting delay "required NTS to accelerate the falsework operation to mitigate the delay to the construction schedule.").

"An order to accelerate, to be effective, need not be couched in terms of a specific command. A request to accelerate, or even an expression of concern about lagging progress, may have the same effect as an order." Norair, 666 F.2d at 549; see Ace Constructors, Inc., 70 Fed. Cl. at 281 (applying Norair). Here, the Government's repeated warnings that NTS maintain the original project schedule despite a critical path work stoppage of over two months constituted an order to accelerate.

The Government argues that it knew NTS was accelerating, but thought it was part of NTS' recovery schedule dated March 5, 2010, which anticipated that NTS would accelerate during the spring and summer 2010. Def.'s Post-Trial Br. at 76. However, NTS performed additional work beyond what was required in the March 5 recovery schedule. See JX 59. To accelerate work, NTS increased crew sizes by adding labor and working additional hours, including more shifts and overtime, and added equipment and other resources. Tr. 1540-41; PX 147.31-.32. The CO acknowledged NTS' decision to hire additional employees, stating "[t]he Government appreciates the fact you are planning to increase crews to accomplish the contract work which will allow you to maintain the contract schedule." JX 27.1; see also PX 114.

The Government Was on Notice of NTS' Constructive Change Claim.

The Government contends that NTS failed to provide timely written notice that NTS considered the Government's demands a constructive change. Def.'s Post-Trial Br. at 136-38. The Court rejects this argument. The contracting officer had actual knowledge of the circumstances giving rise to NTS' constructive change claim, because it was the Government that issued the letters questioning NTS' previously approved design, requested KPFF to respond to BergerABAM's letters, and reiterated that NTS needed to adhere to the schedule, which caused NTS to accelerate after the stoppage of critical path work. JX 23; PX 63; PX 65; PX 153; JX 24. NTS disputed the Government and BergerABAM's questioning of its design and never agreed with their interpretation of the ACI code. Although FAR 52.243-4(d) requires 20 day-written notice of changes, there is an exception to the 20-day notice requirement where, as here, the Government had "actual or imputed notice of the circumstances giving rise to the claim." Nova Grp./Tutor-Saliba, 125 Fed. Cl. at 474; see also K-Con Bldg. Sys., Inc. v. United States, 778 F.3d 1000, 1010 (Fed. Cir. 2015).

NTS' Claimed Damages for Constructive Acceleration

This Court finds that NTS has demonstrated that the Government constructively changed the Contract and required NTS to accelerate work, causing NTS to incur additional costs.

Plaintiff requests $1,275,632.10 in damages due to the Government's questioning of NTS' design, NTS' concomitant delay and acceleration. Pl.'s Post-Trial Br. at 199; JX 34.1. These damages are broken down as follows:

1. NTS' Work Due to Constructive Change	
A. Overtime	$105,762.00
B. Productivity Loss	$607,280.00
C. Equipment Operating Expense (Standby and Overtime)	$140,487.00
D. Allowable Field Overhead (8.4% of Subtotal 1.A, 1.B, and 1.C.)	$71,696.44
2. Subcontractors' Work Due to Constructive Change	
A. KPFF Consulting Engineers	$115,937.71
B. Hayre McElroy & Associates, LLC	$59,207.50
C. Northwest Cascade, Inc.	$5,431.20
3. NTS' Allowable Overhead on Subcontractors (11.4% of subtotal Item 2)	$20,585.71
4. NTS' Allowable Home Office Overhead (3% of Total for Items 1 and 2)	$33,174.06

5. NTS' Allowable Profit (8% of Total for Items 1 and 2)		$88,464.15
6. B&O Tax (.6440%)		$8,037.29
7. NTS' Bond Premium (1.568%)		$19,569.04
	Total Costs REA No. 14	$1,275,632.10

JX 34.

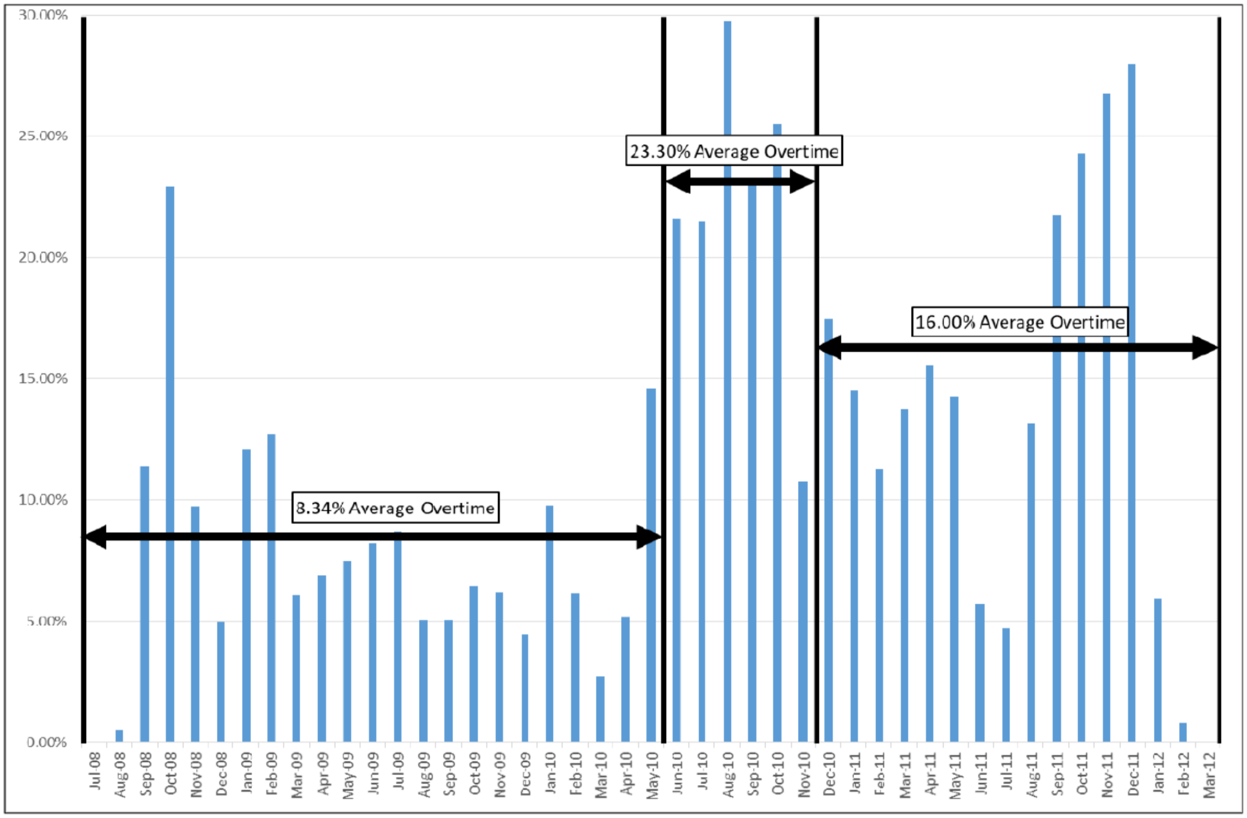
Overtime

NTS claims $105,762 in "costs for overtime premium paid to NTS employees during the acceleration period," May 27 through November 21, 2010. Pl.'s Post-Trial Br. at 187-88; DX 144.40. NTS' expert witness, Mr. Anderson, and the Government's expert witness, Mr. Boe, agree that NTS employees worked overtime due to the global stability issue. PX 147.22; DX 144.37. According to Mr. Anderson's Overtime Cost Detail chart, the total overtime hours were 4,422. PX 134.31. In his rebuttal expert report, Mr. Anderson stated that NTS worked an overtime rate of 19.72 percent during the acceleration period -- equating to $105,742.[27] PX 147.24; PX 134.23,.31.

The Government's expert, Mr. Boe, however, opined that Plaintiff's overtime rate should be reduced by "casual overtime." Tr. 2638-39. Specifically, Mr. Boe opined that NTS' average overtime rate outside the alleged acceleration period was 11.60 percent in relation to total hours worked, and characterized this 11.60 percent as "casual overtime" that NTS cannot recover because it was attributable to NTS' standard practice of overtime throughout the project. Def.'s Resp. at 178 (citing DX 144.46).

Mr. Boe submitted the following chart reflecting overtime expended between July 2008 and May 2012:

[27] Plaintiff's overtime request is based upon calculations performed by NTS' expert, Mr. Anderson, but Mr. Anderson's expert report calculates NTS' overtime costs at $105,742 for the acceleration period, not $105,762. Pl.'s Post-Trial Br. at 187-88; PX 134.31. Because Plaintiff relies on Mr. Anderson's expert report for its damages demand, the Court uses that number, $105,742, for NTS' overtime costs.



DX 144.41; <u>see</u> Tr. 2639.

Mr. Boe concluded that outside of the March 8 to May 27, 2010 acceleration window, NTS averaged an overtime rate of 11.60 percent in relation to total hours worked and, consequently, that NTS would have expended overtime at an approximate rate of 11.60 percent between May 27 and November 21, 2010, regardless of acceleration. DX 126.45-.46. Thus, he opined that Mr. Anderson's overtime damages should be reduced proportionally yielding $43,541 in overtime costs. DX 144.46.

NTS' expert, Mr. Anderson, thoroughly supported his overtime calculations, as seen in the chart below:

Attachment 3: Overtime Cost Detail

W/E	A Reg Hrs	B OT HRS	C Taxes, WC & Gen Ins	D Health Ins	E Cash Fringe	F Pension	G Reg Pay	H OT Pay	Total Burden Payroll	I = H / B Avg Weekly OT Wage	J = G / A Avg Weekly Reg Wage	K = I - J Delta OT Pay - Regular Pay	L = K * Burden Rate OT Burden per hour	M = K + L OT Cost (Delta + Burden) per hour	N = M * B OT Cost (Delta + Burden)
06-Jun-10	403.5		$4,161.08	$1,267.40	$1,965.05	$1,315.93	$13,158.90		$21,868.36		$32.61		$0.00	$0.00	$0.00
13-Jun-10	694.5	285.5	$11,189.73	$3,164.48	$5,458.23	$2,236.05	$22,359.59	$13,803.41	$58,211.49	$48.35	$32.20	$16.15	$6.68	$22.83	$6,518.85
20-Jun-10	1015	265	$15,492.32	$4,621.46	$7,663.10	$3,260.85	$32,607.39	$12,829.05	$76,474.18	$48.41	$32.13	$16.29	$6.74	$23.02	$6,100.61
27-Jun-10	765.5	199	$10,597.79	$3,197.14	$5,293.09	$2,453.82	$24,537.69	$9,853.15	$55,932.68	$49.51	$32.05	$17.46	$7.22	$24.68	$4,911.13
04-Jul-10	881.5	135	$10,305.52	$3,283.19	$5,122.56	$2,826.56	$28,264.89	$6,486.45	$56,289.17	$48.05	$32.06	$15.98	$6.61	$22.59	$3,050.08
11-Jul-10	681	236	$9,423.24	$2,853.81	$4,878.24	$2,197.72	$21,977.11	$11,666.55	$52,996.67	$49.43	$32.27	$17.16	$7.10	$24.26	$5,725.47
18-Jul-10	690	256.5	$10,333.30	$3,289.89	$5,277.74	$2,209.16	$22,091.84	$12,628.78	$55,830.71	$49.24	$32.02	$17.22	$7.12	$24.34	$6,242.80
25-Jul-10	1022	245.5	$15,296.02	$4,553.87	$7,217.43	$3,275.41	$32,754.28	$12,000.83	$75,097.85	$48.88	$32.05	$16.83	$6.96	$23.80	$5,841.87
01-Aug-10	1109	338.5	$16,741.06	$5,283.81	$8,437.95	$3,552.55	$35,525.49	$16,636.30	$86,177.16	$49.15	$32.03	$17.11	$7.08	$24.19	$8,188.52
08-Aug-10	1054.5	255.5	$14,447.44	$4,766.03	$7,093.31	$3,336.47	$33,364.22	$12,398.28	$75,405.75	$48.53	$31.64	$16.89	$6.98	$23.87	$6,098.50
15-Aug-10	996	393.5	$16,120.07	$4,960.34	$8,298.02	$3,206.60	$32,065.43	$19,175.36	$83,825.82	$48.73	$32.19	$16.54	$6.84	$23.37	$9,197.92
22-Aug-10	1012	313	$14,463.82	$4,480.94	$7,737.54	$3,240.11	$32,401.22	$15,467.82	$77,791.45	$49.42	$32.02	$17.40	$7.20	$24.60	$7,698.92
29-Aug-10	754.5	177.5	$10,286.07	$3,456.19	$5,252.88	$2,429.35	$24,293.77	$8,501.21	$54,219.46	$47.89	$32.20	$15.70	$6.49	$22.19	$3,938.13
05-Sep-10	552	65.5	$5,905.52	$2,068.20	$2,804.96	$1,747.56	$17,475.45	$3,214.87	$33,216.56	$49.08	$31.66	$17.42	$7.21	$24.63	$1,613.21
12-Sep-10	190.5	12.5	$2,246.06	$766.23	$1,029.67	$594.35	$5,943.55	$612.94	$11,192.80	$49.04	$31.20	$17.84	$7.38	$25.21	$315.14
19-Sep-10	639	283.5	$11,948.08	$3,808.78	$5,956.36	$1,965.16	$19,651.46	$13,870.53	$57,200.37	$48.93	$30.75	$18.17	$7.52	$25.69	$7,282.53
26-Sep-10	688.5	71	$7,727.50	$2,819.63	$3,214.44	$2,111.28	$21,539.49	$3,284.34	$40,696.68	$46.26	$31.28	$14.97	$6.19	$21.17	$1,502.79
03-Oct-10	610.5	289	$10,056.18	$3,260.28	$5,240.14	$1,943.25	$19,432.40	$14,292.05	$54,224.30	$49.45	$31.83	$17.62	$7.29	$24.91	$7,199.37
10-Oct-10	571	55.5	$7,257.13	$2,743.05	$3,192.08	$1,784.45	$17,844.06	$2,673.10	$35,493.86	$48.16	$31.25	$16.91	$6.99	$23.91	$1,326.90
17-Oct-10	594.5	115.5	$7,789.40	$2,631.15	$4,128.39	$1,925.08	$19,250.20	$5,642.64	$41,366.86	$48.85	$32.38	$16.47	$6.81	$23.29	$2,689.56
24-Oct-10	390.5	184	$8,425.42	$2,786.78	$4,470.96	$1,269.70	$12,696.93	$9,034.11	$38,683.90	$49.10	$32.51	$16.58	$6.86	$23.44	$4,313.37
31-Oct-10	624.5	15.5	$6,010.53	$2,115.28	$2,930.44	$2,009.67	$20,095.95	$774.77	$33,936.64	$49.99	$32.18	$17.81	$7.36	$25.17	$390.13
10-Nov-10	718.5	4	$6,946.03	$2,165.47	$3,374.45	$2,335.89	$23,358.43	$196.14	$38,376.40	$49.04	$32.51	$16.53	$6.83	$23.36	$93.44
14-Nov-10	411.5	91.5	$5,243.69	$1,583.88	$2,830.89	$1,287.03	$12,870.26	$4,561.10	$28,376.84	$49.85	$31.28	$18.57	$7.68	$26.25	$2,402.06
21-Nov-10	936	134	$11,013.94	$3,429.33	$5,885.37	$3,093.13	$30,930.37	$6,621.75	$60,973.89	$49.42	$33.05	$16.37	$6.77	$23.14	$3,100.89
Grand Total	18006	4422	$249,426.92	$79,356.61	$124,753.29	$57,607.13	$576,490.37	$216,225.53	$1,303,859.85						$105,742.21

Burden Rate Calculation:	
Ratio of OT Hrs to Total Hrs (B/(A+B)	0.1972
Total Burden Applicable to OT (C+D+E)	$ 453,536.82
Portion of Burden Allocable to OT	$ 89,421.25
Total OT Pay (H)	$ 216,225.53
OT Burden Rate	0.41

Notes
[1] Revised OT Hours and OT Pay excludes Cost codes 01030-050, 01045-050, 17016-010, 17024-010 from REA #14 OT Cost Detail. See Revised Cost Detail and Revised Cost Pivot Table Tab
[2] Refer to Revised OT Burden Cost Tab for Total Burden Applicable to OT Calculation

PX 134.31; <u>see also</u> PX 134.21; Tr. 1326.

The Court credits Mr. Anderson's overtime calculation without adjustment. The Court is not persuaded by Mr. Boe's reduction. Mr. Boe relied upon a speculative argument that overtime would have been standard throughout this project, could have been appropriately averaged, and that his calculated average must be deducted from awarded overtime damages. Plaintiff has demonstrated that its overtime was due to the 57-day delay in the project coupled with no extension to the project's completion date, and the need to accelerate to meet that date. As such, the Court finds that NTS is entitled to its full amount of overtime damages -- $105,742 -- as calculated by Mr. Anderson.

<u>Lost Productivity</u>

NTS claims $607,280 for costs incurred due to "direct labor costs (excluding overtime premium)" resulting from loss of productivity caused by acceleration. Pl.'s Post-Trial Br. at 188; JX 34; PX 147.32; Tr. 1281. Mr. Anderson opined that this productivity loss occurred due to overtime, increased work force and increased scope to construct bump outs, and pile coring. PX 147.31.

In his evaluation, Mr. Anderson considered three approaches to determining labor productivity loss: (1) industry factors, (2) measured mile, and (3) modified total cost. <u>See</u> PX 134; Tr. 1287-89, 1304.

The industry factors approach is based on published loss percentages that should be expected due to a discrete type of impact that could occur on a project and is used to determine the cost of that impact. Tr. 1224, 1288. Several industry groups publish these factors, including the Mechanical Contractors Association ("MCAA"), which NTS relied upon in its industry factor calculation. Tr. 1224; PX 134.21. Mr. Anderson ultimately rejected the use of the industry factors approach -- stating that the technique was "a great method for looking forward in time, but because . . . this is after the fact, this is a forensic analysis, we have actual data, a more accurate method would be to use either measured mile or the modified total cost approach." Tr. 1288. Mr. Boe agreed than an industry factor analysis was inappropriate. Tr. 2692.

"[T]he measured mile approach is an approach where you look at an unimpacted piece of the work to find out what it actually took to do that piece, and you compare it to the impacted production to see if you had a production loss, and you can measure that loss." Tr. 1289; see also Tr. 1225. Mr. Anderson originally determined that "the measured mile approach [was] the most accurate and preferred approach." PX 134.23. For his measured mile comparison, Mr. Anderson looked at construction of the very first bent out of 54 completed, which was not impacted by the acceleration. Tr. 1289. Mr. Boe was critical of Mr. Anderson's measured mile analysis based on the first bent for multiple reasons -- "selection of Bent #1 as the un-impacted work, productivity sample size, unreliable [timecard] data, and a lack of consideration for NTS delays." DX 126.46.

After considering Mr. Boe's criticisms, Mr. Anderson revised his conclusion stating,

> Given the criticism, the facts of this case, and the limits of the data, while the measured mile is normally considered the best method, a measured mile approach might not be achievable. In such case, the modified total cost approach for calculating loss of productivity can be used as an accurate measurement tool.

PX 147.27. Mr. Anderson ultimately concluded that the modified total cost approach was the preferred method given the facts of this case. Tr. 1305.

A total cost method determines damages by taking "the difference between the actual cost of the contract and the contractor's bid." Raytheon Co. v. White, 305 F.3d 1354, 1365 (Fed. Cir. 2002). This method is disfavored by courts "because of concerns about bidding inaccuracies, which can reduce the contractor's estimated costs, and performance inefficiencies, which can inflate its actual expenditures." Id. "The modified total cost methodology addresses some of the objections to the total cost method" by adjusting for possible inaccuracies. Id.; Neal & Co. v. United States, 36 Fed. Cl. 600, 638 (1996), aff'd, 121 F.3d 683 (Fed. Cir. 1997) ("The modified total cost method is simply the total cost method, adjusted for any deficiencies in the plaintiff's proof in satisfying the requirements of the total cost method."); see also Tr. 1225-26.

The modified total cost method requires the contractor, typically through an expert, to prove: (1) the impracticability of proving actual losses directly; (2) the reasonableness of its bid; (3) the reasonableness of its actual costs; and (4) its lack of responsibility for the added costs. Raytheon Co., 305 F.3d at 1366 (quoting WRB Corp. v. United States, 183 Ct. Cl. 409, 426 (1968)).

Here, Defendant does not dispute the impracticability of proving actual costs directly or the reasonableness of Plaintiff's initial pricing estimate.[28] The final two elements for applying the modified total cost approach are the reasonableness of Plaintiff's actual costs and Plaintiff's lack

[28] Mr. Anderson evaluated NTS' bid, looking at the method it used "to determine the bid, the quantities, the calculations, and the basis of the production." Tr. 1305. Mr. Anderson looked for bid inaccuracies but did not find any. Tr. 1305-06. In evaluating NTS' bid, the Government concluded that the NTS price proposal was reasonable. JX 7.7.

of responsibility for those costs. Because these elements overlap, the Court considers them in tandem. Mr. Anderson testified that he evaluated Plaintiff's costs in performing specific work, and in particular looked at cost codes related to concrete work in his analysis. Tr. 1306; PX 147.28-.29; PX 143.12-.13. He confined his analysis to "only labor that was involved with the building of bents, contract work" -- the labor that was allegedly affected by the acceleration. Tr. 1285; PX 134.22-.23.

The specific tasks included in Mr. Anderson's analysis were 1) bent field fab form, 2) bent survey, 3) pile collars, 4) deck panels, 5) bent/wall forms, 6) rebar handling, 7) place bent concrete, and 8) strip. PX 134.23. Mr. Anderson then compared budgeted versus actual costs for the identified task codes:

Loss of Productivity - Modified Total Cost Approach

Cost Code	Description		Budget		Actual
3510.010	Inventory, Shake out, Build Forms	$	54,501.36	$	52,518.40
3511.010	Pier B Survey	$	15,000.00	$	110,849.73
3512.010	Install Pile Collars	$	422,800.00	$	588,171.53
3513.010	Deck Panels	$	166,939.00	$	235,181.56
3514.010	Bent/Wall Forms	$	103,697.00	$	419,364.31
3515.010	Rebar for Pier - Handling	$	61,400.00	$	94,121.51
3516.010	Place Beam Concrete	$	69,847.00	$	236,720.55
3517.010	Strip Pile Col & Beam Forms	$	222,786.00	$	600,971.11
		$	1,116,970.36	$	2,337,898.70

PX 147.32; Tr. 1291-92.

Mr. Anderson then "removed productivity losses that occurred for bents that were constructed prior to the end of May of 2010 [because] those initial bents were done essentially in an unaccelerated fashion." Tr. 1292. Mr. Anderson also removed budgeted scaffolding costs on the last 17 bents, since NTS "didn't implement the scaffolding." Id. Mr. Anderson did not adjust his cost calculation for any contractor-caused inefficiencies because he "didn't find any that were relevant during this period of time which was analyzing specific to bent construction." Tr. 1306.

The Government contends that Plaintiff has not established the reasonableness of its costs or its lack of responsibility for such costs because Plaintiff fails to properly account for activities Plaintiff voluntarily undertook, which should have been subtracted from its calculation. Specifically, Mr. Boe concluded that NTS' undertaking ACC's backcharged work caused 196 days of work delay. Def.'s Resp. at 173 (citing Tr. 2627-28).

According to Mr. Boe, "[s]everal factors contributed to labor overruns for bent construction: Pile Cutoffs (Backcharged to ACC), Dowel Install & Repairs (Backcharged to ACC), Underwater Pile Repairs (Backcharged to ACC), Out of tolerance piles (REA 9), Skew Angle Redesign (REA 9), [and] Global Stability (REA 14)." DX 144.49. Mr. Boe opined that NTS failed to apportion loss of productivity among these multiple factors. DX 144.53; DX 126.50. No productivity loss was attributed to backcharged ACC work or skew angle redesign. DX 144.49. The record supports Defendant's argument. NTS voluntarily performed pile cutoffs, pile dowel installation, and pile repair work that ACC was intended to perform, and then backcharged ACC for that work. PX 170; Tr. 2624 (Mr. Boe explaining that PX 170 states "that NTS is going to take over this work, this pile cutoff work, because ACC didn't complete the work."). The Government asserts that "NTS's undertaking the Backcharged Work negatively affected NTS's productivity during the acceleration period." Def.'s Resp. at 172. NTS does not dispute that it was performing ACC backcharged work during the acceleration period. This performance inefficiency inflated NTS' expenditures and should have been adjusted in its modified total cost methodology. See Raytheon Co., 305 F.3d at 1365.

Plaintiff has not met its burden of proving modified total cost damages, in particular, Plaintiff's lack of responsibility for lost productivity costs because Plaintiff failed to attribute any lost productivity to backcharged ACC work.

Equipment Operating Expenses (Standby and Overtime)

NTS seeks $140,487 in equipment operating expenses. This cost is divided into two components: equipment standby and equipment overtime.

Equipment Standby

NTS claims it incurred $44,526 in equipment standby costs because it "was forced to idle certain pieces of equipment during the March 8 to May 27, 2010 delay period." Pl.'s Post-Trial Br. at 191. The Government argues that equipment standby costs are not recoverable for three reasons: (1) NTS did not include a delay claim in REA 14, (2) Plaintiff's calculation of rates and percentages ignores adjustments required by the Army Corps of Engineers manual, and (3) NTS improperly relies on Mr. Elgenson's long-after-the-fact allocation of costs. Def.'s Resp. at 179-80.

The fact that NTS only alleges a constructive acceleration claim, and not a delay claim, is undisputed. See Pl.'s Post-Trial Br. at 186 ("Here, the government appears to be mis-classifying this as a delay claim, as opposed to a constructive acceleration claim."). The Government's expert, Mr. Boe, testified that NTS' equipment standby costs were "a delay cost without a delay claim," and therefore, these costs should not be awarded. Tr. 2648.

Defendant, however, was on notice that Government-caused delay due to its questioning of Plaintiff's design was a key allegation put forth by Plaintiff. REA 14, submitted in 2011, was expressly titled "REA No. 14, Global Stability Delay." PX 73.1 (emphasis added). REA 14's stated purpose was to "recover extra cost resulting from NTS's mitigation of the 64 work day stoppage on Pier B." Id. PX 74 expressly states NTS "is requesting compensation for the overtime and inefficiencies NTS incurred to mitigate the sixty four (64) work day stoppage." PX 74.1. REA 14 was attached to Plaintiff's certified claim, and this language encompasses Plaintiff's equipment standby claim. PX 156. Plaintiff's equipment standby damages are based on the same operative facts as its constructive acceleration claim. Whether these damages are classified as delay costs or suspension costs is a matter of nomenclature and should not preclude recovery in the circumstances here. The costs were incurred as a direct result of the Government's challenge to Plaintiff's design and Plaintiff's concomitant suspension of critical path work.

Defendant's second and third arguments against equipment standby damages relate to the calculation performed by Plaintiff's expert, Mr. Anderson.

In his initial expert report, Mr. Anderson calculated equipment standby costs to be $89,430, based on the list of equipment, percent of use, and costs provided by site personnel Dan Fox, Gary Elgenson, Glenn Paulk, and Walt Birdsall. PX 134.23, .84. Mr. Anderson adjusted his calculation to $44,526 in his rebuttal report, stating "After my initial report, and as a result of the DCAA Audit which concluded in early August, 2017, NTS agreed to adjust its equipment rates by using USACE Construction Equipment Ownership and Operating Expense Manual. The rates have been modified to meet this standard." PX 147.23.

The Government asserts that NTS' equipment standby costs are "improper in that they ignore the adjustments the Army Corps of Engineers manual requires to be applied." Def.'s Resp. at 179. To calculate equipment operating expenses, Mr. Anderson applied equipment rates using the United States Army Corp of Engineers' Construction Equipment Ownership and Operating Expense Manual and adjusted rates from NTS. See PX 147.24. Adjusted equipment rates provided to Mr. Anderson were calculated by NTS' Project Manager, Mr. Elgenson. Tr. 911. He testified that he "reviewed each item, and understanding what work was in front, what the work was -- what equipment was allocated and what it was supposed to be doing. And if there was no work able to be performed, . . . then that equipment was on standby." Tr. 912. Mr. Elgenson conferred with other project personnel, Dan Fox and Glenn Paulk, to determine if his rate calculations were appropriate. Tr. 913. Mr. Anderson further testified that he followed the Corps' rates and that NTS made the adjustments required, and "we have not seen an alternative analysis that shows our numbers are wrong." Tr. 2890.

Mr. Anderson utilized the lower rate as between NTS' adjusted rates and the Corps of Engineers' unadjusted rates. Defendant does not dispute that NTS incurred costs associated with equipment standby, and Mr. Anderson's use of the lower rate as between NTS' and the Corps' rates provides a sufficient basis to award these damages. Accordingly, the Court awards Plaintiff $44,526 for equipment standby costs.

Equipment Overtime

NTS also requests $95,961 for equipment overtime costs during the acceleration period. Pl.'s Post-Trial Br. at 192; Tr. 1299. To calculate equipment overtime expenses, Mr. Anderson relied upon NTS' identification of equipment used on overtime and applied adjusted equipment rates using the United States Army Corps of Engineers' Construction Equipment Ownership and Operating Expense Manual. Tr. 1300. Mr. Anderson's equipment overtime calculation was evidenced in the following chart in his Rebuttal Expert Report:

Attachment 4: Revised Equipment Overtime Analysis

Nova Group

NTS Equipment Number	NTS Description	USACE ID No.	USACE Description	USACE Total Hourly Rate ($/hour)	NTS Total Hourly Rate ($/hour) (See Note 7)	Total Hourly Cost Used for Analysis ($/hour)	FCCM (Facilities Capital Cost of Money)	Overtime Rate ($/hour)	Total Overtime Hours	Overtime Cost
999993	Flexi Floats, 7'x7"	M10MZ001	MARINE EQUIPMENT, WORK BARGE, SECTIONAL, MEDIUM DUTY, 40' X 8' X 4', 23 TON	$5.22	-	$5.22	$0.34	$4.88	197	$961
23-009	25' Aluminum Survey Boat, 260 HP	M10XX015	MARINE EQUIPMENT, BOATS & LAUNCHES, 26', W/STEERING NOZZLE, INLAND TUG 250HP	$40.94	-	$40.94	$1.99	$38.95	197	$7,673
20-547	Lancer assult Craft/steel work	M10MZ005	MARINE EQUIPMENT, WORK BARGE, SECTIONAL, MEDIUM DUTY', W/ONE BUCKHEAD AND SPUDS, 40' X 12' X 4', 36 TON	$1.89	$0.63	$0.63	$0.00	$0.63	197	$0
Subtotal										$8,635

Tutor Saliba

NTS Equipment Number	NTS Description	USACE ID No.	USACE Description	USACE Total Hourly Rate ($/hour)	NTS Total Hourly Rate ($/hour) (See Note 7)	Total Hourly Cost Used for Analysis ($/hour)	FCCM (Facilities Capital Cost of Money)	Overtime Rate ($/hour)	Overtime Hours	Overtime Cost
00850	210 Ton Crawler Crane	C85KC008	CRANES, MECHANICAL, LATTICE BOOM, CRAWLER, 200 TON, 50' BOOM, LIFTING	$155.31	$86.77	$86.77	$20.89	$65.88	197	$12,978
00868	230 Ton Crawler Crane	C85MA010	CRANES, MECHANICAL, LATTICE BOOM, CRAWLER, 230 TON, 300' BOOM, LIFTING	$190.57	$126.84	$126.84	$26.08	$100.76	197	$19,850
00961	100 Ton R/T	C85TE009	CRANES, MECHANICAL, LATTICE BOOM, CRAWLER, 100 TON, 230' BOOM, LIFTING	$101.05	$61.46	$61.46	$13.03	$48.43	197	$9,541
01010	Concrete Pump - 43m	C55OE001	CONCRETE PUMP, PUMP & BOOM, 130 CY/HR, REACH: 72' HORIZONTAL / 85' VERTICAL (ADD 50,000 GVW TRUCK	$70.07	$68.22	$68.22	$2.81	$65.41	197	$12,886
01335	Generator 20KW-36KVA	G10XX005	GENERATOR SET, SKID MTD, 25 KW	$10.61	-	$10.61	$0.28	$10.33	197	$2,035
01374	Generator 12KW-21KVA	G10XX002	GENERATOR SET, PORTABLE, 10 KW	$4.92	-	$4.92	$0.08	$4.84	197	$953
01376	Generator 12KW-21KVA	G10XX002	GENERATOR SET, PORTABLE, 10 KW	$4.92	-	$4.92	$0.08	$4.84	197	$953
01436	Air Compressor	A15XX027	AIR COMPRESSOR, 175 CFM, 125 PSI (ADD HOSE)	$24.64	$23.31	$23.31	$0.78	$22.53	197	$4,438
01475	Air Compressor	A15XX027	AIR COMPRESSOR, 175 CFM, 125 PSI (ADD HOSE)	$24.64	$23.31	$23.31	$0.78	$22.53	197	$4,438
02306	Light Tower	L20AB018	LITE SET, TRAILER MTD., 4/1,000W, W/8KW GEN, ELECTRIC MAST WINCH	$6.80	-	$6.80	$0.26	$6.54	197	$1,288
02326	Generator 12KW-21KVA	G10XX002	GENERATOR SET, PORTABLE, 10 KW	$4.92	-	$4.92	$0.08	$4.84	197	$953
02327	Generator 12KW-21KVA	G10XX002	GENERATOR SET, PORTABLE, 10 KW	$4.92	-	$4.92	$0.08	$4.84	197	$953
02461	Forklift-10K (Reach)	F10JC002	FORK LIFT, ROUGH TERRAIN, 8,000 LBS @ 30' HIGH STRAIGHT MAST, 4X4	$21.95	$22.13	$21.95	$1.32	$20.63	197	$4,064
02462	Forklift-10K (Reach)	F10JC002	FORK LIFT, ROUGH TERRAIN, 8,000 LBS @ 30' HIGH STRAIGHT MAST, 4X4	$21.95	$22.13	$21.95	$1.32	$20.63	197	$4,064
02485	Forklift-10K (Reach)	F10JC002	FORK LIFT, ROUGH TERRAIN, 8,000 LBS @ 30' HIGH STRAIGHT MAST, 4X4	$21.95	$22.13	$21.95	$1.32	$20.63	197	$4,064
03363	Light Tower	L20AB018	LITE SET, TRAILER MTD., 4/1,000W, W/8KW GEN, ELECTRIC MAST WINCH	$6.80	-	$6.80	$0.26	$6.54	197	$1,288
03364	Light Tower	L20AB018	LITE SET, TRAILER MTD., 4/1,000W, W/8KW GEN, ELECTRIC MAST WINCH	$6.80	-	$6.80	$0.26	$6.54	197	$1,288
03367	Light Tower	L20AB018	LITE SET, TRAILER MTD., 4/1,000W, W/8KW GEN, ELECTRIC MAST WINCH	$6.80	-	$6.80	$0.26	$6.54	197	$1,288
Subtotal										$87,326
Grand Total										$95,961

Overtime % of Hours: 19.72%

Notes:

1. NTS Equipment Number and NTS Description from Nova and Tutor Saliba Equipment Rates. See Attachment 4B and 4C.
2. USACE ID No., USACE Description, USACE Total Hourly Rate and FCCM (Facilities Capital Cost of Money) from 2009 USACE Region 8 Construction Equipment Ownership and Operating Expense Schedule
3. NTS Total Hourly Rate from Walt Birdsall. See Attachment 4D
4. More conservative rate of NTS and USACE rates used for Total Hourly Cost Used for Analysis
5. Overtime Rate ($/hour) = Total Hourly Cost Used for Analysis - FCCM (Facilities Capital Cost of Money)
6. Overtime Hours = Overtime period (25 weeks) * 40 hours/wk * Overtime % of Hours (19.72%) = 197 hours
7. Overtime % of Hours calculated from Attachment 3 of BRG Affirmative Report
8. Overtime Cost = Overtime Rate * Overtime Hours

PX 147.56.

Although Mr. Boe opined that Mr. Anderson did not make required adjustments, the Court is persuaded that Mr. Anderson made sufficient adjustments as supported by Mr. Anderson's examples. Mr. Anderson testified:

> A. Yes. So what happened here was, originally we were provided notes by NTS, the contractor, as to what their equipment hourly rate was. One of the criticisms I received in my initial report was that we should be using U.S. Army Corps of Engineer rates. I looked at both rates. And when the NTS rate was lower than U.S. Army Corps -- I use whatever rate was lower in my analysis. And so I have two columns. One is the U.S. Army Corps rate, one is the NTS rate, and then the one I use the analysis was the lower of the two.
>
> Q. [By Counsel for Plaintiff] So let's walk through a couple of examples. If you have -- let's go with the 230-ton crawler crane, which is the second item. NTS Equipment No. 00868. Do you see that?
>
> A. Yes.
>
> Q. What's the USACE total hourly rate listed there?
>
> A. $190.57 an hour.

Q. And then the NTS total hourly rate is, what is that listed?

A. Hundred twenty-six, eighty-four cents an hour.

Q. Okay. So of those two, you used the lower number?

A. I used the lower, the 126.84 provided by NTS.

Q. And then from that number, did you subtract the FCCM [Facilities Capital Cost of Money]?

A. Yes, I did.

Q. And what does that -- what -- what did that calculation give?

A. It provides -- it then provides an overtime rate, a usage rate of $100.78 an hour for that crane. I then multiplied it by the number of overtime hours.

Q. And that yielded your overtime cost?

A. That yielded the overtime cost for that piece of equipment.

. . .

Q. And moving down the page further, there's an item for forklift. Do you see that? There's two of them.

A. Yes.

Q. First one. What's the corps rate there?

A. The corps rate was 21.95 an hour.

Q. What was NTS's rate?

A. 22.13.

Q. Which one did you use?

A. We used the corps rate, which was slightly less, of 21.95.

Q. And did you subtract the FCCM from that?

A. Yes.

Q. And then after that calculation, what did you do next to determine the overtime cost?

A. Multiplied that by the -- you have an overtime rate of $20.63 an hour. You multiplied it by the number of overtime hours to achieve an overtime cost for that piece of equipment.

Tr. 1301-04. Mr. Anderson's analysis sufficiently addressed Mr. Boe's criticisms regarding required adjustments for equipment overtime calculations and supported Plaintiff's revised claim.

The Government also argues that, as with labor overtime, equipment overtime should be reduced by 11.60 percent to account for casual overtime, but as explained above, the Court is not persuaded by Defendant's casual overtime argument. Def.'s Resp. at 179; Tr. 2648-49. As such, the Court awards NTS $95,961 for equipment overtime.

Overhead, Subcontractor Costs, and Markups

The parties stipulated to the quantum of all subcontractor costs in Plaintiff's REA 14:

a. KPFF costs:	$115,937.71
b. Hayre McElroy & Associates, Inc. costs:	$59,207.50
c. Northwest Cascade:	$5,431.20
Total	$180,576.41

Tr. 3080; May 25, 2018 Stipulation ¶ 14. This Court has determined the Government is liable for acceleration costs, including these subcontractor costs, and awards $180,576.41 to NTS for the subcontractor work related to REA 14.

The parties also stipulated to home office overhead, profit, B&O tax, and bond premium markups as follows:

a. Home Office Overhead: 3% of direct costs and subcontractor costs;

b. Profit: 8% of direct costs and subcontractor costs;

c. B&O Tax: .6090% of all costs and markups[;]

d. Bond Premium: 1.590% of all costs and markups."

May 25, 2018 Stipulation ¶ 15.[29]

* * *

The Court awards NTS $528,802.82 on its constructive change claim, as follows:

1. NTS' Work Due to Constructive Change		
A. Overtime		$105,742.00
B. Productivity Loss		$0.00
C. Equipment Operating Expenses (Standby and Overtime)		$140,487.00
D. Allowable Field Overhead (8.4% of Subtotal 1.A, 1.B, and 1.C.)		$20,683.24
	Subtotal	$266,912.24
2. Subcontractors' Work Due to Constructive Change		
A. KPFF Consulting Engineers		$115,937.71
B. Hayre McElroy & Associates, LLC		$59,207.50
C. Northwest Cascade, Inc.		$5,431.20
	Subtotal	$180,576.41

29 The field overhead rate of 8.4 percent, subcontractor overhead rate of 11.4 percent, home office overhead rate of 3 percent, and profit rate of 8 percent were included in NTS' bid and approved by the Government. JX 4.300; Tr. 1440-41.

3. NTS' Allowable Overhead on Subcontractors (11.4% of Subtotal Item 2)	$20,585.71
4. NTS' Allowable Home Office Overhead (3% of Total for Items 1 and 2)	$13,424.66
5. NTS' Allowable Profit (8% of Total for Items 1 and 2)	$35,799.09
Subtotal	$517,298.11
6. B&O Tax (.6440%)	$3,331.40
7. NTS' Bond Premium (1.568%)	$8,173.31
Total	$528,802.82

Plaintiffs who succeed on a CDA claim are entitled to interest on that claim. 41 U.S.C. § 7109. Interest accrues "beginning with the date the contracting officer receives the contractor's claim, pursuant to section 7103(a) of this title, until the date of payment of the claim." 41 U.S.C. § 7109(a)(1). NTS' certified claim was filed on June 26, 2014, and it is entitled to interest calculated according to the CDA from that date until payment.

The Clerk is directed to enter judgment for Plaintiff in the amount of $528,802.82 together with interest calculated according to the CDA from June 26, 2014 until the date of payment.

s/Mary Ellen Coster Williams
MARY ELLEN COSTER WILLIAMS
Senior Judge