In the United States Court of Federal Claims

No. 04-954 C

(Filed January 7, 2008)

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METRIC CONSTRUCTION CO., INC.,	*	Contracts; Equitable Adjustment; Constructive Change Doctrine; Trial; Defective Specifications; Misrepresentation; Reasonableness of Contractor Action in Response to Communication by the Government.
Plaintiff,	*	
v.	*	
THE UNITED STATES,	*	
Defendant.	*	
* * * * * * * * * * * * * * * *	*	

Steven D. Meacham, Seattle, WA, for plaintiff.

Brian S. Smith, United States Department of Justice, with whom were *Peter D. Keisler*, Assistant Attorney General, *Jeanne E. Davidson*, Director, *Harold D. Lester, Jr.*, Assistant Director, Washington, D.C., for defendant.[1]

OPINION

Bush, *Judge*.

Metric Construction Company, Inc. (Metric) seeks $2,100,340, plus interest, court costs and attorneys fees, for costs it incurred during the construction of a

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[1]/ Ellen M. Lynch became counsel of record for defendant after post-trial briefing was complete.

building for the United States Army Corps of Engineers (Corps).[2]

BACKGROUND

In 1999, Metric was awarded Contract No. DACA05-99-C-0030 (contract) to construct the Deployable Medical Systems Warehouse (warehouse) at Hill Air Force Base in Utah. Compl. at 2. When the warehouse roof developed serious leaks, the Corps required Metric to install a new roof. Metric's claims before this court stem largely from the costs Metric incurred repairing water damage from the roof leaks, replacing damaged property in the warehouse and installing the second roof. On March 30, 2004, Metric submitted a certified claim for $2,173,091.85 to the Corps for these costs, but never received a final decision from the contracting officer.

Jurisdiction over Metric's claims is undisputed and exists pursuant to 41 U.S.C. § 609(a)(1) (2000). Metric pled three theories of entitlement to relief in this court: breach of contract, constructive change/extra work, and breach of implied warranty. Compl. at 5-6. These claims survived defendant's motion for summary judgment, primarily because of factual disputes related to the Corps' design of structural steel underlying the roof and the issue of whether the Corps' design specifications and communications with Metric misrepresented information critical to proper roof installation. *See Metric Constr. Co. v. United States*, 73 Fed. Cl. 611, 614-17 (2006).

Trial was held in Seattle, Washington in March 2007. The court has before it the trial transcript (Tr.), trial exhibits (DX and TX), and the parties' post-trial briefs (Pl.'s Br., Def.'s Br., and Pl.'s Reply). This matter is now ripe for decision.

DISCUSSION

I. Issues Being Tried

Metric now relies on a relatively straightforward theory of entitlement to an equitable adjustment to the contract for costs it incurred related to roof leaks at the

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[2]/ The parties stipulated to the costs incurred by Metric related to roof leaks at the building, although the issues of causation of the leaks, and partial or complete liability for the leaks, remain in dispute. Tr. at 15; Stip. of March 21, 2007.

warehouse. Metric alleges that the Corps' specifications for the steel underlying the roof were defective, and that Metric relied on those specifications. Metric also alleges that the defective specifications, and related communication by the Corps, were misrepresentations upon which Metric relied to its detriment.

Although defendant has a different theory of the case, alleging that Metric chose a roof system incompatible with the Corps' building design, in the court's view the most important analysis here, after trial, is whether plaintiff has met its burden to prove the elements of its entitlement theory. To the extent that defendant's framing of the legal issues central to this dispute fails to persuade the court, the court must review the evidence supplied by both parties to see whether it supports or rebuts plaintiff's arguments. Earlier in this litigation, the court rejected defendant's argument that, as a matter of law, Metric's claims must be dismissed because Metric failed to produce a workable roof in response to a performance specification, holding that plaintiff's theory of entitlement was plausible, if proved by evidence at trial.[3] *See Metric Construction*, 73 Fed. Cl. at 615 (noting that defendant's "argument does not directly refute Metric's contention that the Corps' plans and specifications were misleading and erroneous and that the information contained therein impaired Metric's ability to choose the correct roof product for the building when it was carrying actual loads").

Once again, the court is not persuaded by defendant's arguments, or the evidence offered at trial, that this dispute turns on the fact that Metric was allowed

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[3]/ The United States Court of Appeals for the Federal Circuit has explained the difference between performance specifications and design specifications:

> Performance specifications set forth an objective or standard to be achieved, and the successful bidder is expected to exercise his ingenuity in achieving that objective or standard of performance, *selecting the means and assuming a corresponding responsibility* for that selection. . . . Design specifications, on the other hand, describe in precise detail the materials to be employed and *the manner in which the work is to be performed*. The contractor has no discretion to deviate from the specifications, but is required to follow them as a road map.

P.R. Burke Corp. v. United States, 277 F.3d 1346, 1357 (Fed. Cir. 2002) (citations and internal quotations omitted) (emphasis in original).

to choose the roofing system which would work on top of the steel structure designed by the Corps. There is no dispute that the roof of the warehouse was a performance specification. *See Metric*, 73 Fed. Cl. at 615. But all of the relevant testimony at trial confirmed that the structural steel framework to which the roofing system was attached was a design specification. *See* Tr. at 586 (Mr. Griffes); 605 (Mr. Miller); 659-60 (Mr. Willard); *see also Conner Bros. Constr. Co. v. United States*, 65 Fed. Cl. 657, 685 (2005) (stating that "detailed measurements, tolerances, materials, and elaborate instructions as to how to perform the contract are of a design nature") (citation omitted). Because the steel framework was designed by the Corps and Metric was allowed no deviations from the Corps' design, the steel framework design specification carries with it certain responsibilities on the part of the government. *See Summit Timber Co. v. United States*, 677 F.2d 852, 857 (Ct. Cl. 1982) (noting that in some cases "the government is liable for damage attributable to misstatements of fact (in a contract or specifications) which are representations made to the contractor") (citations and internal quotations omitted). Because Metric's entire case is now based on alleged defects in, or misrepresentations regarding, the design of the structural steel members underlying the roofing system, defendant's argument regarding Metric's responsibility to install an appropriate roofing system in response to the Corps' performance specification is inapposite to the issues being tried in this case.[4]

Instead, the court must review the evidence proffered by the parties to see whether the specifications concerning the steel members underlying the warehouse roof were defective, and were relied upon by Metric in its roofing installation. The court must also determine whether the specifications and/or communication from the Corps misrepresented the steel framework of the warehouse, and whether Metric relied upon this misrepresentation and incurred costs as a result. Finally, the court must determine what portion of the stipulated amount of Metric's incurred costs related to roof leaks was proved to be related to Metric's reliance on either the steel specifications or communication from the Corps. But first, some review of the evidence concerning the warehouse's design and construction is warranted.

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[4]/ Defendant correctly asserts, however, that the Corps was under no obligation to design the building's steel framework so as to accommodate Metric's particular choice of a roofing system. Def.'s Br. at 29 (arguing that plaintiff has misunderstood the Corps' obligations, in that "Metric . . . appears to believe that it was incumbent upon the Government to design the structural steel so that it would be compatible with the roof that Metric would later select").

II. Building and Roof Construction

A. Relevant Evidence

Both parties called witnesses with personal knowledge of Metric's performance of the contract. Testifying for plaintiff were: Mr. Thomas Phillip Miller, president of Metric; Mr. Mark Green, who was part-owner of Professional Raingutter Service, Inc., Metric's roofing subcontractor; and Mr. Stuart Burnell, who works for Hainline & Associates, Inc., the construction management company which directed the work on the warehouse after disputes arose between Metric and the Corps. Testifying for defendant was Mr. Tim H. Willard, a project engineer for the Corps involved with the warehouse construction project.

In addition, both parties provided expert testimony. Testifying for plaintiff were: Mr. Burnell, an expert in construction estimating, who functioned both as an expert and percipient witness; Mr. Daryl Unrue, a roofing and waterproofing consultant; and Mr. Charles Griffes, a structural engineer. Testifying for defendant were: Mr. Richard S. Koziol, a roofing expert; and Mr. Raymond H.R. Tide, a structural engineer. The court found the expert and percipient witnesses presented by the parties to be credible.

The court did not observe a significant number of disputes as to what happened during the construction of the warehouse, or, specifically, in the description of the roof leaks that occurred. Indeed, the parties relied on each other's demonstrative exhibits to explain both the structural steel framework underneath the roof, and the roofing system attached to that framework, as well as on a trial exhibit which all agreed mapped the location of some leaks that occurred after the first roof had been constructed. *See* TX 19; DX 1001at 94-96. The parties also stipulated that the structural steel components of the building's framework had been manufactured according to the standards specified in the contract. Tr. at 600. Thus, in most respects, witnesses for both plaintiff and defendant relied on the same evidence, although their interpretations of the significance of that evidence differed. In one instance, however, the court excluded evidence proffered by defendant.

B. Bench Ruling Excluding Evidence Regarding the Second Roof's Performance

Defendant sought at trial to elicit testimony regarding the performance of the second roof placed on the building, from more than one witness. Tr. at 286-87, 491-92. Plaintiff objected, and the court sustained the objection for two reasons. First, the court did not find that adequate notice had been given to plaintiff or the court in the pretrial filings of defendant, so that it was understood that evidence of the alleged failure of the second roof would be offered at trial to prove that Metric's design choice for the first roof was faulty. *Id*. at 296. Second, the court ruled that evidence of the alleged failure of the second roof was irrelevant, because such evidence would not aid the court is resolving liability issues for the first roof. *Id.* at 297. Each of these points is discussed below.

When counsel for defendant explained that he planned to elicit testimony regarding the performance of the second roof, the court inquired as to where mention of the performance of the second roof could be found in defendant's pretrial filings. Tr. at 294. Pursuant to Appendix A of the Rules of the United States Court of Federal Claims (RCFC), the litigating parties must disclose before trial the facts and legal issues that will be placed before the court during trial. RCFC App. A ¶ 14 ("[T]he memorandum [of contentions of fact and law] shall contain . . . a statement of the issues of fact and law to be resolved by the court. The issues should be set forth in sufficient detail to enable the court to resolve the case in its entirety by addressing each of the issues listed."). Defendant's counsel responded that the issue was mentioned both in defendant's memorandum of contentions of fact and law and in its witness list. Tr. at 294-95.

Defendant's memorandum of contentions of fact and law never stated that a legal argument would be presented to the court wherein the performance of the second roof would be used to refute defendant's liability for the problems of the first roof. Instead, a passing mention of the second roof's alleged leaks was presented in the fact section of defendant's memorandum, with no further elaboration or legal argument asserting that the second roof's alleged problems would prove helpful in assigning liability for the first roof's leaks. *See* Def.'s Mem. ¶ 38 ("Although installed in an entirely different fashion, without any of the 'design' issues that Metric blames upon the Government and relies upon in support of its case, Metric's second roof has performed unsatisfactorily and suffers from many of the same functional defects as Metric's first roof."). The next section of defendant's memorandum, titled "Contentions of Law," as defendant's counsel admitted at trial, contains no mention of an argument that alleged leaks experienced after the second roof's installation disprove Metric's arguments

concerning the government's liability for the failure of the first roof.

Thus, neither the court nor plaintiff was on notice that trial evidence would discuss a theory that alleged performance problems with the second roof refuted Metric's contentions regarding the first roof. Defendant's counsel pointed out that another mention of the alleged problems with the second roof appeared in defendant's witness list, because that list stated that Mr. Willard would testify on, among other subjects, "his observations of the problems with both of the roofs installed by Metric." Def.'s Witness List ¶ 1. This comment does not, however, make up for defendant's lack of any mention of a legal argument positing that the second roof's performance was evidence negating Metric's theory of liability for the first roof.

The court ruled that, although passing mention of alleged problems with the second roof was made by defendant, adequate notice, in accordance with the court's pretrial procedures, of a legal argument concerning the relationship between the two roofs and their performance history had not been given to plaintiff or the court. For this reason, plaintiff would be prejudiced if evidence were to be admitted on this topic, and the court's management of the trial would be undermined if a continuance were to be provided to plaintiff to respond to the testimony elicited by defendant. Therefore, defendant was not allowed to present evidence regarding the alleged problems associated with the second roof installed on the building. *See White Mountain Apache Tribe of Ariz. v. United States*, 11 Cl. Ct. 614, 646-47 (1987) (holding that "new evidence utilizing a new theory" that was not part of pretrial exchanges should not be permitted to be introduced at trial); *Barrier v. United States*, 1 Cl. Ct. 674, 681 (1983) (stressing the importance of pretrial exchanges to both opposing counsel and the court, and rejecting plaintiff's attempt to raise new issues that went beyond the issues identified by the parties in their pretrial filings).

The court sustained plaintiff's objection for another reason. No expert reports had been prepared on the performance of the second roof. No expert report had analyzed the failure of the first roof by studying the performance of the second roof. No expert deposition testimony had been taken regarding the significance of the second roof's alleged leaks in analyzing the first roof's leaks. It appears that defendant proposed to offer testimony regarding observed leaks from the second roof, and opinion testimony regarding the significance of those leaks in determining liability for the first roof's leaks.

The court found that such evidence would not be relevant, under the Federal Rules of Evidence. "'Relevant evidence' means evidence having any tendency to make the existence of any fact that is of consequence to the determination of the action more probable or less probable than it would be without the evidence." Fed. R. Evid. 401. The first roof had been the subject of multiple expert reports, depositions, and tests. Theories of causation of the first roof's problems were thoroughly examined by the parties, and that attention provided meaningful evidence to be reviewed by the court. The second roof had not received the same attention. Therefore, observations and conjecture concerning its problems would be more of a distraction than a help in resolving liability for incurred costs attributable to the first roof's failure.

Finally, if the court understands defendant's contentions correctly, the alleged "proof" of Metric's liability for a roof design flaw suffers from a logical fallacy. Defendant's argument relies on several propositions. (A) Roof One may have had, as plaintiff has argued, excessive camber, and it leaked.[5] (B) Roof Two does not have excessive camber, and it leaks. *See* Tr. at 492 (defendant's counsel stating that the second roof "failed in the exact same way that the first one did and it didn't have any camber problems"). (C) Therefore, the cause of Roof One's leaks is not excessive camber. *See* Tr. at 281 (defendant's counsel stating that "[s]o the fact that the second roof suffers from the exact same problem [of many leaks] as the first roof and it apparently doesn't have anything to do with . . . most importantly, the problem that is being blamed on the Government [excessive camber in the roof] goes to whether that problem, that initial problem can in fact be blamed on the Government"). Defendant's conclusion is superficially attractive, but flawed.

Defendant's argument is only valid if excessive camber is alleged by plaintiff to be a *necessary* cause of all roof leaks at the warehouse, *i.e.*, that leaks could not occur in the absence of excessive camber. Excessive camber, however, has merely been alleged by plaintiff to be a *sufficient* cause of leaks at the warehouse, *i.e.*, that excessive camber is enough to cause some leaks at the warehouse. So the fact that the second roof does not allegedly have excessive camber and still leaks is irrelevant to plaintiff's contention that excessive camber caused the leaks in the first roof. The evidence proffered by defendant regarding

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[5]/ Excessive camber will be discussed in detail *infra*. Simply stated, camber refers to a curved or bowed surface as opposed to a flat surface.

the alleged leaks from the second roof would not have been determinative of liability for the first roof's leaks, and the issue of liability for alleged leaks from the second roof is not before the court in this lawsuit. For this reason, too, evidence of the second roof's performance was irrelevant, and was not permitted at trial.[6]

C. The Steel Framework Under the Roof

The warehouse is a large rectangular building enclosing about five acres of interior space, longer in the north-south direction than it is wide in the east-west direction. The central ridge-line of the roof runs north-south, and two fire-walls project through the roof in an east-west direction dividing the building into a north bay, middle bay and south bay. For each bay, the ridge-line divides the roof area into two approximately square sections of roof, each of which has a 4% slope from the ridge to the eave. TX 1 at A5.0. Water running off the roof travels approximately 200 feet from ridge to eave, east or west, at a very gentle slope. In winter, snow accumulates on the roof. Tr. at 456 (Mr. Burnell).

The steel framework under the roof has four components which are of special interest in this dispute. *See* TX 1 at S3.1 (south bay partial roof framing plan). Columns were erected along the ridge-line at regular intervals and from each ridge column, additional columns were placed approximately every 50 feet toward each eave. On top of the columns, following the east-west line from ridge to eave, were fastened joist girders whose top surface declines at a 4% slope, approximately.[7] On top of the joist girders were fixed closely-spaced joists running north-south. These joists provided the structure to which the roof would be attached. Viewed from above, the joist girders and joists form a grid of narrow rectangles oriented in the north-south direction. *See id.* In certain areas this grid structure was reinforced with X-shaped cross-braces made of steel plate, which were fixed on top of the joists. *See id.*

D. The Roofing System

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[6]/ Defendant made a brief proffer concerning the scope of Mr. Willard's proposed testimony regarding the performance problems of the second roof. Tr. at 685.

[7]/ The joist girders in question are structural steel beams approximately 48 feet long. Tr. at 519 (Mr. Griffes). Joists are another type of steel beam used in the steel framework of the warehouse. Tr. at 165 (Mr. Unrue).

The Corps specified that Metric was to choose and install a standing seam metal roof (SSMR) system on top of the underlying steel framework. TX 4. A standing seam metal roof consists of panels, long thin sections of flat metal roofing material, running from ridge to eave, joined together side-by-side by raised seams. In this case, the panels were not continuous panels running for approximately 200 ft., but were four panel sections of almost 50 ft. each, joined together by "endlaps" to make the full 200 ft. run from ridge to eave. In addition, Metric was to install a vapor barrier and insulation between the steel framework and the roofing panels.

According to the evidence presented at trial, the attachment of the standing seam metal roof to the steel framework by Metric's subcontractors resulted in the following configuration of materials. Thin plastic sheeting, the vapor barrier, was placed over the top of the joists, but was allowed to sag between the joists. Into these spaces between the joists, within the plastic sheeting, six inches of blanket insulation was laid, rolled out along the north-south axis of the building. In a perpendicular direction, three inches of blanket insulation was placed on top of the joists, rolled out along the east-west direction. Roof panels were placed in the same direction, east-west from ridge to eave, starting at one of the fire-walls or the roof's edge. Clips were hooked into the roof panel seams and screwed into the joists, before the seams were crimped shut, compressing the insulation underneath the panel. At the X cross-braces, the clips compressed not just the three inches of insulation laid on top of the joists, but another six inches of insulation would be compressed because that insulation had been laid over the X cross-braces rather than down between the joists. Subsequent panels were hooked to the open seam of the last panel, which was crimped shut by machine, and then were clipped to the top of the joists in a similar fashion as the roofers progressed across the bay's roof.

The Corps' specification for the SSMR stated that it should withstand changes in temperature throughout a range of up to 212 degrees Fahrenheit during the life of the roof. TX 4 at 8. Because sheet metal expands and contracts according to its temperature, the panels of a SSMR will expand and contract and this movement has to be accommodated by the design of the roof system. Because the roof is attached to the joists by clips, and the joists are not expanding and contracting in the same manner as the roof panels, the majority of the clips used to attach the roof to the joists have to be "floating" clips, which will allow a certain amount of movement back and forth as the roof panels expand and contract. Tr. at 174-75. If the clips do not allow free movement of the panels, a phenomenon which occurred at the warehouse, the forces of expansion and contraction will

cause the roof panel sections to grind away at each other in places where two panel sections would, by design, normally move in concert, and this grinding will cause damage which is likely to allow leaks. It is undisputed that many of the leaks at the warehouse were related to damage at the endlaps joining fifty foot sections of roof panels, caused by panel expansion and contraction that was not accommodated by the floating clips. *See* Def.'s Br. at 15 (stating that "we do not dispute that the primary fault in Metric's roof, and the reason why roof 'replacement' was necessary, was repeated and irreparable endlap failures"). The parties vigorously dispute, however, the issue of liability for the binding of the clips, and the issue of which factor or factors caused the clips to bind.

III. Evidence of Defective Specifications

A. Legal Standard

Under the constructive change doctrine, the government is liable for additional work caused by a constructive change to the contract. *See Aydin Corp. v. Widnall*, 61 F.3d 1571, 1577 (Fed. Cir. 1995) ("Where it requires a constructive change in a contract, the Government must fairly compensate the contractor for the costs of the change." (citing *J.B. Williams Co. v. United States*, 450 F.2d 1379, 1394 (Ct. Cl. 1971))). Several categories of constructive change have been identified: "(I) disputes over contract interpretation during performance; (II) Government interference or failure to cooperate; (III) defective specifications; (IV) misrepresentation and nondisclosure of superior knowledge; and (V) acceleration." *Miller Elevator Co. v. United States*, 30 Fed. Cl. 662, 678 (1994) (citations omitted). First, the court reviews the evidence presented at trial which goes to the issue of defective specifications. Metric contends that one of the specifications for the steel framework of the warehouse, related to the manufacture of the joist girders, was defective.

A contractor may rely on specifications provided by the government when constructing a building according to those specifications. *See Robins Maint., Inc. v. United States*, 265 F.3d 1254, 1257 (Fed. Cir. 2001) ("Whenever the government uses specifications in a contract, there is an accompanying implied warranty that these specifications are free from errors.") (citing *United States v. Spearin*, 248 U.S. 132, 137 (1918)); *Essex Electro Eng'rs, Inc. v. Danzig*, 224 F.3d 1283, 1289 (Fed. Cir. 2000) ("When the government provides a contractor with defective specifications, the government is deemed to have breached the implied

warranty that satisfactory contract performance will result from adherence to the specifications, and the contractor is entitled to recover all of the costs proximately flowing from the breach.") (citations omitted). "The test for recovery based on inaccurate specifications is whether the contractor was misled by these errors in the specifications."[8] *Robins Maintenance*, 265 F.3d at 1257. However, the government's implied warranty of its specifications is generally voided if the contractor does not follow those specifications. *Mega Constr. Co. v. United States*, 29 Fed. Cl. 396, 418 (1993) (citing *Al Johnson Constr. Co. v. United States*, 854 F.2d 467, 469-70 (Fed. Cir. 1988)). "It is well-established that contractors may be entitled to an equitable adjustment for increased costs of performance due to defective specifications." *Clearwater Constructors, Inc. v. United States*, 71 Fed. Cl. 25, 32 (2006) (citing *L.W. Foster Sportswear Co. v. United States*, 405 F.2d 1285 (Ct. Cl. 1969)); *see also AAB Joint Venture v. United States*, 75 Fed. Cl. 414, 429-30 (2007) (holding that when the specifications in a contract were largely inappropriate for the construction anticipated under the contract, the plaintiff could recover under a theory of defective specifications); *Sterling Millwrights, Inc. v. United States*, 26 Cl. Ct. 49, 88 (1992) (holding that because certain specifications, which consisted of "predominantly, if not completely, design specifications," were defective, the plaintiff was "entitled to be paid for the extra expenses and time it incurred in trying to complete the project").

Even if a specification is defective, however, contractors must be reasonable in their conduct during construction. *See Space Corp. v. United States*, 470 F.2d 536, 538 (Ct. Cl. 1972) (stating that "when a contractor is faced with an obvious omission, inconsistency or discrepancy of significance, he is obligated to bring the situation to the government's attention if he intends subsequently to resolve the issue in his own favor") (citations omitted). Contractors have a duty to inquire as to inconsistent specifications which include patent, that is, obvious or glaring, defects. *See E.L. Hamm & Assocs., Inc. v. England*, 379 F.3d 1334, 1339 (Fed. Cir. 2004) ("To demonstrate that it was misled, the contractor-claimant must show both that it relied on the defect and that the defect was not an obvious omission, inconsistency or discrepancy of significance – in other words, a patent defect – that would have made such reliance unreasonable."); *NVT Techs., Inc. v. United States*,

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[8]/ Whether Metric was misled by the allegedly defective joist girder specification is also part of Metric's misrepresentation claim. The primary distinction between the two claims is that Metric's misrepresentation claim also relies on further communication from the Corps concerning the joist girders.

370 F.3d 1153, 1162 (Fed. Cir. 2004) ("If the ambiguity is patent, it triggers a duty to inquire. A patent ambiguity is one that is 'obvious, gross, [or] glaring, so that plaintiff contractor had a duty to inquire about it at the start.'" (quoting *H & M Moving, Inc. v. United States*, 499 F.2d 660, 671 (Ct. Cl. 1974))). If the erroneous nature of a defective specification is not glaring or obvious, however, the contractor may recover if it has been misled by the specification. *See AAB Joint Venture*, 75 Fed. Cl. at 430-31.

B. The Joist Girder Specification

The dispute in this case focuses on the joist girders, and whether the Corps' design specification for the joist girders was defective. These joist girders were to be manufactured and certified to meet Steel Joist Institute (SJI) standards. TX 3 at 1. Individual joist girders were designated on the Corps' detailed construction drawings with information that would point the manufacturer to SJI tables regarding particular joist girder designs. TX 1 at S4.3; Pl.'s Br. at 9. The contract drawings indicated the dead loads and the live loads which would be applied to certain points along each joist girder.[9] TX 1 at S4.3. Metric contends that the dead loads indicated on the contract drawings were erroneous.

To understand the potential impact of erroneous dead loads on the design of the joist girders, two other aspects of the joist girders must be considered. The first is camber. A weight-bearing horizontal structural steel member such as a joist girder is normally constructed with a certain amount of camber, or an upward bowing of its top surface, so that when the dead and live loads are applied to the joist girder, the camber will permit the joist girder to remain relatively flat and not to sag downward excessively. The joist girders at issue here were manufactured with approximately an inch of camber, in the course of approximately 48 feet of length. Tr. at 519 (Mr. Griffes); TX 81 at 71. The other aspect of the joist girders is deflection, which is the amount of flattening that will occur once the dead and live loads are applied. Deflection calculations in the SJI standards rely in part on dead loads. TX 81 at 66. The parties have stipulated that the joist girders installed by Metric were manufactured in accordance to SJI designations and standards. Tr.

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[9]/ Weight borne by a joist girder is divided into dead load and live load. Dead load is "the weight that is always present, which in this instance was the weight of the steel itself, plus the other portions of the building that were held up by the steel." *Metric Construction*, 73 Fed. Cl. at 614 n.3. Live load is the "weight that is sometimes present; in this case, snow was the most important part of the live load." *Id.*

at 600. Metric's contention is that the joist girders were fabricated to accommodate the dead loads indicated on the construction drawings, as specified by the Corps, and because of the erroneous dead loads these joist girders did not deflect sufficiently when installed in the warehouse. If the dead loads experienced by the joist girders were actually lighter than those indicated on the drawings, the joist girders, designed for heavier loads, would, Metric alleges, remain bowed upward to an excessive degree, and would not provide the flat plane that would otherwise have been expected by the contractor.

The preponderance of the evidence presented at trial supports Metric's contention that the dead loads on the Corps' drawings were erroneous, that this error was not patent, and that the joist girder manufacturer relied on the erroneous information when fabricating the joist girders. First, Mr. Burnell calculated the actual dead loads burdening the joist girders and found them to be less than half of the dead loads indicated in the Corps' construction drawings. TX 73 at 12. Although defendant posited that the Corps could prefer to "overbuild" the structural steel to accommodate more dead loads than those that would actually be present upon building completion, Tr. at 109, the testimony of Mr. Griffes and Mr. Miller indicated that a contractor must be able to rely on the instructions given in the construction drawings as to the dead loads that would burden a joist girder, Tr. at 546 (Mr. Griffes); *id.* at 610-11 (Mr. Miller); *see also id.* at 699 (Mr. Willard) (agreeing with plaintiff's counsel's statement that a contractor could "rely upon the [table in the construction drawings listing live and dead loads on the joist girders] to say these are the dead loads and these are the live loads that we are going to experience on th[e] joist girder[s]"). Defendant did not rebut plaintiff's evidence that the actual dead loads were less than half of the dead loads indicated on the Corps' drawings. The court finds that the dead loads provided in the Corps' drawings were erroneous, and that the specification for the joist girders was defective for this reason.

Metric also proved that the dead load error in the construction drawings was not glaring or obvious. Up until the time that the roof plane was inspected by Mr. Green, Metric had no reason to question the dead loads indicated on the drawings. Tr. at 545 (Mr. Griffes) (stating that "only the Corps of Engineers' guys would know that . . . they specified dead load on a high end of the range"), 561 (Mr. Griffes) (stating that "I would never expect the joist girder, the steel joist guy to pick up on this nor would I expect Metric to pick up on it"). When Mr. Green noticed the roller coaster effect of the joist girders not deflecting to a flat plane,

Metric reasonably contacted the Corps for guidance as to the camber issue. For this reason, the court finds that Metric's actions were reasonable in relying on the construction drawings and in contacting the Corps once a potential problem had been discovered.

The manufacturer of the joist girders was a company named Valley Joist. Valley Joist was provided the Corps' construction drawings and subsequently designed the joist girders. Valley Joist relied on the construction drawings. TX 83. Mr. Griffes testified that Valley Joist fabricated the joist girders so as to comply with the construction drawings and SJI standards, which referenced the erroneous dead loads. Tr. at 517-24. Mr. Miller also testified that Valley Joist had to follow the Corps' plans and specifications in fabricating the joist girders. Tr. at 610-11. Thus, the joist girders from Valley Joist contained camber and deflection characteristics based at least in part on the erroneous dead loads provided by the Corps. Tr. at 533 (Mr. Griffes). The court finds that the joist girders were designed and manufactured to respond to dead loads which had been erroneously stated by the Corps in its construction drawings, and thus that Metric followed the defective specification provided by the Corps. The issue of reliance on the defective specification for the joist girders overlaps with the issue of the Corps' misrepresentation of the how the joist girders would perform when loaded, so the court turns to the issue of misrepresentation here. *See supra* note 8.

IV. Evidence of Misrepresentation

A. Legal Standard

As previously mentioned, misrepresentation is another category of constructive change. This particular type of constructive change occurs when the government has misrepresented information regarding a construction specification, and the contractor has relied upon the misrepresentation to his or her detriment. *See Miller Elevator*, 30 Fed. Cl. at 678 (citations omitted); *see also Meyers Cos. v. United States*, 41 Fed. Cl. 303, 311 (1998) ("'Misrepresentation occurs when the government misleads a contractor by a negligently untrue representation of fact, or fails to disclose information it has a duty to disclose.'" (quoting *John Massman Contracting Co. v. United States*, 23 Cl. Ct. 24, 31 (1991))). "Absent some valid basis for a contrary conclusion (*e.g.*, an absence of detrimental reliance by a government contractor, a failure to investigate 'sources which would have revealed the truth,' or the like), the government 'is liable for damage attributable to

misstatements of fact (in a contract or specifications) which are representations made to the contractor.'" *Summit Timber Co. v. United States*, 677 F.2d 852, 857 (Ct. Cl. 1982) (quoting *Flippin Materials Co. v. United States*, 312 F.2d 408, 413 (Ct. Cl. 1963)) (other citations omitted). "In order for a contractor to prevail on a claim of misrepresentation, the contractor must show that the Government made an erroneous representation of a material fact that the contractor honestly and reasonably relied on to the contractor's detriment." *T. Brown Constructors, Inc. v. Pena*, 132 F.3d 724, 729 (Fed. Cir. 1997); *see Helene Curtis Indus., Inc. v. United States*, 312 F.2d 774, 778 (Ct. Cl. 1963) ("Specifications so susceptible of a misleading reading (or implication) subject the defendant to answer to a contractor who has actually been misled to his injury.") (citations omitted). It is of no consequence that such misrepresentations may have been innocent and inadvertent, as long as they are material and the contractor suffers increased costs of performance as a result. *Summit Timber*, 677 F.2d at 857 (citing *Everett Plywood & Door Corp. v. United States*, 419 F.2d 425, 431 (Ct. Cl. 1969) and *Morrison-Knudsen Co. v. United States*, 345 F.2d 535, 539 (Ct. Cl. 1965)). In addition, if the government misrepresents information regarding its specifications in its communications to the contractor during performance, the government may be liable if the contractor relies on such misinformation. *See Max Drill, Inc. v. United States*, 427 F.2d 1233, 1243 (Ct. Cl. 1970) ("When an official of the contracting agency is not the contracting officer, but has been sent by the contracting officer for the express purpose of giving guidance in connection with the contract, the contractor is justified in relying on his representations [and may be entitled to an equitable adjustment for such misrepresentations of fact material to contract performance].") (citing *Fox Valley Eng'r, Inc. v. United States*, 151 Ct. Cl. 228, 240 (1960)).

Metric has alleged two instances of misrepresentation that impaired its ability to select and install a functioning roof for the warehouse. First, Metric alleges that the contract drawings and specifications misrepresented the dead loads on the joist girders, which would have produced a flatter roof plane if the stated dead loads had been correct. Because the roof plane was not flat enough once all of the dead loads had been applied, Metric asserts that the roof panels could not move smoothly in response to temperature changes. Metric concludes that the roof, installed in reliance on the joist girder specifications, was damaged because of binding and grinding panels which eventually produced severe leaks in the roof. Second, Metric alleges that the Corps misrepresented the flatness of the roof plane that would eventually occur, when Mr. Green brought up the issue of potentially

excessive residual camber in the roof joists.[10] Metric contends that if the Corps had clearly answered the question about camber and dead loads in Request For Information (RFI) 173 and had not misled Metric, the roof installation which proceeded on top of excessive camber could have been avoided and the leaks would never had occurred. Metric concludes that it reasonably relied on the Corps' communication in RFI 173, which was a material misrepresentation for which the Corps is now liable. The court will review each of the alleged instances of misrepresentation in turn.

B. Joist Girder Specification

Two entities, besides Metric and the Corps, played a role in the choice and installation of a SSMR on the warehouse. Professional Raingutter Service, Inc., partly owned by Mark Green, was the installer and Metric's roofing subcontractor. Mr. Green had several years of experience with SSMR systems. Tr. at 326-27. Mr. Green provided the Corps' relevant drawings, plans and specifications for the warehouse to MBCI, a company that manufactured standard roofing products. MBCI has extensive experience with SSMR roofing systems, and is a major supplier of roofing materials, including a product called the SuperLok Roofing System. TX 12 at 2; Tr. at 153-54 (Mr. Unrue); *id.* at 441-42 (Mr. Green); *id.* at 623 (Mr. Miller). Based on the specifications, Mr. Green and MBCI chose the SuperLok SSMR to propose to the Corps. Tr. at 329 (Mr. Green). The Corps approved the SuperLok system after requesting some minor modifications in the design of certain flashing elements. Tr. at 332 (Mr. Green).

The SuperLok system had certain tolerances for the flatness of the plane of the roofing panels as they ran from ridge to eave: 1/4 inch variation in 20 feet and 3/8 inch variation in 40 feet. TX 12 at 2. Metric established that the flatness requirements of the SuperLok roof recommended by MBCI were fairly standard for SSMR roofing systems. Tr. at 142-43, 207-10 (Mr. Unrue); *id.* at 615 (Mr.

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[10]/ The terms "residual camber" and "excessive camber" are used somewhat interchangeably in this opinion to describe the phenomenon of the upwardly bowed surface of the joist girders that did not adequately deflect to a flatter surface, once loads had been applied to the steel structure. These terms were similarly used at trial. *See, e.g.*, Tr. at 576 (defendant's counsel); *id.* at 625 (Mr. Miller); *id.* at 800 (plaintiff's counsel); *id.* at 802 (Mr. Tide). The phenomenon of the bowed surface of the installed joist girders, according to Mr. Griffes, is more precisely described as the "deflected shape" of the joist girder. *Id.* at 535-36. The court reluctantly sacrifices precision of terminology for clarity.

Miller). Before the steel joist girders were erected, no one questioned whether the structural steel and the SuperLok flatness requirements were compatible. Nothing in the Corps' design documents would have alerted Metric that the joist girders would not lie flat enough for the roof plane required by the SuperLok roofing system once dead loads were applied, Tr. at 561 (Mr. Griffes), and the contract did not require that Metric check the Corps' specifications for defects that were not glaring or obvious.[11] In fact, the only party that might have had knowledge of the dead load inaccuracy in the contract drawings, before the steel was actually in place, was the Corps.

A preponderance of the evidence shows that the roof selected by Metric was designed to perform satisfactorily based on the representations in the construction drawings. Tr. at 449 (Mr. Green). Metric was entitled to rely upon the Corps' specifications and Valley Joists' certifications, which in the normal course would have produced an adequately flat roof plane for the SuperLok SSMR. Tr. at 543 (Mr. Griffes). The court finds that the Corps misrepresented the dead loads that the joist girders would experience, and thus also misrepresented the flatness of the joist

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[11]/ Defendant appears to suggest that the contract specifications for the SSMR placed all responsibility for the compatibility of the roof system and the underlying steel framework on Metric, and that "it was *Metric's* responsibility to perform the engineering analysis to ensure that Metric's roof selection would perform correctly." Def.'s Br. at 29 (emphasis in original). This argument fails. First, the specification in question merely commands, in general terms, that the standard manufacturer's SSMR product selected by the contractor has undergone independent testing to make sure that it is capable of withstanding the types of conditions specified in the contract and to comply with the SSMR design specifications. *See* TX 4 at 5 ("The Contractor shall furnish a manufacturer's standard product which satisfies all requirements contained herein and has been verified by load testing and independent design analyses to meet the specified design requirements."). The court does not read this specification to imply that Metric itself would hire an engineer to test its selected commercial product against the warehouse's design specifications for all building specifications including the structural steel. Even if a requirement that Metric conduct an engineering analysis could be read into this specification, a reading that is not evident from the specification itself, such an analysis would appear to be focused on testing the SSMR against specific maximum conditions that could threaten the roof panels such as wind uplift, thermal movement, snow loads, etc., rather than examining and rechecking all of the Corps' calculations present on the face of the contract drawings. *See* TX 4 at 8. The other specification pointed to by defendant refers only to testing required for proposed additions/revisions to the structural framework underlying the SSMR, and is thus inapplicable to this dispute because Metric did not attempt to modify or add to the Corps' design specifications for the joist girders and joists providing support for the SSMR. Tr. at 696-98 (Mr. Willard).

girders once they were erected.[12] The issue of whether or not Metric reasonably relied on this material misrepresentation to its detriment can only be resolved by reviewing the Corps' response to RFI 173, Metric's inquiry into the residual camber in the joist girders that might impair the functioning of the SuperLok roof, and the events that followed Metric's receipt of the Corps' response to RFI 173.

C. Request for Information (RFI) 173

Mr. Green was the first one to notice that the top surfaces of the joist girders on the warehouse retained enough camber, once erected, to create a "roller coaster" effect from ridge to eave when observed at eye-level. Tr. at 333-34. Mr. Green was concerned that this camber in the joist girders might not flatten once all dead loads were placed on the joist girders, and communicated his concern to Metric. *Id.* at 335-36. Metric was concerned about unnecessary delays and directed Mr. Green to take the Corps' project engineer, Mr. Willard, up in a lift to view the camber in the joist girders at eye-level, so that there would be no confusion as to what Mr. Green had observed. *Id.* at 336. According to Mr. Green, Mr. Willard agreed that there was "considerable distortion" in the roof plane. *Id.* Mr. Willard testified that he did go up in a lift to look at the roof plane distortion issue. Tr. at 674. Mr. Willard testified that there was too much camber in the joist girders and that there was a roller coaster effect.[13] Tr. at 703.

None of the percipient witnesses had exact measurements of the remaining

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[12]/ Defendant argues that the dead load figure given by the Corps in its drawings could not have represented any actual dead load amount, because Metric's choice of a roofing system, itself a component of the dead load, had not been determined at the time the Corps created the drawings. Def.'s Br. at 17 n.8. However, as plaintiff points out, it does not appear from the evidence presented at trial that different SSMR products that would meet the Corps' SSMR specifications offer significant variations in weight. Pl.'s Reply at 2 n.2. Defendant's contention that a dead load figure given in the contract drawings could not have estimated the weight of most SSMR systems that would meet the Corps' specifications is unaccompanied by citation to any testimony or expert evidence that would support defendant's argument. Nor is the court aware of any evidence that would support defendant's theory. Thus, the court concludes that the Corps' dead load figures in the contract drawings were intended to include the weight of the SSMR chosen by Metric and were intended to give accurate information upon which Metric could rely.

[13]/ The joist girders did not flatten adequately even after the first roof was installed on top of them. Tr. at 151-53 (Mr. Unrue); *id.* at 459-61 (Mr. Burnell).

camber in the joist girders, at this stage of the construction, or a firm estimate as to how many of the joist girders were not flat enough for the SuperLok roof system. Mr. Green testified that the camber issue was not "minimal." Tr. at 342. After the roof began to leak, Mr. Unrue said that the camber issue was present in "numerous locations" and was "repetitive[] . . . in a straight line," *id.* at 152, and Mr. Burnell said that "the bows and bumps in the roof . . . went from what we call the columns to the columns," *id.* at 459. According to Mr. Tide, who surveyed several joist girders a few years later, almost 70% of the joist girders might have had enough residual camber to exceed the flatness requirements of the SuperLok roof. Tr. at 826. Thus, Mr. Green had noted and alerted the Corps' project engineer to a serious and widespread potential problem with the joist girders and the flatness requirements of the roofing system that was about to be installed.

Metric requested guidance from the Corps in RFI 173:

> DISTORTION OF STANDING SEAM METAL ROOF
>
> Due to the cambers on the open web joists, joist girders and steel trusses, which differ as the span changes, the eave to ridge lines of the roof framing are not on an even plane. These inconsistencies may lead to the distortion of the standing seam metal roof panels beyond the tolerable allowance. Attached please find a copy of the manufacturer[']s information sheet where item No. 6 gives us the tolerable distortion per panel length. Please provide us guidance into this matter before we proceed with the installation of the roof panels.
>
> [CORPS] RESPONSE
>
> JOIST & JOIST GIRDERS MANUFACTURED IN ACCORDANCE WITH THE SJI SPECIFICATION SHOULD BE AT THE RECOMMENDED TOLERANCE LEVEL. SHIMS UNDER THE CONCEALED FASTENERS MAY BE REQ'D WHERE TOLERANCES ARE EXCEEDED. ROOF INSTALLER SHOULD FIELD VERIFY PRIOR TO ERECTING PANELS.

TX 12 at 1. To rephrase RFI 173 to convey only its most pertinent statements and request: (1) the joist girders, because of their camber, provide an uneven top surface for the roof plane running from ridge to eave; (2) roof panels may thus be distorted beyond acceptable tolerances for the roofing system; (3) attached, please see the tolerances for variation in the roof plane; and (4) please provide guidance before we install this roof. According to the preponderance of the testimony at trial, there also was an implicit question in RFI 173, namely: "This is the camber that you asked for; will this camber cause us problems once the roof is on and all the dead and live loads have been applied to the joist girders?" *See* Tr. at 335 (Mr. Green) (noting that the steel framework and roof are "dynamic" and come to "a final resting point" once construction has been completed), 371-72 (noting that as a roofer he could not predict whether a roof plane that was out of tolerance before installation of an SSMR would be flat enough to be within tolerance for the SSMR after construction was complete); *id.* at 574-75 (Mr. Griffes) ("[M]y opinion is the RFI was as good you ever might get f[rom] a contractor and . . . even then somebody should have said, hey, whoa, we might have a problem with this because we might really get something a lot less than what was specified for dead load"); *id.* at 625 (Mr. Miller) (summarizing RFI 173 as an opportunity to "get a hold of the Corps of Engineers and find out, you know, these are the guys that designed it, let's find out if we really have a problem"), 627 (paraphrasing RFI 173 as "basically asking, you know, what's going to happen with these joists and joist girders when this building gets built and the loads are applied, are they going to fall within these tolerances or not?").

The Corps' response to RFI 173 permits a variety of interpretations. TX 12 at 1. Mr. Green's interpretation of the Corps' response was that he was being asked to shim the roof to cancel out all of the remaining camber in the joist girders, that such a course of action was unwise, because some amount of camber was typically needed prior to installing the roof, and that shimming was not his job if indeed that was the Corps' solution to the camber issue.[14] Tr. at 342 (stating that "it was a conflicting directive to me" and that he told Metric "if somebody wants the roof shimmed have somebody do it and call me when it's done"). Mr. Willard, the author of the Corps' response to RFI 173, admitted that he had limited

[14]/ A shim is a piece of steel used to correct for variances in the plane of a structural steel framework. Shimming, as referred to in RFI 173, might mean placing steel shims of varying thicknesses between the joists and the roof panel clips, or between the joist girders and the joists themselves, to nullify the roller coaster effect caused by the residual camber in the joist girders. Tr. at 73-74 (plaintiff's counsel).

experience with SSMR systems before the warehouse project. Tr. at 686-87. He also testified that when he viewed the "roller coaster" distortion of the roof plane that he expected some of that camber to flatten as more dead loads were applied to the joist girders. Tr. at 703. Mr. Willard appears to have somewhat changed his description of the intent of the communication in the Corps' response from the time of his deposition to the time of his testimony at trial. *See id.* at 706-15. At the time of his deposition, Mr. Willard appeared to have understood that his response to RFI 173 suggested that Metric shim the steel framework, if necessary, only after the roof was installed. *Id.* at 713. At the time of trial, Mr. Willard stated that his response to RFI 173 was intended to have Metric make corrections to the roof plane, if needed, before installing the roof. *Id.* at 676. What is certain is that Mr. Willard, at the time he received RFI 173, did not check the dead load information that the Corps had provided to Valley Joist to confirm that Valley Joist had not been misled into fabricating joist girders that would not flatten enough to be compatible with the SuperLok roof. *Id.* at 715.

Mr. Miller interpreted the first sentence of RFI 173 as a conditional go-ahead, suggesting that if Valley Joist had fabricated the joist girders in accordance with SJI specifications, that the roof plane would not exceed the tolerance of the SuperLok roof when construction was complete. Tr. at 627-28. This is a reasonable, although not unassailable, interpretation of the first sentence of the response to RFI 173. In Mr. Miller's estimation, the other two sentences suggested techniques for coping with irregular joist girders that had not been correctly fabricated, and exceeded SJI tolerances. *Id.* at 628. He was not very concerned about fabrication issues, he said, which were rare in his experience, and was satisfied that the Corps had reassured Metric that the design for the joist girders was compatible with the SuperLok roof. Tr. at 629-30. Mr. Miller testified that Valley Joist had also been contacted by a Metric employee concerning the joist girders, and the fabricator had confirmed that when the dead loads predicted by the Corps were applied, that the camber issue would be adequately resolved. Tr. at 626, 629.

Although the communication between the Corps and Metric was not a model of clarity, the court agrees with Mr. Griffes that in the context of a large construction project, the RFI from Metric, and Metric's interpretation of the Corps' response, was reasonable conduct. Tr. at 574-75; *see also id.* at 640 (Mr. Miller) (noting that Metric was "under a deadline . . . and wanted to get the project done"). The evidence shows that Metric reasonably inquired into a potential compatibility

issue between the Corps' steel framework design and Metric's choice of the SuperLok roofing system, and was reassured by both the Corps and Valley Joist that the residual camber would subside after construction was complete. Once Metric had raised the issue of variation in the roof plane and the tolerances of the SuperLok SSMR, the Corps could have clearly indicated that it was not going to investigate the potentially excessive camber issue, or could have suggested that Metric do so. Instead, the Corps stated that "joist & joist girders manufactured in accordance with the SJI specification should be at the recommended tolerance level." TX 12 at 1.

The parties have stipulated that the joist girders were manufactured in accordance with SJI specifications. The court finds that the Corps misrepresented, in RFI 173, the residual camber of the joist girders, by stating that the joist girders would be within tolerances if manufactured according to SJI standards. Further, the court finds that Metric relied on the Corps' misrepresentation in RFI 173 when it proceeded to install the SuperLok roof. *See* Tr. at 629-30 (Mr. Miller) (stating that Metric conducted field verifications to ensure that the joist girders met SJI specifications, and then directed Mr. Green to proceed with the first roof's installation).

V. Costs Incurred by Metric Related to Roof Leaks

A. Causation

It is undisputed that many endlaps connecting the sections of roof panels failed. This failure was due to thermal expansion and contraction of the sheet metal panels, which, because the roof panels could not freely slide in the directions they were designed to move, instead caused the panel sections to work against each other and damage the roof in ways that allowed water to enter the building. Tr. at 352 (Mr. Green). When the damage was repaired, recurring thermal movement would cause the same damage again. *Id.* at 352-53. Experts who analyzed the roof's problems agreed that endlap failure was a major cause of leaks. *Id.* at 149-51 (Mr. Unrue); *id.* at 752 (Mr. Koziol).

It is also undisputed that while other leaks in the roof could have been repaired, replacement of the entire first roof, either by ripping it off and starting fresh, or by covering it over with a second roof, was necessary because there was no permanent fix for the endlap failures due to the binding of the clips and

misdirected thermal movement, which would continue to occur over the lifetime of the building. *See* Tr. at 202 (Mr. Unrue); *id.* at 752 (Mr. Koziol). Other solutions besides roof replacement were discussed, proposed and rejected. *Id.* at 467-70 (Mr. Burnell); TX 64. Eventually, however, the Corps approved a plan to cover the first roof with a second roof. Tr. at 463-64 (Mr. Burnell). Of Metric's stipulated costs related to leaks in the roof, most were incurred installing a second roof over the first one. Stip. of March 21, 2007 (showing that before profit and overhead were applied, the costs designated "[i]nstall temporary repair and install new roof" were approximately 86% of all of Metric's incurred costs related to roof leaks); Tr. at 15.

Although defendant attempted to show that other causes besides residual camber in the joist girders led to failure of the endlaps, Metric proved by a preponderance of the evidence that camber was the primary cause of endlap failure. There were several potential causes of endlap failure that were discussed by the witnesses at trial, including the residual camber in the joist girders, the compressed insulation in between the X cross-braces and the roof panels, the "hockey sticking" of the four roof panel sections in each run that did not perfectly align, and the angle of the joists as opposed to the angle of the roof panels, all of which might have had a tendency to cause the clips to bind the panels and to prevent appropriate roof panel movement in response to temperature changes.[15] The residual camber in the joist girders was proven to have caused most of the endlap failures.

Mr. Unrue, the only roofing expert who both examined the first roof before it was covered over and testified at trial, concluded that camber in the roof joists caused the roof plane to distort beyond the tolerances of the SuperLok roof and impeded proper thermal movement. Tr. at 151. He analyzed other potential causes that might have prevented the roof panels from moving properly, and concluded that excessive camber was the primary cause of endlap failure. *Id.* at 224. Mr. Unrue conducted significant research in his search for the cause or causes of the roof's failure, analyzing the amount of friction that might have been caused by compressed insulation, and the binding that might have occurred due to "hockey sticking" of roof panel sections. He concluded that residual camber in the joist

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[15]/ In each run from ridge to eave, four roof panel sections were connected by endlaps. If, in the process of their installation, the four panel sections were positioned in a slightly crooked fashion, rather than in a perfectly straight line, this condition was referred to at trial as a "dog leg," or "hockey sticking." Tr. at 128-29.

girders was the primary cause of endlap failure. The court found Mr. Unrue's testimony to be persuasive.

Mr. Green concurred that the insulation compressed over the X cross-braces would not be a problem. Tr. at 405. He was more concerned about the potential for binding of the clips due to the roller coaster effect attributable to the camber in the roof joists. *Id.* at 393. Mr. Burnell testified that camber was generally considered by those at the construction site to be at the root of the leaks problem. *Id.* at 461, 466, 471. According to Mr. Burnell, the Corps expressed concern about one repair proposal because it was not evident how the suggested repair would address the excessive camber issue. *Id.* at 470. Mr. Griffes, a structural engineer, concurred that camber likely to have existed in the joist girders would have interfered with appropriate thermal movement of the roof panel sections. *Id.* at 544. Plaintiff's witnesses established that residual camber in the joist girders directly contributed to binding of the clips and endlap failure, and was indeed the primary cause of endlap failure.

Defendant's expert, Mr. Koziol, did not inspect the first roof before it was covered by the second roof, and based his conclusions largely on the expert reports of others who had analyzed the first roof's failure. Tr. at 754-55. He conducted no independent tests, and did not interview the authors of previous expert reports. *Id.* at 755. Although Mr. Koziol exhibited a great understanding of roof design and roof leaks, his lack of personal observation or experience with this roof rendered some of his opinions less credible than those of Mr. Unrue. For example, Mr. Koziol assumed that one variation in the roof plane measured by Mr. Unrue was due to insulation, rather than due to excessive camber, but Mr. Koziol had not observed or measured that area on the roof. *Id.* at 737. Mr. Koziol opined that compressed insulation caused most of the endlap failures, based at least in part on an earlier expert report that he had not authored. Tr. at 753-54. Although the court believes that compressed insulation caused some resistance, as established by tests conducted by Mr. Unrue, *id.* at 224, the court does not find that compressed insulation at the X cross-braces was the major cause of the endlap failures.

Mr. Koziol also opined that resistance on roof panel movement was created by a 4% divergence between the angle of the joists and the angle of the roof plane. Tr. at 768. However, Mr. Koziol did not measure the roof to confirm that there was a 4% divergence, nor did he test the clips to determine whether a 4% divergence would create resistance, or measure how much resistance would have

been caused by a 4% divergence between the joists and roof plane. Tr. at 768-71. None of the other roofing experts examining the leaky roof had identified a 4% divergence between the joists and the roof plane, or attributed roof leaks to that phenomenon. The court finds that any resistance related to the angle of the joists was not established to have been a major cause of endlap failure.

Defendant also posited that if Metric had constructed a roof with no endlaps, there would have been no endlap failures. Def.'s Br. at 24 (describing the endlaps as numerous and unnecessary). Therefore, defendant concludes that any endlap failures are related to Metric's choice of a roof design, not to the Corps' liability for defective specifications and misrepresentations concerning the joist girders. *Id.* In the same vein, defendant argues that Metric could have chosen a roof product which used an articulating clip, which might have reduced resistance and avoided endlap failure. *Id.* at 28. Similarly, defendant argues that Metric could have chosen a roof product that would have tolerated the camber in the joist girders and avoided the problems it encountered with the SuperLok roof. *Id.* at 25 (stating that "Metric compounded its problem by choosing the Superlok system"). In hindsight these are all colorable propositions that might have merit.

All of these arguments suppose, however, that Metric should have known that the joist girders would not flatten once actual dead loads were applied to them. The court has found, instead, that Metric was entitled to rely upon the Corps' specifications and its communications regarding the joist girders. *See supra*. Therefore, defendant cannot escape liability by suggesting roof designs that would have worked better than the roof system chosen by Metric, when the evidence shows that the SuperLok system's tolerances could have been met if the joist girders had performed as expected. The SuperLok system, with endlaps, was not described as an unusual or risky choice by any of the witnesses at trial.

The court concludes that residual camber in the joist girders was the primary cause of endlap failure, and that the Corps is liable for the costs Metric incurred which are attributable to this problem.

B. Quantum

Although the primary reason the first roof needed to be replaced was the failure of the endlaps, and the primary reason the endlaps failed was due to residual camber in the joist girders, Metric's costs related to roof leaks cannot all be

attributed to the defective specification for the joist girders and the Corps' misrepresentations regarding the camber issue. The court first examines the evidence relating endlap failure to leaks in the roof. Next, the court assesses the relative importance of camber to the failure of the endlaps. Finally, the court computes the amount of damages attributable to the Corps' liability for defective specifications and misrepresentation regarding the joist girders.

At trial, variously expressed but consistent estimates were presented as to how many of the leaks in the first roof were attributable to the failure of the endlaps. Mr. Green estimated that approximately 90% of the leaks were related to failures of the endlaps. Tr. at 354. Mr. Koziol testified that the endlaps were a major source of leaks in the first roof, *id.* at 752, and reported that leak locations "primarily coincid[ed] with the location of roof panel end laps," DX 1001 at 11. Mr. Unrue testified that endlap failures were pervasive and "the major points of water entry" through the first roof. Tr. at 149-51. Identifying, with perfect certainty, the cause for each individual leak, or the damage caused by a particular leak, was neither attempted by nor deemed feasible by any of the witnesses at trial. *See id.* at 778 (Mr. Koziol) (commenting that an identified leak could be one leak, or ten different leaks in the same general area).

Numerous other leaks in the first roof, caused by workmanship issues in installing the roof, occurred some distance away from the endlaps joining roof panels. These other leaks were consistently described as being less serious, and more easily reparable, than the leaks caused by the failure of the endlaps. The weight of evidence showed that the first roof required replacement largely because the endlaps had failed. *See, e.g.*, Tr. at 752 (Mr. Koziol); Def.'s Br. at 15. Considering all of the evidence presented at trial, the court finds that the failed endlaps caused most of the leaks and costs associated with leaks in the roof. Tr. at 354 (Mr. Green); *id.* at 733 (Mr. Koziol). The court adopts 90% as the correct percentage to apply to the total costs incurred by Metric because of roof leaks, as the amount attributable to leaks caused by endlap failures. Mr. Green, who testified to the 90% figure, had the most direct knowledge of the roof leaks as they occurred and recurred, and this figure roughly corresponds to the percentage of incurred costs that could be directly attributed to replacing the roof. *See* Stip. of March 21, 2007 (showing that the line item titled "[i]nstall temporary repair and install new roof" comprised approximately 86% of Metric's incurred costs related to roof leaks).

Of several potential causes for endlap failure, where thermal forces were misdirected by clips binding the free movement of the roof panel sections, the court has found that the evidence weighs most heavily in favor of plaintiff's contentions. The primary cause of binding was the out-of-plane shape of the joist girders. Neither compressed insulation, nor the irregular installation of the roof panels in a "hockey sticking" manner, nor the angle of the clips, by itself, was shown to have provided significant resistance to panel movement. Tr. at 218, 223-24, 308-09 (Mr. Unrue); *id.* at 754, 768-71 (Mr. Koziol). The insulation and "hockey sticking" problems cannot be totally discounted, however, given expert testimony suggesting that additional pressure on the clips was exerted by these conditions. Tr. at 223-24 (Mr. Unrue), *id.* at 736 (Mr. Koziol). There was also some evidence that the camber issue was not uniform throughout the entire roof, based on measurements taken not long before trial, which may or may not have represented the situation that existed at the time that the first roof developed leaks. Even if the survey of camber was perfectly indicative of conditions in existence during the relevant time period, that evidence showed that around 70% of the joist girders sampled did have excessive camber. *Id.* at 826 (Mr. Tide). Weighing the totality of the evidence, the court finds that residual camber in the joist girders caused 70% of the endlap failures, a percentage which roughly corresponds to the joist girder survey results compiled by Mr. Tide, and analyzed by plaintiff. *See id.* at 827-30; TX 89.

Metric's incurred costs related to the failure of the first roof were stipulated by the parties to total $2,100,340. Tr. at 15; Stip. of March 21, 2007. The court has found that only 90% of these costs were related to endlap failure. Thus, the portion of Metric's incurred costs related to endlap failure is $1,890,306. The court has found that only 70% of the endlap failures were proven to be related to the residual camber of the joist girders, for which the Corps is liable. Thus, the portion of Metric's incurred costs related to endlap failure for which the Corps is liable is $1,323,214.20. Metric is entitled to an equitable adjustment increasing the Corps' payment responsibility in the amount of $1,323,214.20. This figure represents the portion of Metric's incurred costs which can be directly attributed to the Corps' defective specification and misrepresentations regarding the joist girders. To the extent that plaintiff's evidence could be argued to have not proved the exact quantum of the equitable adjustment to which it is entitled, in the alternative the court finds that $1,323,214.20 is also a fair and reasonable computation of the equitable adjustment due Metric according to the jury verdict

method.[16]

CONCLUSION

Metric is awarded $1,323,214.20 as an equitable adjustment to the United States Army Corps of Engineers' Contract No. DACA05-99-C-0030. The United States is also liable for interest pursuant to 41 U.S.C. § 611 (2000), from March 30, 2004 until payment for the judgment in this case is received.

Accordingly, it is hereby **ORDERED** that:

(1) Plaintiff shall be **AWARDED** an equitable adjustment increasing the Corps of Engineers' payment responsibility by $1,323,214.20;

(2) Additionally, plaintiff shall be **AWARDED** interest on $1,323,214.20 from March 30, 2004 until it receives payment for this judgment, at a rate determined by 41 U.S.C. § 611;

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[16]/ As the Federal Circuit has explained:

> In order to adopt the jury verdict method, "[a court] must first determine three things: (1) that clear proof of injury exists; (2) that there is no more reliable method for computing damages; and (3) that the evidence is sufficient for a court to make a fair and reasonable approximation of the damages." *Dawco Constr., Inc. v. United States*, 930 F.2d 872, 880 (Fed. Cir. 1991). This court makes clear, however, that the jury verdict method may only be used when other, more exact, methods do not apply. *Id.*

Grumman Aerospace Corp. v. Wynne, 497 F.3d 1350, 1358 (Fed. Cir. 2007). In this case, Metric has clearly shown, and indeed the parties have stipulated to, the costs incurred as a result of the roof leaks. No better method (other than the rough calculations presented in this opinion) for computing damages exists, given the perplexing nature of the origin of roof leaks, which would provide a more precise dollar amount for the Corps' liability in this case. In addition, plaintiff presented clear and abundant evidence, in testimony and expert reports, which showed the relative importance of the residual camber issue in causing the most serious leaks in the roof and necessitating roof replacement, enabling the court to determine a fair and reasonable amount of damages due Metric. Thus, in the alternative, the figure of $1,323,214.20 is justified by the jury verdict method of computing damages.

(3) The Clerk is directed to **ENTER** final judgment for plaintiff in the amount of $1,323,214.20, plus interest; and

(4) No costs.

s/Lynn J. Bush
LYNN J. BUSH
Judge

cc:
ADR Judge Marian Blank Horn