Board of Contract Appeals
General Services Administration
Washington, D.C. 20405

GRANTED IN PART: January 11, 2001

GSBCA 14744, 14877

HENSEL PHELPS CONSTRUCTION CO.,

Appellant,

v.

GENERAL SERVICES ADMINISTRATION,

Respondent.

David P. Dapper of Wickwire Gavin, Los Angeles, CA; and Stephen B. Hurlbut of Wickwire Gavin, Vienna, VA, counsel for Appellant.

Dalton F. Phillips and Sharon J. Chen, Office of General Counsel, General Services Administration, Washington, DC, counsel for Respondent.

Before Board Judges **BORWICK**, **NEILL**, and **DeGRAFF**.

NEILL, Board Judge.

These appeals concern two claims brought by Hensel Phelps Construction Co. (HPCC) regarding construction of a complex to house offices and laboratories of the National Oceanic and Atmospheric Administration (NOAA) in Boulder, Colorado. A substantial part of both claims includes a claim of HPCC's mechanical subcontractor for the project, Trautman & Shreve, Inc. (T&S). The first claim is for the costs associated with the installation of vibration isolation on certain piping. The parties disagree as to whether this was a contract requirement. The second claim is for a loss of productivity allegedly resulting from actions and inactions on the part of the Government and its agents. Because the two claims relate to the same project, we have consolidated them here for purpose of decision. For the reasons set out below, we conclude that the Government is liable for the majority of the costs sought by HPCC in the two claims.

Findings of Fact

1. On September 23, 1996, the General Services Administration (GSA) awarded a contract (the contract) to HPCC for the construction of a new building for NOAA in Boulder, Colorado. The contract award amount totaled $50,002,000. Appeal File, GSBCA 14744, Vol. 1, Exhibit 1.[1] The contract stated that this new federal building was a facility designed to meet the specific needs of designated divisions within NOAA. The building was to embrace a gross construction area of approximately 372,000 square feet. The first, second and third floors were to be fully above grade, while a garden level, partially below grade, was to be a partial floor plate composed of both occupied areas and major mechanical equipment spaces. Id., Vol. 1, Exhibit 1 at 01010-2. The building in its entirety was to be subdivided into four separate blocks or "buildings," namely, blocks A, B, C, and D.[2] Respondent's Supplemental Appeal File, Vol. 24, Exhibit G235 (Exhibit 1). The blocks differed significantly among themselves based upon the character of the work that was to be performed in them. Block A was to consist primarily of laboratories. It also was to house on its ground level the major mechanical room where the chillers are located. Block D also contained equipment rooms and some laboratories. Blocks B and C were to be office-oriented with mostly offices and computer rooms. Transcript at 2452-53. In initiating construction of the building, HPCC followed a reverse sequence starting first with block D and then proceeding, in turn, to blocks C, B, and A. Id. at 823.

2. HPCC's contract contained the standard Changes clause required for construction clauses under the Federal Acquisition Regulation (FAR). 48 CFR 43.205(d) (1996) (FAR 48.205(d)). The August 1987 version of the clause, which was applicable at the time the

---

[1]In accordance with Board Rule 104(a) and (b) the parties have made several appeal file submissions -- some in connection with the individual appeals and some consolidated submissions covering both GSBCA 14744 and GSBCA 14877. The Government's submissions are as follows:

1. Appeal File, GSBCA 14744 (four volumes)
2. Appeal File, GSBCA 14877 (one volume)
3. Respondent's Supplemental Appeal File (Consolidated) (twenty-seven volumes)

The Appellant's submissions are as follows:

1. Appellant's Supplemental Appeal File, GSBCA 14744 (two volumes)
2. Appellant's Supplemental Appeal File, GSBCA 14877 (one volume)
3. Appellant's Supplemental Appeal File (Consolidated) (five volumes)

[2] We note here that the terminology used by fact and expert witnesses in speaking of these blocks is not altogether consistent. Some use the term "block" while others refer to an individual block as a "building." Our practice here is to use the term which actually appears on the page of the transcript or the document being cited.

solicitation was issued, contained the following provision which is of particular relevance to these appeals:

> FAR 52.243-4 CHANGES (AUG 1987)
>
> (d) If any change under this clause causes an increase or decrease in the Contractor's cost of, or the time required for, the performance of any part of the work under this contract, whether or not changed by any such order, the Contracting Officer shall make an equitable adjustment and modify the contract in writing.

Appeal File, GSBCA 14744, Vol. 1, Exhibit 1 (GSA Form 3506 at 30-31). During the life of the contract, the Government issued forty-five change orders involving T&S. Respondent's Supplemental Appeal File, Vol. 23, Exhibit G234 (Exhibit 12). The contract also contained the FAR Inspection of Construction clause. One provision of that clause of particular relevance to these appeals reads:

> FAR 52.246-12 INSPECTION OF CONSTRUCTION (JULY 1986)
>
> (d) The presence or absence of a Government inspector does not relieve the Contractor from any contract requirement, nor is the inspector authorized to change any term or condition of the specification without the Contracting Officer's written authorization.

Appeal File, GSBCA 14744, Vol. 1, Exhibit 1 (GSA Form 3506 at 16).

3. Division 15 of the specifications in HPCC's contract with GSA for the construction of the new NOAA building is entitled "Mechanical." In this section one finds the mechanical specifications for the NOAA project. Appeal File, GSBCA 14744, Vol. 1, Exhibit 1 at TC-4. On October 10, 1996, HPCC and T&S entered into a subcontract totaling $7,840,014. Pursuant to this subcontract, T&S agreed to perform nearly all of the work called for in Division 15 of HPCC's contract with GSA. Of all the sections in Division 15, only the work in Sections 15325 (fire protection), 15981 (building automation system), and 15990 (testing, adjusting and balancing) were reserved for award to a subcontractor other than T&S. Id., Vol. 4, Exhibit 3 at 3. T&S is one of the largest mechanical contractors in the state of Colorado. Transcript at 402.

4. By letter dated October 28, 1996, GSA's contracting officer (hereinafter the "contracting officer") issued to HPCC a notice to proceed with the contract, with completion to be by November 8, 1998. Respondent's Appeal File, GSBCA 14744, Vol. 14, Exhibit G11.

5. The first contract GSA awarded for the design of the new NOAA building was eventually terminated for default in 1991. Shortly thereafter GSA awarded an architectural/engineering (A/E) contract to the firm of Fentress Bradburn and Associates (FBA). This contract was also beset with problems and came close to being terminated for default. Nevertheless, the decision was made not to terminate. FBA submitted a final

design in the summer of 1994. Transcript at 427-31; Appellant's Supplemental Appeal File, Vol. 1, Exhibits 118, 119.

6. GSA retained CRSS Constructors (CRSS) as its construction manager and to act as GSA's representative during construction of the NOAA project. As GSA's representative on the project, CRSS was responsible for handling communications with GSA's consultants and with the contractor. This included processing requests for information (RFIs), negotiating change orders, providing construction phase engineering services, reviewing schedules, making field observations, and undertaking some inspection responsibilities. Transcript at 419, 2298-99.

7. A mechanical engineering firm, BCER, was retained to assist CRSS on technical matters. This was not the firm which had worked earlier with FBA. FBA had been assisted by the firm of Reigel Doyle & Associates (RDA). Transcript at 83.

GSBCA 14877: Vibration Isolation Claim

I. The Isolation of Plumbing Piping

8. The president and chief executive of T&S testified regarding vibration isolation and provisions made for it in T&S's bid. This witness has had a wide variety of experience in the field of mechanical contracting. He started as a pipe-fitter apprentice in 1970 and gradually worked his way upward to the ranks of supervisory foreman, general foreman superintendent, and eventually project manager. In 1986, he became managing vice president in charge of all company operations. In 1991, he became company president. Transcript at 19-20.

9. This witness testified that vibration isolation consists of various means of reducing or eliminating the transmission throughout a structure of vibration from mechanical equipment, typically reciprocating equipment from heating, ventilation and air conditioning (HVAC) equipment such as a chiller. Common means of vibration isolation include rubber pads placed underneath equipment and pipe hangers incorporating spring isolators or, for smaller diameter pipe, rubber-in-sheer hangers which use a rubber isolator rather than a spring. Transcript at 27-30; Appellant's Trial Exhibits 1, 2A, 2b. The witness further explained that vibration isolation is commonly specified for HVAC piping because such piping is connected to reciprocating equipment and consequently requires vibration isolators to eliminate or reduce the transmission of vibration from the equipment through the pipes. Transcript at 33.

10. One matter of dispute in this appeal is whether vibration isolation was to be installed on plumbing piping as well as on HVAC piping. In preparing its estimates prior to submitting a final bid to HPCC, T&S did not believe that vibration isolation was required for plumbing piping. It therefore made no provision for the material or labor costs which would be associated with such a requirement. T&S's president and chief executive testified

on this point. He explained that in all his years of experience in the field of mechanical contracting he has never personally seen a requirement for vibration isolation on plumbing piping systems. Speaking on behalf of T&S, one of the oldest mechanical companies in the state of Colorado, he contended that such a requirement had never been seen in the fifty year history of the company. Transcript at 32.

11. T&S's president and chief executive also explained that he is familiar with the company's estimating process and has worked in this area since becoming a project manager. Transcript at 20. In his position as president and chief executive officer of the company, he routinely is involved in the bidding process and particularly in the final review of company estimates prior to the submission of a final bid to a general contractor. He made such a review of the estimate supporting the bid submitted by T&S to HPCC for the NOAA project. He states that the estimate did not include any provision for the costs of vibration isolation of plumbing piping systems because, had these costs been included, this would have been called to his attention by the estimators as something out of the ordinary. Id. at 23-26, 64. He further testified that, as a result of this dispute, he has subsequently learned just how the company's senior estimator actually did estimate the cost of vibration isolation hangers for the project. Id. at 68-69.

12. On February 5, 1997, T&S submitted an RFI to HPCC. HPCC, in turn, forwarded this RFI (number 305) to CRSS. This RFI posed the following question. It referenced a provision concerning the vibration isolation of horizontal pipes found in paragraph 3.1 of Section 15241 of the contract specifications. One section of the paragraph specifically lists a requirement for vibration isolation on various floors and levels of building blocks A, C, and D. Noticing the absence of any mention of block B, T&S asked: "Block B is not included in the vibration isolation for horizontal piping on specification 15241-9, 3.1. Is this the intent? Please advise." Appellant's Supplemental Appeal File, GSBCA 14877, Exhibit 13. CRSS submitted RFI 305 to BCER (Finding 7) for reply. BCER replied with one word: "Correct." This reply was passed back to T&S through CRSS and HPCC. Appeal File, GSBCA 14877, Exhibit 1.

13. CRSS had in its employ, during the construction of the NOAA building, a field engineer who served as the company's mechanical inspector for the project. Like the T&S president, he too had never seen a requirement for vibration isolation on plumbing piping. Nevertheless, he testified that, after reading the contract's mechanical specification, odd as it might seem, it appeared to him that the contract called for vibration isolation of all piping. Transcript at 479-83. This inspector testified that he first noticed that T&S was not installing vibration isolation with plumbing piping after construction began on the building's first block, namely, block D. Since most of the work on the garden level of block D was mechanical he did not have occasion to observe that there were no isolators on plumbing piping until work started on the first level. He testified:

> The first thing that they started was in Building D, and I think it was 11/1. And in the garden level -- most of the garden level is mechanical room. When they start the first level where they have HVAC piping and plumbing, what I noticed was that they have all the isolators for the HVAC piping, but not for the plumbing.

Id. at 483-84. The inspector further testified that he mentioned the absence of isolators on plumbing piping to a T&S supervisor one day in a casual manner while returning to the office with him. The inspector's recollection of the brief discussion is vague. He testified that the individual with whom he spoke assured him that someone had already been contacted on this matter and that the isolation was not required. The inspector cannot recall what, if anything more, was said in this first discussion with the T&S supervisor. Id. at 483-85.

14. This same CRSS inspector testified that he does not recall whether he mentioned T&S's failure to install vibration isolation with plumbing piping to the official at CRSS to whom he reported. Transcript at 493. He did not bring the matter to the attention of the general contractor, HPCC. Id. at 496. Neither did he issue a field observation notice (FON) on the matter. Id. at 495 He explained that the purpose of a FON is to capture for the record the need to take corrective action on a particular item. He stated that it was his practice not to issue a FON immediately but first to mention his concern orally. If corrective action was not taken within a few weeks, then he would issue the FON. Id. at 495-96. In this case, he admits he did nothing on the matter for two or three months even though he was well aware that installation of plumbing piping without vibration isolation was continuing in both blocks C and D. Id. at 485, 497.

15. The CRSS inspector contends that he again brought up the issue of vibration isolation on plumbing piping in late September or early October 1997. He testified that he did so at the close of a meeting he attended with T&S's project director to discuss HVAC valves. He stated that, when discussion of the valves had concluded, he asked about vibration isolation for the plumbing piping. He further testified that the general contractor was represented at this meeting and that, in his opinion, in the final analysis, it was the responsibility of the HPCC's quality assurance staff to ensure that T&S installed plumbing piping with the requisite vibration isolation. Transcript at 485-88. The record contains a letter dated October 7, 1997, sent by the CRSS inspector to an HPCC official. It concerns "Vibration and Neoprene Wrap issues." In it the inspector commented, among other things, on subsection 3.1.D.2.a of section 15241 of the contract specifications (see Findings 30-31). He wrote: "All HVAC piping, all plumbing piping, including drain piping, all laboratory water piping (or other liquid piping) larger than 3/8" is required to get the isolators and neoprene wrap as per this specification sections [sic]." Appellant's Appeal File Supplement, GSBCA 14877, Exhibit 15.

16. The recollection of T&S's project manager is in conflict with that of the CRSS inspector concerning when the issue of vibration isolation on plumbing piping first arose. The project manager contends that T&S knew nothing of the Government's concern regarding the lack of vibration isolation on plumbing piping until it received a copy of a letter sent by CRSS to the general contractor (HPCC) dated October 31, 1997. Transcript at 100-02. The letter states: "ALL piping systems, unless specifically excluded, are subject to the requirements of Specification Section 15241, Noise and Vibration Control, not just the Hydronic Piping."[3] Appeal File, GSBCA 14877, Exhibit 3.

[3]The term "hydronic" is defined as: "Of relating to, or being a system of heating or cooling that involves transfer of heat by circulating fluid (as water or vapor) in a closed

17. Like T&S's president and chief executive, T&S's project manager for the NOAA project had never before seen a requirement for vibration isolation on a plumbing system. He testified that in his thirty-one years of experience in the mechanical contracting field, which has included some special purpose buildings such as the NORAD facility in Colorado Springs, he had never seen a requirement for vibration isolation on plumbing piping. Transcript at 80. He readily admitted, however, that he had never worked on a project which included seismic measurement. Id. at 123. Accordingly, it is his testimony that when RFI 305 went forward in February 1997 (Finding 12), it was based upon T&S's understanding that the specification section, namely Section 15241, which contained the requirement for vibration isolation on horizontal piping in blocks A, C, and D, applied only to HVAC piping. Id. at 81-87, 154.

18. The record shows that, by letter dated October 10, 1997, CRSS advised the general contractor and, through HPCC, T&S as well, that the answer previously provided in February to RFI 305 (Finding 12) was "inaccurate and should not have confirmed the statement posed in the RFI." Appeal File, GSBCA 14877, Exhibit 2. T&S's project manager testified that T&S understood this revision of the Government's original reply to RFI 305 to mean only that vibration isolation was required on HVAC piping in block B. Transcript at 100-03; Appellant's Supplemental Appeal File, GSBCA 14877, Exhibit 18 at 1. This in itself was extremely upsetting to T&S since it involved going back and retrofitting the HVAC piping which had already been installed in block B -- some of which was quite large. Specifically the retrofit for these pipes required supporting the piping from below while the hanger rods extending from the ceiling were cut to permit insertion of an isolator spring before reassembling the hanger and reattaching it to the ceiling. Transcript at 88-89, 155-56.

19. Given the record before us, we find that it was not until October 1997, as the Government focused on the provision in Section 15241 which had originally led the contractor to submit RFI 305 in early February of that year, that an even larger issue began to emerge. As we have already seen (Findings 16-17) and will see below in greater detail, T&S believed that Section 15241 on noise and vibration control dealt only with hydronic or HVAC piping. In its letter of October 31, 1997, to the general contractor, CRSS rejected that interpretation when it wrote: "ALL piping systems, unless specifically excluded, are subject to the requirements of Specification Section 15241, Noise and Vibration Control, not just the Hydronic Piping." Appeal File, GSBCA 14877, Exhibit 3. T&S's project manager testified that this communication was even more devastating for T&S than the retraction of the answer to RFI 305. This communication would involve a retrofit far more extensive than that required to install vibration installation on HVAC piping already installed in block B. According to T&S's project manager, the installation of plumbing piping first began in April 1997. By the end of October 1997, a good percentage of the plumbing piping had already been installed in blocks D, C, and B and a little had also been installed in block A. Transcript at 96, 111, 156-57.

---

system of pipes." Webster's Ninth New Collegiate Dictionary 590 (1990). For purposes of this case, therefore, we consider "hydronic piping" as equivalent to or the same as "HVAC piping." See Transcript at 104-05, 455.

20. T&S's project manager testified that, following receipt of CRSS's letter of October 31, he and others attempted to convince CRSS's inspector and other CRSS officials that their application of Section 15241 to plumbing piping was incorrect. It is his recollection that CRSS conferred with its BCER consultant who, in turn, insisted on conferring with the firm responsible for writing the specification. Transcript at 107-09. Nevertheless, by letter dated November 5, 1997, and by a second letter dated November 14, the contracting officer indicated that he was in agreement with CRSS on the matter and directed HPCC to install the isolation on all plumbing piping. Appeal File, GSBCA 14877, Exhibits 4, 7. HPCC, in turn, formally advised CRSS of its disagreement and reserved its right to claim additional compensation under the contract's changes clause. Id., Exhibit 6.

21. Much of T&S's argument regarding the inapplicability of Section 15241 to plumbing piping turns on the fact that this particular section is said to include requirements for mechanical and electrical systems. The project manager testified that it is customary in the mechanical construction field or the "MEP business" to distinguish among "mechanical, electrical, and plumbing." Transcript at 134. Given the presence of a section in the specification dealing with plumbing systems and the distinction found elsewhere in Division 15 of the contract between "mechanical" and "plumbing," he considered that Section 15241, which was expressly said to deal with "mechanical and electrical systems," was applicable to hydronic or HVAC piping but not plumbing piping. Id. at 133-140. The testimony of T&S's president and chief executive supported the use of these distinctions in the trade. He explained that while the term "mechanical" is used in a "global" sense to describe generally the work of mechanical contractors, when used to describe the systems with which these contractors are concerned, it refers to HVAC as opposed to other systems such as plumbing or fire protection. Id. at 70-71.

22. The author of Section 15241 was called to testify at the hearing for these appeals (the hearing). She had served as an acoustic and vibration consultant to FBA during the design phase of the NOAA project. In early November 1997, she was contacted by an FBA representative and asked to comment on the reference in Section 15241 to a requirement therein for vibration isolation on "all piping." An FBA "Memorandum of Contact" summarizing her conversation with the FBA representative states that she replied that "all piping" was all-inclusive except where specifically indicated in the specification as, for example, the express exclusion of fire suppression systems from this requirement. She is further quoted as saying that this requirement for vibration isolation was highly unusual but nevertheless a requirement. Copies of this memorandum of contact were provided to CRSS by FBA. Appellant's Supplemental Appeal File, Vol. 1, Exhibit 152. At the hearing this witness confirmed that she had been contacted by FBA on this matter and that the report of her conversation as provided in the FBA memorandum was accurate. Transcript at 457-59.

23. This same witness testified that her direct involvement with the preparation of Division 15 was limited to drafting Section 15241 on vibration isolation. She did not draft any other sections of Division 15 and, as a matter of fact, in May 1996 left the firm which was assisting FBA in the design of the NOAA project. Transcript at 457-61, 475-76. When asked about any possible distinction between the term "mechanical" and "plumbing," she testified that there is no distinction between the terms from a "design responsibility" standpoint. Id. at 447-48. She did, however, admit that she was aware of a distinction

sometimes made between the terms from a mechanical contractor's standpoint so far as project implementation is concerned. Id. at 467-68. She likewise admitted that she was aware that in other sections of Division 15 there is a distinction made between mechanical or HVAC piping and plumbing piping. Id. at 468. Nevertheless it is her contention that this is a distinction made between various complex mechanical systems for purposes of ensuring their proper coordination. She notes, for example, that it would be impractical to set out drawings for all these systems on a single sheet of paper. Hence the need to distinguish between systems for purposes of coordination. Id.

24. The author of Section 15241 on noise and vibration control also testified that it was her intent that this section should apply to all sections of Division 15. She readily admits the initial provision of this section, which lists related sections of Division 15, does not include any reference to plumbing piping sections in Division 15. Nevertheless she contended that this initial listing is not said to be all-inclusive. Transcript at 466. Finally, she testified that although she has in fact said that the requirement for vibration isolation is highly unusual, it is not that unusual when one is dealing with special purpose buildings such as the one in question. Id. at 474.

25. T&S's vice president and operations manager was also called to testify regarding vibration isolation for plumbing systems. This witness has worked in the construction industry for well over thirty years. During that time he has worked as a sheet metal apprentice, as a journeyman, as a foreman, and as a project supervisor. He has also occupied management positions of considerable responsibility in various well-established mechanical construction firms. He confirmed that in the past he had worked on "some fairly sophisticated projects" which included laboratory facilities and other facilities with sensitive equipment. Nevertheless, he testified that, in the course of his career, he had never encountered a project in which plumbing piping was isolated for vibration. Transcript at 293-97. He also, like his colleagues, argues that, in the field of mechanical contracting, a definite distinction is made between mechanical and plumbing systems. The record contains excerpts from the 1994 editions of the Uniform Mechanical Code (UMC) and the Uniform Plumbing Code (UPC) which T&S's operations manager provided to HPCC in January 1998. This material was forwarded by HPCC, in turn, to a Government official shortly thereafter. It confirms that the UMC, which is published by the International Conference of Building Officials, is expressly designed "to provide complete requirements for the installation and maintenance of heating, ventilating, cooling and refrigeration systems." An excerpt from the UPC, which is published by the International Association of Plumbing and Mechanical Officials, defines "plumbing system" as :

> all potable water supply and distribution pipes, all plumbing fixtures and traps, all drainage and vent pipe, and all building drains, including their respective joints and connection, devices, receptacles, and appurtenances within the property lines of the premises and shall include potable water piping, potable water treating or using equipment, fuel gas piping, water heaters and vents for same.

Appeal File, GSBCA 14877, Exhibit 9 at 1-4, 26-29.

The Contract Provisions

26. Division 15 of the contract between HPCC and GSA contains forty-six different sections. Appeal File, GSBCA 14744, Vol. 1, Exhibit 1 at TC-4. These sections cover a wide variety of systems such as HVAC, fire protection systems, plumbing systems, laboratory special gases and piped systems, natural gas piping systems, condenser water filtration system, water treatment system, and building automation system. Id.

Some of the sections of Division 15 having particular relevance to these appeals are as follows. For the sake of brevity, we will, with few exceptions, summarize them here rather than set them out verbatim.

27. Section 15010: BASIC MECHANICAL REQUIREMENTS.
The first provision in this section provides a summary of the section contents and also states: "This Section shall form part of and be incorporated into all Division 15 Sections." Appeal File, GSBCA 14744, Vol. 2, Exhibit 1 at 15010-1. Although the whole of Division 15 is labeled "Mechanical," Section 15010, the very first section in the division, distinguishes in some provisions between "mechanical" and "plumbing" as, for example, in paragraphs 1.06(C)(1) and 3.02(a). Indeed, subparagraph 3.02(a)(10) of this section refers to the need to examine and compare "mechanical, plumbing and fire protection Drawings and Specifications." Id. at 15010-5, 15010-7. This section also provides a general definition for "pipe, tube and fittings" as "Pipe, tube, pipe fittings and tube fittings used for the conveyance of liquid and gaseous fluids." Id. at 15010-6.

28. Section 15145: HANGERS AND SUPPORTS.
The first provision of this section likewise provides a summary of the section contents. The section is said to include hangers and supports "for mechanical systems piping and equipment." It also lists two other sections of Division 15 as related to this section, namely, the section dealing with noise and vibration control (Section 15241) and that concerning hydronic piping (Section 15510). Paragraph 3.1 of this section expressly states: "Specific hanger requirements are specified in the Section specifying the equipment and systems." Appeal File, GSBCA 14744, Vol. 2, Exhibit 1 at 15145-1, 15145-3.

29. Section 15241: NOISE AND VIBRATION CONTROL.
The first provision of this section leads off with the statement: "This Section includes noise and vibration control equipment, devices and requirements for mechanical and electrical systems and equipment . . . ." It then lists fourteen other sections of Division 15 as related to Section 15241. The first two sections relate to basic mechanical requirements, materials, and methods. The remaining twelve sections, however, concern matters which (with the possible exception of a section relating to air compressors) on their face obviously relate to the building's HVAC system. These sections treat such matters as room air conditioning units, air handling, metal ductwork, duct accessories, air outlets and inlets, air terminals, air-cooled reciprocating chillers, water-cooled centrifugal chillers, split system air conditioning systems, and terminal heat transfer units. In this initial listing of ostensibly related sections, no mention is made of the section dealing with plumbing piping or laboratory piping, or of Section 15145 dealing with hangers and supports. Also, unlike the

first provision of Section 15010 (Finding 27), there is no provision in this first paragraph of Section 15241 or elsewhere in the section which expressly states that the section forms part of and is to be incorporated into all sections of Division 15. Instead this introductory provision to Section 15241 simply advises the reader to "[r]eview all Sections of Division 15 and 16 for additional requirements that may relate to the work of this Section." Appeal File, GSBCA 14744, Vol. 2, Exhibit 1 at 15241-1. Paragraph 3.3 of Section 15241 also contains background noise criteria which must be met and testing procedures to ensure compliance with these requirements in various areas of the building. Id. at 15241-12 to 15241-14.

30. One provision of Section 15241 which merits particularly close scrutiny appears in paragraph 3.1, which deals with the locations where vibration isolation is required. Subparagraphs D and E read as follows:

> D. Horizontal Pipe Vibration Isolation
> 1. Building Area: Block A / All Levels
> Block C / Garden Level
> Block D / Garden Level
> and Levels 1 and 2
>
> All piping in the areas listed above shall be vibration isolated as follows:
>
> > a. Greater than 1-1/2 in. Diameter Pipe: The first 50 feet of piping from the connected equipment or all the piping within the mechanical equipment room, whichever length is greater, shall be isolated by Type 8 isolation hangers. The Type 8 hangers shall have the same minimum static deflection as specified for the isolation mounts of the connected equipment. Piping in all other locations shall be isolated by hangers of Type 6. All hangers of Type 6 shall have a minimum static deflection of 0.70 in. All hangers shall be located as close to the overhead supports as possible.
> >
> > b. 1-1/2 in Diameter Pipe or Less: Provide minimum ½ in. thick resilient neoprene pipe wrap around all piping as each rigid pipe hanger.
>
> 2. All piping not specified within the building areas outlined above shall be vibration isolated as follows:
>
> > a. Greater Than 1-1/2 in. Diameter Pipe: The first 50 ft. of piping from the connected equipment or all the piping within the mechanical equipment room, whichever length is greater, shall be isolated by Type 8 isolation hangers. The Type 8 hangers shall have the same minimum static deflection as specified for the isolation mounts of the connected equipment.

> For piping in all locations, provide resilient neoprene pipe wrap at all rigid pipe hangers.
>
> b. 1-1/2 in. Diameter Pipe or Less: Provide minimum ½ in. thick resilient neoprene pipe wrap around all piping at each rigid pipe hanger.
>
> 3. All emergency fire sprinkler piping is exempt from the vibration isolation procedures. No equipment, hangers, isolators, or any other suspension apparatus shall be suspended from or make contact with the emergency fire sprinkler piping.
>
> E. Vertical Pipe Riser Vibration Isolation: Provide pipe riser vibration isolation at all vertical pipe riser support locations within the first 50 ft. of piping from the connected equipment. Refer to the Drawings for detail. Provide Type 3 - Spring Isolators with minimum static deflection of 0.75 in. when the piping is under full load capacity. Provide sliding guides on the piping.

Appeal File, GSBCA 14744, Vol. 2, Exhibit 1 at 15241-9 to 15241-10.

31. Section 15410: PLUMBING PIPING.

The summary provided in paragraph one of this section explains that the section deals with plumbing piping systems. This first provision of Section 15410 lists six other sections of Division 15 as related to this section. Among the sections listed in this initial provision is Section 15510, which deals with hydronic piping. Section 15241, dealing with noise and vibration control, however, does not appear in this initial listing of related sections. Neither is Section 15241 listed anywhere else in this section -- not even in Paragraph 3.11, which deals with "Hangers and Supports Installation." Paragraph 3.5 of this section, which deals with "Piping Installation, General" is a very brief provision and simply states: "Basic piping installation requirements are specified in Division 15 Section 'Hydronic Piping.'" Appeal File, GSBCA 14744, Vol. 2, Exhibit 1 at 15410-1, 15410-7, 15410-10.

32. Section 15415: LABORATORY PLUMBING.

The first paragraph of this section indicates that the section includes the piped service systems within the laboratory suite areas. Ten sections of Division 15 are identified as related to this section 15415. Among these are Section 15145, dealing with hangers and supports; Section 15410, dealing with plumbing piping; and Section 15510, dealing with hydronic piping. No reference is made in this list of related sections to Section 15241, dealing with noise and vibration control. Paragraph 2.03 of this section relates to hangers and supports but contains no reference to Section 15241 or vibration isolation. Appeal File, GSBCA 14744, Vol. 2, Exhibit 1 at 15415-1, 15415-4.

33. Section 15510: HYDRONIC PIPING.

The summary at the start of this section explains that the section includes piping systems for hot water heating, chilled water cooling, condenser water, make-up water for these systems, blow-down drain lines and condensate drain piping. Piping materials and equipment

specified in the section are said to include pipes, and pipe hangers and supports. This summary provision at the start of Section 15510 also identifies ten other sections of Division 15 as relating to this section. Among the sections listed is the above mentioned Section 15410 which deals with plumbing piping. Section 15241, dealing with noise and vibration control, does not appear in this list of related sections. Appeal File, GSBCA 14744, Vol. 2, Exhibit 1 at 15510-1. Paragraph 3.2 of Section 15510 is entitled "Piping Installations." It is a lengthy provision covering over four pages. Id. at 15510-9 to 15510-14. It is followed by paragraph 3.3, which is entitled "Pipe Hangers and Supports." Subparagraph 3.3.B. concerns the installation of pipe attachments and reads as follows:

> 1. Adjustable steel clevis hangers for individual horizontal runs less than 20 ft. in length.
> 2. Adjustable roller hangers and spring hangers for individual horizontal runs 20 ft. or longer, and as required on horizontal runs less than 20 ft. in length where required to accommodate and properly control pipe extension.
> 3. Pipe roller complete - MSS Type 44 for multiple horizontal runs, 20 ft. or longer, supported on a trapeze.
> 4. Spring hangers to support vertical runs.
> 5. Refer to Division 15 Section "Noise and Vibration Control" for additional requirements.

Id. at 15510-14.

Contractor's Interpretation

34. The principal witness to explain appellant's interpretation of the sections of Division 15 relating to the installation of vibration isolation was T&S's project manager for the NOAA project. He testified that in discussions following receipt of CRSS's letter of October 31 advising that all piping systems, not just the hydronic piping system, were subject to the requirements of Section 15241, he and other company representatives strenuously attempted to convince CRSS and GSA representatives that their interpretation of the contract was incorrect. Transcript at 107-12. Explaining T&S's position on the matter, he argues that the question of proper pipe installation should begin with Section 15145 of Division 15, dealing with hangers and supports. There one is told that specific hanger requirements are specified in the sections specifying the equipment and the systems. Accordingly, in his opinion, one should then turn to the sections of Division 15 dealing with the various systems to determine the applicable requirements regarding hangers and supports. Only in the case of hydronic piping, Section 15510, is one expressly advised, in a specific provision of that section dealing with hangers and supports, that the provisions of Section 15241 on noise and vibration control apply. According to T&S's project manager, therefore, Section 15241 unquestionably applies to the installation of hydronic piping. This, in his opinion, is confirmed in a review of the text of Section 15241, which is said to include the requirements for "mechanical and electrical systems and equipment." See Finding 27. According to this witness, in view of the traditional distinctions in the trade regarding mechanical, electrical, and plumbing work, the omission of any reference to plumbing in this phrase convinces him that Section 15241 does not apply to plumbing systems. This is further confirmed in his mind by the absence of any mention of plumbing sections among

the specification sections identified at the start of the Section 15241 as "related." Transcript at 103-06.

35. T&S's project manager further testified that, in turning to the specific hanger support requirements dealing with systems other than hydronic piping, such as plumbing piping and laboratory piping, one finds no references to Section 15241 such as those readily found in the section dealing with hydronic piping. In Section 15410, which deals with plumbing piping, no reference is made to Section 15241 in the list of related sections appearing at the start of the section. Neither is any reference made to Section 15241 in a specific provision on pipe hangers and supports or elsewhere in Section 15410. Similarly, he testified to the absence of any reference to Section 15241 on vibration isolation in Section 15415, which deals with laboratory piping. Transcript at 106-07.

The Government's Interpretation

36. It is the position of the contracting officer that Section 15241 is all-inclusive except where specifically indicated in the specifications. In a decision issued on April 8, 1999, after this appeal was already docketed, he stated that this position is based upon a detailed review of the specification and discussions with the drafters of the documents. Respondent's Supplemental Appeal File, Vol. 27, Exhibit G237. A letter in the record dated March 30, 1998, from the contracting officer to HPCC sheds light on the rationale behind the Government's position. The contracting officer notes that Section 15010 of Division 15 is specifically said to "form part of and be incorporated into all Division 15 Sections." He further points out that it is in this same section that a definition of "pipe, tube, and fittings" is given as "pipe, tube, pipe fittings and tube fittings used for the conveyance of liquid and gaseous fluids." Hence, where Section 15241 calls for vibration isolation of "all piping" in paragraph 3.1 D.1&2, the piping should be understood as inclusive of all piping as defined in Section 15010, i.e., that "used for the conveyance of liquid and gaseous fluids." Appeal File, GSBCA 14877, Exhibit 10.

II. Isolation of HVAC Riser Piping

37. Another issue regarding vibration isolation on which the parties are in disagreement concerns the isolation of HVAC riser piping. Paragraph 3.1 E of Section 15241 calls for vertical pipe riser vibration isolation "at all vertical pipe riser support locations within the first 50 feet of piping from the connected equipment." See Finding 30. T&S's president testified that this requirement was understood by T&S as applicable to any HVAC riser connected to equipment since vibration from the equipment would be transmitted through the pipe not the air. The "first 50 feet," therefore, was understood as fifty linear feet of piping. Transcript at 36-37. T&S's project engineer for the NOAA project testified that he read this requirement in the same manner. Vibration isolation was put on HVAC risers at support locations within the first fifty feet of piping from connected equipment. However, in October or November of 1997, this became a matter of disagreement. T&S's project engineer testified that at that time CRSS's inspector advised him that vibration isolation should be installed on all risers within fifty feet of equipment whether or not they are connected to the equipment. The project engineer stated that after three to four days of exhaustive argument, he was directed by the CRSS inspector to install

vibration isolation on all the vertical HVAC risers and compressed air and vacuum lines for vertical plumbing already installed in blocks C and D. The status of work in these two blocks at the time was considerably advanced. The project engineer testified that by this time there was drywall covering the majority of the lines. It was necessary, therefore, to go back underneath the access flooring and cut small openings in the drywall in order to be able to get to the risers and install vibration isolation. Id. at 191-94.

38. CRSS's inspector in his testimony confirmed that he had discussed the vibration isolation on HVAC risers with T&S's project engineer. He readily admitted that he specifically told the engineer that vibration isolation should be installed on all vertical risers within fifty feet of piping from connected equipment. He explained that his insistence on vibration isolation on all HVAC risers was based on details shown on plans for the HVAC system which called for every pipe coming out of the riser through the floor to have a two-inch spring vibration isolator. He further explained that he did not make T&S put similar isolation on the plumbing risers because this was not shown as it was for HVAC risers. When asked on cross-examination about the HVAC plan to which he had referred in direct examination, the CRSS inspector replied that he had not reviewed the plan in preparation for his testimony and could not recall which drawing contained the detail regarding HVAC risers. Transcript at 488-92.

39. T&S's project manager testified that he too was told by CRSS's inspector that vibration isolation was required on all risers and not just on the first fifty linear feet of the piping connected to equipment. On cross-examination this same witness readily admitted that part of his job included submitting written protests to the Government when directed to do work not covered by the contract. Nevertheless, he cannot recall having submitted such an objection regarding the CRSS inspector's insistence on additional vibration isolation for risers. Transcript 152-53, 161.

III. Installation of Sheet Metal Shields and Neoprene Pads at Roller Hangers

40. In addition to the installation of vibration isolation on plumbing piping and HVAC riser piping, appellant also contends that the Government's insistence that sheet metal shields and neoprene pads be installed at roller hangers was also not required under the contract. Certain large diameter pipes called for in the NOAA project were to be supported by roller hangers. These hangers support the pipes from above but allow for lateral movement of the pipe, as a result of expansion and contraction, on a roller incorporated into the bottom of the pipe hanger. Between the bottom of the large pipe and hanger roller is a metal shoe. Although the contract specifications called for spring vibration isolators to be used with roller hangers, the parties eventually realized that the two were incompatible since the spring isolator would allow the roller hanger to move rather than the pipe to move on the hanger's roller. Transcript at 366; Appellant's Trial Exhibit 5. T&S's vice president and operations manager testified that there were RFIs on the matter and meetings to discuss the RFIs. T&S was finally directed to remove the spring isolators on the hanger rollers already installed and to use on those roller hangers and all additional roller hangers an alternative form of vibration isolation. The alternative method involved inserting between the metal shoe and the hanger roller two sheet metal shields separated from each other by a neoprene pad. Transcript at 369-70; Appellant's Trial Exhibit 6; Appeal File,

GSBCA 14877, Exhibit 8 at 8, 18-19. T&S contends that the retrofit of roller hangers to remove the isolator springs and replace them with the sheet metal shields and neoprene pad constituted a compensable change. Transcript at 371-73.

IV. HPCC's Claim

41. By letter dated October 2, 1998, HPCC submitted a certified claim to the contracting officer in the amount of $582,140. Included in HPCC's claim was a T&S claim for $479,730. Both the general contractor's claim and that of its subcontractor, T&S, concerned additional costs said to have been incurred as a result of disagreements over vibration isolation required under the contract. Appeal File, GSBCA 14877, Exhibit 11.

42. T&S's portion of appellant's claim explains that the subcontractor's claim involved five areas of disagreement or concern. The first and primary issue was the Government's insistence that the contract required installation of vibration isolation on the building's plumbing system. The second area of disagreement was on whether the contract required isolation on all vertical riser HVAC piping. A third area of concern to T&S was the recovery of costs associated with another alleged change, namely, the Government's directive to install shields with neoprene lining between them above the roller in roller pipe hangers. The fourth item underlying T&S's claim was recovery of the costs of complying with all of these vibration isolation demands not just to the extent that they related to the base contract but also to the extent that they applied to work called for in change orders already negotiated and settled *before* the Government made these demands known to T&S. Fifth and finally, T&S sought reimbursement for the incremental costs directly attributed to the initial incorrect response of the Government to RFI 305, namely, the cost of retrofitting HVAC piping in building B with vibration isolation. Appeal File, GSBCA 14877, Exhibit 11 at 33-34.

43. In addition to the usual markup of T&S's claim, HPCC's portion of the October 2 claim involved the general contractor's costs of quality control and scheduling support associated with the vibration isolation work said to be in excess of base contract requirements. Appeal File, GSBCA 14877, Exhibit 11 at 2-3.

44. When no contracting officer's decision was rendered on the October 2 claim within the time specified by law, counsel for HPCC, by letter dated January 15, 1999, filed at the Board a notice of appeal from a deemed denial of the claim. In a decision dated April 8, 1999, however, the contracting officer confirmed denial of the claim and wrote:

> Due to the all-inclusive provisions of Section 15241, it is the decision of the Contracting Officer that the contract documents clearly detail the requirements and locations for vibration isolation. The claim is therefore rejected in its entirety.

Respondent's Supplemental Appeal File, Vol. 27, Exhibit G237.

45. HPCC's claim of October 2, 1998, incorporated T&S's claimed vibration isolation costs through September 18, 1998. Appeal File, GSBCA 14877, Exhibit 11 at 38.

T&S has since updated its claim by $1097 to a total of $480,827. Appellant's total claim as it currently stands is, therefore, broken down as follows:

:

T&S Costs	$480,827.00
HPCC Commission on Subcontractor Costs (10%)	48,082.70
HPCC Direct Costs	39,834.00
Subtotal	568,743.70
General Liability & Builders Risk Insurance (.4%)	2,274.97
Subtotal	571,018.67
Performance and Payment Bonds (.6%)	3,426.11
Subtotal	574,444.79
City of Boulder Tax (3.11% of 50% of cost)	8,932.62
TOTAL	$583,377.40

Appellant's Supplemental Appeal File, Vol. 2, Exhibit 188 at 1 (unnumbered).

T&S's Component of Appellant's Claim

46. T&S's claimed costs break down as follows:

Labor	$163,566
Material	90,027
Subcontracts (Vibration Testing)	13,954
Equipment	28,254
Other Costs	1,534
Small Tools	12,379
Consumables	9,602
Project Management	10,973
Foreman & Superintendent	53,977
Warranty (1%)	3,303

Subtotal	$387,568
Overhead (12%)	46,508
Subtotal	434,077
Profit (10%)	43,408
Subtotal	477,484
Bond (.7%)	3,342
TOTAL	$480,827

Appellant's Supplemental Appeal File, Vol. 2, Exhibit 188 at 3 (unnumbered).

47. In order to track costs incurred in installing vibration isolation for which T&S contends the Government is responsible, T&S established a cost code, namely 99258, to which all field labor and material costs associated with the added vibration isolation work were coded. Only costs for vibration isolation work that was deemed by T&S to be outside the scope of contract requirements were coded to this account. This included the retrofitting of HVAC piping in block B. Transcript at 94-96, 194-95, 307-12. T&S's project manager and operations manager both testified that when the disputed vibration isolation work was performed by a crew member, the foreman would ensure that this code was used in making the appropriate entry on the individual's time card. Time cards were subsequently reviewed for accuracy by the general foreman as well as the project manager before being entered in the company's accounting system. Id. at 95, 307-08.

48. At the hearing, T&S's portion of appellant's claim was explained by T&S's vice president and operations manager. He stated that the company's claim of $163,566 in labor costs associated with vibration isolation work which was considered to be over and above contract requirements is based on the total of labor costs listed in the project control analysis under cost code 99258. Similarly, T&S's claim of $90,027 for material associated with this same work is based[4] upon data in the same cost code. Transcript at 307-12. A copy of the project control analysis in the record confirms the operations manager's explanation. Appellant's Supplemental Appeal File, Vol. 2, Exhibit 186 at 24. Appellant has also provided for the record source documents supporting the entry of labor and material costs in cost code 99258 and the summarization of that data in the aforementioned project control analysis. Id., Exhibits 182, 187.

49. T&S's operations manager also testified that the claim for $13,954 for "subcontracts" represented the costs of vibration testing by an independent contractor. He explained that not all of the cost of this testing was assigned to testing of the vibration isolation in dispute. Rather, fifty-seven percent was deemed to be allocable to the

[4]The witness pointed out that the actual total shown in the project cost analysis for material costs under this code is $95,417. It was reduced to $90,027 to correct for a miscoding error found before submission of the claim. Transcript at 313-15.

installation of the disputed isolation. This was based upon the fact that fifty-seven percent of the pipe hangers purchased for the project were hangers used for the installation of the plumbing system. Transcript at 329-30.

50. T&S's operations manager further testified that the costs claimed for equipment, small tools, other costs, consumables (such as fuel and saw blades) and project management (project manager, project engineer, etc.) were calculated as a percentage of T&S's direct labor costs incurred in performing the added scope of work. This calculation was based upon the ratio between T&S's total project costs for each category and T&S's total direct labor costs on the project. For example, to calculate T&S's claim for equipment cost, the witness took T&S's total project cost for rental equipment and divided it by T&S's total project cost for field labor in order to determine what percentage equipment costs represent vis-a-vis the labor dollars on the project. The result was 17.27%. He then multiplied T&S's claim of $163,000 for field labor associated with vibration isolation to determine an equipment cost proportionate to this labor cost. T&S's operations manager explained that this methodology for calculating the cost of labor-driven categories such as these is consistent with T&S's practice. He also noted that, in his experience working with other well established mechanical contractors he had used the same methodology. Transcript at 331-42. A GSA auditor familiar with appellant's claim was called to testify regarding the claim. In the course of his testimony he explained that it is the custom of GSA normally to view tool and equipment costs as time-related. Nevertheless, he readily acknowledged that such costs could possibly be viewed instead as labor-related. Id. at 2603.

51. As to the $53,977 sought by T&S under the heading "Foreman & Superintendent," T&S's operation manager testified that the figure was arrived at using the average union formula for the man-loading projects. Because this too is a labor-driven issue, the amount calculated for the costs of foremen and superintendents is arrived at by multiplying the cost of field labor by certain agreed-upon percentages. He further explained that this is "pretty much the standard" and in fact was used in the negotiation of change orders under instant contract. Transcript at 342-47, 353. Appellant has submitted for the record, and T&S's operations manager explained in some detail, the provisions of one of the union agreements dealing with the man-loading formula. Id. at 347-49; Appellant's Supplemental Appeal File, Vol. 3, Exhibit 197.

52. Finally, T&S's operations manager testified that the percentage markups for warranty (one percent), overhead (twelve percent), and profit (ten percent) are the same markups that the Government consistently allowed on change orders involving T&S's work throughout the NOAA project, while the claimed bond markup (.7 percent) is less than that claimed and allowed by the Government (1.2 percent) during the project. Transcript at 349-57; Respondent's Supplemental Appeal File, Vol. 5, Exhibits CR136 at 27, CR206 at 10.

53. T&S's claim, as presented to GSA and as set out above in Finding 45, does not contain a break-out according to the various vibration isolation issues that comprise the claim. See Finding 46. During his direct examination, however, T&S's operations manager was asked to describe how the claim could be broken out if expressed in terms of those issues. In late 1997, after T&S was directed to proceed with the installation of the disputed vibration isolation, T&S's operations manager and the company's project manager for the

NOAA project together prepared estimates of what the additional work would cost in terms of material and labor. These estimates were included in a cost proposal on vibration isolation which was put forward by HPCC in early 1998. Appeal File, GSBCA 14877, Exhibit 8. Using these estimates, T&S's operations manager at the hearing placed the cost of retrofitting the horizontal hydronic piping in block B at approximately $65,000. Id. at 11; Transcript at 360-61. The cost of installing vibration isolation on vertical risers was estimated to be approximately $4000. The balance of T&S's $480,827 claim was said to consist of the cost of installing vibration isolation on the building's plumbing system (including the retrofit of plumbing piping already installed without this isolation). Transcript at 361-65.

HPCC's Component of Appellant's Claim

54. HPCC's own costs relating to its vibration isolation claim are as follows:

Quality Control	14,400
Scheduling Support	6,000
Subtotal	20,400
HPCC Labor Burden (49.36%)	10,069
Small Tools (5%)	1,020
Subtotal	31,489
Overhead (15%)	4,723
Subtotal	36,212
Profit (10%)	3,621
TOTAL	39,834

Appellant's Supplemental Appeal File, Vol. 2, Exhibit 188 at 2 (unnumbered).

55. Appellant's chief witness for the costs incurred by HPCC as a result of the controversy regarding vibration isolation was the general contractor's project manager for the NOAA project. This witness has worked in the construction business for many years and in various capacities. He has worked for HPCC for seventeen years, starting as a field engineer and later moving up to the position of superintendent and project engineer. For the last twelve years he has served as a project manager for HPCC. He testified that throughout the many years he has worked in construction, he has never seen a requirement for vibration isolation on plumbing piping. Transcript at 237-42.

56. HPCC's project manager testified that the general contractor's direct costs associated with the vibration isolation dispute were limited to additional quality control and schedule support primarily during an eight-month period from November 1997 to June 1998. During this period, HPCC's two quality control inspectors monitored the retrofitting

of piping already installed in blocks D and C and the further installation of the disputed isolation in blocks D, C, B, and A. HPCC estimated that the additional quality control during this period was approximately forty hours a month. The labor rate of $45 an hour is one established early in the project and used consistently to price quality control work in change orders negotiated during the project. Transcript at 247-54; Appeal File, GSBCA 14877, Exhibit 11 at 3. The claim for additional scheduling support was based on an estimated eighty hours. The support was deemed necessary in view of an increase in contract scope of almost a half million dollars. According to HPCC's project manager, the Government's insistence on additional vibration isolation added several new activities which required analysis and entry into the critical path schedule (which is the major portion of the schedule support effort) and subsequent tracking from month to month. The labor figure of $75 an hour represents HPCC's costs for that schedule support. Transcript at 254-55, 272; Appeal File, GSBCA 14877, Exhibit 11 at 3. HPCC's project manager also testified that the labor burden of 49.36 percent, and the small tool, overhead, and profit markup used for the general contractor's component of the isolation claim, are those consistently used in negotiating contract change orders. Transcript at 255-59.

57. As to appellant's overall claim, HPCC's project manager testified that the markup of ten percent commission on subcontractor costs has been previously accepted by GSA on fully executed contract modifications. So likewise with regard to the markups for general liability and builder's risk insurance, performance and payment bond, and tax payable to the City of Boulder. Transcript at 259-61. Indeed, this witness confirmed that these same last three markups were allowed when the Government audited HPCC's related labor productivity claim. Id. at 261-62; Appellant's Supplemental Appeal File, Vol. 2, Exhibit 190 at A-1 to A-4.

Discussion

The Isolation of Plumbing Piping

Appellant reads Section 15241 on noise and vibration control as applicable only to the building's HVAC or hydronic piping system. The Government, instead, contends Section 15241 is applicable to all systems not expressly exempt from the specification. We find appellant's interpretation to be the correct one.

The principal disagreement between the parties centers on the meaning one is to give to the term "mechanical" as that term is used in Division 15 of the contract specifications. GSA is of the opinion that it is to be understood at all times in an univocal sense as inclusive of all systems normally falling within the purview of mechanical contracting and not just HVAC systems. Appellant instead insists that in mechanical contracting, "mechanical" primarily connotes the HVAC systems -- as distinct from plumbing and other systems. The truth of the matter is that, within Division 15, the term is used in both the broad sense and the more restrictive sense. Perhaps the strongest support for the Government's position is in the one-word title of Division 15, namely, "Mechanical," or in the reference to "mechanical systems" in Section 15145. Findings 3, 28. Yet Division 15 does, on occasion, depart from this use of the term "mechanical" in its broad sense in favor of a more restricted use. In the very first section of Division 15, namely Section 15010, which deals with "Basic Mechanical Requirements," there are provisions which distinguish "mechanical" and

"plumbing." One provision goes so far as to refer to "mechanical, plumbing and fire protection drawings and *specifications*" (emphasis added). Finding 27. A critical question arises, therefore, when one encounters the term "mechanical" in the introductory paragraph of Section 15241, where it is stated that this section applies to noise and vibration equipment, devices and requirements for "mechanical and electrical" systems and equipment. See Finding 29.

Evidence of trade practice and custom is an acknowledged part of the initial assessment of contract meaning. Metric Constructors, Inc. v. National Aeronautics and Space Administration, 169 F.3d 747, 752 (Fed. Cir. 1999); accord Gholson, Byars & Holmes Construction Co. v. United States, 351 F.2d 987 (Ct. Cl. 1965) (the language of a contract is to be given effect according to its trade meaning notwithstanding that in its ordinary meaning it is unambiguous). So far as trade practice and custom are concerned in this case, the evidence provided regarding vibration isolation of plumbing piping and the distinction made in the trade between "mechanical" and "plumbing" work has proven to be particularly useful.

T&S is one of the oldest and largest mechanical contractors in Colorado. Finding 3. The cumulative professional expertise of T&S's president, vice president, and project manager and HPCC's project manager is extensive. Findings 8, 17, 25, 55. These officials, when called to testify, consistently contended, in what we deem to be a highly credible manner, that they had never seen a requirement for vibration isolation on a plumbing system. Findings 10, 17, 25, 55. T&S's officials also explained that "mechanical" in the field of mechanical contracting is primarily used to connote HVAC systems, as opposed to other systems with which a mechanical contractor may be involved. Findings 21, 25.

We realize that the testimony of these witnesses on these issues should be weighed carefully since it could be deemed to be self-serving. However, we find the testimony of these individuals convincing not only because of their apparent credibility but because their testimony regarding trade usage and custom is supported by the documentation and the testimony of others not necessarily sharing their interests. CRSS's field engineer and mechanical inspector testified that he too had never seen a requirement for vibration isolation on plumbing piping. He also, while testifying, distinguished the work in the mechanical room on the garden level of block D from the plumbing and HVAC piping on the first level. Finding 13. Indeed, even the principal author of Section 15241, although claiming that there is no distinction between "mechanical" and "plumbing," from a "design responsibility" standpoint, nevertheless admitted that such a distinction is possible for contractors so far as implementation is concerned. Finding 23. Further, excerpts from the UMC and the UPC provided by T&S's operations manager likewise support the contention that in the trade "mechanical" is often understood as relating to HVAC and is seen as distinct from plumbing. Finding 25. Finally, we note a similar distinction made by one of the Government's expert witnesses in an exhibit included in his report. This individual was recognized by the Board as an expert in schedule analysis with a component of that analysis relating to labor inefficiency. Transcript at 2346. The exhibit in question deals with RFIs submitted during the course of the project. It is identified in the expert's report as "Plumbing/Mechanical RFI Log." In addition to listing RFIs individually, this exhibit also categorizes the RFIs by the "discipline" said to be involved. Principal among the disciplines

mentioned are one for "plumbing" and a separate one for "mechanical." Respondent's Supplemental Appeal File, Vol. 23, Exhibit G234 (Exhibit 3).

We, therefore, find nothing unreasonable in T&S concluding from the start that Section 15241 used the term "mechanical" in the more restrictive sense and that the section, therefore, did not apply to plumbing systems but only to hydronic piping of the building's HVAC system. The correctness of T&S's conclusion is particularly enhanced by the abundant references in the preliminary paragraphs of Section 15241 to other sections of Division 15 -- nearly all of which concern the HVAC system and none of which refer to sections of Division 15 that deal with other piping systems such as plumbing piping or laboratory piping. Finding 29.

It is not, however, merely the wording of Section 15241 which supports the correctness of appellant's position regarding its application. T&S's perception of the applicability of this section in terms of the overall context of Division 15 also strikes us as preeminently reasonable. See Findings 34-35. Not surprisingly, as the subcontractor responsible for the installation of nearly all of the various piping systems called for in Division 15, T&S gave particular attention to Section 15145 concerning hangers and supports. It is this section which expressly provides that hanger requirements are listed in those sections specifying equipment and systems. Finding 28. In reviewing those sections specifying equipment and systems for the three principal types of piping, namely, Section 15410 (Plumbing Piping), Section 15415 (Laboratory Plumbing), and 15510 (Hydronic Piping), there is no reference to Section 15241 (Noise and Vibration Control) in any of the three sections other than in Section 15510 (Hydronic Piping). See Findings 31-33. Indeed, the single reference in Section 15510 to Section 15241 does not even appear in the introductory paragraph of the section. Rather, it appears in one of the final paragraphs of this section, namely paragraph 3.3, which deals with pipe hangers and supports. Finding 33. This, in the mind of T&S officials, only serves to confirm their contention that Section 15241 relates only to the HVAC system.[5] We find this conclusion as to the applicability of Section 15241 when seen in the context of other sections of Division 15 relating to the various required systems to be well reasoned and amply supported by the contract specification as written.[6]

---

[5]At the hearing, the Government called a consultant with considerable experience in the construction contract field. Counsel offered this individual as an expert "in contract interpretation." Although the Board permitted this witness to testify, the presiding judge made clear from the outset that, to the extent that the ultimate application of the facts to the plain language of the contract is within the province of the trier of fact, the Board would not accord to this witness's testimony the deference normally given under the rules of evidence to an expert witness. Transcript at 575-85. It is interesting to note, however, that even this witness conceded under cross-examination that the lack of any direct reference to Section 15241 in the plumbing piping section of Division 15, as opposed to such a reference in the hydronic piping section, was indeed "an important consideration." Id. at 614.

[6]The Government notes that there is in Section 15410 (Plumbing Piping) a provision that basic piping *installation* requirements for plumbing piping are as specified in Section 15510 (Hydronic Piping). This, according to the Government, renders Section 15241 applicable

In contrast, the Government's position regarding the applicability of Section 15241 is incorrect precisely because it ignores the context in which the T&S officials have interpreted the applicability of that section. The Government contends that "all piping" as the term is used in paragraph 3.1 of Section 15241 is "all-inclusive" and that the section, therefore, applies to all horizontal piping regardless of the system in which it is used. Finding 36. This interpretation ignores the apparent intent and the meaning experienced mechanical contractors would attribute to other sections of Division 15, which relate to the individual systems and their specific requirements. We of course agree with the Government that the definition of "pipe," as given in Section 15010, applies to the term as it is used in Section 15241 or, for that matter, in any other section of Division 15. From this it does not follow, however, that when the term "piping" is qualified with the term "all" that this phrase cannot be restricted by the context of the section itself. Since we find T&S's conclusion that Section 15241 applies only to hydronic piping to be reasonable, the term "all piping," as appearing in that section, can and should be understood as referring to all hydronic piping and not necessarily as inclusive of all piping in other systems as well.

One argument raised by the Government and perhaps worthy of note is that reference to the exclusion of emergency fire sprinkler piping from the requirement for vibration isolation in paragraph 3.1 of Section 15241 would be superfluous if the intent of the specification was to make this section applicable only to hydronic piping. We find the argument less than convincing. The particular provision is safety-related. The contractor is advised that no equipment, hanger, isolators or other suspension apparatus may be suspended from or make contact with sprinkler piping. Finding 30. We see no reason why, for safety reasons, it would not be advisable to include such a provision in Section 15241 even if the provision is applicable only to hydronic piping.

When asked about the absence of a reference at the start of Section 15241 to a section in Division 15 which relates to plumbing piping, the principal author of Section 15241 replied that this initial listing of related sections was not said to be all-inclusive. Finding 24. This is of course correct. The introductory paragraph does in fact advise the reader to review all sections of Divisions 15 and 16 for additional requirements that may relate to the work of this section. Finding 29. Nevertheless, the author's response strikes us as unduly defensive. If the requirement for vibration isolation of plumbing piping was as unusual as she admits it to be, one would certainly expect the sections dealing with plumbing piping to be highlighted in the listing of related sections appearing at the beginning of Section

---

to plumbing piping as well, since Section 15510 has a specific provision rendering hydronic piping subject to the requirements of Section 15241. Respondent's Posthearing Brief at 96. A close examination of the sections in question shows that Section 15510 (Hydronic Piping) does, in fact, contain a lengthy provision regarding piping installation, namely paragraph 3.11. However, no reference to Section 15241 is contained in this paragraph or any of the many subsequent subparagraphs of that same provision. Rather, the sole reference to Section 15241 in Section 15510 is found in a separate provision dealing with pipe hangers and supports. The corresponding provision on pipe hangers and supports in Section 15410 on plumbing piping contains no reference to Section 15241. Hence, this bootstrap argument of GSA regarding the applicability of Section 15241 to plumbing piping is tenuous at best. Compare Finding 31 with Finding 33.

15241. Furthermore, we find this initial listing significant not only for what is absent from it but also for what it actually contains. The majority of the sections which are listed as related concern the building's HVAC system. Finding 29. If the author's intent was, as she states, to make this section equally applicable to all piping systems (Findings 22, 24), this extraordinary emphasis on sections relating to HVAC and the absence elsewhere in the section of any reference to its applicability to other piping systems not only fails to reflect this alleged intent but is in fact misleading. In short, if Section 15241 was intended to apply to plumbing piping, then in both wording and format, the section clearly falls short of this purpose. Perhaps this is attributable to the author's lack of direct involvement in the preparation of any section of Division 15 other than Section 15241. See Finding 23. Whatever the reason may be, we remain convinced that, as written and viewed in context with the sections of Division 15 relating to other piping systems, Section 15241 applies only to HVAC or hydronic piping.

Although the parties are in disagreement as to the interpretation of provisions in Section 15241, neither contends that these provisions are ambiguous. Contracts are not necessarily rendered ambiguous by the mere fact that the parties disagree regarding the meaning of their provisions. Brunswick Corp. v. United States, 951 F.2d 334, 337 (Fed. Cir. 1991). In this particular case, we do not find the requirements in paragraph 3.1.D of Section 15241 calling for vibration isolation on "all piping" to be ambiguous. As already noted, from the text of the section itself as well as from cross-references in this section to related sections and from the absence in other sections of cross-references to this section of Division 15, we agree with HPCC and T&S that Section 15241 relates to hydronic piping and does not include plumbing piping. Admittedly, the term "mechanical" is used in the specification in more than one sense. This, however, in and of itself, does not necessarily render the specification ambiguous or preclude a careful reader from understanding the proper meaning of the term from the context in which it appears.[7]

Respondent complains that there is insufficient evidence in the record that T&S in preparing its bid did in fact rely on the assumption that the requirements in Section 15241 were applicable only to hydronic piping. Given the conclusion we reach here that the section is applicable only to hydronic piping, such a showing of actual reliance is hardly necessary. Nevertheless, nothing in the record persuades us that T&S did in fact change its position on this issue. T&S's president was involved to some degree in the bidding process and, since the start of this dispute, has made it his business to look into how the company's bid was prepared. Finding 11. He remains convinced that T&S, in preparing its bid, did not believe that vibration isolation was required on plumbing piping. Finding 10. Other testimony from this witness as well as from other experienced T&S and HPCC employees

[7]Both appellant and the Government argue in the alternative that even if the provisions of Section 15241 are adjudged by the Board to be ambiguous, they would still prevail. Appellant contends that if its interpretation is within the zone of reasonableness it should prevail since the provision was drawn by the Government. The Government instead argues that any ambiguity, if it does exist, is patent and, therefore, should have been the subject of an inquiry on the part of the contractor. Alternatively, if the alleged ambiguity was latent, then there is insufficient evidence that appellant did, in fact, rely on the interpretation it now espouses. Appellant's Posthearing Brief at 75-76; Respondent's Posthearing Brief at 92-93. Given the conclusion we reach here, we see no need to discuss these issues.

supports the conclusion that it would be highly improbable that a mechanical contractor would assume that vibration isolation would be required for plumbing piping. Findings 9-10, 17, 25, 55.

If anything, the evidence in the record for this appeal strongly suggests that it was not the general contractor or its subcontractor which suffered a change of mind on the need to install vibration isolation on the plumbing piping, but rather the Government together with its consultants and representatives. T&S contends that the initial dispute regarding the need for vibration isolation took place prior to October 1997 and was limited to the requirement to install it with HVAC piping in block B. This dispute eventually led to the revision of the Government's answer to RFI 305 in early October 1997. Findings 16-18. The evidence persuades us that it was this initial controversy that spurred the Government into a more thorough examination of Section 15241 which eventually led it to conclude incorrectly sometime in October that vibration isolation was required by this section not just for HVAC piping in block B but for all piping systems throughout the building -- including plumbing piping. Finding 19.

Only the testimony of CRSS's inspector suggests any concern on the part of the Government about the lack of vibration isolation on other than HVAC piping prior to October 1997. We have serious difficulty, however, with the credibility of this witness. Given his position and responsibility, it is nothing short of astounding that he would do nothing regarding this alleged deficiency for two or three months notwithstanding his being well aware that the installation of plumbing piping without vibration isolation was continuing throughout this period. Nevertheless, the only documentary evidence of his alleged concern is a letter to HPCC dated October 7. He himself testified that, before that time, he did not advise the general contractor of his concern, issued no FON on the matter, and does not recall whether he even advised his supervisor at CRSS of the problem. Findings 14-15. The inspector's suggestion at the hearing that contract compliance was ultimately the responsibility of the general contractor's quality assurance team hardly explains his prolonged silence on such a significant issue. See Finding 15. It also is a puzzling remark in view of the fact that it was still his responsibility to issue a FON when required.

Given the record before us, therefore, we are persuaded that the position of HPCC and T&S on the absence of any requirement for vibration isolation on plumbing piping has been consistent from the outset. Any change in position on this issue is attributable to Government rather than the general contractor or its mechanical subcontractor.

Accordingly, we conclude that appellant and its subcontractor, T&S, correctly and consistently interpreted the contract as not requiring vibration isolation on plumbing piping and that the Government's insistence on the installation of this isolation constituted a contract change for which appellant is entitled to compensation.

Isolation of HVAC Riser Piping

The contract provision regarding the isolation of HVAC riser piping is relatively straightforward. It reads:

> Provide pipe riser vibration isolation at all vertical pipe riser support locations within the first 50 ft. of piping from the connected equipment. Refer to the Drawings for detail.

Finding 30. T&S's project engineer testified that CRSS's inspector insisted that vibration isolation be installed on all vertical HVAC risers and compressed air and vacuum lines for vertical plumbing already installed in blocks C and D. Finding 37. The inspector agrees that this was a matter of disagreement with T&S's project engineer but states that he insisted on the installation of vibration isolation only on the vertical HVAC risers but not the plumbing risers. He further contends that he did so because, upon consulting a contract drawing he saw that all HVAC risers but not the plumbing risers were shown as having this isolation. Finding 38. The Government contends that appellant has not contested the inspector's determination based upon the drawing and that this determination should, therefore, be assumed to be correct. Respondent's Posthearing Brief at 100.

We are not prepared to make such an assumption. As already noted, we found the testimony of this inspector on other matters lacking in credibility. We find his testimony regarding the requirement for isolation on risers equally lacking. When pressed on cross-examination regarding the drawing, this witness replied that he had not reviewed the contract in preparation for his testimony and that he could not even recall which drawing contained the alleged detail regarding HVAC risers. Finding 38. We find the testimony of T&S's project engineer on these matters considerably more credible and enlightening.

Where, however, does this leave us? The scant evidence provided to us by the Government is insufficient to convince us that a contract drawing or drawings conflicted with the plain meaning of the written specification. The inspector's insistence on the installation of vibration isolation not just on risers actually connected to equipment but on other risers situated within fifty feet of such equipment does not appear, therefore, to have been required by the contract. Nevertheless, nothing in the record indicates that this dispute between the T&S representatives and the CRSS inspector was elevated to a higher level or ever made the subject of a written notice. Finding 39.

The appellant contends that the inspector's insistence on the installation of additional vibration isolation on the risers constitutes a constructive change. Appellant's Posthearing Brief at 77. We think not. Typically, under the Changes clause, for a claimant to prevail on such a theory, it must demonstrate that the additional work was actually called for or ratified by the contracting officer or by someone authorized to act on his or her behalf. Michael Weller, Inc. v. Office of Navajo and Hopi Indian Relocation, GSBCA 10627-NHI, et al., 94-2 BCA ¶ 26,849, at 133,611, aff'd sub nom. Michael Weller, Inc. v. Bavasi, 132 F.3d 53 (Fed. Cir. 1997) (table); Jordan & Nobles Construction Co., GSBCA 8349 et al., 91-1 BCA ¶ 23,659, at 118,511 (1990); Fan Inc., GSBCA 7836, et al., 91-1 BCA ¶ 23,364, at 117,186 (1990); Gricoski Detective Agency, GSBCA 8901, et al., 90-3 BCA ¶ 23,131, at 116,144. There is no evidence here that this in fact occurred. The contract inspection clause expressly states that the Government's inspector is not authorized to change contract requirements without the contracting officer's written authorization. Finding 2. Appellant has not convinced us that this disagreement between the T&S employees and the inspector became the subject of a specific challenge elevated to a level above the inspector or that the

inspector had the requisite authority to insist on such a change in contract requirements. Accordingly, we deny this portion of appellant's claim.

Installation of Sheet Metal Shields and Neoprene Pads at Roller Hangers

We can find nothing in respondent's posthearing brief which would suggest that GSA opposes this claim. Neither do we have the same objection to this claim, based as it is on a theory of constructive change, as we do with regard to the claim for the cost of installing vibration isolation on risers. The record contains unrebutted testimony by the vice president and chief of operations for T&S that the problem concerning the vibration isolation of roller hangers was the subject of RFIs and meetings discussing those RFIs. Finding 40. Unlike the dispute regarding the isolation of risers, the issues raised regarding roller hangers were resolved in accordance with a formal procedure which undoubtedly operated with the consent and support of the contracting officer.

RFI 305

Counsel for GSA contend that appellant's claim relating to RFI 305 (Findings 12, 17-18) represents a claim for equitable adjustment under the contract's Changes clause. Respondent's Posthearing Brief at 102. At the hearing, however, counsel for appellant repeatedly represented to the Board and to GSA counsel that the contractor's claim for costs resulting from a change in the reply given to RFI 305 is not based upon any alleged change in requirements. Transcript at 142-46. The testimony of T&S's project manager on cross-examination supports this contention. T&S clearly seeks only the incremental costs of having to go back and install vibration isolation on horizontal HVAC piping which had already been installed in block B *without* isolation per the guidance provided in the Government's first reply to RFI 305. Id. at 146-48. The theory of recovery on this portion of appellant's claim is a simple one. The Government's representatives, at the contractor's request, provided an interpretation of a specification which was ultimately found to be incorrect. Because the contractor relied upon this guidance to its detriment, GSA is expected to make the contractor whole for any damages resulting from the incorrect interpretation. We find the claimant's expectation reasonable under the circumstances.

GSA suggests that T&S's reliance upon the guidance provided in the first response to RFI 305 was unreasonable. According to counsel, both T&S and BCER, which provided the initial response, simply failed to read carefully an unambiguous contract provision. We disagree. The omission of any reference to block B in paragraph 3.1.D.1 of Section 15241 does, in our opinion, give rise to a reasonable question as to whether this is a deliberate omission. If it is obvious that, in the absence of a reference to block B in 3.1.D.1, the provisions of 3.1.D.2 should be seen as applicable to block B, then that also raises an additional and equally reasonable question of precisely why the vibration isolation for piping in block B is not to be treated in the same manner as piping in blocks A, C, and D. See Finding 30.

Despite the contention of GSA counsel that the Government should not be liable for the consequences of the incorrect answer to RFI 305, the contracting officer himself has candidly testified that he believes that the Government owes T&S compensation for the retrofit required as a result of the incorrect answer provided to RFI 305. Transcript at 549.

We agree. The Government is not shielded from the consequences of improvident instructions directed to a contractor by an official authorized to issue the instructions. Jordan & Nobles Construction, 91-1 BCA at 118,512.

Quantum

It is, of course, well established that the ascertainment of damages or of an equitable adjustment is not an exact science. The amount sought by a claimant need not be ascertainable with absolute exactness or mathematical precision. What is essential is that evidence be presented which is sufficient to enable a court or jury to make a fair and reasonable approximation. Electronic & Missile Facilities, Inc. v. United States, 416 F.2d 1345 (Ct. Cl. 1969); Specialty Assembling & Packing Co. v. United States, 355 F.2d 554 (Ct Cl. 1966); Wunderlich v. United States, 351 F.2d 956 (Ct. Cl. 1965); Clark Concrete Contractors, Inc. v. General Services Administration, GSBCA 14340, 99-1 BCA ¶ 30,280, at 149,746. The evidence presented by appellant on the quantum of its claim regarding vibration isolation more than adequately meets this requirement. Indeed, GSA had made no effort to rebut this evidence but rather has chosen to focus its energies on the threshold issue of whether appellant is entitled to payment of the claimed quantum.

T&S's vice president and operations manager and HPCC's project manager both testified in a competent and credible manner regarding their companies' components of appellant's claim. Findings 47-52, 55-57.

T&S's establishment and use of a specific cost code obviously facilitated the systematic and reliable gathering of data regarding labor and material costs associated with the company's claim. Findings 47-48. Indeed, we conclude that it thus served as a reliable vehicle for identifying the costs associated with all five aspects of T&S's vibration isolation claim. See Finding 42.

We likewise find T&S's segregation of testing costs associated with the added vibration isolation work to be reasonably based. Finding 49. The same is true of the method used for calculating the costs of labor-driven items such as equipment, small tools, consumables, and project management as a percentage of direct labor costs associated with the added scope of work. The testimony of T&S's operations manager and the GSA auditor convinces us that this is an acceptable accounting method. See Finding 50. Indeed, as counsel for appellant points out, the approach is not without precedent. E.g., John Driggs Co., ENGBCA 4913, 88-2 BCA ¶ 20,530. T&S's calculation of the appropriate percentage, based upon the ratio of the total particular class of costs to the total project labor cost, appears to us to be reasonable provided the item in question is, as is the case here, labor-driven. As to the calculations of claimed amounts for foreman and superintendent, as well as the standard markups for warranty, overhead, and profit, these also appear to be acceptable since they follow a methodology previously agreed to by the parties in negotiating contract changes (Findings 51-52) and GSA offers no reason why use of the same methodology here would be inappropriate.

As to the HPCC components of the overall claim, we find the estimates of additional time required for quality control and scheduling as well as the pricing of the same to be reasonably based. This is especially true with regard to the rate for quality control which is

the same as that used in negotiating change orders involving similar services. As for the labor burden, markups for commission on subcontractor costs, general liability and risk insurance, bond, and tax, as appellant points out, GSA had previously agreed to similar rates in connection with negotiated change orders. Finding 56-57. As in the case of T&S's markups, in the absence of any specific objection from GSA, we see no reason why they should not be allowed here.

In view of our conclusion that T&S is not entitled to recover for the cost of installing vibration isolation on all HVAC vertical risers, we do not award appellant the entire amount claimed in GSBCA 14877. T&S's operations manager testified that he and the project manager had estimated that the cost associated with the installation of vibration isolation on vertical risers would amount to approximately $4000. Finding 53. We, therefore, have removed $4000 from the subtotal of $387,568 shown on T&S's portion of appellant's claim. See Finding 46. After application of the usual markups for overhead, profit, and bond to this reduced subtotal, we calculate T&S's portion of the claim to be $475,864. Substituting this revised figure for T&S costs of $480,827 shown in appellant's breakdown of its claim (Finding 45), we calculate that appellant is entitled to an award of $577,777, which with these adjustments is now broken down as follows:

T&S Costs	$475,864
HPCC Commission on Subcontractor Costs (10%)	47,586
HPCC Direct Costs	39,834
Subtotal	563,284
General Liability & Builders Risk Insurance (.4%)	2,253
Subtotal	565,537
Performance and Payment Bonds (.6%)	3,393
Subtotal	568,930
City of Boulder Tax (3.11% of 50% of cost)	8,847
TOTAL	$577,777

GSBCA 14744: Labor Productivity Claim

I. Appellant's Claim

T&S's Evaluation of Impact and Acceleration Costs

58. By letter dated November 24, 1997, T&S provided HPCC, as general contractor, with an evaluation of additional costs already incurred and anticipated for completion of the NOAA project. These costs were said to result from directed acceleration of work and from the impact on base labor caused by "multiple changes, scope revisions and lack of proper timely information." In its submission, T&S estimated that the acceleration costs and cumulative change impact costs would come to a total of $2,290,984. T&S noted that, of this amount, $1,014,262 represented the estimated cost breakout for directed acceleration. T&S observed, however, that because the acceleration took place while the work was being impacted by various delays and disruptions, it was extremely difficult to separate acceleration costs from impact costs. The quantification method used by T&S was that used in the Modification Impact Evaluation Guide of the Army Corps of Engineers. Included with this request was a copy of T&S's baseline entitlement schedule, the impacted base-line schedule extended, and the acceleration schedule -- all of which, according to T&S, demonstrated that this subcontractor had been required to have substantially more men on site than was originally expected in order to accelerate the work and keep the project on schedule. Appellant's Supplemental Appeal File, GSBCA 14744, Vol. 1, Exhibit 47.

59. By letter dated November 24, HPCC forwarded to CRSS's project manager T&S's proposal of the same date regarding acceleration and impact costs. Included in HPCC's package was an overall project mitigation schedule (two diskettes). HPCC's forwarding letter stated:

> As we have discussed as a group several times, there has been an impact on the project due to mechanical changes. It has been very difficult to assess. Even with this enclosed material in hand, we request a meeting with all prominent parties as early as next week to discuss the impact and costs and identify additional information needed to completely understand and evaluate costs and schedule.

Respondent's Supplemental Appeal File, Vol. 15, Exhibit G81.

Discussion of HPCC's Request

60. In early December 1997, HPCC and T&S representatives met with the contracting officer and other GSA and CRSS representatives to discuss the request for acceleration and impact costs. Appellant's Supplemental Appeal File, GSBCA 14744, Vol. 1, Exhibit 49. Through HPCC, T&S provided additional supporting documentation requested by CRSS. Respondent's Supplemental Appeal File, Vol. 15, Exhibit G84. By letter dated December 11, CRSS's project manager wrote to HPCC regarding T&S's proposal. He first observed that, in combining the request for acceleration costs with a request for impact or inefficiency costs, T&S had, in effect, made it impossible to resolve these claims. He stated that the two must be handled separately and that any claim for acceleration costs must be supported by a schedule showing the additional resources allocated to specific activities in quantities sufficient to remove the negative float and maintain the current completion date. As for the impact claim, the CRSS project manager noted, among other things, that the methodology used to quantify this portion of T&S's request was unacceptable since it did not take into account other factors which could account for labor overruns, such as errors in bid preparation, coordination with other trades, labor

shortages, and time lost on unacceptable work. Appellant's Supplemental Appeal File, GSBCA 14744, Vol. 1, Exhibit 51.

61. In a second letter to HPCC, also dated December 11, 1997, the CRSS project manager advised that the mitigation or recovery schedule recently submitted by HPCC required a narrative to explain each of the various revisions. It was also pointed out that, pursuant to the contract, any revision to activity manpower such as those in this proposed schedule revision required the performance of a time impact analysis. Appellant's Supplemental Appeal File, GSBCA 14744, Vol. 1, Exhibit 52.

62. When asked by HPCC to respond to the two CRSS letters of December 11, T&S pointed out that separate figures had been provided for acceleration and impact costs. The company vice president further observed that he could well understand why CRSS and GSA were finding it difficult to understand how best to quantify the impact of the pervasive changes made in the contract work. He suggested that perhaps some thought should be given to converting partially T&S's subcontract into a cost reimbursement-type contract in order to relieve the contractor of the high degree of risk associated with the numerous changes. In any event, T&S declined to provide further information, pointing out instead that the information now being sought by CRSS had already been furnished. Appellant's Supplemental Appeal File, GSBCA 14744, Vol. 1, Exhibits 53-54, 56.

63. On January 5, 1998, T&S and HPCC officials met with the contracting officer and other representatives of GSA and CRSS. T&S's proposal regarding acceleration and impact cost was again discussed at some length. The minutes for that meeting state:

> GSA informed HPCC and Trautman & Shreve of what needs to be provided to GSA for their review:
> - Corps of Engineers Modification Impact Acceleration Guide (this must be acceptable to GSA)
> - Proposal
> - Daily Logs from Trautman & Shreve
> - Trautman & Shreve basis of original bids & estimates[.]
>
> GSA handed out the necessary information and stated that if reasonable value can be determined[,] Trautman & Shreve will be compensated. A form 1411 will be transmitted to HPCC and T&S.

Appellant's Supplemental Appeal File, GSBCA 14744, Vol. 1, Exhibit 57.

64. During the month of January 1998, HPCC, as agreed during the meeting of January 5, provided to the contracting officer through CRSS a copy of the Modification Impact Acceleration Guide of the Corps of Engineers, a copy of its pricing proposal of November 24 accompanied by a prepared standard form 1411, a copy of T&S's daily reports, and confidential information regarding T&S's original bid and estimates. Appellant's Supplemental Appeal File, GSBCA 14744, Vol. 1, Exhibit 61; Respondent's Supplemental Appeal File, Vol. 15, Exhibits G106-G107.

The Acceleration Issue

65. At this same meeting on January 5, T&S officials asked if they should continue acceleration. This led to a discussion of whether T&S had in fact been directed to accelerate. T&S suggested that the matter be "defined" within the next few days. Appellant's Supplemental Appeal File, GSBCA 14744, Exhibit 57. This discussion regarding acceleration prompted GSA's project manager to send a memorandum to the contracting officer. The memorandum, dated January 6, noted that the statement made at the meeting by T&S's chief executive officer that T&S was directed to accelerate its work was untrue. Rather, the GSA project manager wrote that T&S's project manager in the summer of 1997 announced that the company was bringing additional people to the project to perform work instead of having employees work overtime. According to the GSA project manager, this decision on the part of T&S did not result from any request from either CRSS or GSA. The GSA project manager's memorandum also noted that acceleration had been requested only for the underground plumbing in block B and that this had been covered by contract modification PS-34. Respondent's Supplemental Appeal File, Vol. 15, Exhibit G95.

66. By letter dated January 9, 1998, the contracting officer provided HPCC with the requested clarification of the acceleration issue. He noted that early in the discussion regarding the HVAC changes covered by Change Request (CR) 85, T&S had advised that it would add additional resources to the project to mitigate the effect of these changes. The contracting officer noted that GSA did not object to this approach but that, in the final analysis, it was the responsibility of the contractor to prosecute the work in accordance with the detailed construction schedule so as to meet the project completion date of December 11, 1998. Nevertheless, the contractor was invited to submit cost and pricing data in support of its pending pricing proposal to see if the costs sought are "reasonable, allowable and allocable to the changes." Respondent's Supplemental Appeal File, Vol. 15, Exhibit G98.

67. T&S was distressed by the contracting officer's letter of January 9. In a letter dated January 13 to HPCC's project manager, T&S's vice president and operations manager wrote: "Verbally, the Government and CRSS have been very supportive of our extraordinary efforts (and expenditures) aimed at bringing this drastically changed project in on schedule. In writing, however, Trautman & Shreve is being abandoned." The contracting officer's letter was seen by T&S as an implied denial by the Government of any responsibility whatsoever for impacts to the project schedule. Appellant's Supplemental Appeal File, GSBCA 14744, Vol. 1, Exhibit 63.

68. In an attachment to his letter of January 13 to HPCC, T&S's operations manager offered for the record some key points for consideration. He contended that T&S was, in fact, directed to accelerate the schedule to mitigate impacts caused by the HVAC changes called for in CR85 and that this direction was given after it became clear to all concerned that this was the most beneficial recourse for the owner. He asked for an immediate meeting with the owner to determine whether this acceleration should continue. If it were not to continue, then, in his opinion, the contractor should be given time extensions in view of the direct and indirect impacts of CR85. T&S's operations manager also noted that because the project completion date of December 11, 1998, did not reflect either the direct or indirect impacts to the present contract schedule created by CR85, a final revision of that schedule could not be done without prior agreement on how the impacts of CR85 were to be accommodated. Appellant's Supplemental Appeal File, GSBCA 14744, Vol. 1, Exhibit

63. T&S's letter and attachment of January 13 were forwarded to the contracting officer by HPCC by letter dated January 14. Id., Exhibit 66.

69. By letter dated January 30, T&S's operations manager wrote HPCC again on the issue of acceleration or schedule extension as an alternative to acceleration. He listed twenty-three change order requests (CORs) previously submitted by T&S which had led to various change orders. He pointed out that each COR had included a request for an extension of time (and related costs) but that during negotiations CRSS's representative had requested that extension and/or acceleration costs be handled in a separate change order. Upon review of the twenty-three CORs identified in this letter, T&S concluded that it was entitled to 108 days of extension for the changes in question. Not included in these CORs was COR 155 (which dealt with HVAC system changes). Under that COR alone, T&S contended that it was entitled to an additional sixty days of extension. The letter provided what were said to be schedule fragnets (see Finding 95) for the twenty-three listed CORs. The letter closed with the observation that these time extensions should be born in mind by CRSS and GSA as they proceeded to evaluate the acceleration and cumulative impact costs being sought. Respondent's Supplemental Appeal File, Vol. 16, Exhibit G113. By letter dated February 4, HPCC forwarded this submission of T&S to CRSS with the request that a decision be made promptly on whether GSA wished to extend the contract or accelerate to compensate for the schedule impact. Id., Exhibit G115.

70. Even before receiving T&S's submission of January 30, CRSS's project manager advised HPCC, in a letter dated February 3, 1998, that GSA had approved a $50,000 payment on an activity number listed on a pending pay request submitted by HPCC. The item in question related to "Costs associated with Directed Acceleration and Impacts" and amounted to a total of $2,290,984. HPCC was directed to enter the $50,000 into its pending pay request. Appellant's Supplemental Appeal File, GSBCA 14744, Vol. 1, Exhibit 70. A letter in the record from the CRSS project manager to the GSA contracting officer sheds some light on this payment. The letter states:

> CRSS rejected the first Hensel Phelps pay request dated February 2nd because it included costs for what the contractor believes to be costs for accelerating CR #85. This scope is not negotiated or reflected in a contract modification. However CRSS and GSA agree to pay $50,000 toward the contract modification on this pay request.

Respondent's Supplemental Appeal File, Vol. 16, Exhibit G117. Attached to this letter is a GSA Form 184 (Construction Progress Report), which has the following explanatory note bearing the initials of the CRSS project manager:

> The $50,000 payment does not have a contract modification, but it is expected that the resolution of the impacts relating to CR 85 will be decided by the contracting officer in 2 or 3 weeks. The $50,000 is a good faith progress payment in relation to CR 85.

Id. Following this payment, HPCC requested that GSA pay additional funds on the T&S acceleration issue. By letter dated March 3, 1998, the contracting officer advised the general

contractor that no additional payments would be made "pending resolution of the issue as a whole." Appellant's Supplemental Appeal File, GSBCA 14744, Vol. 1, Exhibit 72.

71. At the hearing, the contracting officer testified that the $50,000 payment he approved at this time was based upon recommendations received from the Government's scheduling consultant. He explained that he had asked for an analysis in order to determine, at least in rough terms, what his maximum exposure on this issue would be. The consultant concluded that CR85 did support an extension in contract performance. The contracting officer recalled that this was said to be approximately nineteen days. To mitigate the effect of this extension and bring the contract completion date back to December 11, the consultant is said to have recommended additional labor. The cost of this labor was estimated to be fifty or sixty thousand dollars. The amount in question was for only schedule impact, not cumulative impact. Transcript at 2097-98, 2135.

72. The record contains a letter to CRSS's project manager from the Government's scheduling consultant. It is dated February 9 and discusses the impact of CR85. It concludes that CR85 impacted the critical path of the baseline schedule by forty-seven days. See Respondent's Supplemental Appeal File, Vol. 19, Exhibit G198. At the hearing, the contracting officer when shown a copy of this letter was uncertain if he had ever seen it. Transcript at 2136. He later testified that the letter was simply provided to document his earlier discussions with the scheduling consultant. Id. at 3090. The letter's contents are not altogether consistent with the contracting officer's testimony. The letter speaks of a schedule impact of forty-seven days rather than nineteen and is based upon a completion date of November 4 rather than December 11, 1998.[8]

Revision of the Project Mitigation Schedule

73. In mid-February, after consultation with T&S, HPCC submitted to CRSS a revision of the N11A schedule, i.e. the project mitigation schedule, proposed to CRSS on November 24, 1997 (Finding 157). Appellant's Supplemental Appeal File, Vol. 2, Exhibit 166.

Further Discussion Regarding HPCC's Request for Acceleration and Impact Costs

74. By letter dated March 10, 1998, the GSA contracting officer advised HPCC that HPCC had failed to provide the factual data necessary to justify or even negotiate the equitable adjustment requested. Referring back to CRSS correspondence with HPCC in December 1997 (Findings 60-61), the contracting officer stressed the need to separate the

[8]In his testimony the contracting officer suggested that perhaps the forty-seven-day impact was reduced to nineteen based upon a completion date of December 11. Transcript at 2148. Unfortunately, these matters remain unresolved. Although Government counsel was of the opinion that the consultant's written report on the schedule impact of CR85 was in the record and the contracting officer believed that the record also contained a copy of an e-mail message on the subject from the consultant, no further documentation was ever identified or produced. Id. at 2099, 3091-92.

request for acceleration costs from that for the costs of base labor impact. On acceleration, he stated that CRSS had performed an independent schedule analysis which showed an impact to the contract completion date. Nevertheless, he reminded HPCC that it could not be compensated for extra costs unless GSA first received the time impact analysis required under the contract. On the request for compensation for a base labor impact of the mechanical changes occasioned by CR85, he noted that the Modification Impact Evaluation Guide of the Corps of Engineers is not recognized by GSA and, indeed, no longer used by the Corps. Furthermore, he noted that HPCC's response to the CRSS letter of December 11 had not addressed the issue of costs not attributable to the owner and the projection of costs into the future. In view of these considerations, the contracting officer advised HPCC that GSA would not proceed further with review and negotiation of the present pricing proposal until these concerns were addressed in detail. This letter also rejected T&S's earlier proposal that the parties consider converting, at least in part, the current contract into a cost reimbursement type contract. The contracting officer pointed out that this was impossible since the Government was not in privity with T&S. Appellant's Supplemental Appeal File, GSBCA 14744, Vol. 1, Exhibit 75.

75. The contracting officer's letter of March 10, 1998, was distributed and discussed at some length at a meeting held on March 11 and attended by the contracting officer and representatives of T&S, HPCC, CRSS, and other representatives of GSA. The minutes for that meeting state:

> T&S stated that they thought they had provided all the necessary information to GSA. GSA responded that they agree that there is an impact to the project, but there is not sufficient information to quantify that impact.

Appellant's Supplemental Appeal File, Vol. 2, Exhibit 169. During this meeting, the participants discussed what method of assessment should be used to assess the base labor impact. CRSS confirmed the unacceptability of the Corps' method. The participants also discussed the fact that, aside from a handful of modifications, most had been signed with zero-day impact. CRSS questioned why schedule impact was not addressed at the time. HPCC representatives suggested that this was due to the absence of any time impact analyses. It was, therefore, suggested that the modifications be readdressed for schedule impact. Id.

76. Relying on representations made by GSA officials at the meeting of March 11 that they agreed there was an impact but were unable to quantify it, T&S prepared a submission shortly after the meeting. The submission proposed a specific methodology for analysis of impact on base contract work. T&S proposed the use of inefficiency percentages set forth in the Mechanical Contractors Association of America (MCAA) labor productivity bulletin to compute the value of impact and acceleration to both its changed and base contract work. It was noted that this method had been used before this Board. Before proceeding further on the matter, however, T&S sought confirmation from GSA that the proposed MCAA approach was acceptable at least in concept. Respondent's Supplemental Appeal File, Vol. 16, Exhibit G130. T&S's submission was forwarded to CRSS by HPCC by letter dated March 19, 1998. Id., Exhibit G131.

77. A letter from the contracting officer dated March 20, however, advised HPCC that the contractor's underlying assumption that GSA believed that the base contract work had in fact been impacted was incorrect. The contracting officer wrote:

> GSA has acknowledged that the manhours associated with the direct costs of CR-85 resulted in a schedule impact. This schedule impact is to the approved baseline schedule. GSA, through CRSS, has requested that Hensel Phelps provide an acceleration plan to mitigate this impact. This represents the total acknowledgment of entitlement to date.
>
> The position of the Contracting Officer is that Hensel Phelps has yet to document an impact to base labor, and therefore no entitlement to inefficiency costs has been established nor recognized.

Appellant's Supplemental Appeal File, Vol. 2, Exhibit 171. The letter concluded with the suggestion that the contractor's time would be better spent attempting to prove entitlement rather than in proposing methods for calculating quantum. Id.

78. Later in March, HPCC forwarded to CRSS a hefty supplement (137 pages) to the submission on impact analysis already prepared by T&S and provided to CRSS by HPCC with its letter of March 19 (Finding 76). Respondent's Supplemental Appeal File, Vol. 16, Exhibits G133-G134. Thereafter, HPCC, on its own behalf and on behalf of T&S, asked for the opportunity to meet with CRSS and GSA on March 31 to discuss this supplemental submission. Id., Exhibit G136. The meeting was inconclusive. Appeal File, GSBCA 14744, Exhibit 3 at 13. A subsequent meeting was held on April 14 to discuss again the status of CRSS's review of HPCC's submissions. Little was accomplished. GSA and CRSS were not ready to discuss their assessment of the submissions. T&S asked twice whether any further information was necessary. CRSS replied that, at this point, there did not seem to be a need for further information, but that if a need did arise, T&S would be notified. Both HPCC and T&S spoke of the need to resolve this matter promptly. The amount being sought, over a million dollars, was said to represent work that had been in place since this dispute arose and which was continuing to be financed by the contractor. T&S's suggestion that it should be paid interest on this amount was rejected as impossible in the absence of a formally certified claim. Appellant's Supplemental Appeal File, Vol. 2, Exhibit 174.

CRSS's Comments on Revised N11A Schedule

79. To assist GSA and CRSS in their evaluation of the proposed N11A schedule and in response to their request, HPCC incrementally progressed and impacted (as necessary) the N11A service schedules for each month from October 1997 through February 1998. On March 25, 1998, schedule data disks were provided for evaluation. The balance of reports and plots, along with an extensive narrative, was submitted in early April. On April 3rd the parties met to discuss the submission. Respondent's Supplemental Appeal File, Vol. 18, Exhibit G152a at 6. By letter dated April 22, CRSS provided comments and suggested changes for the proposed mitigation schedule. Among several items provided for in the schedule but which CRSS wished to delete was one dealing with the installation of vibration isolation and another dealing with mechanical work impacts. Id., Exhibit G141. T&S objected to these and other proposed deletions and questioned how the Government could

insist on the deletion of the mechanical work impact when Government representatives during a meeting only the week before had said that they needed additional time to review the HVAC piping impacts issue (Finding 78). T&S contended instead that the schedule, as revised and proposed, was realistic and did in fact address the work that was actually being performed. Id., Exhibit G145.

The Contracting Officer's Rejection of Appellant's Proposal

80. By letter dated May 7, 1998, the contracting officer rejected in its entirety HPCC's claim regarding acceleration and impact costs. He explained that GSA had used cause and effect as the standard to determine whether the contractor was entitled to the adjustment sought. He further explained that the information provided by HPCC "contained errors and/or inaccuracies" and "failed to show that any relationship exists between the direct mechanical impacts of the changed work and the unchanged work." Appellant's Supplemental Appeal File, Vol. 1, Exhibit 176. The contracting officer's rationale for denying HPCC's proposal, although reasonably clear from the context of his letter, is perhaps more clearly expressed in a letter written later requesting an audit of HPCC's certified claim. He wrote: "As we have discussed, the contractor has not been able to prove a causal relationship between the change orders executed by GSA and the claimed base labor impact." Id., Exhibit 179.

81. Not surprisingly, once GSA had rejected HPCC's request for impact and acceleration costs allegedly incurred to ensure that the project remained on schedule, HPCC, in a letter to the contracting officer, drew his attention to the fact that in monthly schedule update narratives it had been consistently noted that GSA's failure to respond to pending time extensions had forced the contractor to constructively accelerate mechanical work. Accordingly, the contracting officer was asked to address the previous request of February 4 regarding time extensions totaling 108 days (Finding 69). Respondent's Supplemental Appeal File, Vol. 18, Exhibit G149. The contracting officer's reply to HPCC's inquiry was to state that there simply had been no requests for time extensions. He reminded HPCC that the contract requires the submission of a time impact analysis within fourteen calendar days after the commencement of a delay and that, in cases where the analysis is not timely submitted, it is mutually agreed that the particular change order delay or contractor request does not require a contract time extension. Appellant's Supplemental Appeal File, Vol. 2, Exhibit 177. By letter dated June 8, HPCC took issue with the contracting officer and pointed out that the contractor had on several occasions both in writing and orally notified GSA of schedule impacts specifically related to mechanical scope changes and problems. Id., Exhibit 100.

GSA's Acceptance of the N11A Schedule

82. By letter dated June 4, the contracting officer advised HPCC that the N11A schedule was accepted subject to certain exceptions. For purposes of this decision, one exception of particular significance read:

> GSA does not accept any responsibility for added resources that the Contractor has decided to add to the project. As a reminder, under the Contract, the Contractor is required to furnish sufficient forces and work such

> hours and shifts as necessary to ensure the prosecution of the work in accordance with the detailed construction schedule. If the Contractor is unable to maintain the progress established in the detailed construction schedule, the Contractor shall take any and all steps as may be necessary to improve the project progress without additional costs to the Government.

Respondent's Supplemental Appeal File, Vol. 18, Exhibit G151.

83. At the hearing, the Government called a witness whom the Board accepted as an expert in construction scheduling. Transcript at 2166-76. While commenting on the N11A schedule, he explained that in the spring of 1998 HPCC ceased presenting a sequential set of updated schedules to the owner as its billing tool. Instead, HPCC resubmitted reconstructed schedule updates going back to November 1997 and then, beginning with May 1998, updated just this retrospective schedule. He opined that the resultant N11A schedule was referred to as the "mitigation schedule" because it was purported to be the schedule that should have been prepared had T&S's original claim submittal of November 1997, including acceleration, been incorporated into the contract schedule. Transcript at 2785-86, 2799-817.

HPCC's Certified Claim

84. On July 1, 1998, in response to the contracting officer's rejection of May 7, HPCC submitted a certified claim in the amount of $3,354,571. The T&S calculations incorporated into the claim are based in great part on T&S's original submission of November 24, 1997, except that the methodology formally used by the Corps of Engineers in its Modification Impact Evaluation Guide had been discarded in favor of that followed in the MCAA Bulletin. Appeal File, GSBCA 14744, Vol. 4, Exhibit 3. By letter dated July 7, 1998, the contracting officer advised appellant that the claim submittal lacked the information necessary to evaluate it. In early August he advised appellant that cost and pricing data would be required to support the claim and that the claim would also have to be audited. Appeal File, GSBCA 14744, Vol. 4, Exhibits 4-5. Appellant and T&S attempted to respond to the contracting officer's request for additional data. In late August, the contracting officer advised HPCC that an additional sixty days would be required to evaluate the certified claim. In late October 1998, the contracting officer advised HPCC that the audit of appellant's claim would not be complete until November 16th. The date for the final decision was, therefore extended to December 17th. Id., Exhibits 7, 10. At this point in time, HPCC filed an appeal from a deemed denial. The appeal was docketed but proceedings were stayed at the request of counsel for the parties until December 17. On that date, however, the contracting officer advised HPCC that because of the complexity of appellant's claim, he was again extending the time for his final decision. This time the decision date was extended to April 10, 1999. Id., Exhibit 12. The Board's stay having expired, proceedings resumed. By letter dated April 8, 1999, the contracting officer issued his decision confirming denial of HPCC's claim. Respondent's Supplemental Appeal File, Vol. 27, Exhibit G236.

II. Events Leading Up To HPCC's Claim for Impact and Acceleration Costs of July 1, 1998

T&S's Estimate

85. In preparing its estimate of the cost to perform its scope of work on the NOAA project, T&S used a computer-based estimating system. T&S's estimators determined the quantity of materials required to perform the work and those quantities were then entered into the computer. The software then calculated an estimated baseline number of man hours required to install those materials based upon labor units developed by the MCAA. Transcript at 704-05.

86. The MCAA labor units used to develop estimated man hours for installing materials represent a baseline from which contractors determine the actual number of hours required to perform a given task.[9] Once the baseline hours are calculated, mechanical contractors using MCAA-based estimating systems then discount the number of hours derived from using the MCAA labor units when calculating the amount of a bid. In other words, a mechanical contractor's estimate is typically based upon some percentage of the labor hours derived by applying the MCAA labor units to material quantities. Transcript at 704-06, 784, 2200-02, 2253, 2283-85.

87. T&S's president and chief executive officer testified that T&S has never bid a project at 100% of MCAA-derived man hours. Typically, T&S estimates projects in Colorado at between .5 and .7 of MCAA-derived man hours, although it has profitably performed projects estimated as low as .45 and as high as .85 of MCAA-derived man hours. Transcript at 706-07, 784. Indeed, according to one of the Government's own witnesses, a mechanical estimator for CRSS, .7 of MCAA-derived man hours represents a "benchmark" for estimating mechanical work. Id. at 2202.

88. T&S's estimate for its bid to HPCC for the mechanical portion of the NOAA project included 50,159 man hours. Respondent's Supplemental Appeal File, Vol. 7, Exhibit G3 at 5-5; Transcript at 1515-20. This represented 56% of the number of man hours generated by T&S's estimating system using the undiscounted MCAA labor units or, as the witnesses at the hearing described it, T&S estimated and bid the mechanical portion of the work to HPCC at ".56 MCA." Transcript at 714, 2122.

89. Prior to formulating its bid to HPCC for the NOAA project, T&S met with HPCC to agree upon a plan for constructing the project which called for the flow of work to proceed from building to building, beginning with block D and followed by blocks C, B and A. The agreed-upon plan also called for the work in each building to proceed from the first floor, followed by the second floor and then the third floor to ensure an even, unobstructed flow of work that could be performed as efficiently as possible. Transcript at 709.

90. In determining the appropriate discount to apply to the MCAA-derived man hours in its estimate, T&S's management and senior estimator considered numerous factors

---

[9]These MCAA labor units used as a tool in preparing a bid for a new project should not be confused with the labor inefficiency factors also developed by the MCAA. The latter are used to gauge the effect of changes on a contractor's productivity. It was these inefficiency factors which T&S proposed using in mid-March 1998 as a medium to assess impact costs of contract changes on unchanged contract work. See Finding 76.

affecting T&S's labor productivity. These factors included the availability of key personnel to supervise and manage T&S's labor force, T&S's prior experience with HPCC, the anticipated timing and sequence of work as previously discussed with HPCC, the availability of labor, the complexity of the project, the location of the project, and the ability to prefabricate materials in the contractor's shop rather than on the project site. Transcript at 703, 709, 711, 714.

91. Prior to award of the contract for the NOAA project to HPCC, both CRSS and FBA prepared estimates of the anticipated cost of construction. In terms of labor hours, CRSS estimated that the scope of work that became part of T&S's subcontract with HPCC would require 41,951 man hours, while T&S's bid to HPCC was based on its estimate that it would take 50,159 man hours for the same scope of work. This suggests, if anything, that T&S's bid included *more* hours than CRSS believed were necessary to perform the same scope of work. However, on a dollars-to-dollars basis, T&S's bid for the mechanical labor ($1,586,155) and CRSS's estimate for the same mechanical labor ($1,595,362) were within 0.5% of each other. Appellant's Supplemental Appeal File, Vol. 1, Exhibit 120; Respondent's Supplemental Appeal File, Vol. 7, Exhibit G3; Appellant's Trial Exhibit 10; Transcript at 1501-16, 1522.

92. Similarly, FBA's estimate dated June 5, 1994, reflected a total of $7,629,898 for all HVAC and plumbing labor and materials included within the scope of T&S's subcontract. This amount compares favorably to T&S's contract figure of $7,840,014 and reveals a difference of only about 2.8%. Appellant's Supplemental Appeal File, Vol. 1, Exhibit 120 at 35-48; Appellant's Trial Exhibit 10; Transcript at 1573-76.

Development of the Baseline Schedule

93. HPCC's contract with GSA required it to develop and maintain a detailed construction schedule. The schedule was to be computer generated and updated monthly. The contract provides:

> Once the "baseline" Detailed Construction Schedule has been approved and accepted by the Government, there will be no changes, modifications, or alterations, except that described within Section 3.9, performed by the contractor without explicit written permission by the Government.[10]

Appeal File, GSBCA 14744, Vol. 1, Exhibit 1 at 01311-1. In particular, the contract expressly provided: "The updated Construction Schedule submitted by the Contractor shall not show a completion date later than the specified Contract Duration, subject to any time extensions approved by the Government" Id. at 01311-13.

[10]The contract reference to "Section 3.9" is an obvious error. That section deals with weekly schedule meetings. Presumably the intended reference is to Section 3.11, which deals with construction schedule revisions.

94. The changes, modifications or alterations in the baseline schedule which were permitted under the contract are described as follows:

> 3.11 CONSTRUCTION SCHEDULE REVISIONS
>
> A. Updating the Construction Schedule to reflect actual progress made up to the date of a Schedule Update shall not be considered revisions to the Construction Schedule.
>
> B. If it appears the Construction Schedule no longer represents the actual prosecution and/or progress of the work, the Government will request, and the Contractor shall prepare and submit a revision to the Construction Schedule.
>
> C. The Contractor may also request revisions to the Construction Schedule in the event the original logic was not workable. If the Contractor desires to make changes in the Construction Schedule to reflect revisions in his method of operating and scheduling of work, the Contractor shall notify the Government in writing at least fourteen (14) calendar days prior to the next Schedule Update, describing the revision(s) and setting forth the reasons thereof. If deemed necessary by the Government, a written Time Impact Analysis as detailed in Section 3.13[11] shall be provided by the Contractor. Accepted revisions will be incorporated into the next monthly Schedule Update.
>
> D. Requests for revisions of activity manpower, activity costs, or redistribution of activity costs shall be made in accordance with the requirements of this section ([as provided in] 3.12).

Appeal File, GSBCA 14744, Vol. 1, Exhibit 1 at 01311-15.

95. Some of the key contract provisions regarding time impact analysis which are relevant to this dispute are as follows:

> 3.12 TIME IMPACT ANALYSIS FOR CHANGE ORDERS, DELAYS, AND CONTRACTOR REQUESTS
>
> A. When Change Orders are initiated, delays are experienced, or the Contractor desires to revise the Construction Schedule per 3.12C, the Contractor shall submit to the Government a written Time Impact Analysis, illustrating the influence of each Change Order, delay, or Contractor request on the current Contract Completion Date. The preparation of Time Impact Analysis shall include a Fragmentary Network (Network Analysis) of the new and existing activities directly affected by the change demonstrating how the

[11]This too is an incorrect reference. Section 3.13 concerns the coordination of contract work. The proper reference is most probably to Section 3.12, which concerns time impact analyses.

> Contractor proposes to incorporate the Change Order, delay or Contractor request into the Construction Schedule. The Time Impact Analysis shall demonstrate the time impact based on: (1) the date the Change Order is given to the Contractor or the date the delay occurred; (2) the status of construction at that point in time; and (3) the event-time computation of all affected activities. The event times used in the Time Impact Analysis shall be those included in the latest Construction Schedule Update or as adjusted by mutual agreement.
>
> B. Activity delays shall not automatically mean that an extension of the Construction Duration is warranted or due the Contractor. It is possible that a Change Order or delay will not affect existing critical activities or cause non-critical activities to become critical. A Change Order or delay may result in only absorbing a part of the available total float that may exist within an activity chain of the Network, thereby causing no effect on the Contract Completion Date.
>
> C. Float[12] is not for the exclusive use or benefit of either the Government or the Contractor. Contract time extensions will be granted only to the extent the equitable time adjustments to the activity or activities affected by the Change Order or delay exceeds the total (positive or zero) float of a critical activity (or path) and exceeds the Contract Completion Date.
>
> . . . .
>
> E. In cases where the Contractor does not submit a Time Impact Analysis within fourteen (14) calendar days, it is mutually agreed that the particular Change Order[,] delay or Contractor request does not require a Contract time extension.

Appeal File, GSBCA 14744, Vol. 1, Exhibit 1 at 01311-15, 01311-16.

96. The contract required HPCC to submit within two weeks of contract award a preliminary plan covering the first ninety days of contract performance. Appeal File, GSBCA 14744, Vol. 1, Exhibit 1 at 01311-3. Within sixty calendar days following notice to proceed, HPCC was required to submit for approval its proposed baseline schedule. Id. at 01311-6. Pending development of the baseline schedule, the preliminary schedule was to be updated on a monthly basis. Id. at 01311-5.

97. On or about December 9, 1996, T&S submitted a proposed schedule for the mechanical work to HPCC with the file name "NOAT" for HPCC's use in preparing the

---

[12] "Float" is defined elsewhere in the contract as "the amount of time between the early start date and the late start date, or the early finish date and the late finish date of any activity in the project schedule." "Total float" is defined as "the amount of time any given activity or path of activities may be delayed before it will affect the contract completion date. Appeal File, GSBCA 14744, Vol. 1, Exhibit 1 at 01311-10, 01311-11.

project baseline schedule. Respondent's Supplemental Appeal File, Vol. 14, Exhibit G14. Discussions ensued between HPCC and T&S over the development of the baseline schedule as it affected T&S's portion of the work. These discussions ultimately culminated in the submission to GSA of a baseline schedule that was acceptable to both HPCC and T&S. Transcript at 815-18, 1293-94, 1960-62, 3026, 3111-14. It is unclear from the record precisely when HPCC submitted its proposed baseline schedule to the Government. Presumably it was no later than February 1997, for a letter in the record dated March 3, 1997, from T&S to HPCC, indicates that by that time the proposed baseline plan had already been reviewed by GSA and the contractor and subcontractor were working on requested revisions. Respondent's Supplemental Appeal File, Vol. 14, Exhibit G22. T&S's project manager testified that the final baseline schedule, referred to as the "NOA1" schedule, was approved by GSA in March 1997. Transcript at 818, 3025.

98. The NOA1 schedule called for the four buildings or "blocks" to be constructed more or less sequentially, beginning with blocks D and C, followed by blocks B and A. While there was considerable overlap between blocks D and C, and between blocks B and A, the schedule called for T&S's work in blocks D and C to be well advanced before T&S was required to perform any above-ground work in blocks B and A. Thus, T&S anticipated being able to move its piping crews gradually from blocks D and C into blocks B and A as work in the former buildings neared completion. Transcript at 1011, 1294-95; Respondent's Supplemental Appeal File, Vol. 24, Exhibit G235 (Exhibit 10).

99. Although that portion of the NOA1 schedule which governed T&S's work differed in some respects from T&S's proposed NOAT schedule, the schedules were consistent with some basic assumptions on which T&S's bid was based. In particular, the NOA1 schedule did not require any greater number of man hours than were included in T&S's bid, and the total amount of time T&S was required to be on the project was not significantly different.[13] Transcript at 818-19, 3026-27, 3111-12.

100. The record contains the narrative portion of numerous monthly updates of the baseline schedule provided by HPCC up to and including April 1998. Nearly all of these updates refer to potential or actual impacts attributable to various mechanical (i.e., HVAC or plumbing) design changes. Those covering the months following September also refer to acceleration of contract performance to mitigate schedule impact of these changes. Appellant's Supplemental Appeal File, GSBCA 14744, Vol. 1, Exhibits 24, 29, 36, 41, 46, 48, 55, 71, 73; Vol. 2, Exhibits 84, 93.

---

[13] The Government's expert in construction scheduling testified regarding the differences between T&S's proposed schedule and the approved NOA1 baseline schedule. On direct examination he testified that the duration of time T&S planned to work on the four blocks was smaller than that shown on HPCC's approved baseline schedule. This, in the opinion of this witness, would make it more difficult for T&S to accomplish its work at the bid rates. Transcript at 2712-13. On cross-examination, however, this same witness readily agreed that the total amount of time T&S was to remain on the job remained substantially the same under T&S's proposed baseline schedule and the ultimate NOA1 schedule. Id at 3027.

101. Updates of the baseline schedule were also provided to the Government by HPCC on diskette. The Government's expert in construction scheduling testified that he undertook a comparative analysis of all available updates submitted over the course of the contract. Transcript at 2723-35; Respondent's Supplemental Appeal File, Vol. 24, Exhibit G235 (Exhibit 14). The first of these updates, "update 1," filed after approval of HPCC's baseline schedule in March 1997, was submitted in early April of the same year. It is based upon data available as of April 1 (schedule data date). The contractual completion date on this schedule was the same as that shown on the approved baseline schedule, namely, November 4, 1998. This update of the schedule, however, showed twenty-six working days of negative float and a resulting projected (as opposed to "contractual") completion date of December 11. Transcript at 1411, 2729-30, 3015.

T&S's Work Plan

102. In developing the baseline schedule, it was T&S's goal to lay out and schedule its work as efficiently as possible in order to achieve maximum productivity from its workers. As contemplated in the baseline schedule, T&S's plan was to assign crews for each system (HVAC piping, domestic water, natural gas, special gases, and storm drains and sanitary waste) to blocks D and C. Upon completion of blocks D and C, these crews were to move to blocks B and A. T&S anticipated that crews would begin work at the garden (bottom) level of the building and, as the work was completed, would make their way upward to the upper levels of each building. Transcript at 823-38, 1011, 2842-45; Appellant's Trial Exhibit 7; Respondent's Supplemental Appeal File, Vol. 26, Exhibit G235 (Exhibit 57).

103. T&S's planned crew flow was designed to maximize efficiency. For example, T&S's plan was designed to minimize material handling, as it allowed T&S to stock a floor with all of the materials needed for that floor at once and helped insure that workers at all times had sufficient materials to keep the job moving. Transcript at 836-37.

104. Similarly, T&S's plan also assumed that the company would have access to each floor and an opportunity to complete the bulk of its piping work before other trades started the installation of their work, since the HVAC and plumbing pipes must be installed to fit in the limited amount of ceiling space available. Transcript at 841-42.

105. Because T&S's plan assumed that each crew would complete its work on a given floor before moving upward to the next floor, it did not anticipate having members of a particular crew working on more than one floor at the same time. This was intended to minimize the amount of supervision required for each crew. Transcript at 837-38, 898-99. In addition, T&S's plan was based upon the assumption that the makeup of its crews would be the same throughout each building in order to maximize the efficiency of each crew. Id. at 835.

106. T&S's plan was also based upon the assumption that the plans provided by the Government were complete and reasonably coordinated. Transcript at 843, 845.

Identification of Errors in the Plumbing Design

107. The contract specifications required HPCC to prepare coordination drawings. HPCC, however, subcontracted the responsibility for these drawings to T&S. Coordination drawings are intended to show the final layout of the various mechanical, electrical, and plumbing pipes, conduits, and ducts in the ceiling spaces and elsewhere; the contract drawings prepared by the project designers only show the layout of these systems schematically. In other words, the coordination drawings are prepared to make sure that the various systems will, in fact, all fit into the limited amount of space available. Appeal File, GSBCA 14744, Vol. 1, Exhibit 1 at 01040-1; Transcript at 845-47, 947-50. The purpose of preparing coordination drawings is to take the mechanical, electrical, and plumbing design, as shown by the engineer in the contract drawings, and to fit that design into the building space as depicted by the architect on the contract drawings. Transcript at 847.

108. T&S started preparation of the coordination drawings in January 1997 and almost immediately discovered major discrepancies in the information shown in the contract's plumbing drawings. T&S's project manager testified that in his thirty-one years in construction he had never seen a set of contract drawings as badly coordinated as the drawings on the NOAA project. Transcript at 850-53. Many of these discrepancies involved conflicts in pipe sizes from drawing to drawing. For example, a plumbing line running the length of a building might be depicted on multiple sheets of the plans. However, the size of the pipe depicted on one sheet would not match the size of that pipe shown on another sheet. Id. at 851-52. CRSS itself had discovered several discrepancies of this nature when it reviewed the bid drawings in July 1996, but apparently no corrections were made at that time. Appellant's Supplemental Appeal File, Vol. 3, Exhibit 202 at 5-8; Transcript at 2631-34.

109. T&S's project manager advised HPCC of "an inordinate amount of design deficiencies in the contract drawings," provided specific examples of these deficiencies, and asked for assistance in scheduling a meeting to discuss the problem. Respondent's Supplemental Appeal File, Vol. 14, Exhibit G20. A meeting was scheduled for February 11, 1997. CRSS arranged to have its BCER consultant present as the meeting but advised GSA that this was deemed to be an extra service because the "massive" coordination issues exceeded the company's contract scope. GSA replied that, if the issues proved massive and outside the level of effort of CRSS's contract, then this would be a matter for the attention of the design architect, FBA. CRSS was, therefore, directed to give FBA the opportunity to attend the upcoming meeting as well. Appellant's Supplemental Appeal File, Vol. 1, Exhibit 121.

110. BCER, the consulting engineering firm retained by CRSS, had not assisted with the original design of the plumbing and mechanical systems. The engineering firm of record which had worked with FBA on the project's original design was RDA (Finding 7). At the meeting held on February 11, 1997, to discuss the deficiencies already detected in the plumbing drawings (Finding 109), a BCER representative pointed out that his firm would be limited in the help it could render to resolve the deficiencies since it was not involved in the actual design of the systems and its engineers, therefore, did not know the original design parameters of the job as RDA's engineers would. Transcript at 860-61.

111. In an effort to resolve the various problems encountered in the contract plumbing drawings used to prepare the necessary coordination drawings, T&S submitted

multiple RFIs and met frequently during the month of February with HPCC, CRSS, and design consultants. T&S's project manager testified that after the February 11 meeting, there was a meeting "where they brought Doyle in to do some talking." Transcript at 862. At one held on February 27, representatives of CRSS and BCER discussed the possible need for a general review of the mechanical/plumbing drawings as a whole for purposes of facilitating replies to the various RFI/coordination issues being raised. T&S's project manager testified that such a review, which is typically done before drawings are put out for bid, would have identified discrepancies in the various contract drawings. He further testified, however, that the proposed review was never undertaken. Id. at 864-65. In a letter dated March 4, 1997, to HPCC, T&S's project manager warned that delay in resolving the RFI/coordination issues was threatening the coordination drawing process. Respondent's Supplemental Appeal File, Vol. 14, Exhibit G24. The warning was repeated in a second letter, dated March 7. Id., Exhibit G28. By letter dated March 6th, HPCC had already advised CRSS of the need to expedite a resolution of these mechanical and plumbing drawing issues in order to "minimize cost and schedule impacts and to continue the coordination effort." Appellant's Supplemental Appeal File, GSBCA 14744, Vol. 1, Exhibit 20. A coordination drawing status sheet in the record supports this concern of HPCC and T&S that the coordination process keep pace with the contract schedule. Respondent's Supplemental Appeal File, Vol. 14, Exhibit G29.

112. By the month of March 1997, T&S was already installing underground plumbing in blocks D and C and sleeves and imbeds through the project as pours were being made. Transcript at 869-70; Respondent's Supplemental Appeal File, Vol. 25, Exhibit G235 (Exhibit 40). During that time, however, it was discovered that a perimeter drain system had been omitted from the contract plumbing drawings. T&S's project manager testified that this had a profound impact upon the installation of underground plumbing in blocks D and C. Transcript at 870-75; see also Respondent's Supplemental Appeal File, Vol. 14, Exhibit G32.

113. By the month of April 1997, construction on block D was already above ground and T&S was at work on the garden level. Transcript at 895; Respondent's Supplemental Appeal File, Vol. 25, Exhibit G235 (Exhibit 26).

Events During the Month of April 1997

Installation of Plumbing Piping

114. When T&S began the installation of above-ground plumbing piping in April 1997, it did not have a completed plumbing system design from which to work. Many RFIs regarding discrepancies in the plumbing drawings remained to be resolved. Indeed, as late as early May, T&S's project engineer wrote HPCC that plumbing drawings were still under revision and a review of these revisions disclosed that there were still items in these revised drawings which would require further clarification/direction through the RFI process. Appellant's Supplemental Appeal File, GSBCA 14744, Vol. 1, Exhibit 21. As a result, T&S was unable to implement its plan to have its plumbing piping crews complete work on a given floor before moving to the floors above. Instead, T&S was required to move its men from location to location within the building, installing piping in areas where the design was

reasonably complete, while awaiting information concerning areas where the design had not yet been finalized. Transcript at 895-97, 1223.

The Perimeter Drain System Change (CR22)

115. By mid-April, T&S had submitted its estimate for a change dealing with the perimeter drain system (Finding 112) but still was unaware of whether GSA planned to extend the project completion date or call for acceleration of work to avoid any delay associated with the change. T&S's estimate included a schedule impact of thirty-eight calendar days. Respondent's Supplemental Appeal File, Vol. 14, Exhibit G31. HPCC incorporated T&S's information into an overall cost proposal covering the perimeter drain system and the extension of the contract schedule for an additional thirty-eight calendar days. It submitted the proposal to CRSS under cover of a letter dated April 25. This letter also advised CRSS that, as requested, a change request accelerating the completion date from December 11 to November 24 would be submitted under separate cover. Id., Vol. 1, Exhibit CR22 at 14-18.

Events During the Month of May 1997

T&S's Proposal Regarding Plumbing Design Changes

116. By letter dated May 6, 1997, T&S forwarded a change estimate to HPCC based upon changes made thus far in the plumbing design by the firm which prepared the original plumbing and mechanical design, namely RDA. The cover letter identified twenty-eight specific drawings which had already been revised. It also noted that there were still items in these revised drawings which would require further clarification or direction through the RFI process. The change estimate for direct costs amounted to $112,904 and anticipated a schedule impact of twenty-three days. Appellant's Supplemental Appeal File, GSBCA 14744, Vol. 1, Exhibit 21.

Problems with the HVAC Design

117. A project update dated May 9 and prepared for the contracting officer by GSA's project manager, advised that T&S had reported that it was seeing the same problems on HVAC contract drawings that it had found with the plumbing drawings. Appellant's Supplemental Appeal File, Vol. 1, Exhibit 126. By letter dated May 12, 1997, to HPCC, T&S's project manager detailed some of these deficiencies. He wrote:

> Specifically, the pipe sizes changing on risers from floor to floor or drawing to drawing; main sizes which are not consistent on a particular run of pipe and lines which cannot be traced to succeeding drawings. These are items which need to be clarified to allow the coordination process to continue in a productive manner.
>
> Several RFI's . . . have been written concerning some of these situations, however, many more will need to be submitted to clarify all our questions.

Appellant's Supplemental Appeal File, GSBCA 14744, Vol. 1, Exhibit 22.

Revisions of the Original Plumbing Drawings

118. At an RFI review meeting held on May 20 to discuss mechanical drawing revisions, an engineer from RDA made several changes in the HVAC and plumbing drawings. Some of these were in response to nine specific RFIs pending at the time. CRSS directed T&S to incorporate these changes into coordination drawings. In a letter dated May 21, 1997, T&S advised HPCC that it would revise completed coordination drawings to reflect these changes and would incorporate them into future drawings as well. The letter acknowledged the need to proceed immediately with this task in view of work which was already on-going. Respondent's Supplemental Appeal File, Vol. 14, Exhibit G38.

GSA's First Call for Acceleration

119. It was also during this month of May 1997 that HPCC advised CRSS of the possibility of a twenty-two day delay of the project as a result of a revised underground plumbing design for block B. The general contractor proposed an acceleration plan to minimize the impact of this change on the succeeding activities and the project's critical path. Respondent's Supplemental Appeal File, Vol. 14, Exhibit G40. GSA's project manager recommended acceptance of the proposal on the ground that the estimated acceleration cost would be below HPCC's claimed project delay costs of $26,000 per day. Appellant's Supplemental Appeal File, Vol. 1, Exhibit 128. On June 13, the contracting officer issued a unilateral contract modification authorizing the acceleration at a cost not to exceed $11,000.[14] Respondent's Supplemental Appeal File, Vol. 2, Exhibit CR51 at 1.

Events During the Month of June 1997

HPCC's Pay Request Number 8

120. On June 3, CRSS received HPCC's pay request number eight. The following day, the CRSS project manager forwarded this request to the contracting officer with a recommendation that it be paid. The CRSS forwarding letter noted that the current updated schedule narrative which was submitted with the request showed December 11, 1998, as the projected completion date. The letter, however, reassured the contracting officer that acceptance of the pay request would not indicate acceptance of this late date. Rather, the CRSS project manager wrote that the delay in completion shown on the updated schedule (i.e., from November 4 to December 11) was still under review by CRSS and GSA. Appellant's Supplemental Appeal File, Vol. 1, Exhibit 130.

Continuing Problems with Coordination Drawings

121. During the hearing, T&S's project manager testified regarding a particular problem confronting the crews installing the plumbing piping in blocks D and C during the

[14]The contract was subsequently amended by mutual agreement to add an additional $1304 to the cost of rectifying this plumbing design deficiency without any consequent delay. Respondent's Supplemental Appeal File, Vol. 2, Exhibit CR51 at 3, 16.

month of June. While the piping was being installed, T&S was of course continuing its efforts to prepare reasonably complete coordination drawings for use by its workers in the field. However, by early June, T&S concluded that the coordination drawings that had already been released for use by its workers in the field had become obsolete due to the many clarifications and changes subsequently issued by the Government. On occasion, workers relying on unrevised earlier drawings would install "something which would have to come back out." Consequently, on June 11, T&S recalled all existing coordination drawings from the field until they could be revised to reflect the latest changes. Revised drawings were reissued to the field on June 24. The preparation and issuance of other consolidated drawings and, when necessary, the revision of those subsequently issued continued after this date until their final approval on July 21. Transcript at 1032, 1986.

122. As a result of problems encountered with the preparation of reliable coordination drawings, T&S's workers in the field proceeded cautiously and, for a brief period in June, without any coordination drawings at all. During this time piping continued to be installed based upon frequent consultations between crew foremen and T&S's field engineer located in the company's trailer on site. When necessary, the engineer would provide the foremen with informal sketches. Often information was relayed from T&S's engineering staff to the field by walkie-talkie. As a result, these foremen, whom T&S had originally planned to use as "working" foremen, were generally unable to work actually side by side with their crews but rather found themselves caught up almost on a full-time basis in this coordination process with the project management office. This situation contributed to a growing problem with workers' morale. Transcript at 901-07.

HPCC's Proposal on Plumbing Changes (CR34)

123. By letter dated June 11, 1997, HPCC submitted to CRSS a cost proposal for a contract modification covering the various revisions made in the contract plumbing drawings. The proposal was based upon T&S's change estimate of May 6 (Finding 116). HPCC sought a modification in the amount of $127,390. An attached change order pricing summary listed subcontractor and other *direct* costs (ODC) at $112,904. The final figure of $127,390 is the result of the general contractor's various markups of T&S's earlier proposal of May 6. Respondent's Supplemental Appeal File, Vol. 2, Exhibit CR34 at 13-14. The contracting officer was advised of HPCC's proposal in a project update dated June 13. The update noted that HPCC had also advised that there would be a similar proposal based upon deficiencies in the HVAC drawings as well. The update also noted that, because these additional costs were in excess of projected contingencies for the project, additional funding would be required as well. Appellant's Supplemental Appeal File, Vol. 1, Exhibit 132.

Meeting Regarding Perimeter Drain Change and Extension of Schedule

124. On June 17, 1997, the contracting officer, other GSA officials, and representatives of CRSS met with representatives of HPCC. The purpose of the meeting was to discuss HPCC's pending proposal regarding the perimeter drain and the requested thirty-eight day extension of the contract schedule. During that meeting, GSA's project manager complained that the required time impact analysis in support of the requested extension had not been submitted until June 11, thus leaving the Government little time to understand and analyze the delay. Appellant's Supplemental Appeal File, Vol.1, Exhibit 143

at 18 (unnumbered). The record, however, contains correspondence between CRSS's project director and the company's scheduling consultant which shows that, as far back as mid-May, the alleged delay had been the subject of study and analysis. The schedule consultant had advised CRSS at the time that, in her opinion, after an analysis of HPCC's submission, the contractor was entitled to a 146-day delay and that the proposed thirty-eight day delay was, therefore, "very reasonable." Id., Exhibit 127. Shortly before the meeting of the parties on June 17, CRSS's project manager, based upon this consultation and consultation with his in-house schedulers, recommended to the contracting officer that GSA acknowledge the thirty-eight-day delay stemming from the "excavation and perimeter drain redesign/relocation impacts." Id., Exhibit 131. During the meeting of June 17, a spokesman for HPCC explained that the contractor's own analysis had indicated that the delay in question should have been 121 days but that through various mitigation efforts the schedule impact had been reduced to thirty-eight days. HPCC suggested that GSA place the results of the CRSS analysis "on the table" for purposes of comparison. GSA declined. Id., Exhibit 143 at 19 (unnumbered).

125. The HPCC representatives left the meeting of June 17 convinced that the parties had finally agreed the contractor was entitled to the requested thirty-eight day extension and that negotiations of a change order would begin promptly. Respondent's Supplemental Appeal File, Vol. 14, Exhibit G43. A memorandum for the record prepared by the GSA project manager confirms that agreement had in fact been reached. Appellant's Supplemental Appeal File, Vol. 1, Exhibit 143 at 19 (unnumbered). A memorandum dated June 22 from the contracting officer to GSA's project manager indicates, however, that the GSA project manager was apparently far from satisfied with the outcome and had suggested the agreement be changed. In his memorandum to the GSA project manager, the contracting officer stated that it was his understanding that agreement had been reached on the thirty-eight day delay. He added:

> I believe that any change in the agreement at this time will lead to a great deal of ill will and may in fact endanger the project. At the least, it would probably lead to a delay claim in the range of 121 days. Please Reconsider.

Id., Exhibit 134. GSA's project manager did reconsider. By reply memorandum dated June 23, he advised the contracting officer that he concurred with his assessment that the agreement should remain unchanged in view of the real prospect of a delay claim for a considerably longer period of time. Id., Exhibit 143 at 16 (unnumbered).

Meeting Regarding Impact of Plumbing and HVAC Design Changes

126. On June 24, GSA's project manager together with representatives of CRSS met with representatives of HPCC and T&S. Also at the meeting was a representative of the original A/E firm, FBA. At this meeting, GSA and CRSS were advised by HPCC that, owing to the ongoing changes in design, there was potential for a schedule impact. The contractor contended that sixty percent of the plumbing and HVAC piping had been changed. Concern was expressed regarding RFI responses. Some of these responses were said to be in conflict with parameters laid out by RDA. For example, BCER was reputed to have stated that plans should take precedence while RDA had stated that riser diagrams should take precedence. In addition, due to revisions in piping, some sleeves already in

place were incorrectly sized. The contractor requested that RDA perform an overall design review. GSA's representative agreed that CRSS should contact RDA on the matter but voiced concern regarding the firm's availability. Appellant's Supplemental Appeal File, Vol. 1, Exhibit 137. An update on this same meeting prepared by GSA's project manager provides some additional detail. He wrote:

> Plumbing is being removed and reinstalled due to new pipe sizes. Pipe sizes conflict between riser diagrams and plan. Trautman & Shreve was instructed to follow the plan view by BCER because it was a hard bid job. When Reigel/Doyle reissued the 24 plumbing drawings, they said that the riser diagrams took precedence.

Id., Exhibit 138.

127. Several of the participants at the meeting on June 24, 1997, including representatives of both the Government and the contractors, recall that, during the meeting, the possibility of delay owing to changes in the plumbing and HVAC piping design was discussed. Various options to mitigate this delay were discussed. The contractors' representatives advised GSA that the options available were to extend the project completion date, add additional manpower, and/or work overtime. Agreement was eventually reached that the preferred method of mitigating the schedule impacts would be for T&S to add manpower rather than extend the contract schedule. Transcript at 924-26, 1245-47, 1332-35, 2047-52, 2310-12. GSA's project manager testified that during the meeting representatives of the contractor actually advised him that they would be adding people to mitigate the impacts associated with the changes in the drawings. Id. at 2047-48. Following the meeting on June 24, the GSA project manager reported to the contracting officer that the contractor was adding additional manpower to mitigate the effects of these anticipated schedule delays. Id. at 2051. T&S's operations manager testified that in June T&S did in fact begin acceleration to overcome schedule impacts. Id. at 1576.

128. The testimony of GSA's project manager regarding the decision made at the meeting of June 24 to add manpower to the project is particularly significant. While under direct examination, he explained that during the meeting a T&S representative stated that there was additional work which had been added as a result of correcting some of the piping sizes and that additional people would be brought on to take care of that work. Transcript at 2032. Upon cross-examination, this witness agreed that during the meeting the contractor had expressly stated that the manpower was being added for the purpose of mitigating the impact of the various plumbing and mechanical changes that were in the process of being made. Id. at 2047. He was then asked if he understood that this would be done at the Government's expense since it was to mitigate the effect of Government-directed changes. He replied:

> Well, I guess there's a couple [of] issues there. Once, certainly for a change there - it's up to the contractor to decide how he elects to prosecute the work. And under this contract, the contractor is required to furnish whatever people, facilities, offices, or to work whatever shifts necessary in order to ensure that the work progresses in accordance with the detailed construction schedule.

Id. at 2048. When confronted with testimony given previously in a pretrial deposition, however, the GSA project manager agreed that, when T&S proposed to add manpower to mitigate the effect of the changes in mechanical design, there was general agreement without any objection that this was the best way to proceed. Id. at 2049. The cross-examination then continued as follows:

> Q. Okay. And you understood, did you not, at the meeting in June where this proposal was made that there were going to be costs associated with that acceleration effort, didn't you? Costs to the Government.
>
> A. Yes I did.
>
> Q. Okay. You didn't think the contractor was doing it on his own nickel?
>
> A. That is true.
>
> Q. Now, given that state of mind, did you discuss it with the contracting officer? It was part of your responsibilities, wasn't it, to report to the contracting officer on -- as -- in your role as project manager was to report issues that were developing in the course of the project?
>
> A. Yes. That was my responsibility. And we did have discussions on the project on a frequent basis.
>
> Q. And in the course of those discussions, you told [the contracting officer] didn't you, that the contractor was adding additional manpower to mitigate the effects of the scheduled delays?
>
> A. Yes.
>
> Q. And did [the contracting officer] direct you to tell the contractor not to do that; tell the contractor that he should not be adding additional manpower?
>
> A. No.

Id. at 2050-51.

T&S's Proposal Regarding HVAC Design Changes (CR85)

129. On June 27, shortly after the meeting of June 24, T&S provided HPCC with an initial price proposal covering the costs associated with the HVAC design changes. The costs included in the proposal are said to be net (i.e., reflecting deductions for deleted work). They are all said to be *direct* costs and cover such matters as project management, supervision, and administration in processing revisions; project engineering in researching and preparing RFIs and questions; revising coordinated drawings already complete; incorporating revisions into the contract documents; computer augmented drafting and design (CADD) drawing revisions to the contract documents; and meetings attended by staff in resolving these issues. The proposal advised that any indirect cost/time impacts resulting

from the multiple changes would be priced accordingly. The schedule impact of the proposal was said to be 129 days. Respondent's Supplemental Appeal File, Vol. 14, Exhibit G44.

T&S's Request for Notice to Proceed

130. On June 30, T&S's project manager again wrote to HPCC. His letter referenced the letter of three days earlier, which listed the direct costs associated with the HVAC design revisions and a prior letter of May 6 (Findings 116, 129) setting out the costs associated with the revision of the contract plumbing design. His point was a simple one. T&S must have, without further delay, "written Notice to Proceed to continue with the installation of changed work into the project including research and coordination, drawing revision and CADD work associated." Appellant's Supplemental Appeal File, GSBCA 14744, Vol. 1, Exhibit 27.

Planned Review and Approval of Coordination Drawings

131. In a schedule narrative provided by the general contractor at the close of June, reference was made to the revisions to the HVAC piping and the evaluation of the impact they might have on the contract schedule. These modifications were said to affect most of the piping. HPCC reported that coordination drawings incorporating the revisions would be submitted for approval by the consulting engineer and this evaluation would be complete within the next two weeks. Appellant's Supplemental Appeal File, GSBCA 14744, Vol. 1, Exhibit 29.

Events During the Month of July 1997

Notice to Proceed Given

132. HPCC promptly referred to GSA T&S's request for notice to proceed. GSA's response was equally prompt. In a letter dated July 1 to HPCC, the contracting officer agreed that the issues raised by T&S did involve changes in mechanical scope and had resulted in considerable design efforts on the part of T&S to keep the job moving. He wrote:

> Please accept this letter as an official notice that HPCC and Trautman and Shreve are authorized to proceed with these efforts, and that GSA understands that there will be additional costs associated with these efforts.

Appellant's Supplemental Appeal File, GSBCA 14744, Vol. 1, Exhibit 28.

Perimeter Drain Change and Extension of Contract Schedule (CR22)

133. On that same date, July 1, the contracting officer signed a contract modification providing for the thirty-eight day extension of the contract schedule agreed to in principle

and subsequently negotiated in detail during the latter half of June (Findings 120, 124-25). Respondent's Supplemental Appeal File, Vol. 1, Exhibit CR22 at 1A.

Meeting Regarding Revisions of Mechanical Work

134. On July 15, 1997, representatives of GSA (including the contracting officer), CRSS, HPCC, and T&S met for the purpose of discussing the several matters related to the revisions of the mechanical work on the NOAA project. At that meeting, HPCC and T&S representatives spoke of their concern regarding the mechanical and plumbing revisions made to the contract documents as a result of the RFI process and various job site meetings with the mechanical consultants, BCER and RDA.[15] The HPCC and T&S spokesmen explained that the only set of documents containing all revisions to date was the one maintained by T&S at the job site. HPCC's representative stated that he believed one of the mechanical consultants should be tasked with the responsibility of preparing a revised set of documents including all revisions. T&S's spokesman urged that a decision be made promptly regarding the party responsible for this task. He explained that T&S's crews continued to be delayed by the need to call the project engineer several times a day to verify whether what was being installed was accurate. The T&S representative also wished to know why the mechanical consultants had not given their final approval to the T&S documents as expected two weeks earlier (Finding 131). The contracting officer replied that he had already approved retention of RDA for whatever was required for the review and approval process. T&S's project manager stated that a meeting to review the drawings had been scheduled for the previous week but had still not taken place. CRSS's project manager agreed to look into the matter and expedite the review process. Discussion then turned to having the revised documents officially "stamped" by one of the mechanical consultants upon completion of the project. Minutes of the meeting state that the contracting officer observed that "GSA might have to assume responsibility for the design themselves [sic] considering the difficulties encountered in this area to date." HPCC's representative then asked if the contracting officer would provide a letter relieving HPCC and T&S of any design responsibility for the project. The contracting officer agreed to do so. Appellant's Supplemental Appeal File, GSBCA 14744, Vol. 1, Exhibit 30.

135. At this same meeting on July 15, HPCC and T&S officials advised the contracting officer and GSA's and CRSS's project managers that T&S was experiencing "major impacts" as a result of the multiple revisions to the HVAC and plumbing piping designs. T&S's spokesman pointed out, however, that it was not yet possible to "get our arms around" the magnitude of the impacts. The contracting officer responded by stating that he understood that it would be difficult to summarize the effect of multiple change impacts at that time but acknowledged that T&S would submit a cost proposal once T&S was in a

[15]GSA's expert in construction scheduling testified that RDA had attended meetings on site to discuss design problems on three separate occasions. The first meeting was said to have taken place on May 20, 1997. See Finding 118. The second design resolution meeting with RDA was said to have taken place on July 2, shortly before this July 15 meeting. The third design resolution meeting with RDA was said to have taken place shortly after the July 15 meeting, namely, on July 17. Transcript at 2948; Respondent's Supplemental Appeal File, Vol. 24, Exhibit G235 (Exhibit 5R).

position to quantify the impacts. Transcript at 961-63, 1549; Appellant's Supplemental Appeal File, GSBCA 14744, Vol. 1, Exhibit 30.

T&S Urges Formal Notice of Impact

136. On July 16, T&S's project manager, following up on remarks made during the meeting of the previous day, wrote HPCC regarding the need to give formal notification of the cost and time impacts anticipated by T&S. He wrote:

> The major revisions to the Plumbing and HVAC Piping recently made by the consultants in addition to the 200 plus Information Requests submitted to date are the major source of these impacts. The impacts associated with the direct costs of these revisions have been submitted as required. [See Findings 116, 123, 129.] However, the impacts to the overall Mechanical work resulting from the cumulative effect of multiple changes and revisions have not been addressed in these proposals.

Appellant's Supplemental Appeal File, GSBCA 14744, Vol. 1, Exhibit 32.

T&S Tasked with Incorporating all Mechanical/Plumbing Revisions in Contract Drawings

137. The meeting which T&S wished to have with the mechanical consultants to secure final approval of design changes and revisions appears to have taken place finally on or about July 21. T&S's project manager testified that the meeting was attended by representatives of T&S and HPCC and engineers from RDA and BCER. The purpose of the meeting was to review the changes that had been made to date by the two firms and to make sure that there were no remaining conflicts.[16] Transcript at 943, 955. T&S's project manager further testified that those present appeared to be in agreement on the contract drawing changes.[17] Id. at 943, 955. One remaining problem, however, concerned the issuance of revised contract drawings. At the time, only T&S possessed a set of drawings

---

[16]The precise date of this meeting is unclear from the record. Counsel for appellant speaks of it as having taken place on or about July 21. Transcript at 2500. However, several RFIs submitted toward the close of July refer to "discussion with RDA on July 15, 1997." Respondent's Supplemental Appeal File, Vol. 6, Exhibit G2 at 300-04, 306. Given the matters discussed at the meeting and the presence of an RDA consultant, however, this may well be the meeting which respondent's construction scheduling expert spoke of as having taken place on July 17. See supra note 15.

[17]T&S's project manager also testified that, at this point in time, even with agreement on changes made to date, he still had some lingering concern regarding the sufficiency of the balance of the piping design. He testified that, from discussions with the RDA representative, he learned at that time that the representative himself had a similar concern with regard to the domestic water system. Transcript at 959-60. This tends to confirm the witness's earlier testimony that the changes in mechanical design were never subject to general review. See Finding 111.

which reflected all of the changes that had been made to the plumbing and mechanical piping -- some of which were simply penciled markings made by RDA's representative. HPCC as general contractor was eager to have official revised drawings to release to other subcontractors for use in their own work as it might relate to or interrelate with T&S's work, and for pricing related changes. T&S desired to be out from under the burden of being the sole source of information for these other subcontractors on the most current set of contract drawings relating to mechanical, electrical, or plumbing installations. This desire on the part of HPCC and T&S for official revised contract drawings led to a discussion regarding who would prepare the drawings for release. Neither BCER nor RDA was willing to undertake the task. Id. at 944-56.

138. On July 22, a meeting was held in T&S's on-site trailer at the NOAA project. The meeting was attended by representatives of CRSS, BCER, HPCC, and T&S. After considerable discussion, T&S was directed to proceed with incorporating all the mechanical/plumbing revisions made to date into the contract documents. It was agreed that this would include all revisions made by BCER which would be provided in electronic format to T&S on July 28. Once complete, the revised documents would be transmitted to BCER, which would maintain them from that time forward, incorporating any future changes which might occur.[18] Appellant's Supplemental Appeal File, GSBCA 14744, Vol. 1, Exhibit 34.

Partnering Meeting of July 25

139. T&S's operations manager testified that at a regularly scheduled partnering meeting on July 25, 1997 which was attended by representatives of GSA (including the contracting officer), NOAA, CRSS, HPCC, and T&S, the parties discussed the fact that T&S had roughly doubled its anticipated manpower to deal with the impact of the mechanical changes. In response, GSA's project manager is said to have acknowledged T&S's efforts and expressly stated his appreciation to T&S for having done so. Transcript at 1560-61, 1576-79; Respondent's Supplemental Appeal File, Vol. 14, Exhibit G52.

HPCC Gives Formal Notice of Impact

140. By letter dated July 31, HPCC, acting in response to T&S's urging (Finding 136), formally advised CRSS that it was experiencing an impact due to the cumulative effect of multiple mechanical changes. Enclosed with HPCC's notice was a copy of T&S's earlier

[18] By letter dated August 3, the contracting officer, as previously agreed (Finding 134), wrote HPCC regarding responsibility for these mechanical design changes which were to be incorporated into the contract documents by T&S. He assured the general contractor that T&S would not be considered the engineer of record for these revisions and that liability regarding them would not extend to T&S. Appellant's Supplemental Appeal File, Vol. 1, Exhibit 141.

letter to HPCC regarding this matter.[19] Appellant's Supplemental Appeal File, GSBCA 14744, Vol. 1, Exhibit 34.

Events During the Month of August 1997

Concerns with Impacts on Contract Schedule

141. A joint memorandum prepared by representatives of GSA, CRSS, and HPCC on the scheduled partnering session regarding the NOAA project held on July 27 shows that one subject of particular concern was the project schedule. Specifically, this involved the scheduling of work due to the mechanical changes while controlling impacts to cost and to the completion date. Respondent's Supplemental Appeal File, Vol. 14, Exhibit G52 at 3. T&S's operations manager, who was in attendance at the session, recollected at the hearing that, at the time of the partnering meeting, given the impact on base labor of the various changes and the numerous RFIs, it was generally recognized that the contract schedule would be affected and that, even with acceleration, there would still be problems. Nevertheless T&S, although aware that a considerable number of days would have to be recovered, still had no idea of precisely how many days were involved. Consequently, according to the joint memorandum on the session, it was agreed that the contractors would prepare an impact schedule. Transcript at 1577-80. Indeed, one of the action items in the memorandum of the session calls for the resolution of the mechanical schedule impact issue by August 8. Respondent's Supplemental Appeal File, Vol. 14, Exhibit G52 at 5.

142. On August 1, T&S submitted to HPCC four versions of an impact schedule, namely, TSI1, TSI2, TSI3, and TSI4. Each version of the schedule incorporated the impacts of the antecedent version and then incorporated additional impacts from other changes under consideration as well. For example, TSI2 included all impacts from various changes identified as included in TSI1 and added others as well. Among those added to TS12 were the impacts associated with the revisions of the plumbing design. TSI3 included the impacts already incorporated into TSI2 and added others -- among which were the impacts associated with the HVAC revisions. Together, these four preliminary analyses or schedules indicated that the contract's baseline schedule, as thus revised, showed a total of 174 days of impact. Appellant's Supplemental Appeal File, GSBCA 14744, Vol. 1, Exhibit 35.

HPCC Submits Revised Schedules and Proposal Regarding HVAC Design Changes (CR85)

143. By letter dated August 6, HPCC forwarded to CRSS T&S's various revised schedules as well as T&S's price proposal of June 27 regarding direct costs associated with the HVAC changes (Finding 129). The material was furnished in anticipation of a meeting scheduled for the following day with CRSS officials to discuss schedule impacts. HPCC's

[19]HPCC's letter identifies the enclosed T&S letter as dated "July 18, 1997." We assume this to be a typographical error since the letter in question was obviously that which was dated July 16, 1997, and which discussed the need to advise the Government of the existence of a separate impact claim (Finding 136).

forwarding letter expressly stated: "Again, the total impact for costs and schedule is not in this package." Appellant's Supplemental Appeal File, Vol. 1, Exhibit 143.

Negotiations on Plumbing Design Changes (CR34)

144. On August 7, representatives of GSA and CRSS met with HPCC's and T&S's project managers to discuss HPCC's cost proposal for a contract modification covering the various revisions made in the contract plumbing drawings. See Findings 116, 123. A price negotiation memorandum prepared by CRSS explains that negotiations on this proposal had been delayed until a proposal was submitted on HVAC changes (Finding 143). Only direct costs were negotiated. Respondent's Supplemental Appeal File, Vol. 2, Exhibit CR34 at 5.

Meeting to Discuss Schedule Impact

145. Also on August 7, as previously agreed, representatives of HPCC, T&S, CRSS, and GSA met to discuss T&S's analyses of schedule impacts. Minutes of the meeting indicate that the schedule delays of concern to the parties involved far more than the multitude of changes in the plumbing and HVAC design. T&S is said to have presented a chronology of events leading to the schedule delays. Some of these events and items were listed as follows:

> Better than 60% of the plumbing and HVAC piping has been changed.
> -Numerous RFI's have changed pipe size, and some complete runs of piping, most of these changes increased the pipe sizes.
> -Change Request 39 -Revised Roof Drainage (Re configuration of Roof Drains)
> -Risers (incorrect Plan Views or not shown on drawings - routing and size changes have been made)
> -Resizing with RDA [Reigel Doyle & Associates]
> -Condenser Water Piping - Major Changes
> -Cooling Tower and Underground Piping (piping to equipment not shown on drawings)
> -No piping shown to FCU's [fan coil units]
> -Re configuration of CRAC [computer room air conditioning], Chiller and Boiler rooms

Appellant's Supplemental Appeal File, GSBCA 14744, Vol. 1, Exhibit 37 at 1; Transcript at 1561-65, 1581-82.

146. Notwithstanding the goal set at the earlier partnering session to resolve the mechanical schedule impact issues by August 8, matters remained far from resolved at the conclusion of the meeting on August 7. The meeting minutes state that T&S would examine the issue of whether the schedule could be accelerated through continued increase in manpower and CRSS and its consultant would review the schedule and impacts. In the meantime, CRSS and HPCC agreed to negotiate the direct costs associated with all of the various changes under discussion. Appellant's Supplemental Appeal File, Vol. 1, Exhibit 144.

T&S Formally Advises HPCC of Manpower Increases

147. By letter dated August 29, T&S's project manager advised HPCC of T&S's specific increases in manpower to mitigate some of the delays associated with the many changes which had occurred to date. The letter states that the baseline schedule for the period of June through September indicated average man-loading of twenty-four men for plumbing, piping, and off-site fabrication activities. At the time, however, T&S actually had thirty-nine men on site and seven working in the fabrication shop. Appellant's Supplemental Appeal File, GSBCA 14744, Vol. 1, Exhibit 38. T&S's project manager testified that he wrote this letter out of a growing concern over the absence of any express direction from GSA to provide additional manpower. He explained that, as far back as June, T&S had begun to add manpower to the project. The number of workers had increased over the following months. He claimed that, prior to his letter of August 29, he had orally requested several times a written directive from GSA but had received nothing. Transcript at 995-98.

Events During the Month of September 1997

Negotiations on HVAC Design Changes (CR85)

148. In a final negotiation session on September 10, CRSS, HPCC, and T&S representatives reached agreement on a contract modification covering direct costs associated with HVAC drawing revisions. The following day, CRSS submitted Change Request (CR) 85 to HPCC with a final concurrence. Respondent's Supplemental Appeal File, Vol. 4, Exhibit CR85 at 1A. On September 17, T&S submitted its final proposal to HPCC based upon the agreement reached in the final negotiation session. Included in T&S's proposal is an adjustment of labor costs for the changed work based upon the MCAA labor inefficiency factors. Id. at 13, 62-63. The proposal also notes that the changes in question will require an extension of forty-six days. The description of the costs proposed by T&S is the same as that provided in T&S's original proposal to HPCC on June 27 (Finding 129). They are all said to be direct costs. Id. at 27. HPCC in turn, by letter dated September 23, submitted this proposal of T&S as part of its own final proposal to CRSS. HPCC's cover letter for the proposal expressly stated that the proposal did not include costs associated with schedule delays and that these costs would be submitted upon completion of the schedule review. Id. at 22. Upon receipt of HPCC's final proposal, CRSS forwarded it to the contracting officer with the request that the change be covered in the next modification to the contract. Id. at 1A.

149. At HPCC's request, T&S entered the ninety-five man-days of schedule impacts associated with the HVAC piping revisions into the project baseline schedule which included the thirty-eight day extension having a project finish date of December 11, 1998. By letter dated September 29, T&S's project manager advised HPCC's project manager that this resulted in a finish date of February 9, 1999. He also provided HPCC with a compact disc containing the revised schedule (IMP5). Respondent's Supplemental Appeal File, Vol. 14, G59.

Events During the Month of October 1997

T&S's Schedules Sent to CRSS

150. By letter dated October 2, HPCC forwarded T&S's revised schedule IMP5 to CRSS and asked for a meeting on the matter no later than October 8. The letter also advised CRSS that HPCC reserved the right to submit costs associated with the expected extension at a later date. Appellant's Supplemental Appeal File, GSBCA 14744, Vol. 1, Exhibit 40.

Negotiations on Plumbing Design Changes (CR34)

151. On October 8, representatives of GSA and CRSS met again with HPCC's and T&S's project managers to resume negotiations on HPCC's cost proposal for a contract modification covering the various revisions made in the contract plumbing drawings (Findings 116, 123). Respondent's Supplemental Appeal File, Vol. 2, Exhibit CR34 at 5. T&S's project manager, who participated in these negotiations, testified that there was no discussion during the course of the negotiations about T&S entitlement to compensation resulting from the impact of the changes on unchanged work. Id.; Transcript at 901.

CR85 Issued

152. On October 14, the contracting officer issued modification PS-53, which covered CR85. The modification expressly stated: "Number of calendar days of contract time extension and costs related to the time extension will be included in a future Modification." The findings of fact for the modification stated that the modification was issued because of design deficiency. An explanatory note states further that the A/E firm which prepared the contract documents was responsible for the CR and that if the documents had been correct the modification would have added only $20,000 to the base bid but that because work was proceeding while RFIs were answered, labor inefficiencies occurred which inflated the price to $307,308. Respondent's Supplemental Appeal File, Vol. 4, Exhibit CR85 at 2A, 4A.

Only Direct Costs in CR85

153. CRSS's assistant project manager who participated in negotiations leading to CR85 testified that it was her understanding that HPCC intended to negotiate only direct costs for this CR and that any claim for indirect costs resulting from multiple changes would be priced separately. Transcript at 2630. The price negotiation memorandum for the same CR, which she drafted and signed, confirms that the negotiations involved only direct costs. Respondent's Supplemental Appeal File, Vol. 4, Exhibit CR85 at 6A. Similarly, T&S's operations manager testified that, in the final negotiation session for CR85 in which he and the project manager for CRSS participated, it was explained to him that CRSS did not want to include in this or other individual change requests anything for impact on base labor or for acceleration. Rather, this would be treated later as a separate and single item. He testified that a similar explanation was provided to him by the CRSS's assistant project

manager when she participated in negotiations with him on subsequent change orders. Transcript at 1598-99.

GSA's Call for Acceleration

154. CRSS, after examining T&S's IMP5 schedule, raised several questions. This led to a subsequent revision (IMP8) of the schedule and a meeting of HPCC and T&S with GSA and CRSS representatives on October 15. A question raised at that meeting but not resolved was whether GSA wished to extend the project's contractual finish date or accelerate the mechanical work. Appellant's Supplemental Appeal File, GSBCA 14744, Vol. 1, Exhibit 42; Respondent's Supplemental Appeal File, Vol. 15, Exhibit G66. By letter dated October 17, CRSS advised HPCC that GSA "will accelerate the schedule to mitigate the impact caused by the HVAC conflicts detailed in Change Request No. 85." The letter further advised that the method of acceleration would be that stated by T&S, namely, addition of manpower without overtime. Appellant's Supplemental Appeal File, Vol. 1, Exhibit 147. A copy of CRSS's letter to HPCC was promptly provided to T&S by HPCC's project manager. Id., Exhibit 148.

CR34 Sent to Contracting Officer

155. By letter dated October 28, CRSS forwarded to the contracting officer CR34 with the request that the change be covered in the next modification to the contract. Backup documentation prepared by CRSS for the modification states that it was occasioned by a design deficiency. This was further explained with the note: "The contract drawings contained incorrect pipe sizes. The A/E is 100% responsible for this change." Respondent's Supplemental Appeal File, Vol. 2, Exhibit CR34 at 6.

Vibration Isolation Dispute

156. By letter dated October 31, 1997, CRSS advised HPCC that vibration isolation was required on all plumbing piping. Finding 16. T&S disagreed strongly with CRSS's interpretation of the pertinent contract provisions and requested an immediate partnering meeting to resolve matters. HPCC endorsed the request and asked CRSS to schedule a meeting no later than November 4. Appellant's Supplemental Appeal File, Vol. 1, Exhibit 151. The contracting officer's directive of November 5 (Finding 20) following a meeting on the previous day led to a formal notice from HPCC to CRSS dated November 12, advising that the general contractor reserved the right to additional costs and/or schedule impacts created by GSA's reading of the applicable contract specifications. Id., Exhibit 153.

Events During the Month of November 1997

157. On November 24, 1997, T&S submitted to HPCC an evaluation of the additional costs said to have been incurred to date and estimated for the remainder of the project as a result of the acceleration of work and the impact to base labor from multiple changes, scope revisions, and lack of proper and timely information. Respondent's Supplemental Appeal File, Vol. 15, Exhibit G79. By letter of the same date, HPCC forwarded T&S's evaluation to CRSS together with a copy of a proposed overall project

mitigation schedule (two diskettes). This schedule was designated as N11A. Id., Exhibit G81. It represented additional mechanical resources to prevent delays due to changes in scope as well as noncritical schedule revisions. Id., Vol. 18, Exhibit 152a at 6.

Events During the Month of December 1997

CR34 Issued

158. On December 4, 1997, the contracting officer signed contract modification PS-65, which covered CR34. The modification had been previously signed by HPCC on October 20. Respondent's Supplemental Appeal File, Vol. 2, Exhibit CR34 at 1. At the bottom of page two of the modification, which is a facsimile of GSA Form 1137, the following language appears:

> Number of calendar days of contract time extension required due to above changes. (Full justification of any extension should be provided). If no change in the time of performance results from these changes, write "None". This does not effect [sic] the total contract completion date.

Id. at 2. To the right of this statement, the word "None" appears. Id.

Additional Considerations

T&S's Starting Dates

159. Under HPCC's approved baseline schedule, T&S was scheduled to start above-ground HVAC and plumbing activities in block D in early May 1997. Appellant's Trial Exhibit 7. Above-ground work on block C was scheduled to start in early March and above-ground work on block B was to start in late June. Because the ground or garden level of block A contained the major mechanical room where chillers were located, above ground at this level was scheduled to begin in January 1997 but work on the first level and subsequent levels was not scheduled to begin until after mid-August. Transcript at 2453; Respondent's Supplemental Appeal File, Vol. 24, Exhibit G235 (Exhibit 11R).

160. In preparing update number one of the approved baseline schedule in early April (schedule data date of April 1), HPCC incorporated into the schedule the thirty-eight day calendar impact which T&S estimated to be associated with the change dealing with the perimeter drain system (Finding 115). This had the effect of delaying all of T&S's scheduled work not yet done by a period of similar duration. For example, T&S's above-ground work in block D, which was scheduled to begin in early May, would thus begin in early June. Respondent's Supplemental Appeal File, Vol. 24, Exhibit G235 (Exhibits 16, 25).

161. Based upon his analysis of the project's as-built schedule, GSA's expert on construction scheduling testified that all of the subcontractors began work in advance of the approved baseline schedule and that T&S was no exception. This witness further testified that, according to daily reports prepared by T&S, on April 14, 1997, T&S was "working on piping on building D, garden level . . . ." Transcript at 2828-30, 3038; Respondent's

Supplemental Appeal File, Vol. 24, Exhibit G235 (Exhibit 26). This witness clarified his position regarding acceleration of work with the following statement:

> Now, I'm not here to say that the contractor has no right to accelerate the job. That's not what I'm saying at all. I'm saying that if the contractor chooses to do that, the Government should not be responsible for the impact and the effects of doing that.

Transcript at 2853.

The On-going Labor Shortage

162. The problem created for T&S by the need to revise the project's plumbing and HVAC design was exacerbated by a developing labor shortage in the region. T&S was reluctant to leave any of its workmen without work for any period of time for fear that the workers would find other jobs and replacements would not be found. Accordingly, simply idling its work force while awaiting information on the final designs was not an option for T&S. Transcript at 767, 896, 1227-28.

163. Nor was it feasible for HPCC, as general contractor, to direct its other subcontractors to stop work in areas where T&S was unable to proceed due to the lack of a completed design. HPCC and its other subcontractors were facing the same labor shortage as T&S and were likewise facing a contract completion date that did not officially change until the modification covering CR22 was issued on July 1, 1997. Transcript at 924-25, 1223-28, 1302-03.

The Magnitude Versus the Timing of the Piping Changes

164. T&S's project manager was questioned during the hearing concerning the magnitude of the plumbing piping changes made during construction. He explained that there were various changes in piping size as well as addition and subtraction of piping. If one were to look at the total amount of change, sixty-five percent of the plumbing system was affected. He readily added, however, that the net change was not a huge number. Rather, the major impact of these changes was their timing. The changes occurred at a critical time when T&S was in the midst of preparing coordination drawings and working with other subcontractors in sleeving and imbedding the project. Transcript at 891-92.

HPCC's Decision to Proceed Despite Delays Encountered by T&S

165. At the hearing, HPCC's project manager was asked whether early in the project, in anticipation of getting a thirty-eight day extension of the contract schedule in connection with the perimeter drain system change (Findings 112, 115, 124-25, 133), his company advised its subcontractors that additional time would be available to perform their work. He replied that this was not done and would not have been done until the proposed extension was made official with the issuance of a contract modification. He readily admitted that the proposed extension was common knowledge before official approval in July and that in April a thirty-eight day delay had actually been incorporated into the contract schedule, thus moving the projected completion date from November 4 to December 11, 1998 (see Finding

101). Nevertheless, work in progress was still not delayed. HPCC's project manager explained that, up to June 27 when negotiations on CR22 finally concluded and the way was open to the issuance of a contract modification on July 1 officially establishing the thirty-eight day delay, it was still far from clear whether the delay would be granted. Prior to that time, HPCC had offered GSA two options. One was to delay performance by thirty-eight days. The other was to avoid delay through partial acceleration (see Finding 115). HPCC was aware that there was internal disagreement within GSA -- primarily between the contracting officer and the project manager -- on which course to follow. This disagreement was not resolved until late June (see Findings 124-25). Accordingly, the HPCC project manager explained that, prior to that time, he lacked the confidence to advise his subcontractors either officially or unofficially that there would be an extension. Transcript at 1326-27, 1441, 3100-03.

166. HPCC's supervisor responsible for coordinating the trades at the NOAA project site confirmed the critical impact which the timing of the piping changes had on the general contractor's plan for proceeding. He testified that when it became clear that design issues with respect to plumbing piping would make it impossible for T&S to move forward with installation according to the originally planned sequence, the company interrupted this sequence. When it was impossible to finish a particular scope of work owing to a lack of required information, crews would move on and return to complete the work once the information was available. In these situations, other trades were permitted to enter that particular work site to install as much of the other work as possible -- unless even that was impossible because installation was dependent upon the completion of the T&S work which was temporarily on hold. Transcript at 1223-24, 1241. In short, HPCC made a choice between impacting all of the other subcontractors as a result of the design deficiencies or impacting T&S. Id. at 1223-27, 1250-52. HPCC's on-site coordinator testified that, although this decision would sometimes require T&S to work around and over or through the other trades and their work, he nevertheless considered it to be a prudent decision. He explained:

> Because I've done a lot of work with Trautman & Shreve over the years, and I know what they're capable of doing. They're a qualified contractor, and that it really was a benefit to the project, I think, because it kept the issues in the right area where they needed to be.

Id. at 1252.

167. T&S, therefore, proceeded with its planned installation when and where possible. Often crews returning to a site to complete work begun earlier found themselves working side by side with other subcontractors and under greater restrictions than originally planned. In addition, crews would periodically be called to work "hot spots," i.e., places where HPCC needed work to be completed without further delay so that a follow-on trade could continue to pursue its work. Transcript at 896-97, 1299-302.

168. Because T&S's crews were being spread out over multiple floors, T&S was required to provide more supervision than it had planned. This constituted yet another reason why T&S was forced to abandon its plan to use working foremen. See Finding 122. These workers thus became "non-working" foremen whose responsibilities were restricted

to supervising crews split up and working in various areas, procuring materials, and obtaining and coordinating information as it became available. Transcript at 898-99, 903-04, 1223.

Additional Design Deficiencies

169. While most of the discrepancies in the plumbing and HVAC drawings were resolved while T&S was working in blocks D and C, as the work shifted to blocks B and A at the start of 1998, T&S continued to encounter discrepancies in other drawings, particularly the laboratory gas piping systems. As in the case of plumbing and HVAC drawings, the location and size of various piping runs did not match from drawing to drawing, the need for pipe size reduction would not be shown, or some laboratory piping lines might not be shown on the drawings at all. This required the submission of additional RFIs, further delayed installation, and led to frequent conflicts with other trades, particularly the electrical subcontractor and the contractor responsible for installation of cabinets in the laboratories. Transcript at 1175-88.

The RFI Process

170. At the hearing, the Government's expert in schedule analysis stated that the RFI process did not have any significant impact on T&S's field labor productivity. He and his associates calculated that T&S had submitted a total of 506 RFIs. Of these, 291 (57.5%) required nothing more than clarifications and no further action on the part of GSA. On the other hand, 215 (42.5%) led to contract changes. He further concluded that 444, or 88%, of the RFIs were answered on time or within seven days of the date the information was requested. Of the remainder, 43, or 8.5%, of the RFIs were answered within two to four weeks of the date requested, and 12, or 3.5%, were answered later than four weeks after the date requested. Of the last category, 7 of the 12 RFIs led to changes. Respondent's Supplemental Appeal File, Vol. 23, Exhibit G234, Summary Report at 3.

171. On cross-examination, this same expert admitted that his staff, in undertaking this analysis of T&S's RFIs, made no attempt to determine whether the answers provided to the RFIs were correct or required further clarification. Follow-up RFIs would simply have been treated as just another RFI. Transcript at 2488. The expert further explained that, based upon information provided by GSA's and CRSS's project managers, he operated on the assumption that once an RFI had been answered, HPCC or T&S could proceed with the work in question without further delay. Id. at 2498. The record reveals that T&S frequently found it necessary to submit follow-up RFIs. E.g., Respondent's Supplemental Appeal File, Vol. 6, Exhibit G2 at 133, 135, 151, 154, 163, 184, 195. One RFI in particular, RFI 744, was submitted in early June and sought clarification on forty-seven items as a direct result of an RFI meeting which had been held on May 20 with a representative of RDA in attendance to discuss nine pending RFIs. Id. at 254-61. Similarly, in late July, after another joint session with RDA and BCER engineers in attendance to resolve RFI issues (Finding 137), at least six follow-up RFIs were submitted. Id. at 300-04, 306. Indeed, it is interesting to note that this expert witness during cross-examination did not even appear to be aware of the protracted effort required after the initial meeting with RDA in May to resolve RFI issues relating to the plumbing and HVAC design. When asked about a meeting with RDA and BCER in July, the witness recollected only that this was a follow-up meeting to discuss

whether RDA would prepare and reissue contract drawings. Transcript at 2500-01. He likewise was unaware of any conflict in advice given on the plumbing and HVAC designs by the consultants for BCER and RDA. Id. at 2491-92. As to the problems encountered by T&S in contract drawings for the lab gas piping system, this witness was of the opinion that the matter was not even in question in this case. Id. at 2495.

T&S's Labor Overrun

172. T&S contends that it budgeted a total of 71,033 man hours for the NOAA project. This consists of 50,159 man hours, as originally bid (Finding 88), plus a subsequent increase of 20,874 man hours (nearly 42%) for change order work and for the installation of additional vibration isolation per the Government's directive. Transcript at 1941-42. T&S also claims, based upon its labor distribution report (Appellant's Supplemental Appeal File, Vol. 4, Exhibit 208), that it expended a total of 125,449 man hours on the NOAA project. When the total of 71,033 budgeted man hours is compared to this overall as-built figure of 125,449 man hours expended on the project, a resulting labor overrun of 54,416 man hours is found to exist. Transcript at 1939-43; Appellant's Trial Exhibit 28.

III. Appellant's Calculation of its Claim for Labor Productivity Losses and Other Damages

The Testimony and Report of Appellant's Expert

173. At the hearing, HPCC stated that its claim for labor productivity losses and other damages amounts to a total of $2,072,061.09. Of this amount, $1,745,148.28 represents costs claimed by T&S; the balance represents direct costs and markups claimed by HPCC. See Appellant's Supplemental Appeal File, Vol. 3, Exhibit 205 (Summary of Entitlement).

174. In support of its claim, appellant submitted a written expert's report and called upon that expert to testify at length regarding his analysis of the claim. The expert was Steven Huyghe, President and Chief Operating Officer of A.W. Hutchison & Associates. Mr. Huyghe was qualified without objection from the Government as an expert in construction (with an emphasis on mechanical construction specifically), construction scheduling, and construction labor productivity. Transcript at 1699-1700, 1734; Appellant's Trial Exhibit 11.

175. Mr. Huyghe has been employed in the construction industry since 1964, and has over the years performed work as a laborer, pipe fitter apprentice, project engineer, assistant superintendent, scheduler, project manager, and vice president and president of numerous construction firms, with the majority of his hands-on project management experience involving heavy mechanical projects, such as wastewater treatment and process plants. Mr. Huyghe holds a degree from Purdue University in construction management and is licensed as a general contractor. Mr. Huyghe has previously qualified and testified as an expert witness in the evaluation of lost labor productivity in various courts throughout the United States. Transcript at 1700-32; Appellant's Trial Exhibit 11.

176. Mr. Huyghe was retained by T&S to evaluate the construction of the NOAA project and to assess the extent to which T&S's labor productivity losses were attributable

to the acts or omissions of the Government. Transcript at 1735-38; Appellant's Supplemental Appeal File, Vol. 3, Exhibit 205.

177. In performing his evaluation, Mr. Huyghe conducted a thorough review of the project records; visited the project site on multiple occasions; reviewed T&S's original plan for performing its work; conducted extensive interviews with HPCC's and T&S's project personnel; and prepared a detailed as-built schedule based upon documentation available to him, which plotted the project's progress in time from day to day. Transcript at 1741-47, 1763-67; Appellant's Trial Exhibit 12; Appellant's Supplemental Appeal File, Vol. 1, Exhibit 113. Mr. Huyghe also prepared as-built manpower curves based upon data contained in T&S's labor distribution report. The curves show the amount of labor being expended over time in the performance of both base contract and change order work. Transcript at1773-77; Appellant's Supplemental Appeal File, Vol. 4, Exhibit 208. This data is displayed graphically in demonstrative exhibits prepared by Mr. Huyghe and used by him at the hearing. Appellant's Trial Exhibits 15, 16.

178. The as-built schedule was developed by Mr. Huyghe and his staff by manually plotting actual events and activities on a floor-by-floor, building-by-building basis for the entire duration of the project. In preparing the as-built schedule, Mr. Huyghe relied upon the daily logs prepared by HPCC, T&S, and other subcontractors; project photographs; project correspondence and other contemporaneous project documents; and multiple interviews with project personnel that worked in the field. Transcript at 1763-67; Appellant's Trial Exhibits 12, 14, 17. Preparation of the as-built schedule and manpower curves allowed an examination of the relationship between the actual events taking place on the job site and the amount of manpower being expended by T&S's plumbing and pipe fitters. Transcript at 1776-77; Appellant's Trial Exhibits 14-16.

179. Once his as-built schedule was prepared, Mr. Huyghe was able to correlate increases in T&S's manpower with the various unanticipated events in the life of the project, such as the detection of design deficiencies in contract drawings, the preparation and revision of coordination drawings, the release of other trades onto the site to mitigate the impact of the design deficiencies, the disruption created by the Government's insistence on the installation of vibration isolation on plumbing piping, and increases in change order and punch list work. Transcript at 1789-1813; Appellant's Trial Exhibits 15-16, 18.

Use of the MCAA Labor Inefficiency Factors

180. In order to assess the impact on T&S's productivity due to the unanticipated conditions encountered by T&S in installing plumbing and HVAC piping, Mr. Huyghe relied upon six of the sixteen standard factors affecting labor productivity identified in the MCAA publication entitled Factors Affecting Labor Productivity (MCAA Bulletin PDS 2 (1996), hereafter referred to as the "MCAA Manual"). Transcript at 1836-38, 1841-1842; Appellant's Supplemental Appeal File, Vol. 3, Exhibit 200; see also Finding 76.

181. The MCAA Manual identifies sixteen potential factors affecting a mechanical contractor's labor productivity and, based upon the experience of its members, sets forth the expected loss of efficiency on a percentage basis depending on whether the pervasiveness of each individual factor is "minor," "average," or "severe." For example, the MCAA

Manual describes the effects of "stacking of trades" and the potential loss of productivity factors as follows:

	Percent of Loss per Factor		
Factor	Minor	Average	Severe
STACKING OF TRADES: Operations take place within physically limited space with other contractors. Results in congestion of personnel, inability to locate tools conveniently, increased loss of tools, additional safety hazards and increased visitors. Optimum crew size cannot be utilized.	10%	20%	30%

Appellant's Supplemental Appeal File, Vol. 3, Exhibit 200. As set forth in the MCAA Manual, these loss of productivity factors are a tool for identifying and pricing change orders, as well as the effect of change order work on other unchanged work: "The values are a percentage to add onto labor costs for change orders and/or original contract hours." Id. at 1; Transcript at 1836-37, 2393.

182. Mr. Huyghe concluded that six of these MCAA factors could have affected T&S's labor productivity on the NOAA project, namely, "stacking of trades," "morale and attitude," "reassignment of manpower," "concurrent operations," "dilution of supervision," and "learning curve." Transcript at 1836-38, 1841-42; Appellant's Supplemental Appeal File, Vol. 3, Exhibit 200. In addition to the manual's description of the factor "stacking of trades," already set out in the previous finding, the MCAA Manual provides the following descriptions for the other five factors selected for use by Mr. Huyghe:

> "Morale and Attitude" Excessive hazard, competition for overtime, over-inspection, multiple contract changes and rework, disruption of labor rhythm and scheduling, poor site conditions, etc.
>
> "Reassignment of Manpower" Loss occurs with move-on, move-off men because of unexpected changes, excessive changes, or demand made to expedite or reschedule completion of certain work phases. Preparation not possible for orderly change.
>
> "Concurrent Operations" Stacking of this contractor's own force. Effect of adding operation to already planned sequence of operations. Unless gradual and controlled implementation of additional operations made, factor will apply to all remaining and proposed contract hours.
>
> "Dilution of Supervision" Applies to both basic contract and proposed change. Supervision must be diverted to (a) analyze and plan change, (b) stop and replan affected work, (c) take off, order and expedite material and equipment, (d) incorporate change into schedule, (e) instruct foreman and

> journeyman, (f) supervise work in progress, and (g) revise punch lists, testing and start-up requirements.
>
> "Learning Curve" Period of orientation in order to become familiar with changed condition. If new men are added to project, effects more severe as they learn tool locations, work procedure, etc. Turnover of crew.

Appellant's Supplemental Appeal File, Vol. 3, Exhibit 200 at 2.

Division of Project into Three Periods for Purposes of Assessment

183. Because the impacts on T&S's productivity varied over time and from building to building, Mr. Huyghe divided the project into three separate periods and evaluated the impacts on T&S's plumbing and HVAC crews separately for each building and each time period. Period one covered from mid-April 1997 (commencement of above-ground piping) through June 1997; period two from July 1997 through February 1998; and period three from March 1998 through the end of the project. Transcript at 1759-61, 1783, 1789-815; Appellant's Trial Exhibits 20-25. This, according to Mr. Huyghe, permitted him to take into consideration specific events in making his evaluation of T&S's productivity losses. Transcript at 1784.

184. The three time periods were chosen to reflect the different events and impacts taking place on the project during each time period. Thus, period one represents the time frame during which the mechanical design deficiencies first restricted T&S's ability to follow its plan. During this period of time T&S was attempting to complete the plumbing and HVAC coordination drawings in the face of continuous revisions emanating from BCER and RDA even as work in the field progressed. Transcript at 1789-91; Appellant's Trial Exhibits 18, 19. Period two represents the time frame during which T&S began adding manpower to the project in an effort to mitigate the potential delays arising out of the design deficiencies. At the same time, T&S was tasked with responsibility for completing coordination drawings and preparing revised contract drawings, and faced the added burden of retrofitting vibration isolation on previously-installed HVAC and plumbing piping. Period two also includes the early stages of above-ground piping in buildings B and A, where T&S's ability to perform its work was restricted by the need to reassign manpower to complete the vibration isolation work in buildings D and C, even as the other subcontractors moved forward with their work. Transcript at 1791-1805; Appellant's Trial Exhibits 18, 19. Period three represents the time frame when T&S was attempting to complete its work in buildings D and C even as more change order work was added to its scope. Indeed, Mr. Huyghe concluded that T&S performed more change order work than base contract work in these buildings during this time period. In buildings B and A, T&S maintained its increased manpower to mitigate delays due to the continued restriction of its progress, even as additional changes continued to be made to correct design deficiencies. Transcript at 1806-15; Appellant's Trial Exhibits 18-19.

Impact Upon Base Work of Plumbing and Piping Crews

185. Mr. Huyghe's principal task was to assess the impact of unanticipated changes and other events on the productivity of T&S's plumbing and HVAC piping crews in

performing *base contract* work, and then *only* as to the crews' performance of rough-in work. To do this, Mr. Huyghe determined the total number of as-planned or "budgeted" man hours which were to have been performed by these crews during each period of time. Consequently, in determining the number of base contract man hours that were potentially impacted by the Government's actions, he excluded from the 50,159 man hours originally bid (Findings 88, 172) all man hours in T&S's estimate for the NOAA project for below-grade piping,[20] finish work, shop fabrication, etc. The number of potentially impacted as-planned or budgeted hours came to a total 36,055.61 man hours. Transcript at 1831-33, 1850; Appellant's Trial Exhibit 20; Appellant's Supplemental Appeal File, Vol. 3, Exhibit 205, Tab D at 1, Tab C at 14, Tab B at 25, Tab A at 34.

Distribution of Budgeted Base Contract Hours

186. Once the total number of potentially-impacted budgeted man hours was established for each building, it was then necessary to distribute those man hours over each of the three relevant time periods. Because T&S's as-planned hours were not allocated by time period, Mr. Huyghe distributed the hours in proportion to the total *actual* base contract man hours incurred during each time period shown by T&S's project records. This resulted in the following allocation of T&S's as-planned man hours by building and by period:

	Period 1	Period 2	Period 3
Building D	1,916.10	5,736.49	1,439.58
Building C	1,656.24	3,796.83	1,163.93
Building B	422.10	5,233.60	1,895.30
Building A	886.90	4,723.74	7,184.80

[20]Mr. Huyghe excluded from his analysis all man hours budgeted for below-grade or underground contract work based upon his opinion that such work simply would not have been impacted by the disruptions and changes in question. Transcript at 1832, 1850.

Transcript at 1833-35;Appellant's Supplemental Appeal File, Vol. 3, Exhibit 205, Tab D at 1, Tab C at 14, Tab B at 25, Tab A at 34.

The Expert's Actual Assessment of Impact on Base Labor of Plumbing and Piping Crews

187. Once the number of as-planned or budgeted hours was determined for each building and each period, Mr. Huyghe then made his own assessment of the impact of the Government's actions on T&S's productivity by evaluating the impact of each of the six productivity factors identified in the MCAA Manual on T&S's as-planned man hours for each building and each time period. As to each factor, Mr. Huyghe testified that his assessment was based upon his knowledge and understanding of the project which was derived from his numerous interviews with project personnel, his extensive review of the project documents, his construction and analysis of an as-built schedule, his experience in the construction industry, and his expertise in assessing labor productivity losses. Transcript at 1835-36, 1838-41, 1857; Appellant's Supplemental Appeal File, Vol. 3, Exhibit 205; Appellant's Trial Exhibits 18-25.

188. For example, during period two, in building D, Mr. Huyghe concluded that T&S suffered a loss of efficiency attributable to the Government of 10% due to reassignment of manpower because of the need to constantly move members of T&S's plumbing and HVAC piping crews from location to location and floor to floor to work on "hot spots." These were the areas where work could be performed because the design was sufficiently complete, or where work had to be performed to avoid interference with other on-going work. Accordingly, Mr. Huyghe concluded that T&S had suffered productivity losses during this period due to reassignment of manpower in building D of 573.64 hours. He arrived at this figure by multiplying the number of budgeted man hours for work in building D (5736.49 hrs) during the period in question (period two) by 10%. Transcript at 1858-61; Appellant's Supplemental Appeal File, Vol. 3, Exhibit 205, Tab D at 3. Mr. Huyghe made similar assessments regarding conditions in the four buildings during the three periods using all, or at least some, of the six MCAA loss-of-productivity factors he had selected for purposes of his evaluation. His report contains individual sheets for each evaluation factor for each building. Included on these sheets is a textual explanation in support of his estimate of the labor productivity loss experienced during each of the periods of measurement.[21] As a result

[21]Of course, not all of the six factors were applied in every case or to every period. For example, his assessment of impact on base contract work done in buildings B and A during the first period is zero since during this period only underground work was being done in those buildings. See Finding 185. As for his assessment of conditions in buildings D and C during that same period, he used the factors "learning curve," "reassignment of manpower," "dilution of supervision," and "morale and attitude," but did not utilize the factors "stacking of trades" and "concurrent operations," since he apparently did not believe

of this analysis, Mr. Huyghe concluded that the base work of T&S's plumbing and piping crews suffered a total productivity loss, for which the Government was responsible, totaling 19,335 man hours. Transcript at 1853-99; Appellant's Supplemental Appeal File, Vol. 3, Exhibit 205, Tab D at 1-9, Tab C at 14-20, Tab B at 25-30, Tab A at 34-39; Appellant's Trial Exhibits 21-25.

A Separate Assessment for Impact of Vibration Isolation Work

189. Because of the significant impact of GSA's directive in November 1997 requiring T&S to install vibration isolation on all plumbing piping, including previously-installed piping, Mr. Huyghe separately evaluated inefficiencies associated with this event. He estimated the impact this event had on the base contract work of T&S's plumbing and pipe fitting crews from late November 1997 through July 1998, when most of the installation of the isolators in question was finally completed. Transcript at 1904-06. With respect to the additional loss of productivity caused by the Government's vibration isolation directive, Mr. Huyghe concluded that in buildings D and C only "dilution of supervision," "learning curve," "morale and attitude," and "reassignment of manpower" had an additional effect on T&S's base contract work, and only "dilution of supervision," "learning curve," and "morale and attitude" had an effect in buildings B and A. Based upon his assessment of these factors, Mr. Huyghe determined that the base contract work of T&S's plumbing and piping crews suffered a total productivity loss, for which the Government was responsible, totaling 5441 man hours. Transcript at 1910-15, 1920-29; Appellant's Supplemental Appeal File, Vol. 3, Exhibit 205, Tab D at 10-13, Tab C at 21-24, Tab B at 31-33, Tab A at 40-42; Appellant's Trial Exhibits 26, 27.

Comparison Of Mr. Huyghe's Percentages With Those Recommended by MCAA

190. Although Mr. Huyghe used the MCAA inefficiency factors to make his analysis, he did not use the percentages recommended with the factors to reflect "minor," "average," or "severe" disruption. See Finding 181. Rather, he determined what he considered to be the appropriate percentage for the factor in question based upon his knowledge of the circumstances actually existing during the period in question (i.e., periods one, two or three) and the building in question (i.e., D, C, B, or A). The percentages which he used, when compared to those recommended by MCAA, tend, on the whole, to be conservative. By far the majority of his estimates fall between the percentages recommended on the MCAA chart for either "minor" or "average" disruptions. Appellant's Trial Exhibits 21-27.

Impact on Base Finishing Work and Equipment Setting of Fitters and Plumbers

191. In addition to losses of productivity suffered by T&S's plumbing and piping crews installing various piping systems, Mr. Huyghe also concluded that base finishing type

---

that the factual situation warranted application of those factors to base contract work being done in those buildings during that period. For apparently the same reason, he did not utilize the factor "stacking of trades" in his assessment of conditions in buildings D and C during the third period. Appellant's Supplemental Appeal File, Vol. 3, Exhibit 205, Tab D at 5-6, Tab C at 18-19, Tab B at 25-30, Tab A at 34-39; Appellant's Trial Exhibits 21-25.

work and equipment setting performed by T&S's fitters and plumbers on the project also suffered some labor productivity loss, at least in the area of "morale and attitude." He estimated that this impact amounted to a total of 304 hours. This estimate, unlike those discussed above regarding rough-in pipe installation, is not based upon the number of budgeted or planned hours for the work (Finding 185), but rather, simply represents ten percent of the variance between hours budgeted and actually expended for this work. Transcript at 1944-45, 1948-49; Appellant's Trial Exhibits 28, 29. These 304 man hours, when added to the estimated productivity loss of 19,335 man hours for non-vibration isolation work (Finding 188) and 5441 man hours for the impact of vibration isolation work (Finding 189), result in a total estimated labor productivity loss of 25,080 man hours.

Additional Damages Relating to Loss of Productivity

192. In addition to the labor productivity loss of 25,080 man hours, which Mr. Huyghe concluded T&S's plumbing and piping crews experienced, T&S also seeks compensation for additional labor costs. These costs are also said to have been incurred as a result of the Government's disruption of planned contract performance. They include:

	Man Hours
Additional material handling of shop-fabricated material at shop	147
Additional material handling between shop and project site	1,020
Additional supervision	7,132
TOTAL	8,299

Appellant's Supplemental Appeal File, Vol. 3, Exhibit 205 (Summary of Entitlement). We make the following findings regarding each of these items.

193. With regard to additional material handling of shop-fabricated materials, T&S's vice president and operations manager testified that during the months of July and August 1997, T&S produced the shop-fabricated materials required for the NOAA project. Owing to the uncertainty regarding the plumbing and HVAC system designs, however, much of the material prepared was not delivered immediately to the site but rather was stocked temporarily at T&S's off-site shop pending resolution of drawing issues and confirmation of pipe sizes. After consulting with those involved in this work, the operations manager concluded that at least twenty percent of the material handling of shop-fabricated material at the shop itself involved moving materials out to the shop yard and subsequently bringing them back from temporary storage once the decision was made to proceed with delivery to the site. Based upon company labor records, T&S determined that during this two-month period 738 hours were expended in material handling at its off-site shop. Twenty percent of this figure amounts to the 147 hours claimed. Transcript at 1609-13; Appellant's Supplemental Appeal File, Vol. 1, Exhibit 114; Vol. 4, Exhibit 208.

194. With regard to material handling between T&S's fabrication shop and the project site, T&S's operations manager testified the company experienced a significant overrun on this activity. T&S's labor cost report shows that 782 hours were originally budgeted for this work but that a total of 2616 were expended. Appellant's Supplemental Appeal File, Vol. 2, Exhibit 184 at 1. Even after subtracting 814 hours included in negotiated change orders for this activity, there remains an overrun of 1020 hours. T&S's operations manager contends that the overrun was attributable to the number of changes "over and above what you'd normally have." Transcript at 1621. He further explained that T&S's project manager frequently disagreed with GSA on the amount that should be allowed for this activity when change orders were negotiated. He admitted, however, that the sum total of 814 was what was "ultimately agreed to." Id. at 1620.

195. T&S's operations manager explained that the company's claim for the cost of additional supervision stemmed from the fact that T&S had originally intended to utilize "working foremen," i.e., foremen who would direct the plumbing and piping crews and, at the same time, actually help them install materials. This, however, proved to be impossible. Owing to the extensive disruption of contract performance, the foremen became full-time managers taken up in planning and coordinating installation rather than actively working side by side with their crews. Transcript at 1625-28. When asked how this development increased T&S's costs, the company's operations manager explained:

> It's adding people. I mean, we had him as a productive installer and now he's non productive. I mean, he was needed to make the work happen, but he wasn't installing. So somebody else had to take his place.

Id. at 1626-27. For blocks D, C, B, and A, therefore, T&S claims a total of 7132 hours for supervisory time expended by its originally designated "working" foremen. Appellant's Supplemental Appeal File, Vol. 1, Exhibit 110.

Calculation of Quantum in Terms of Dollars

196. In calculating the dollar amounts of its man hour losses, T&S used a composite rate of $30.43 per hour for all productive field labor -- i.e., the workmen who were actually performing the installation of plumbing or HVAC piping at the project site -- and its "non-working" foremen who were required to supervise the additional labor. This rate is comprised of the actual cost of labor of $28.03 as audited by the GSA Office of the Inspector General, plus an allowance of $2.40 per hour for future costs due to accidents or injuries that occurred during the course of the NOAA project, such as insurance premiums and surcharges and direct costs to T&S for medical bills. A GSA auditor testified at the hearing that, at audit, only the $2.40 component of the $30.43 claimed labor rate was not accepted and that was simply because T&S could not explain at the time how the $2.40 had been calculated. Transcript at 2597. During the course of the hearing, this deficiency was rectified by T&S's operations manager who testified in detail on how he calculated this component. Id. at 1613-18, 1628, 2597; Appellant's Supplemental Appeal File, Vol. 3, Exhibit 197; Respondent's Supplemental Appeal File, Vol. 19, Exhibit G210. For material handling between shop and project site, T&S claims a slightly lower labor rate of $18.47. Transcript at 1624; Appellant's Supplemental Appeal File, Vol. 1, Exhibit 114.

197. Using these labor rates, T&S calculated the dollar amount of its man hour losses to be $1,003,523.77. This figure is broken down as follows:

	Period 1	Period 2	Period 3	Vibration Isolation	TOTALS man hours	AMOUNT ($)
Buildings D & C	1,250.30	5,909.78	969.38	2,861.51		
Buildings B & A	–	5,738.19	5,467.85	2,579.73		
SUBTOTALS	1,250.30	11,647.97	6,437.23	5,441.24	24,776	$753,933.68
Other Cost Codes					304	9,250.72
Material Handling (shop)					147	4,473.21
Material Handling (field)					1,020	18,839.40
Additional Supervision					7,132	217,026.76
TOTAL					33,379[22]	$1,003,523.77

Appellant's Supplemental Appeal File, Vol. 3, Exhibit 205 (Summary of Entitlement).

Other Labor-Related Costs

198. In addition to the afore-described labor costs of $1,003,523.77, T&S also claims costs incurred for small tools necessitated or consumed by the additional labor, additional project engineering costs, and additional equipment costs, as follows:

Small Tools	$ 35,112
Project Engineering	69,670
Equipment	298,364

[22]This figure, when compared to the total labor overrun of 54,416 man hours (Finding 172), shows that appellant is *not* seeking relief for 21,037 man hours or 31.6% of this labor overrun. GSA contends that T&S is inconsistent in stating the amount of the total labor overrun for which it is *not* seeking compensation. It points out that, based upon Appellant's Trial Exhibits 21-25, the total number of man hours overrun for which relief is not claimed adds up to 24,090 man hours while Appellant's Trial Exhibit 28 puts this figure at 21,037 man hours. Respondent's Posthearing Brief at 83. Appellant's expert witness, who prepared these exhibits, testified that the correct figure is 21,037 man hours shown in Appellant's Trial Exhibit 28. He explained, to our satisfaction, that the higher figure of 24,090 is an interim calculation not yet adjusted for the productivity, shown on Appellant's Trial Exhibits 26-27, to have been lost as a result of the Government's directive to install vibration isolation on plumbing piping. Transcript at 3134-36.

Appellant's Supplemental Appeal File, Vol. 3, Exhibit 205 (Summary of Entitlement). We make the following findings regarding each of these items.

199. With regard to small tool costs, T&S calculated these costs at a rate of $1.40 per hour (or 4.6% of its composite hourly rate of $30.43), an amount which is less than the actual ratio of small tool costs to labor costs incurred by T&S on the NOAA project (7.57%) and less than the rate used by the Office of the Inspector General in its audit of T&S's claim (6%). Transcript at 1629-30, 2604; Appellant's Supplemental Appeal File, Vol. 3, Exhibit 197; Respondent's Supplemental Appeal File, Vol. 19, Exhibit G210. The claim of $35,112 is based upon an application of the $1.40 per hour rate to the 25,080 man hours of lost production calculated by Mr. Huyghe.

200. T&S's operations manager explained that the claimed project engineering costs consist of the additional time spent by T&S's project engineer and its assistant project manager performing tasks related to the resolution of the various design deficiencies in the contract drawings, such as answering questions posed by workers in the field, preparing RFIs, and generally resolving issues created by the absence of a complete and coordinated design. Transcript at 1633. To the extent that the project engineer or his assistant coded work on their time cards as relating to changes, that work has not been included in this claim. Appellant's Supplemental Appeal File, Vol. 1, Exhibit 107 at 2 (unnumbered). T&S's operations manager also explained that the responsibilities of the project engineer, as originally intended, were to work with the project manager and field superintendent, going through drawings, posting drawings, expediting materials, following up on RFIs, keeping logs up, and the like. This work of the project engineer at the NOAA project, however, was to be completed by the close of 1997. It was not. Transcript at 1637-40. T&S seeks a total of $69,682.41 for project engineering services rendered at the NOAA project site during 1997, 1998, and a brief period in 1999. Of this amount, $8401.29 is for services rendered by the project engineer during 1997. The remainder is for services rendered by the project engineer during 1998 and early 1999, and by an assistant project engineer primarily during the vibration isolation disruption in late 1997 and early 1998.[23] Appellant's Supplemental Appeal File, Vol. 1, Exhibit 107.

201. T&S's operations manager explained that the company's claim of $298,364 for equipment costs covers the cost of rented construction equipment such as heavy scaffolding, forklifts, trucks, trailers, and the like. The figure represents the balance remaining of the company's total documented equipment costs for the project after subtraction of the estimated costs of rental equipment in the initial bid and subsequent contract modifications,

[23] We note a slight discrepancy between the total claim for project engineering ($69,682.41) when drawn from the individual entries shown on pages 3 and 4 of Exhibit 107 of Volume 1 of Appellant's Supplemental Appeal File and the sum total ($69,670) shown on page two of the same exhibit as well as on the entitlement sheet in Volume 3, Exhibit 205 of the same file. Assuming in this instance that the angels rather than the devil are in the details, we will assume that the figure $69,682.41, based as it is upon the individual entries, is more accurate than the unsupported summary entry of $69,670. Consequently we use the former for purposes of this decision.

and other equipment provided for in the bid under some heading other than rental equipment but whose costs were nonetheless charged to the job and included in the total of equipment costs for the project. The remaining balance of rented construction equipment costs was also adjusted downward to reflect a similar claim for equipment costs made in conjunction with appellant's vibration isolation claim (GSBCA 14877). Transcript at1643-51; Appellant's Supplemental Appeal File, Vol.1, Exhibit 115; Vol. 2, Exhibits 186, 188, 189; Vol. 3, Exhibit 206.

202. This T&S claim, like its vibration isolation claim (GSBCA 14877), also has been marked up for overhead (12%) and profit (10%), which are the same markups that the Government consistently allowed on change orders involving T&S's work throughout the NOAA project. Transcript at 1651-55. The markup for bond cost is .7%. Appellant's Supplemental Appeal File, Vol. 3, Exhibit 205 (Summary of Entitlement). This markup for bond cost, as already seen for the vibration isolation claim, is less than that claimed and allowed by the Government (1.2%) during the project. Finding 52.

203. T&S's total claim, therefore, is broken out as follows:

Total Productivity Losses (33,379 man hours)	$1,003,523.77
Small Tools	35,112.00
Project Engineering	69,670.00
Equipment	298,364.00
TOTAL DIRECT COSTS	$1,406,669.77
Overhead (12%)	168,800.37
Profit (10%)	157,547.01
Bond (.7%)	12,131.12
TOTAL	$1,745,148.28

Appellant's Supplemental Appeal File, Vol. 3, Exhibit 205 (Summary of Entitlement).

HPCC's Own Claim

204. In addition to the costs incurred by T&S as a result of the lack of a coordinated piping design at the time of award, the Government's insistence on the installation of vibration isolation on plumbing piping and some additional HVAC piping, and the agreement to add manpower to mitigate schedule impact caused problems with piping designs, HPCC claims the following direct costs which, with markups, total $100,758.90:

Additional Quality Control Management (QCM)	$ 11,250.00
QCM Supplies and Equipment	900.00
Additional Inspector - QC Assistant	14,000.00
Scheduler	34,275.00
Schedule Equipment & Supplies	5,500.00
Subtotal	65,925.00
HPCC Labor Burden (49.36%)	12,463.00
Small Tools (5%)	1,263.00
Subtotal	79,651.00
Overhead (15%)	11,948.00
Subtotal	91,599.00
Profit (10%)	9,159.90
TOTAL HPCC COSTS	$100,758.90

Appellant's Supplemental Appeal File, Vol. 3, Exhibit 205 (Summary of Entitlement).

205. With regard to HPCC's claim of $11,250 for additional quality control management, this figure appears in HPCC's original certified claim regarding labor productivity impacts. Appeal File, GSBCA 14744, Vol. 4, Exhibit 3 at 4 (unnumbered). HPCC concluded that 250 additional hours of quality control management were required as a result of the impact of changes upon base contract work over an estimated one-year period. The figure was arrived at by dividing the approximate value of the original claim ($3,000,000) by one-half the estimated value of a two-year contract ($25,000,000) and multiplying the resulting figure (.12) times the 2080 hours worked by its quality control manager annually. Transcript at 1387-90. The resulting figure of 249.6 is then rounded off to 250 hours. The cost of these hours ($11,250) was figured on the basis an hourly rate of $45, the same rate applied to a similar claim regarding vibration isolation. Finding 56.

206. HPCC also concluded that over a twenty-week period within the same twelve-month time frame, half the time of the quality control manager's assistant (namely 400 hours) was also spent coping with the labor productivity impacts. At an hourly rate of $35, this came to a total of $14,000. Much of the time of both the manager and his assistant

was spent in becoming familiar with circumstances as they developed. As HPCC's project manager testified:

> [T]hese changes didn't come in a well defined quantified document that these people could take and post their set of specs and drawings with. It was a number of issues over a long period of time that took some daily update of those changes.
>
> And then once they understood what the change implemented - the change that was going to be implemented was, they saw to it in the field that it was taking place as directed through the RFIs and the CRs.

Transcript at 1392. HPCC estimated that the cost of QCM supplies and equipment in support of the quality control manager and his assistant amounted to $900. This represented 12% of the original amount budgeted by the general contractor for this item. Id. at 1394.

207. HPCC's certified claim also included a request for $34,275 for the services of a scheduler. This amounted to 457 hours at a rate of $75 an hour. Appeal File, GSBCA 14744, Vol. 4, Exhibit 3 at 4 (unnumbered). HPCC's project manager explained that, as information regarding the quantity and definition of the various changes became available and understood, HPCC attempted to assess their impact upon the schedule. Although HPCC had originally planned to do all scheduling in-house, it eventually became necessary to turn to outside consultants for help in developing a mitigation schedule (N11A) and various status schedules over an eight-month period. HPCC's project manager testified that, were it not for the impacts flowing from the mechanical and plumbing changes, this additional schedule work would not have been necessary. Transcript at 1395-99. He also stated that the $75 rate was the consultant's actual billing rate supported by invoices provided to GSA at the time the claim was audited. Id. at 1397.

208. With regard to the $5500 sought by HPCC for schedule equipment and supplies, HPCC's project manager testified that this involved such items as computer hardware and software, plotter time, plotter paper, and other consumable type costs. He further explained that the figure of $5500 represented an effort on the part of the general contractor to come up with a fair estimate of the additional costs incurred as a result of the impact of the mechanical changes. HPCC had originally budgeted $25,000 for schedule equipment and supplies. It estimated that these costs increased by 20% as a result of the impacts. Transcript at 1398-99.

209. The labor rates and markups used by HPCC in calculating its additional costs are the same as those consistently allowed by the Government on change orders during the course of the NOAA project. Transcript at 1385-401; Appeal File, GSBCA 14744, Vol. 4, Exhibit 3; Appellant's Supplemental Appeal File, Vol. 3, Exhibit 205 (Summary of Entitlement).

210. HPCC's total labor productivity claim, therefore, with the same markups as used in the vibration isolation claim (Finding 45) of a commission on subcontractor costs (10%), general liability and builder’s risk insurance premiums (0.4%), performance and payment

bond premiums (0.6%), and City of Boulder tax (3.11% of 50% of the total cost), amounts to a total of $2,072,061.09 and is broken out as follows:

T&S Costs	$1,745,148.28
HPCC Commission on Subcontractor Costs (10%)	174,514.83
Subtotal	1,919,663.10
HPCC Costs	100,758.90
Subtotal	2,020,422.00
General Liability & Builder's Risk Insurance (.4%)	8,081.69
Subtotal	2,028,503.69
Performance & Payment Bonds (.6%)	12,171.02
Subtotal	2,040,674.71
City of Boulder Tax (3.11% x 50% of Cost)	31,386.37
TOTAL	$2,072,061.09

Appellant's Supplemental Appeal File, Vol. 3, Exhibit 205 (Summary of Entitlement). As noted with regard to appellant's claim regarding vibration isolation, these percentage markups have been allowed by the Government on change orders throughout the NOAA project and were audited and allowed by the GSA Office of the Inspector General in connection with its review of appellant's claim. Finding 57.

Discussion

Appellant's labor productivity claim seeks costs incurred as a result of labor inefficiencies caused by the disruption of its planned performance. The causes of this disruption are said to be as follows:

> Appellant's losses arise out of three separate, but related, factors for which the Government is responsible: (1) the lack of a complete, coordinated design at the time the project was awarded which resulted in extensive changes to the various piping systems; (2) the Government's October 1997 directions to install vibration isolation on HVAC piping in Building B and on plumbing piping throughout the project; and (3) the Government's direction to add manpower to mitigate the potential schedule impact caused by the Government-directed changes.

Appellant's Posthearing Brief at 81.

GSA does not deny that there was a disruption of HPCC's and, in particular, T&S's planned performance. GSA, however, contends that, in the final analysis, the disruption was not the fault of the Government but rather is directly attributable to the actions of appellant and its subcontractor, T&S. As to the three principal causes of disruption enumerated by appellant, the Government is prepared to recognize that the problems encountered with the various piping systems did produce some local or direct impact. Nevertheless, it contends that appellant was compensated for this impact through the change orders which were negotiated to resolve these issues and now has no right to a claim for anything more. As to the disruption resulting from the order to install vibration isolation, as we have seen, the Government contends that this was required by the contract and, therefore, any responsibility for disruption must rest with the contractors themselves. Finally, with one exception concerning CR85, respondent denies that it ever directed appellant to add manpower to mitigate the potential schedule impact caused by the Government's various directed changes.

We examine first the Government's arguments regarding the three major sources of disruption which appellant contends precluded it from following its planned performance (Part I). Our discussion then turns to the causes of the labor inefficiencies for which appellant seeks relief (Part II). Finally, we examine the evidence appellant has presented in support of the quantum of its claim (Part III).

Part I

Can the Disruptions Identified by Appellant Serve as the Basis for Its Labor Inefficiency Claim?

Is Appellant Barred from Recovering Additional Compensation for the Impact of Piping System Changes Now That Bilateral Change Orders Covering Those Changes Have Been Executed?

It is beyond dispute in this case that the two major change orders dealing with piping systems, namely CR34 (plumbing piping) and CR85 (HVAC piping) did contain provision for local or direct impact. HPCC, however, contends that its claim is not for labor inefficiencies associated with local or direct impact but rather with the impact of changes upon unchanged work. In support of its claim, HPCC relies upon that provision of the contract Changes clause, which states that a contractor is entitled to recover not only those impact costs regarding the new work, but also the costs resulting from the impact of the change on unchanged or basic work. Finding 2.

GSA argues that appellant is not entitled to recover those costs associated with the impact of changes on the unchanged work (sometimes referred to as "cumulative" -- as opposed to "direct"-- impact costs) because these costs were readily foreseeable at the time the piping system changes were agreed to, but nonetheless were neither expressly nor implicitly excluded from the signed modification. Hence GSA contends that appellant should now be deemed barred from recovering additional impact costs resulting from those changes. Respondent's Posthearing Brief at 68-69.

Respondent correctly cites two of our decisions, namely William Passalacqua Builders, Inc., GSBCA 4205, 77-1 BCA ¶ 12,406, and Dawson Construction Co., GSBCA 3998, 75-2 BCA ¶ 11,563, in support of the general proposition that priced-out change

orders bar recovery of further costs associated with those changes. Respondent's Posthearing Brief at 68. Nevertheless, in a subsequent decision we wrote:

> Examination of Dawson and Passalacqua reveals that the bar erected by those cases is not nearly as absolute as it appears. Dawson specifically recites that the Board "found no oral understanding between the parties which would serve to alter the written provisions of the change order," 75-2 BCA at 55,203, thereby permitting the inference that proof of a contrary understanding could cause the Board to reach a different conclusion. In Passalacqua the decision seems to rest primarily on the factual inference that appellant was in fact not incurring any impact costs at the time the earlier changes were priced. . . . Thus, these cases turn on their facts and are distinguishable from cases in which the parties expressly or tacitly agreed that certain categories of costs were not part of their agreement.

Pittman Construction Co., GSBCA 4897, et al., 81-1 BCA ¶ 14,847, at 73,299.

GSA writes: "Except for a schedule extension with regard to CR85, Appellant did not agree to exclude any costs from the scope of the bilateral modifications." Respondent's Posthearing Brief at 69. We disagree. The facts in this case indicate otherwise.

At a meeting on July 15, 1997, HPCC and T&S officials advised the contracting officer and GSA's and CRSS's project managers that T&S was experiencing major impacts as a result of the multiple revisions to the HVAC and plumbing piping. At that time the contracting officer recognized the difficulty in assessing these impacts and acknowledged that a proposal dealing with them would be presented at some future date once T&S was in a position to quantify them. Finding 135. In late November, the proposal was in fact submitted. Findings 58-59. Immediately after the meeting of July 15, T&S urged HPCC to provide formal notice of the impacts discussed at the meeting. T&S's letter distinguished between the impact of direct costs and the impacts to the overall mechanical work "resulting from the cumulative effect of multiple changes and revisions." T&S wrote that the latter were not addressed in pending proposals. Finding 136. By letter dated July 31, HPCC provided formal notice of these cumulative impacts to CRSS. In doing so, HPCC provided CRSS with a copy T&S's letter explaining the nature of the impacts. Finding 140.

In short, we are convinced that, in this case, the parties clearly understood from the outset and, therefore, tacitly -- if not expressly – agreed to deal separately with the impact of the piping changes on the unchanged or basic work. Evidence in the record regarding the proposals and negotiations leading to the subsequent issuance of the contract modifications covering CR85 (on October 14, 1997) and CR34 (on December 4, 1997) provides abundant confirmation of this fact. The proposals submitted and the negotiations of those proposals dealt only with direct costs, while it was the understanding of representatives of CRSS, HPCC, and T&S that the contractor's claim for impact of the piping system changes on unchanged work would be treated at a later date as a separate and single item. Findings 69, 116, 123, 129, 144, 148, 151-153, 155, 158. We also see confirmation of the tacit agreement to deal separately with the impact of piping system changes on unchanged work in the tortuous history of appellant's claim from the time of the proposal submission in

November 1997 to the submission of the certified claim in July of the following year. See Findings 60-80. The proposal, when submitted in November 1997, did not come as a surprise to GSA, and throughout the many months that it was under consideration, it was never rejected on the ground that it was barred as a result of the finalization of CRs 34 and 85. Indeed, the affirmative argument of accord and satisfaction was not raised by GSA until shortly before the hearing for this appeal was convened in late November 1999. We, therefore, do not view the actual issuance of contract modifications covering CR34 and CR85 as a bar to appellant's recovery of losses resulting from the impact of the piping system changes upon basic or unchanged work.

Is Appellant Entitled to Compensation for Labor Inefficiencies Suffered as a Result of GSA's Insistence on the Installation of Vibration Isolation?

In our discussion of GSBCA 14877, we have already dealt in considerable detail with the various arguments raised by GSA in opposition to HPCC's contention that the contract did not require vibration isolation on the project's plumbing system or on certain HVAC piping in block B. Given the conclusion we reached in reviewing that claim, it necessarily follows that appellant is entitled to compensation for labor inefficiencies suffered as a result of GSA's insistence on the installation of vibration isolation.

Before leaving this issue, however, we should perhaps underscore the fact that in the labor inefficiency claim we are examining here in GSBCA 14744 appellant does not seek compensation for inefficiencies encountered in the actual installation of vibration isolation. That relief is part of the direct labor costs sought under GSBCA 14877. As we have already pointed out in the preceding section, appellant's inefficiency claim does not seek compensation for labor inefficiencies for changed work. Rather, what is sought here is compensation for the inefficiencies produced in the performance of base contract work. In this case it is the inefficiencies experienced in the performing of base contract work as a result of the Government's insistence that vibration isolation be installed. Because we agree with appellant that the contract did not require the isolation, we conclude that the contractor is entitled to compensation for any inefficiencies experienced in the performance of base work as a result of the GSA's insistence on its installation -- provided, of course, that appellant can prove that such inefficiencies occurred.

Did the Parties Actually Agree to the Addition of Manpower to the Project at the Government's Expense in Order to Mitigate the Impact of Changes in the Project's Piping Designs?

By the time appellant submitted its certified claim for impact and acceleration costs on July 1, 1998, the positions of the parties regarding the issue of acceleration costs were fairly well defined. HPCC and T&S remained convinced that there was an agreement reached in June of the previous year to add manpower to the project to mitigate the effects of the changes in mechanical design and that the cost of this additional manpower would be borne by the Government. Although this alleged agreement on the part of the Government was not immediately memorialized in writing, HPCC and T&S considered it eventually confirmed in October when T&S was formally authorized "to accelerate the schedule to mitigate the impact caused by the HVAC conflicts detailed in Change Request No. 85."

HPCC and T&S obviously did not consider the "good faith" payment of $50,000 authorized in February 1998 as adequate compensation for the costs being sought. Finding 70. They likewise were of the opinion that the documentation submitted in support of their claim was adequate. Finding 75. Finally, following the rejection of their claim for acceleration and impact, HPCC and T&S insisted that GSA should consider their earlier request for an extension of the contract completion date as an alternative to acceleration. Finding 81.

The Government, for its part, denied that it had authorized acceleration except for a unilateral modification issued in June 1997 to avoid an anticipated twenty-two day delay as a result of a revised underground plumbing design for block B and the call for acceleration in mid-October 1997 regarding the HVAC changes covered by CR85. Findings 65, 119, 154. As for the payment of $50,000 authorized in February 1998, this was said to cover the schedule impact on the approved baseline schedule resulting from the direct costs of CR85 -- the only item on which GSA allegedly ever acknowledged entitlement concerning the impact of CR85. Finding 77. On the issue of documentation, GSA had, from the initial submission of appellant's claim in September 1997, continually decried the lack of adequate documentation. Findings 60-61, 63, 74-75, 77, 80. As to HPCC's requests for time extensions, the contracting officer denied the existence of such requests since nothing had been filed within the fourteen-day period established under the contract for submission of these requests. Finding 81.

We turn first to the issue of whether the parties did in fact agree to add manpower to the project in order to mitigate the impact of delays owing to changes in the plumbing and HVAC piping design. Given the evidence before us, we are convinced that, at the meeting of representatives of the parties on June 24, 1997, agreement was reached that the impact of changes in the plumbing and HVAC piping designs would be mitigated by the addition of manpower rather than by authorization of overtime, that this would be at the Government's expense, that this plan was made known to the contracting officer shortly thereafter, that the contracting officer posed no objection to it, and that, as the project progressed, it was well known to the Government that T&S was in fact adding manpower to the project. Findings 127-28, 139, 146. We find it indeed puzzling that, even after the October 17 letter expressly authorizing acceleration, the GSA project manager advised the contracting officer that T&S was incorrect in asserting that it had been directed to accelerate. Finding 65. We find it equally puzzling that the contracting officer, after being advised of the agreement in June to add manpower and expressly authorizing it in October, would ignore these facts in his letter of January 9, 1998, to HPCC. Finding 66.

As to the adequacy of the $50,000 payment authorized in February 1998, disagreement between the parties on this issue as well as over the adequacy of supporting documentation appears to stem from how the parties understand "acceleration," as the term is used to describe appellant's claim. The contracting officer's explanation of how the figure of $50,000 was determined, his subsequent letter of March 10, 1998, and CRSS's earlier letter of December 11, 1997, all indicate that "acceleration" has been understood in its strict sense and that any compensable acceleration would, of necessity, have to be tied closely to critical path items on the contract baseline schedule. See Findings 60-61, 70-72, 74. HPCC and T&S, on the other hand, appear to have used the term "acceleration" in a less technical sense. Given this divergent approach to the concept, it does not surprise us that the parties

remained at loggerheads over the adequacy of the $50,000 payment and the adequacy of the documentation provided in support of the "acceleration" claim. In short, while we are convinced that the parties agreed to add manpower to the project at the Government's expense, we do not believe that this was based on any implied understanding of how appellant would be eventually compensated for this expense. Herein lie the seeds for much of this dispute.

Given the unique circumstances of this case, the contracting officer's refusal to consider appellant's request for time extensions after denying the acceleration claim is also difficult to understand. Following the issuance of CR22 on July 1, 1997, and the consequent extension of the contract completion date from November 4 to December 11, the parties appear to have remained intent on preserving that date as the contract completion date despite not only the changes in plumbing and HVAC design but also other changes. Findings 141, 145-46. Time extensions were hardly the order of the day. Understandably, the contracting officer's letter of January 9 suggesting that the costs associated with meeting the December 11 completion date were to be borne by the contractor came as a genuine surprise to HPCC and T&S. This, however, prompted the contractors to remind the Government that, in view of the impacts which had occurred, the only realistic alternative to acceleration was time extension. T&S promptly broached the issue in writing and in clear terms, submitting at the same time a detailed analysis together with schedule fragnets. All of this was forwarded to the Government by the general contractor. Findings 67-69.

The contracting officer's next move was as perplexing as his letter of January 9 suggesting that appellant was perhaps not entitled to any payment for acceleration. In early February 1998, he authorized payment of $50,000 to appellant for "costs associated with directed acceleration and impacts." Finding 70. For the next three months the parties were engaged in renewed discussion of appellant's acceleration and impact claims. Findings 74-78, 80. The prospect of time extensions once again receded to the background and the mechanical work remained subject to acceleration. Once, however, the contracting officer in his letter of May 7 finally rejected definitively appellant's acceleration and impact claims, he was confronted again with the alternative claim for a time extension. Findings 80-81.

We find no evidence here that appellant slept on its rights under the contract to seek time extensions. The clear message sent by the Government to the contractor from July 1997 to January 1998 was that the contract completion date of December 11, 1998, was to be maintained. When, however, in January 1998 GSA suggested that the costs of maintaining this date, despite numerous adverse impacts, was to be borne by appellant, the alternative of time extensions was raised in what we would consider, under these circumstances, to be a timely fashion. The issue, however, was understandably put aside once more when the contracting officer approved payment of $50,000 and resumed discussions regarding the acceleration and impact claims. It should have come as no great surprise to the contracting officer, therefore, that appellant promptly resurrected the issue once its claims for acceleration and impact were finally rejected. Accordingly, the contracting officer's refusal to discuss appellant's time extension requests on the technical ground that they were non-existent because they were not timely filed is, to say the least, disturbing.

Shortly after the meeting of the parties on March 11, 1998, T&S proposed use of the MCAA inefficiency factors to resolve the pending impact *and* acceleration claims. This suggestion of T&S was put forward by HPCC for the Government's consideration. Finding 76. The idea was promptly rejected by the contracting officer with the brusque observation that the claimant's time would be better spent attempting to prove entitlement rather than proposing methods for calculating quantum. Finding 77.

We find the proposal to use the MCAA factors particularly significant and far from limited merely to a calculation of quantum. It represented a return on appellant's part to the approach it had used in the initial presentation of its claim in November 1997. At that time, T&S noted that, because the acceleration took place while the work was being impacted by various delays and disruptions, it was extremely difficult to separate acceleration costs from impact costs. Finding 58. In a letter dated December 11, 1997, however, CRSS's project manager wrote that as long as the acceleration costs were combined with the request for impact or inefficiency costs, it would be impossible to resolve the claims. He insisted, therefore, that any claim for acceleration costs must be broken out and supported by a schedule showing the additional resources allocated to specific activities in quantities sufficient to remove the negative float and maintain the current completion date. Finding 60. Almost three months later, the contracting officer, in his letter of March 10, made a similar demand. Finding 74.

The subsequent proposal by T&S that the MCAA inefficiency factors be used to address the acceleration issue once more linked the two claims rather than dealing with them separately. By using this theory of recovery, appellant reintegrated the acceleration claim into the labor inefficiency claim and, in effect, stripped the former of those features which would otherwise characterize it as an acceleration claim in the strict sense of the word. What T&S was then proposing to the contracting officer was no longer that it be reimbursed directly for the manpower it found necessary to add to the project, but rather for the impact of this additional manpower on the base work. This addition of resources, to which we have found the parties agreed, thus, through the application of MCAA inefficiency factors, is seen rather as a source of disruption leading to labor inefficiencies rather than as the basis for an acceleration claim in the strict sense of the word.

Although the contracting officer rejected appellant's proposal to use the MCAA inefficiency factors, HPCC did in fact make use of them in formulating the certified claim it submitted on July 1, 1998. Finding 84. In briefing this claim, appellant continues to present the *facts* regarding the alleged "acceleration" as the source of additional disruption leading to labor inefficiencies. Appellant's Posthearing Brief at 81, 93; Respondent's Posthearing Brief at 87.

There is considerable merit in the approach ultimately hit upon by appellant for dealing with increased costs associated with the addition of manpower to the project. It circumvents the special requirements which must be met before a claimant can be reimbursed for acceleration costs -- with which the Government understandably was concerned once it insisted on the claim for acceleration costs being broken out from HPCC's original impact claim. In particular it obviates the need to ensure that the additional manpower was no more than that required to overcome negative float and keep the contract

on schedule. It likewise permits the claimant with the aid of its expert to assess the impact of the labor increase on base activities as opposed to critical path activities.[24] In addition, with this approach, appellant lays aside its claim for time extensions as an alternative to acceleration. Above all, by viewing the facts related to T&S's increase in manpower as the basis for a labor productivity claim rather than an acceleration claim, the Government is thus able to honor in an acceptable fashion the commitment previously made to assist with the costs attendant to the addition of manpower to mitigate the impacts resulting from design changes and keep the project on schedule.

In summary, we are most definitely convinced that GSA did in fact reach agreement with HPCC and T&S that the adverse impact of changes in the project's piping design would be mitigated by the addition of manpower to the project rather than by an extension of the contract completion date or the authorization of overtime. We likewise are convinced that, under this agreement, the Government was in some manner expected to bear the cost of these additional resources. We therefore conclude that appellant's request that it be reimbursed for the labor inefficiencies resulting from the disruption caused by the subsequent addition of manpower is entirely reasonable and should be honored by the Government in view of the agreement previously reached by the parties -- provided claimant can demonstrate that the addition of manpower to the project did in fact adversely impact the unchanged work in the manner and to the degree alleged.

Part II
The Causes of the Labor Inefficiencies for Which Appellant Seeks Relief

A second line of argument pursued by GSA is that even if appellant is not barred from seeking further relief for disruptions, it must prove that the labor overruns said to be associated with the alleged inefficiencies were in fact attributable to these disruptions rather than to causes within appellant's control. This was an issue initially raised by CRSS when HPCC presented its original impact claim in November 1997 and again referred to by the contracting officer when he ultimately rejected the claim in May of the following year. Findings 60, 80. Among the possible causes suggested by GSA are failure to coordinate work properly, failure to read vibration isolation requirements correctly, underbidding the job, substantial difference between T&S's original performance plan and that ultimately incorporated into the baseline schedule, labor shortages, and time lost on unacceptable work. Finding 60; Respondent's Posthearing Brief at 76. We consider them in turn.

Was the Disruption of Appellant's Planned Performance in the Spring and Summer of 1997 Attributable to Causes Within the Control of HPCC and T&S?

GSA contends that the disruption of HPCC's planned performance was attributable not to changes in the project's piping systems, but rather to the general contractor's failure

[24] We note that both GSA expert witnesses freely acknowledged that labor inefficiency claims could be based upon the adverse impact of disruption upon non-critical path activities. Transcript at 2521-22, 3080-81.

to coordinate the project work and, in particular, in the contractor's failure to take advantage of the thirty-eight day delay of the project in the spring of 1997. In their posthearing brief, counsel for GSA write:

> [T]he original baseline schedule called for T&S to begin plumbing in Building D, garden level, on May 6, 1997. . . . Schedule update #1, which incorporated the 38-day extension, called for T&S to start plumbing on June 2, 1997. Instead, T&S resumed plumbing work on April 14, 1997, about seven weeks early. This early start significantly disrupted the work in Building D because T&S was "stacked" among other subcontractors, who were also working ahead of schedule. . . . Any disruption caused by T&S's early start and the consequent mingling of the trades is not GSA's fault.

Respondent's Posthearing Brief at 72.

It is correct that when HPCC prepared update number one of the approved baseline schedule in early April, it incorporated into the schedule the thirty-eight day calendar impact which T&S estimated to be associated with the change dealing with the perimeter drain system. Findings 115, 160. It is likewise true that this had the effect of delaying all of T&S's scheduled work not yet done by a period of similar duration. Accordingly, T&S's above-ground construction in block D, which was scheduled to begin in May, would thus have been scheduled to begin instead in early June. Finding 160.

The Government faults HPCC for continuing to work during April and May 1997 rather than follow the updated schedule with its thirty-eight day delay. We do not. We consider HPCC's decision to be a prudent one under the circumstances. The situation confronting the general contractor during this time was far from encouraging. Serious problems had emerged already with regard to the contract drawings for the plumbing piping systems and, by May, similar problems were found to exist with the drawings covering the HVAC system. These problems gave rise to a myriad of issues requiring resolution through multiple RFIs and resulted in a delay in the preparation of critical coordination drawings. Findings 107-14, 116-18. The proposed thirty-eight day delay had indeed been incorporated into the updated baseline schedule, thus showing a project completion date of December 11. The contractual completion date, i.e., the date to which HPCC remained committed under the contract, however, remained November 4, and the schedule, as updated, showed twenty-six working days of negative float. Finding 101. The prospects of the proposed delay actually being approved by GSA were still uncertain. HPCC's project manager testified that GSA remained undecided over delay versus acceleration until the close of June. Finding 165. Contemporaneous documentation in the record confirms the fact that, until mid-June, GSA remained undecided both as to whether delay should be authorized and as to how long it should be even if authorized. Findings 120, 124-25.

HPCC, therefore, elected to continue work following as best it could its original planned sequence and requiring T&S, when necessary, to work around the other trades. Findings 165-68. Certainly delay of the project during April and May based solely on the hope that an extension of the contract completion date might eventually be approved would most certainly have been fraught with unacceptable risks. In addition, there was the very

real possibility that the resumption of work after such a delay would have brought its own set of problems, given the chronic labor shortage in the area at that time. Findings 162-63. We, therefore, most certainly do not look upon HPCC's decision to press on during April and May as the cause of the disruption of appellant's planned performance. The evidence contained in the record convinces us instead that this decision was well advised and represented a genuine effort on the part of the general contractor to contend with and mitigate, if possible, the unexpected disruption of its planned performance during the first half of 1997 owing to the deficiencies in piping designs.

GSA's expert in contract scheduling expressed the opinion that HPCC's problems with coordination of trades was not attributable to disruptions caused by changes in piping designs, but rather to the general contractor's decision to "over accelerate the job." He explained that once HPCC was aware of the prospect of a thirty-eight day delay and the increase in contract price by $24,000 a day to cover general conditions for that period of time, there was ample motive to beat the delay and thus apply that compensation to pure profit rather than to overhead and profit. Transcript at 2659. HPCC's project manager has denied the accusation, pointing out that during the months of April, May, and June 1997, Government officials were very much aware of the problems facing the contractor and that the GSA project manager himself actually complemented T&S on its ongoing efforts to mitigate the impacts and delays encountered. Id. at 3106-07. We find the expert's argument unconvincing. Certainly every contractor is aware of the benefits of beating its schedule. Nevertheless, in this case, the facts indicate that the contractor's efforts were undoubtedly directed to catching-up with and, if possible, maintaining its schedule, rather than accelerating the schedule for the sake of pure profit.

What, however, was the ultimate cause of the disruption confronting appellant in the first half of 1997? Upon review of all the facts before us, we find nothing to convince us that the disruption was due to causes within the control of HPCC or T&S. Throughout this period these contractors were intent on moving the project forward notwithstanding the problems encountered. They submitted numerous RFIs, sought frequent meetings with CRSS and its engineering consultants to resolve the issues presented in these RFIs, and prepared change estimates covering the system changes ultimately deemed necessary.

Instead, it is our conclusion that responsibility for the disruption which ultimately made it impossible for T&S to follow its intended sequence of work rested with the Government. T&S states that its plan for the NOAA project was based in part on the assumption that the plans provided by the Government were complete and reasonably coordinated. Finding 106. They were not. Unrebutted evidence in the record indicates that even before award CRSS determined that there were deficiencies in the mechanical bid drawings. Finding 108. Following award, the magnitude of these deficiencies became increasingly apparent.

From January to late July 1997, the parties strove to resolve the problems posed by the deficiencies in the contract drawings. During this period, and afterwards as well, HPCC and T&S were critical of the RFI process. Evidence provided indicates that this criticism was justified and cannot simply be dismissed as typical contractor impatience. GSA has attempted to defend the adequacy of the RFI process with the report and testimony of an

expert in schedule analysis. Finding 170. Nevertheless, we find his testimony unconvincing. His failure to differentiate between initial and follow-on RFIs and to make any qualitative evaluation of the answers provided to RFIs renders his analysis virtually useless for our purposes here. Further, his reliance on the representation allegedly made by GSA's and CRSS's project managers, that once an answer was provided the contractor could proceed without delay, was clearly misplaced. Again, such an assumption ignores the possibility of follow-on RFIs -- of which there were many. Finding 171. As late as May 6, when T&S forwarded its change estimate on plumbing design changes, it identified twenty-eight specific drawings which had already been revised and noted that there were still items in these drawings which would require further clarification or direction through the RFI process. Finding 116. Indeed, changes were still being made in plumbing drawings at an RFI meeting on May 20. Finding 118. One critical part of the RFI process involved the participation of the original engineering firm of record, RDA. This further complicated the process and inevitably led to further delays. Findings 110-11, 118, 126, 134, 137.

Without amplifying the record further, we cannot tell with precision how much of the disruption of appellant's planned performance was attributable to the deficiencies in the contract drawings and how much instead was attributable to possible deficiencies in the RFI process -- including the need to coordinate often between the two consulting engineering firms. In the final analysis, however, for this case, it makes no difference. What we do know here is that these delays and disruptions are readily and ultimately traceable to the deficiencies in contract drawings provided to the contractor by the Government.

GSA would have us believe that the problems HPCC and T&S encountered with the contract drawings have been grossly exaggerated by appellant. We are told that the changes ultimately agreed to for the plumbing system were neither complex nor of great magnitude, that the labor hours negotiated for the HVAC changes represented only 9.1% of the labor hours expended by T&S on HVAC work, that the total cost of materials for the HVAC work was only $13,000, and that the impact of these various changes occurred at the beginning of the project and thus was for only a short period before being incorporated into the contract schedule. Respondent's Posthearing Brief at 72-74. Further, the Government's expert on schedule analysis who testified regarding the RFI process expressed the opinion that the problems encountered with the drawings were typical of a project of this size and readily resolved through the RFI process. Transcript at 2363, 2375.

It is in fact true that in the past we have sometimes denied cumulative impact claims on the ground that the number of changes involved and their dollar magnitude have not seemed to us sufficient to produce a significant impact upon the unchanged work. E.g., Freeman-Darling Inc., GSBCA 7112, 89-2 BCA ¶ 21,882. Such determinations, however, are not made in a vacuum without consideration of the attendant circumstances in each case. In this case, the record amply supports the conclusion of T&S's project manager that it was not so much the magnitude of the piping system changes as it was their timing which produced such a significant impact. See Finding 164. By "timing" we understand this witness to be referring not only to when the disruption occurred in the course of the project but to its duration as well.

As early as January 1997, when T&S began work on coordination drawings, it encountered what it described as major discrepancies in the contract's plumbing drawings. Finding 108. The time and intense effort required to resolve the issues presented first with the plumbing system design and later with the HVAC design convince us that from the outset this was far more than a typical problem readily resolved through the RFI process. CRSS promptly sought the assistance of its engineering consultant, BCER, and at the same time advised GSA that BCER's services would have to be deemed as "extra" since they exceeded the scope of the contract with that company given the "massive" coordination issues involved. Finding 109. Once BCER became privy to the nature of the problems, it quickly advised CRSS that there were limits to the assistance it could provide. BCER recommended instead to CRSS that the engineering firm responsible for the original design be called in to assist in the revision of the piping designs and in a general review of these systems once revised. Findings 110-11. The problems presented by the contract drawing deficiencies were not readily resolved and eventually caused HPCC to modify the sequence it had originally planned to follow for T&S vis-a-vis other subcontractors. Findings 166-67.

Clearly in this case, it is not to the material or labor costs of the piping changes ultimately agreed to that we look in order to assess the magnitude of the disruption which occurred. Given the facts here, it is to the timing of the disruption, its duration, and to its resulting consequence that we look. And there we see the general contractor significantly thwarted, through no fault of its own, in its effort to coordinate the project as originally planned.

Were Appellant's Alleged Inefficiencies the Result of Appellant's Failure to Read Vibration Isolation Requirements Correctly?

This argument of course carries no weight in view of our conclusion reached earlier that HPCC and T&S did in fact read these specifications correctly.

Were Appellant's Alleged Inefficiencies the Result of Appellant's Underbidding the Job?

GSA would have us conclude that T&S significantly underbid its portion of the NOAA project and for that reason encountered labor costs significantly in excess of its original estimate. We find the argument unconvincing. The bid was developed using an estimating system which relies on labor units developed by MCAA. Finding 85. The offer actually submitted represented a discount of fifty-six percent from the figure initially derived using the MCAA bid estimating system. Finding 88. T&S's president testified that such discounting is typical. Findings 86-87. It is apparently based upon special considerations not necessarily incorporated into the MCAA standards, such as the special relation between the prime and the subcontractor and the anticipated plan of performance. Findings 89-90. A mechanical estimator employed by CRSS at the time of construction and called by the Government as a witness confirmed that it is customary for mechanical contractors to discount a bid based upon MCAA units. Finding 87. T&S's bid, as discounted with its

labor component of 50,159 man hours and contract price of $7,840,014, compared favorably with pre-award estimates prepared by CRSS and FBA. Findings 91-92.[25]

Were the Alleged Inefficiencies Caused by HPCC's Changes in T&S's Original Planned Schedule?

Another cause alleged by GSA as a possible explanation for T&S's labor overruns is the fact that the performance schedule originally prepared by T&S for HPCC's consideration (the NOAT Schedule) and presumably used by T&S in preparing its bid, differed significantly from the baseline schedule (NOA1) ultimately approved by the Government. As a result, T&S was unable to realize the efficiencies anticipated in its discounted bid. Respondent's Posthearing Brief at 77. The record, however, confirms that the NOAT and NOA1 schedules were consistent with the basic assumptions on which T&S's bid was based. The total number of man hours and time required to be on the project were not significantly different. Finding 99. We, therefore, fail to see why, under the NOA1 Schedule, T&S would be expected to incur an extensive labor overrun not otherwise anticipated under NOAT.

Were the Alleged Inefficiencies Attributable to Local Labor Shortages or Time Lost on Unacceptable Work?

Undoubtedly a labor shortage existed at the time the NOAA project was underway. Findings 162-63. T&S, however, appears to have coped well with it. Indeed, there is convincing evidence that, by August 1997, T&S had roughly doubled its anticipated manpower. Finding 139.

The Government's expert in schedule analysis, who was recognized as having some experience in assessing labor inefficiencies, found that there was an unusually high labor turnover on the project for T&S. The company originally anticipated that thirty workers would be required at peak utilization. The expert, however, found that there were 150 T&S trade workers cycled through the project, excluding field officer personnel, general foremen, and non-working foremen. He opined that a turnover of this magnitude would result in inefficiencies due to the need to orient new laborers. He estimated that this inefficiency amounted to approximately 1100 man hours. Transcript at 2453-56, 2460. He likewise estimated that approximately 1748 man hours were lost on punchlist items and rework. Id. at 2461. The labor turnover addressed by GSA's expert may or may not have been attributable to the existing labor shortage. We cannot tell based upon the information available. As for the degree of punchlist items and rework, we cannot say whether some or

[25]The man hour figures in the T&S and CRSS estimates may perhaps compare unfavorably with an estimate prepared by a colleague of GSA's expert on schedule analysis and included in the expert's report. This estimate puts man hours at 108,092. We know little about the estimate, however, and consequently attach little weight to it. The witness did not himself prepare it, was not recognized as an expert in construction estimates, and does not practice estimating. Indeed, on cross-examination he conceded that he had no prior experience with the MCAA system of estimating. Transcript at 2350-51.

any of this was attributable to coordination problems occasioned by the disruptions which appellant contends were the fault of GSA.

Ultimately, however, these and other alleged alternative causes cited by this expert hold no real significance for us. The expert testified that, so far as T&S's claim was concerned, it was his task to perform an analysis of the NOAA project to determine whether there were any labor productivity losses on the project and, if so, to identify causes of the productivity losses not attributable to GSA. Transcript at 2394-95. He ultimately concluded that T&S had suffered a total of 15,917 man hours in labor overruns the cause of which could not be considered within the control of GSA. Id. at 2459-60; Respondent's Supplemental Appeal File, Vol. 23, Exhibit G234 (Exhibit 24 "Reasons for Labor Differences"). We see no need to weigh the validity of this conclusion given the nature of HPCC's claim. We do not view it as a total cost claim. T&S's total labor overrun for the project was 54,416 man hours. Finding 172. The labor inefficiency claim, however, seeks compensation for only 33,379 man hours. Finding 197. No claim has been made for the balance of 21,037 man hours. See supra note 22. Since the total of 15,917 man hours calculated by GSA's expert fits well within the total number of unclaimed hours, we must recognize that, even if the expert's calculation is correct, the Government has failed to demonstrate that the labor overrun for which appellant seeks relief is attributable to the causes identified by its expert. These causes could just as likely account for the labor overrun for which appellant seeks no relief.

Part III
Appellant's Demonstration of Quantum

The Method Used

Loss of productivity is not an easy matter to prove. The aid of an expert is frequently required. Luria Brothers & Co. v. United States, 369 F.2d 701 (Ct. Cl. 1966) ("It is a rare case where loss of productivity can be proven by books and records; almost always it has to be proven by the opinions of expert witnesses."). In this particular case, appellant's expert elected to use the MCAA inefficiency factors to assess the impact of various unanticipated conditions encountered by T&S in performing the above-ground plumbing and HVAC piping. Findings 180-82. We have previously accepted the use of these factors for this purpose. Clark Concrete, 99-1 BCA at 149,760; Stroh Corp. v. General Services Administration, GSBCA 11029, 96-1 BCA ¶ 28,165, at 141,132.[26]

[26]GSA contends that reliance on Stroh and Clark is misplaced since those cases involve use of the MCAA inefficiency factors to assess direct as opposed to indirect or cumulative impact. Respondent's Posthearing Brief at 85-86. We see no reason why, in a case such as this where the parties agreed to deal separately with the impact of piping changes on the unchanged or basic work, the MCAA inefficiency factors cannot be used to assess this impact. Stroh and Clark do not stand for the proposition that MCAA inefficiency factors cannot be used to assess indirect or cumulative impact. Rather, they confirm the legitimacy of these factors for use in assessing impact. As already noted, the changes clause calls for adjustment of the contract price to reflect increases in the contractor's cost of performing

Application of the MCAA inefficiency factors is not the only technique available for purposes of assessing impact. The "measured mile" analysis permits a comparison of the labor costs of performing work during different periods of time, so as to show the extent to which costs increased from a standard during periods impacted by certain actions. See Clark Concrete , 99-1 BCA at 149,746. Unfortunately, given the facts in this case, this technique simply does not readily lend itself for use here.

The Government's expert in schedule analysis spoke disparagingly of the use of the MCAA inefficiency factors. In his opinion, they have lost credibility over the twenty years they have been in use. Instead, he suggested that a CPM schedule, properly maintained and updated, has made far greater advances as a tool in identifying the potential for lost labor productivity than the MCAA factors have. Transcript at 2387-89. This witness's preference for use of the CPM schedule does not surprise us, given his very limited experience in mechanical construction and in the use of the MCAA factors and his recognized expertise instead in the area of construction scheduling. See Transcript at 2347-57, 2466-69, 2483. The data available in a properly maintained and updated CPM schedule may in theory hold great promise as a tool for assessing labor inefficiencies. In this particular case, however, the multitude of schedules and schedule revisions reflected in the record does nothing to instill confidence in this regard. See Findings 73, 79, 82-83, 141-43, 149, 157. Instead, we have considerably more confidence, at least in this case, in the use of the MCAA inefficiency factors by appellant's expert -- particularly in view of his extensive personal experience in the mechanical construction field. See Finding 175.

Citing to the Court of Claims decision in Luria Brothers, 369 F.2d 713, respondent reminds us that, although an expert is often required to prove loss of productivity, the mere expression of an estimate as to the amount of productivity loss by that expert with nothing to support it will not establish the fundamental basis for making a reasonably correct approximation of damages. Respondent's Posthearing Brief at 84. The Government is apparently convinced that the estimates provided in this case by appellant's expert are totally lacking in support. Counsel write:

> [The expert] presented no proof. He made no attempt to show the nexus between the changes and the alleged cumulative impact. Contrary to Mr. Huyghe's view, the number of RFIs and changes alone is insufficient to establish the Government's liability for a contractor's inefficiency.

Id. at 81. In a similar vein, the Government's expert in schedule analysis criticized Mr. Huyghe's report on the ground that the allegations of disruption were overly broad and the claim still lacked linkage between those broad allegations of disruption and their effects on T&S's labor force. Transcript at 2380. He admitted that the concept of the cadence and

---

work "whether or not that work is changed" by the contracting officer's change order. Finding 2. Accordingly, where the parties are committed to assessing the impact of change or disruption on unchanged work, we have no objection to a qualified expert using these factors for that purpose.

rhythm of the work is a recognized one but one which it is difficult, if not impossible, to use for determination of a specific percentage of productivity loss. Id. at 2384.

We disagree with respondent's assessment of Mr. Huyghe's report and testimony. We found them highly credible and reliable for a variety of reasons. First is the expertise and experience of this witness. He has worked his way up through the ranks in the field of mechanical construction, working at different times as a laborer, apprentice, project engineer, assistant superintendent, scheduler, and project manager. He is a licensed contractor with academic training in construction management and an abundance of hands-on project management experience in mechanical construction. Difficult as the task may be, we believe that an expert with this experience and background should be able to comment competently even on such subtle realities of the workplace as cadence and rhythm of work or worker morale. See Finding 175.

Mr. Huyghe's assessment of T&S's labor productivity losses is far from a "guestimate" devoid of support. It stems from a thorough knowledge of the contract requirements and the actual history of contract performance. Findings 177-79. Based upon what he learned in this regard, he developed a methodology for assessing productivity losses which would do justice to the actual situations he found to exist at different times during the life of the project. Findings 183-84. Aware that appellant's claim relates only to unchanged work, he based his calculations solely on as-planned or budgeted man hours and distributed those man hours over the entire period of the contract in what we consider to be a reasonable manner. Findings 185-86.

Once Mr. Huyghe had determined the number of as-planned or budgeted hours for each building and for each period, he then proceeded to make his own assessment of the impact of Government actions on T&S's productivity for each building and each time period. For this purpose he made use of the MCAA inefficiency factors but calculated his own percentages rather than rely on those recommended for the MCAA factors. Finding 190. He testified that his assessment was based upon his knowledge and understanding of the project which, in turn, was derived from his numerous interviews with project personnel, his own extensive review of the project documents, his construction and analysis of an as-built schedule, his experience in the construction industry, and his expertise in assessing labor productivity losses. Finding 187. Clearly this type of analysis is founded upon and involves the continual application of the principles of cause and effect. In terms of principal causes, Mr. Huyghe undoubtedly looked to the mechanical design deficiencies which restricted T&S's ability to follow its performance plan, the addition of manpower to the project to mitigate the potential delays arising out of the design deficiencies, the need to reassign manpower to complete the directed installation of vibration isolation on plumbing and some HVAC piping, and the addition of change order work to the contract scope as T&S was struggling to complete its work in blocks D and C. Indeed these causes serve as the basis for the division of the project into distinct periods in order to enhance the accuracy of his assessments. See Findings 183-84, 189. All of this becomes apparent when one examines the textual support provided with his assessment of each factor for each of the three buildings during the various periods of construction. Finding 188.

Mr. Huyghe's principal task was to assess the impact of unanticipated changes and disruptions on the productivity of T&S's plumbing and HVAC piping crews in performing base contract work -- and then only as to the crews' performance of rough-in work. Finding 185. We find the conclusions he reached in this regard to be reasonable and well supported. See Findings 187-90. We find his estimate of the impact on base finishing work and equipment setting of fitters and plumbers (304 hours) to be reasonable and well supported as well. Finding 191.

Quantum (T&S's Claim)

Mr. Huyghe concluded that the base rough-in work of T&S's plumbing and piping crews suffered a total productivity loss, for which the Government was responsible, of 19,335 man hours. A separate calculation for the impact of the Government's directive to install vibration isolation on plumbing piping concluded that the plumbing and piping crews suffered an additional productivity loss, for which the Government was responsible, of 5441 man hours. To these figures he has further added 304 hours as the impact on the base finishing work and equipment setting of T&S's fitters and plumbers. Findings 187-91. This comes to a total of 25,080 man hours.

In addition to the labor productivity loss of 25,080 man hours, which appellant's expert concluded T&S piping crews experienced, T&S also claims compensation for other labor costs incurred as a result of the Government's disruption of planned contract performance. These include additional material handling of shop-fabricated material at the shop itself, additional material handling between the shop and project site, and additional supervision. We find the explanation offered in support of the 147 hours spent for additional material handling of shop fabricated material highly convincing. See Finding 193. We cannot say the same, however, for the claim of 1020 hours for additional material handling between shop and project site or for the 7132 hours for additional supervision.

With regard to the additional material handling between the shop and project site, T&S's operations manager explained that the overrun on the estimated hours for this item was the result of the number of changes over and above what one normally would have expected. He explained that through negotiated change orders the parties had agreed to the addition of a total of 814 hours to the contract but that during negotiations T&S had frequently disagreed with GSA on the number of hours that should be allowed for this work. Finding 194. Given the fact that the number of hours for this work has already been the subject of negotiation on various change orders, we have no intention of reopening the matter. In addition, to the extent that this has been a matter of negotiation, we suspect that we may well be dealing here, at least in part, with direct rather than indirect or cumulative impact. We decline, therefore, to grant this portion of appellant's claim.

With regard to the hours of additional supervision, T&S's operations manager explained that these are supervisory hours which were worked by foremen who were originally expected to work side-by-side with piping crews as "working foremen" but, owing to the various disruptions of performance, were required to work as full-time supervisors. This, he explained, resulted in a need to make up in some way for the labor deficit created by the foreman not being able to make his own physical contribution to the installment

effort. As the operations manager put it: "[S]omebody else had to take his place." Finding 195. We understand this to mean that either the original piping crew had to be augmented or the remaining members of the crew had to do additional work. In either event, any resulting increase in costs would not be in connection with the now full-time supervisory foremen (presumably their salary remained unchanged) but rather with the need to add man hours to the existing piping crews. We would, however, view this as the result of a labor production loss resulting from various disruptions. Mr. Huyghe was of course aware that T&S was not able to use its working foremen for the piping crews but instead was required to rely on them for full-time supervision. Transcript at 1862-63. We would, therefore, expect him to bear this fact in mind in making his calculations of production loss. Consequently, we decline to credit T&S with these hours as a separate element. These hours should already be accounted for in Mr. Huyghe's calculations.

The figure of $30.43 per hour which appellant has utilized to convert man hours to dollars is acceptable. Only the $2.40 component covering future costs due to accidents or injuries was questioned by GSA auditors, and then only because T&S could not explain at the time of audit how the figure was calculated. We find the explanation offered by T&S's operations manager at the hearing to be satisfactory. See Finding 196.

In light of the considerations set out above, we revise T&S's claim for man hour losses as follows:

	Period 1	Period 2	Period 3	Vibration Isolation	TOTALS man hours	AMOUNT ($)
Buildings D & C	1,250.30	5,909.78	969.38	2,861.51		
Buildings B & A	–	5,738.19	5,467.85	2,579.73		
SUBTOTALS	1,250.30	11,647.97	6,437.23	5,441.24	24,776	$753,933.68
Other Cost Codes					304	9,250.72
Material Handling (shop)					147	4,473.21
Material Handling (field)					0	0.00
Additional Supervision					0	0.00
TOTAL					25,227	$767,657.61

T&S also seeks certain labor-driven costs related to the labor losses which serve as the basis of its claim, namely small tools, project engineering, and equipment. As noted in our discussion of quantum in appellant's claim in GSBCA 14877, while it is the custom of GSA normally to view tool and equipment costs as time-related, the testimony of T&S's operations manager and a GSA auditor persuades us that T&S's treatment of these costs as labor-driven represents an acceptable approach in this case. See Finding 50. We are, therefore, with one exception explained below, prepared to allow these costs. We consider

the claim for small tools to be reasonable and allowable -- assessed as it is against the number of hours determined by Mr. Huyghe to be the responsibility of GSA. See Finding 199.

As to the claim for equipment costs, we disagree with the amount claimed, namely, $298,364. Finding 198. This figure is said to represent the adjusted balance of the overrun for this category of costs. Finding 201. Without any explanation, the entire amount is assessed against the labor production loss said to be attributable to the Government. Because this category of costs is deemed to be labor-driven, we see no reason why the $298,364 should not be spread over the entire labor overrun experienced by T&S for the project rather than be limited to that portion of the labor overrun for which we have found the Government liable. T&S has calculated the entire overrun to be 54,416 man hours. Finding 172. We have found that the Government is liable for 25,227, or 46.4% of this total labor overrun. We, therefore, award 46.4% or $138,441, of the equipment costs sought here by T&S.

In contrast to the equipment cost, the $69,682 sought for project engineering costs are closely tied to the labor production loss associated with the disruptions for which we conclude the Government is liable. Finding 200. We find them reasonable and sufficiently supported by documentation and testimony in the record.

As with the vibration isolation claim, we find the markups for overhead, profit, and bond to be acceptable. Finding 202. We, therefore, conclude that T&S is entitled to the following:

Total Productivity Losses (25,227 man hours)	$767,658
Small Tools	35,112
Project Engineering	69,670
Equipment	138,441
TOTAL DIRECT COSTS	$ 1,010,881
Overhead (12%)	121,306
Profit (10%)	113,219
Bond (.7%)	8,718
TOTAL	$ 1,254,124

Quantum (HPCC Claim)

HPCC's portion of direct costs associated with T&S's claim and the markups of the same appear to us to be fair and reasonable. The methods used to calculate or estimate the

various quality control and scheduling costs are both sensible and credible given the facts in this case. See Findings 205-08. As we have already seen, in connection with the vibration isolation claim, the markups are consistent with those used by the parties during the life of the NOAA project. See Finding 209.

Substituting the revised figure for the T&S portion of appellant's claim, we conclude that appellant is entitled to an award of $1,518,382 for its total labor productivity claim, which we break down as follows:

T&S Costs	$1,254,124
HPCC Commission on Subcontractor Costs (10%)	125,412
Subtotal	1,379,536
HPCC Costs	100,759
Subtotal	1,480,295
General Liability & Builder's Risk Insurance (.4%)	5,921
Subtotal	1,486,216
Performance & Payment Bonds (.6%)	8,917
Subtotal	1,495,133
City of Boulder Tax (3.11% x 50% of Cost)	23,249
TOTAL	$1,518,382

Is Respondent Entitled to a Credit for the Earlier Payment of $50,000?

The details surrounding the contracting officer's authorization in February 1997 of payment of $50,000 to HPCC are far from clear. Finding 72. The CRSS project manager referred to it simply as a "good faith progress payment in relation to CR85." Finding 70. The contracting officer, on the other hand, appears to have looked upon it as payment of an acceleration claim, distinct from a claim for impact on base contract work. He acknowledged that there was a schedule impact associated with the direct costs of CR85 and was apparently prepared to pay for the acceleration required to overcome this impact. Findings 71, 74, 77.

Can it be argued that since HPCC's certified claim seeks no direct relief for acceleration or schedule impact, but rather only for the impact of disruptions on base contract work, that the earlier payment of $50,000 should not be viewed as a partial payment of this claim? We think not. As we have already noted elsewhere, the cost associated with acceleration has, from the start, been inextricably enmeshed with HPCC's impact claim. Only at the insistence of CRSS, and later the contracting officer, was acceleration looked

upon as a separate element of the original claim filed in November 1997. See Findings 60, 74. The claim, as ultimately certified and submitted in July 1998 using the MCAA inefficiency factors as a tool for assessing impact, clearly looks upon acceleration as an additional source of disruption and not as the basis for a separate claim. In this regard, the certified claim, like the original claim submitted in November 1997, does not assert a separate claim for acceleration as such. It is obvious to us, from the facts of this case, that the authorization in February 1998 to pay appellant $50,000 represented an effort on the Government's part, possibly using its own theory of relief, to make at least a good faith partial payment of HPCC's claim submitted in November of the previous year. Since that claim, as subsequently certified, remained essentially the same, we consider it only fair that respondent be afforded a credit of $50,000 on the amount we conclude here to be due appellant.

Decision

The appeals which are the subject of this decision are both **GRANTED IN PART**. We find that appellant is entitled to payment of $577,777 for its claim regarding the installation of vibration isolation (GSBCA 14877) and to payment of $1,518,382 for its labor productivity claim (GSBCA 14744). With regard to the latter claim, respondent is of course entitled to a credit of $50,000 already paid to HPCC. Appellant is likewise entitled to payment of interest on each of these amounts, in accordance with the Contract Disputes Act, from the date of submission of its certified claims until the date of payment. 41 U.S.C. § 611 (1994).

_____
EDWIN B. NEILL
Board Judge

We concur:

_____
ANTHONY S. BORWICK
Board Judge

_____
MARTHA H. DeGRAFF
Board Judge