

In the United States Court of Federal Claims

No. 12-286C
(Originally filed: June 27, 2022)
(Re-filed: July 13, 2022)¹

NORTHROP GRUMMAN SYSTEMS
CORPORATION,

Plaintiff,

v.

THE UNITED STATES,

Defendant.

Contracts; Contract
Disputes Act, 41 U.S.C.
§§ 7101-7109 (2018);
delay; disruption;
changes; counterclaim;
expectancy damages; lost
savings.

John W. Chierichella, Washington, DC, with whom were Anne B. Perry, David S. Gallacher, Christopher M. Loveland, and Townsend L. Bourne, for plaintiff. Maureen Del Duca and Mark Ries, of counsel.

Cameron Cohick, Senior Trial Counsel, United States Department of Justice, Civil Division, Commercial Litigation Branch, Washington, DC, Christopher J. Carney, Senior Litigation Counsel, Sarah E. Harrington, Deputy Assistant Attorney General, Martin F. Hockey, Jr., Acting Director, with whom were Rebecca S. Kruser and Michael D. Snyder, Trial Attorneys, for defendant. Michael F. Kiely, United States Postal Service, Law Department, of counsel.

¹ This opinion was originally filed under seal to afford the parties an opportunity to propose any appropriate redactions. The parties have since agreed that none are necessary. The opinion thus appears in full.

OPINION

BRUGGINK, *Judge*.

In 2007, the United States Postal Service (“the Postal Service”) entered into a contract with Northrop Grumman Systems Corporation (“Northrop”) for Northrop to build and deliver 102 Flats Sequencing System machines (“FSS machines”) for a fixed price of \$874 million. Following delivery and acceptance of those machines, in 2012, Northrop filed suit under the Contract Disputes Act, 41 U.S.C. §§ 7101-7109 (2018) (“CDA”), claiming that the Postal Service breached the contract by delaying and disrupting Northrop’s performance as well as withholding payments owed. The Postal Service counter-claimed, alleging, *inter alia*, that plaintiff failed to timely deliver the machines.

The court held trial over eight weeks between February 3, 2020, and March 5, 2021. The parties filed post-trial briefs, and the court held post-trial oral argument on December 8, 2021. We find for the reasons set out herein that neither party is entitled to recover on their principal claims for delay, that plaintiff is entitled to recover its unpaid contract balance, along with three specific additional cost claims, and that the government is entitled to certain offsetting claims.

BACKGROUND

I. Postal Service Automation Leading to the Flats Sequencing System

Over the course of the last two decades, the Postal Service has deployed a variety of automation machines to sort and sequence the mail it delivers to reduce the labor involved prior to delivery. The Postal Service’s goal has been to decrease the time its employees spend on sorting and sequencing mail. The Postal Service delivers many sizes of mail and parcels. Here, we are exclusively concerned with “flats,” which is an intermediate size of mail such as catalogs or flyers.

Among the earlier projects, the Postal Service contracted with Northrop for a machine to develop a simple sorting procedure for use with flat mail, known as the Automated Flat Sorting Machine (“AFSM”). Next, in the early 2000s, the Postal Service sought a machine to sequence flat mail into delivery point sequence. The Postal Service began by contracting with Northrop in 2003 to build such a prototype flats sequencing machine. The prototype machine was a half-sized Flats Sequencing System (“FSS”) machine or a “proof of concept” machine.

Northrop satisfactorily built a prototype, and the Postal Service modified the prototype contract in 2006 to direct Northrop to build one pre-production FSS machine (“Pre-Production Contract”). The goal of the Pre-Production Contract was to build a single FSS machine that would sort the mail into delivery point sequence. The machine used many of the same mechanisms and methods that appeared on the later FSS production machines. The design of the FSS machine evolved over time, however, from prototype through pre-production to production. From the prototype to the pre-production machine, Sean Ledford, Northrop’s FSS Program Manager of Engineering, estimated that 75% of the design was mature.² The remaining 25% of machine design was not finished until after commencement of the production stage.

Despite only initiating and not completing a contract to produce one model FSS machine, the Postal Service quickly forged ahead with plans for the follow-on contract to produce 100 working FSS machines. The Postal Service’s plan was to roll out several phases of the FSS machine program with multiple purchases of dozens of machines. In the first phase of this project, the same year that Northrop and the Postal Service contracted for one pre-production FSS machine, the Postal Service also sought proposals for a contractor to build and install 100 production machines. Northrop submitted a proposal in July 2006. At this point, the pre-production machine was still undergoing design reviews, and the design was not finalized.

After Northrop made a series of proposal revisions, on February 23, 2007, the Postal Service awarded Northrop an \$874 million firm fixed price contract to build and install 100 FSS machines for deployment in postal locations across the country (“FSS Production Contract”). The contract also included a First Article Test FSS machine and a training FSS machine, bringing the total to 102 machines. Along with the machines, the FSS Production Contract called for Northrop to develop and deliver voluminous documentation and various other deliverables to aid the Postal Service in installing, moving, maintaining, and trouble-shooting the machines. In context, the parties entered the FSS Production Contract months before the Pre-Production Machine reached its In-Plant Test, which occurred between August 20, 2007 and September 11, 2007.

In sum, as of February 2007, the Postal Service had contracted to buy 102 FSS machines, the design for which was incomplete and the performance

² Mr. Ledford’s role in the FSS Program is depicted on the organizational chart in Background Section III.

of which was untested. Northrop, for its part, had agreed to design, build, and install those machines, along with a host of other deliverables, for a firm fixed price and before it had completed even one pre-production machine. From the standpoint of hindsight, the parties allowed optimism to triumph over caution. While the parties are to be congratulated on eventually persisting in the face of serious obstacles to the design, production, and delivery of all of the machines, machines which are remarkable to behold in operation, the fact remains that their collective lack of preparedness triggered ten years of litigation.³

II. Flats Sequencing System Production Machine

In terms of size, one FSS machine would comfortably fill half of a football field. Sean Ledford, Northrop's engineering manager on the project, explained the process of flats moving through the FSS machine, which consists of a series of inter-connected features—a system of systems. The design as eventually completed included mail being processed through various elements of the FSS. The process begins at the Standalone Mail Preparation (“SAMP”) part of the machine. Mail enters the SAMP at the Automatic Bundle Sorting Unit (“ABSU”), which is basically a hopper. “You put a pallet in, and it tilts it over” and tied bundles of mail fall out. Tr. 2432, 2436 (Ledford). After dumping, the mail moves across a conveyor to prep stations. Postal Service employees cut the bundles open and put the mail in green trays. The preppers put the trays on a conveyer feeding into the FSS machine. Dumpers, conveyers, and prep stations preexisted the FSS machine. For instance, Northrop copied the prep station approach used on the AFSM.

The conveyer belt moves the green trays to the main system where the mail is then automatically inducted into the flat sorting portion of the machine. Once inducted, the mail is run through the sorting mechanism twice: “2-pass sequencing.” During the first trip around the machine, the FSS machine uses a high-speed electronic reader to scan addresses on the mail, then sorts it into the order of stops. If the electronic reader cannot read an address, the machine ejects that item to a human reader who scans in the address manually or the image is sent to an offsite human reader. Ideally, the machine will send few pieces of mail to the human readers. Mr. Ledford explained that trays, conveyers, conveyer lifts, and parcel systems were all common tools at the Postal Service prior to the FSS machine, dating at least to the AFSM program.

³ The court conducted a site visit with the parties to observe the operation of a FSS machine in Washington, DC, on January 17, 2020.

The first pass sorts by stop, not by carrier. The FSS machine, using 360 bins, sorts every carrier's first stop into one bin, second stop into another bin, third stop into the next bin, and so on. At this point in the process, "every piece of the system [was] mature in that[] particular piece[s] of subsystem" existed in the Postal Service in other machines such as the AFSSM, and were used elsewhere in the industry, for example at UPS and FedEx, or in France or the United Kingdom. Tr. 2440 (Ledford).

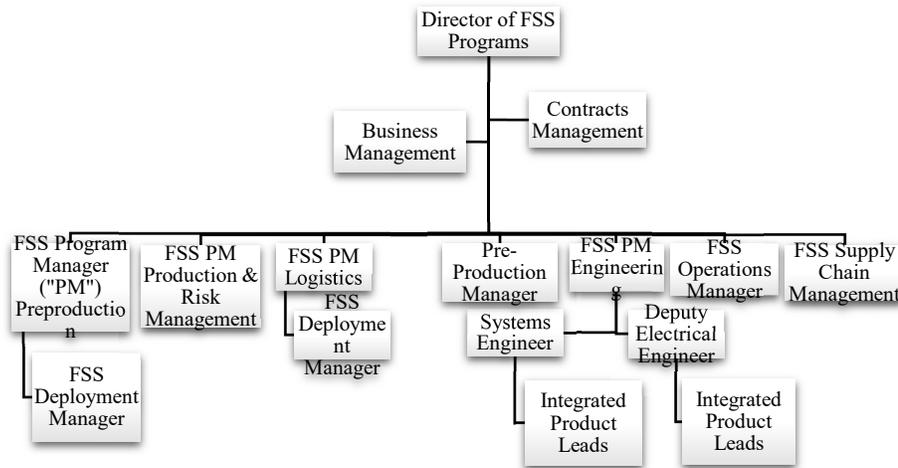
Once the first pass is complete, the conveyer brings the trays to the Integrated Tray Converter ("ITC"). The ITC transfers the mail from a green tray to a blue tray and sends the trays back into the FSS machine for the second sorting, this time into carrier sequence. The mail comes out of the ITC and falls into the blue trays vertically stacked "in the exact sequence that the carrier is going to walk his route"—first stop, second stop, third stop, and so on. Tr. 2435. This feature was a major element of the novelty of the new machine. Thus, unlike many of the preexisting elements of the FSS machine, "the ITC as a whole was one of the least mature subsystems." Tr. 2440. The ITC was added in the production machine design.

On the second pass, the mail is fed into the bin by order of the carrier's stops. The first stop is placed in the bottom of the bin, and then each later stop is stacked on top. At the end of the second pass, the trays come to the ITC again, and the ITC turns the trays "on end" and consolidates the mail into yellow street trays. "[T]hose yellow street trays are what the carrier receives at the delivery unit." Tr. 2439. The yellow trays are transferred from the machine onto Carrier Automated Street Tray Rack ("CASTR") carts. At the point of loading the CASTR carts, the FSS machine produces a manifest of trays on that cart. As explained below, the parties modified the contract so that it called for a manifest which records not just which racks are in which cart, but also orders the racks in each cart in the particular order for each end-use postal employee.

Employees then move the CASTR carts into postal semi-trucks that drive to the delivery units. At the delivery units, the carriers pull their mail off the racks. Prior to the FSS machine, the Postal Service already had experience using carts. The CASTR cart used on the FSS machine is a variation of preexisting carts with "engineering tweaks or modifications." Tr. 2441. The CASTR manifest process, however, was an innovation introduced with the FSS contract.

III. Management of the FSS Production Contract: Cast of Characters

Manufacturing and delivering the FSS production machines involved interrelated tasks of engineering (both hardware and software), documentation associated with the hardware and software, testing, training, and the contracts and business management associated with those activities. Northrop’s organizational structure remained fairly static across the course of performance on the FSS Production Contract, adding or subtracting certain positions as needed:



Within the organizational structure above, Northrop’s FSS Engineering Program Manager oversaw Integrated Product Leads who were in turn responsible for teams manufacturing and delivering individual parts of the FSS machine or other deliverables. A sample of the Integrated Product Leads that are relevant here are Integration & Testing / FAT Integration; Software; the Flats Sorting Machine (“FSM”); the Automated Tray Management System (“ATMS”); the SAMP; Controls & Electrical; and Drafting.

The Postal Service, on the other hand, took a “matrix” approach to contract management. Tr. 3395 (Crone). Many different departments, and their managers, had a role in the performance of the contract. The organization chart attached to this opinion as Exhibit A is illustrative. Don Crone, one of the project managers for the Postal Service on the contract, explained that he was generally in charge of the program on a day-to-day basis and that he had “six or seven people” who reported directly to him, but

that a host of other people in other offices also reported to him, although “not directly.” *Id.* For example, engineers or logistics personnel reported directly to their own supervisors, but Mr. Crone would often be managing their assignments on the FSS program. He cautioned, however, that for certain issues, he would have to speak to their supervisors.

Many of these Postal Service departments, and a myriad of individuals within them, had roles in the rote tasks of contract administration—scheduling, approving payments, and negotiating modifications, to name a few—but several of them also had critical roles in approving deliverables from the plaintiff and definitizing the Postal Service’s final requirements for components of the machine, or other deliverables (*e.g.*, training handbooks and specification drawings). The parties also, by agreement, practiced a form of collaborative management that, although cooperative, added layers of process in the form of hundreds of meetings with individuals on both sides and an iterative log of “action items” that both sides required of each other. The results of these meetings then had to be conveyed to other relevant stakeholders, especially at the Postal Service. The result is an ultra-long paper trail of hundreds of PowerPoint presentations and follow-up emails. These records and testimony from those involved leave the distinct impression that contract administration itself took on a life of its own beyond the overarching goals of finishing the design and delivering 100 machines to the Postal Service. Further, when the parties encountered the unexpected, this style of management was anything but agile and not well suited to adapt to changing circumstances.

IV. Milestones in the FSS Production Contract

The FSS Production Contract, in its most basic terms, required Northrop to build and install the machines and to provide a variety of other deliverables such as spare parts and an electronic handbook meant to teach others how to use, maintain, and repair the machines. In light of the fact that the parties entered a firm fixed price contract, one might expect to find the parties’ standards for performance neatly set out in the February 23, 2007 FSS Production Contract. Instead, many elements of the contract were either ill-defined at the time of entering the contract or they evolved, frequently by consent, during performance.

The Award Data Sheet included in the February 23, 2007 FSS Production Contract is a useful starting point for understanding the milestones in this contract. The Award Data Sheet schedule also orients us to how the Pre-Production Contract interacted with the Production Contract. The Award Data Sheet listed the following events and dates:

- Preliminary Design Review (“PDR”) on 5/7/2007. Preliminary Design Review is “the first opportunity for the Postal Service to closely observe the Supplier’s hardware and software design.” JX 3 at 71314 (SOW A § 5.1).⁴
- Critical Design Review (“CDR”) on 5/28/2007 – 9/29/2007. Critical Design Review is the point at which Northrop would “describe the complete system design.” JX1, SOW A. The FSS Production Contract originally tied CDR to the conclusion of the FSS Pre-Production In-Plant Test. *Id.*
- Pre-Production Machine Technical Data Package (“TDP”) on 7/9/2007. The Pre-Production Machine TDP was a deliverable consisting of certain machine information regarding the pre-production machine.
- Pre-Production Machine Field Test on 8/10/2007. Pre-Production Machine Field Test was a milestone test for the pre-production machine.
- First Article (“FA”) In-Plant Install on 10/22/2007. First Article here refers to the first article machine. In-Plant Install is the beginning of the first article machine installation at the Dulles Postal Service facility.
- Start FA Readiness Demo on 3/31/2008. Start FA Readiness Demo is the start date of the First Article Machine readiness demonstration.
- In-Plant Test (“IPT”) between 4/7/2008 – 5/6/2008. FA IPT is the in-plant test of the First Article Machine.
- First Article Test (“FAT”) between 7/7/2008 – 8/29/2008. This is the First Article Test of the first article machine.
- Handbook Preliminary validation ready on 9/22/2008. The operative date by which Northrop would have its preliminary version of the handbook ready to be validated by the Postal Service.

⁴ Because many of the exhibits contain multiple documents, we cite to the Bates pages of the exhibits whenever possible instead of using internal pagination.

- Deployment (Systems 2 – 100) between 10/20/2008 – 10/21/2010. This is the period during which Northrop was to deploy the FSS machines to various Postal Service facilities.
- Electronic Handbook validation between 10/20/2008 – 12/9/2008. Electronic Handbook validation is the dates during which the Postal Service intended to validate Northrop’s Electronic handbook.

JX 1 at 3706856 (Award Data Sheet).⁵ As reflected in the Award Data Sheet, the parties anticipated that the First Article Test would occur in mid-2008 and that the last machines would be delivered and installed by October 21, 2010.

V. FSS Product Contract Schedule

The Award Data Sheet was just the beginning of schedule evolution on this contract. That sheet stated that the parties would “incorporate[] into the contract via a contract modification” twelve weeks after contract award of the contract “a mutually agreeable FSS Production deployment schedule.” *Id.* The contract’s Statement of Work (“SOW”) Sections B and C also included a number of provisions related to the contract schedule.

The contract included Clause B-15 Notice of Delay, which instructed Northrop, immediately upon becoming aware of any difficulties that might delay deliveries, to notify the contracting officer in writing of those difficulties, the reasons for them, and the estimated period of delay. JX 1 at 3706811. Clause B-16, Suspensions and Delays, on the other hand, provided that, if an order or act of the contracting officer, or failure to act by the contracting officer, caused suspension, delay, or interruption of contract performance, the Postal Service would make an adjustment for any increase in cost of performance and to the performance date. *Id.* If the delay or interruption had a cause other than the contracting officer’s action or failure to act, including Northrop’s fault or negligence, the Postal Service would not make adjustments. In any event, Northrop had an obligation under the contract to notify the Postal Service of the act or failure causing increased costs and delay within 20 days of impact and to submit a claim as soon as was practicable after the delay ended. *Id.* at 3706812.

⁵ The events in the list above are drawn directly from the Award Data Sheet, but the information about each event is drawn from other relevant sections of the contract.

The Postal Service and Northrop entered the contract without a final list of sites that would receive FSS machines. Section C 6.1 of the SOW directed the parties to use “Section C2,” which listed the Postal Service’s proposed equipment locations, when developing the deployment schedule. JX 3 at 71464. Section C 6.1 stated that the Section C2 locations were the “candidate” sites until the Postal Service provided a site configuration report to Northrop. *Id.* In addition, section C 6.2.2 mandated that Northrop “facilitate [POSTAL SERVICE] Operations discussion on schedule development” and “accommodate” the operational needs of the Postal Service in schedule development. *Id.* at 71465.

Section C 6.2 stated that “The Supplier shall develop a deployment schedule subject to [Postal Service] approval within 4 weeks after contract award from the deployment data,” as provided in Section C2. *Id.* This was the first step toward incorporating a “mutually agreeable” deployment schedule into the contract, as the Award Data Sheet anticipated. Section C 6.2 further stated, “All deployments shall be scheduled for completion no later than September 2010,” which is slightly earlier than the date listed on the Award Data Sheet. *Id.* The Section C 6.2 schedule was identified in SOW Section B as the “C-19” deliverable.

Northrop submitted the C-19 schedule deliverable to the Postal Service on June 25, 2007. The Postal Service then edited the candidate delivery site list. The parties incorporated the lightly-edited C-19 schedule into the contract through Modification 2 (“Mod. 2”) on October 12, 2007.

The Mod. 2 schedule included a FSS Preliminary Deployment Schedule Change Sheet and a spreadsheet. The Change Sheet reflected the individual site and machine number changes that the Postal Service had made since adopting Section C2. The Change Sheet listed “deleted” locations, “added” locations, “increased” machine numbers at one location, and “moved” locations on the schedule. JX 1 at 30707256. As of the Mod. 2 schedule, the Postal Service planned to deploy the 100 production FSS machines to 32 Postal Service locations.

The Mod. 2 schedule also included a spreadsheet which detailed the schedule for testing events on the FSS Production Contract and deployment start and ends dates for all 100 production machines. The spreadsheet showed that the First Article Test would occur from July 7, 2008 to August 29, 2008. The spreadsheet then showed installation dates and locations for

all 100 field FSS machines to follow FAT. *See id.* at 466-70.⁶ The Mod. 2 schedule showed deployments concluding in October 2010.

The SOW had one other scheduling provision: Section C 6.3. This section stated:

The [Postal Service contracting officer] will provide individual changes to the deployment schedule to the Supplier. The Supplier shall incorporate these changes into a revised/updated deployment schedule monthly, issued within the first week of each month until the end of program deployment. The [Postal Service] will at [its] discretion substitute locations, providing the Supplier at least one-hundred-twenty (120) days prior notice, without additional compensation.

The Supplier shall evaluate each proposed change provided with less than a 120-day notice in order to assess whether the change can be incorporated without adverse impact and contract cost escalation.

A final, as delivered, schedule shall be provided to the [POSTAL SERVICE] CO within 6 weeks of the acceptance of the last fielded system.

Id. at 71465. SOW section B referred to section C 6.3 as the “C-21” monthly schedule deliverable.

Section C 6.3 allowed the Postal Service to adjust the C-21 deployment schedule on a monthly basis throughout the course of the FSS Production Contract. The Postal Service was permitted to provide “individual changes” to the deployment schedule to Northrop and the number of changes was not limited. *Id.* Northrop then was obligated to incorporate those changes into a monthly updated deployment schedule. This iterative, monthly update would occur the end of deployment. The Postal Service also had the right to substitute locations for FSS production machines at its discretion and without additional compensation so long as it gave Northrop 120 days’ notice. *Id.* (SOW C § 6.3). The Postal Service also could substitute locations without 120 days notice, but in that case, Northrop had the responsibility to assess whether the substitution would have an adverse impact on the schedule or cause cost escalation. *Id.* Northrop did not offer

⁶ These pages appear twice in JX 1, but in both locations they are not Bates stamped. We thus cite to the internal page number of the exhibit.

evidence that it ever informed a Postal Service contracting officer that a Postal Service change given with less than 120-day notice would cause an adverse impact or cost escalation.

Northrop submitted C-21 updated deployment schedules, titled “Rev A” through “Rev M.” Northrop submitted the C-21 deliverables in the following order:

- August 2007: Rev A
- September 2007: Rev B
- December 2007: Rev C
- January 2008: Rev D
- February 2008: Rev E
- June 2008: Rev F
- September 2008: Rev G
- October 2008: Rev H
- October 2008: Rev I
- December 2008: Rev J
- May 2009: Rev K⁷
- August 2010: Rev L
- May 2011: Rev M

The parties titled each of the C-21 schedule deliverables “FSS Updated Deployment Schedule.” Tr. 401 (Ross); DX 1359. This deliverable, like the Mod. 2 schedule, included a Change Sheet, listing the date of the change and a one-line explanation, such as “adjusted site survey date” or “updated facility ready dates” or “increased Atlanta.” The changes could be as minor as “corrected typo” or as significant as “pushed out Team Line 6 by one week” or “swapped” machines. The deliverable, as with the Mod. 2 schedule, also included spreadsheets detailing the deployment expectations for each of the 100 machines. Those details covered all the site information (quantity of machines, facility, address, site coordinator), the site survey start and end dates, site readiness dates, installation start and end dates, integration start and end dates, burn-in dates, and acceptance testing dates. One of the spreadsheets is a color-coded block schedule on which the parties could view all the various deployment activities and the teams assigned to those activities on a timeline. *E.g.*, DX 1359. Northrop witnesses testified that

⁷ The 13-month gap between Rev K and Rev L will be explained during the FAT testing discussion below.

Northrop was working toward these evolving schedules throughout contract performance.⁸ Tr. 402 (Ross).

Throughout these C-21 updated deployment schedules, the end of deployment remained relatively static, still concluding in October 2010, as of the December 2008 Rev J updated deployment schedule. In the May 2009 Rev K updated deployment schedule, however, the end of deployment dates pushed into November 2010, one month later than originally agreed to. Between Rev J and Rev K, the Postal Service informed Northrop that its First Article machine failed the critical First Article Test, which was a contractual gateway to the rest of the delivery and acceptance process. The parties then agreed upon a bifurcated testing process to re-test the first article machine. The Rev K schedule thus incorporated the newly agreed-upon test date, which became known as the FAT 2A test.

Between the May 2009 Rev K and the August 2010 Rev L, the Postal Service informed Northrop that its First Article machine was conditionally accepted following FAT 2A, but would be followed by a FAT 2B test. The parties moved forward to planning a schedule for FAT 2B and related testing. Instead of using the C-21 approach for the next schedule, the Postal Service and Northrop incorporated a new schedule into the contract by modification, the July 4, 2010 Modification 17 schedule (“Mod. 17”). One of the purposes of this modification was to incorporate “a revised machine deployment schedule for the testing and delivery of FSS units.” JX 1 at 3708686. The new schedule was attached as Attachment B. The Postal Service reserved its rights to compensation for the difference between the Mod. 2 schedule and the Mod. 17 schedule. Northrop also reserved its rights to submit a request for an equitable adjustment based on its view that the Postal Service’s actions impacted the program schedule.

Mod. 17 included a schedule chart that listed each FSS machine location, an install start date, a burn-in start date, and ATP start and end dates for each machine and an indication of whether the ATP was a retest.⁹ Mod. 17 also included two block diagram spreadsheets showing which teams were assigned to which machines and the associated installation dates. In this

⁸ Richard Ross, Northrop’s Director of Postal Automation, explained that, although plaintiff generally intended to follow whatever the current C-21 schedule was, in practice, the Postal Service allowed a more “piecemeal” approach to when Northrop could access a site for installation. Tr. 400, 514.

⁹ “ATP” stands for Acceptance Test Protocol but is used as a shorthand for the individual acceptance tests for each delivered and installed machine.

schedule, the deployment dates for the 100 machines continued through May 2011, eight months later than originally anticipated. Following Mod. 17, Northrop submitted two more C-21 updated schedules, Rev L and Rev M, which reflected the deployment schedule through the final machine ATP in August 2011.

VI. Design Milestones Prior to Testing

Choosing a starting point for discussing the performance of the FSS Production Contract is like walking into a maze: even if one begins in the right place, one is likely to get lost along the way. Generally, the contract anticipated Northrop designing the machine, producing the machine, deploying the production machines, and supplying the Postal Service with the tools (parts, training, and documentation) to use the machines. But the actual performance of those tasks was not sequential.

Instead, the parties set out on many tasks simultaneously: software and hardware design happened concurrently; Northrop acquired and tweaked mature parts of the machine before the final design was settled; and testing was iterative with changes made before, during, and after tests. Deliverables like the handbook were subject to changes between the parties before the design was even complete. Although the development contract was premised on Northrop as the designer, the incomplete state of the design and the Postal Service's contractual right to comment on the development and change its requirements led to a level of iteration in the process that was cumbersome, to say the least.

To make matters worse, the Postal Service did not speak with one voice. The Postal Service lacked a coherent approach to managing what its representatives described as one of the largest Postal Service projects ever undertaken. *See* Tr. 1665 (Mr. Donahoe stating that the investment was the largest ever made by the Postal Service in “generative investment”). All throughout Northrop's performance, Postal Service opinions and preferences—whether they amounted to contract changes or not—flowed to Northrop freely from up to 100 different Postal Service representatives. The contract anticipates the contracting officer (“CO”) having the authority to give binding instructions to Northrop regarding what the agency wanted from the machines, which input in this case went beyond mere function to granular design details. The parties disagree as to whether this level of involvement went beyond the contract, and plaintiff brings a claim related to these sorts of changes. But there were no less than four contracting officers on this project, and most of them were not the individuals involved in decision-making on a granular level, instead they only episodically attended program

management meetings or communicated indirectly through the Contracting Officer's Representative and program manager, Mr. Crone.

A. Project Management

The SOW provides, "The Supplier shall manage the design, manufacture, deployment, and support of the FSS and provide the [POSTAL SERVICE] formal and informal reports and information on the planning and status of the management effort." JX 3 at 71327 (SOW A § 12.0). Northrop also had to submit a monthly progress report to the CO. Furthermore, Northrop was to deliver a hard copy of this report to "all [Postal Service] technical and management representatives engaged in Technical Review Meetings (TRM) and discussions" and a CD version to the CO and his representative. *Id.* at 71328 (SOW A § 12.1.2). The Postal Service represented, through the SOW, that it was "not the intent of the [Postal Service] to seek elaborate or costly progress reports," but it did require Northrop to design a database system to deliver the required information that was subject to Postal Service approval. *Id.* (SOW A § 12.1.1). Representative monthly report topics included: a summary of the work accomplished during the month; discussion of any problem areas and a plan for recovery; forecasting planned accomplishments in the next month; identifying all open action items and deliverables; minutes of the previous month's TRM and a draft of the current month's minutes; an accounting summary; an updated milestone chart; and an emergency parts log and report.

In addition to the monthly report, Northrop was required to develop and maintain a Program Plan and Milestone Chart which showed all scheduled events and actions throughout the course of the FSS production program, including all program deliverables, charting all relevant dates for those events. The Postal Service had the right to approve the content of the Program Plan and to dictate the format of the plan.

Finally, as performance of the contract began, the contract provided for a monthly Program Review Meeting (which the parties referred to as the "TRM"), *Id.* at 71330 (SOW A § 12.3), and an "action item" process whereby the parties could create and trade notes regarding work or approvals that needed doing, *id.* at 104-106 (SOW A4 § 1.2). Northrop was responsible for planning the meeting, and it was paid for conducting each. The contract stated that Northrop could expect anywhere from 10 to 100 Postal Service attendees at the monthly meetings. The parties held TRMs monthly throughout the course of the contract. Up to two dozen Northrop representatives, including leadership and representatives of the various specialties, attended along with up to 100 Postal Service representatives. At

the beginning of each TRM, Northrop provided an overview of the status of the project. Then the attendees broke into separate sessions for each specialty, such as Program Management, Software, Hardware, and Handbook. During the breakout sessions, Northrop representatives reviewed the status of the project and the Postal Service provided feedback. Discussion points requiring follow-up were distilled into “action items” and placed into a master document which tracked the nature of the action needed, along with who created, edited, managed, and completed each action. Thousands of action items accumulated across the course of the project. *See* JX 780 (Action items spreadsheet). One of the contracting officers, Robert D’Orso, testified that he and his team reviewed action items in a pre-TRM meeting in preparation for the TRMs with Northrop. Tr. 1918-20. An example highlighted at trial was an action item regarding the height of the side guards of the ABSU. Although the ABSU was borrowed from the prior AFSM design, the Postal Service directed Northrop to increase the side guard height by 5 inches on the FSS production machines. Although several other such items were highlighted in plaintiff’s briefing, it did not separately price these alleged changes nor did it quantify their impact other than in its total cost claim for the net effect of all these items, which it terms a “disruption” claim. More on that later.

If the parties disagreed on an action item, the item might be transferred to a document the parties called a “Puts & Takes List.” Some witnesses described this list as capturing the most important disagreements between the parties, disagreements which required negotiation between Northrop and Postal Service leadership. Some of the items may have been contract changes, many Postal Service witnesses conceded, but other items were not contract changes. Some issues were never resolved. It appears that the contracting officers had access to this list, just as they had access to the Action Items database, but there is no evidence that the contracting officers consistently reviewed or made decisions about the items on the Puts & Takes List.

Ultimately, through Northrop’s monthly progress report, the TRMs, the Action Items Database, and the Puts & Takes List, the parties kept track of the progress of performance. This program management style created a gulf between the contract’s administrative world (contracts management, accountants, lawyers) and the engineering world (hardware, software, testing, deliverable development). Although the contract required CO approval for any changes to the contract specifications, Northrop engineers often capitulated to Postal Service employee demands made during or outside of TRMs simply to keep the project moving. Northrop’s contract management personnel were aware of the risks of this approach; Northrop

reminded team members during internal meetings and correspondence that any deviation from the contract that would alter the schedule or increase costs had to be handled by Northrop's contract management and approved by a Postal Service CO. Tr. 5584-85 (Artimovich); DX 1205; DX 6594. The Postal Service did not make any comparable effort to reign in its employees; the documents and testimony show that the Postal Service took a muddled approach to who approved directions given to Northrop.

B. Design

The parties began performance on the FSS Production Contract with a machine design that was "75% mature" and before the FSS Pre-Production machine had finished testing. SOW Section A Performance Criteria begins with design review events. The first was Northrop's design for the Preliminary Design Review ("PDR"). According to the original SOW timeline, Northrop would facilitate and conduct the PDR ten weeks after contract award, i.e., mid-June 2007. PDR was meant to follow "preliminary design efforts, but before start of detail design. This review [was] the first opportunity for the Postal Service to closely observe the Supplier's hardware and software design." JX 3 at 71314 (SOW A § 5.1). Northrop needed to "describe the complete system design, highlighting all design changes made with respect to the original design disclosed in the technical proposal and to provide rationale for the changes." *Id.* The PDR could also include "a hardware or hands-on demonstration of some of the preliminary designs to better illustrate important aspects." *Id.*

The Postal Service reviewed each module of the machine design to (1) evaluate progress, (2) determine its compatibility with specialty requirements, (3) evaluate the degree of definition and assess the technical risk, and (4) establish the existence and compatibility of the physical and functional interfaces among hardware and other areas of performance. *Id.* at 71315. The Postal Service would review software to evaluate (1) progress of the selected top-level design and test approach, (2) compatibility between software and preliminary design, and (3) the preliminary version of operation and support documents. *Id.*

1. Software

The software development and design process was to be thoroughly documented, as laid out in SOW E. Section 4.3 provides that Northrop had to maintain and track changes and measure requirements for software, including writing requirement baselines and develop a Requirements Traceability Matrix. JX 3 at 73219. SOW E section 5.2 mandates that, if

software maintenance releases impacted design, the Software Design Description (“SDD”) had to be updated and delivered to the Postal Service four weeks prior to Alpha testing. *Id.* SOW E section 6.0 provided that Northrop had to conduct development testing, which consisted of unit, component integration, system integration, and regression testing to ensure delivered products met Postal Service requirements.

SOW E section 6.3 provided that one week after completing internal testing and prior to formal testing, Northrop was to provide a Software Test Report, documenting test results. *Id.* at 73220. Northrop was similarly required to provide a Software Test Report one week after the conclusion of the In-Plant Test and Alpha testing for subsequent software releases. *Id.* All test reports were subject to Postal Service review. *Id.* at 73221. After successful completion of all development testing, and once code corrections were made and re-tested, Northrop had to provide on-site support during Pre-Beta and Beta testing, per SOW E section 6.4.

SOW E section 11.4 required that Northrop maintain updated software documentation reflecting when changes were made to deployed software throughout the life of the contract. SOW E section 15.0 required Northrop to correct any software problems identified with its software and retrofit all systems at no additional cost to the Postal Service. The term “software problems” included hardware problems corrected by changing software.

There were a host of other software document deliverables, only some of which are relevant for our purposes. One such document is the Software Requirements Specification (“SRS”), which was meant to provide a comprehensive collection of the contract’s software requirements for each subsystem of the FSS. SOW E section 4.0 mandated that the requirements listed therein be “decomposed to a uniquely identifiable and singularly independent phrase or sentence” so that each was “traceable, verifiable, and testable.” *Id.* at 73218.

2. Critical Design Review

The next design review was the Critical Design Review (“CDR”). SOW A section 5.2 linked CDR to the FSS Pre-Production In-Plant Test; specifically, Northrop was expected to “conclude” CDR “no earlier than 1 month after the conclusion of the FSS Pre-Production In-Plant Test (provided under a separate contract).” JX 3 at 71314. It was also meant to take place prior to releasing the first production drawings to manufacture components of the First Article FSS, or any production equipment, or release of any such

drawings “at the Supplier’s sole risk.” *Id.* The contract allowed the design review to be done incrementally so long as “the capstone of the CDR . . . [took] into account the inter-relation of the entire system and address[ed] issues that arise with respect to conflicts in module fit and operation with relation to each other and the system.” *Id.* No matter whether unitary or done incrementally, Northrop was required to “describe the complete system design, highlighting all design changes made with respect to the original design disclosed in the technical proposal and the Preliminary Design Review, providing rationale for the changes.” *Id.*

VII. Testing

The FSS Production Contract anticipated multiple FSS machine tests before live mail processing. SOW A Section 8 listed several originally planned tests: In-Plant testing, First Article Testing (“FAT”), and Field Installation Testing. JX 3 at 71319. Deployment and acceptance testing, however, was contingent on plaintiff passing FAT. JX 3 at 73951 (Sow M § 4.0) (requiring the FSS machines “meet all requirements at each phase of testing prior to advancing to the next text phase”). The parties did not perform all of these tests and ultimately broke the First Article Testing into three phases: FAT, FAT2A, and FAT2B, as discussed above and below. The contract also separately called for acceptance testing of each machine after installation in the field.

A. In-Plant Testing

The first test listed in the contract was an in-plant test, which was intended as an opportunity to demonstrate to the Postal Service that the FSS machine is “fully operational, it meets Postal needs, and it complies with all the requirements of the contract, to the extent that can be tested in a non-live mail environment.” *Id.* at 71319 (SOW A § 8.1.1). The First Article Test was contingent upon a successful in-plant test, but events overtook the parties, and an in-plant test was not conducted prior to FAT.

B. First Article Test

The contract required a First Article Test and set out the framework in Clause 2-5, First Article Approval. Northrop was responsible for delivering the First Article Machine to the Dulles Postal Service facility. The Postal Service had a duty to review the installation process for compliance with design requirements. JX 1 at 3706817. Prior to first article approval by the Postal Service, Northrop bought materials or components and started production at its sole risk. *Id.* at 3706818. Costs incurred acquiring materials

or starting production before first article approval were not allocable to the contract for progress payments.

Clause 2-5 provided that the Postal Service would conduct FAT. Following the test, the Postal Service would provide written notice to Northrop of whether it approved, conditionally approved, or disapproved the First Article Machine. *Id.* at 3706817. If the Postal Service approved or conditionally approved the First Article Machine, Northrop continued to have an obligation to comply with the requirements of the specifications and other terms set out in the contract. *Id.* If the Postal Service conditionally approved the First Article Machine, the Postal Service's notice would "state any further action required of the supplier." *Id.* If the Postal Service disapproved, it was required to state its reasons.

If the Postal Service disapproved the first article, according to Clause 2-5, it could terminate the contract for default or require Northrop to submit an additional first article for approval testing. If the Postal Service chose to proceed to retesting, Northrop remained under obligation to meet the delivery schedule. Northrop would, at no additional cost to the Postal Service, make any necessary changes, modifications, or repairs to the first article, or select another first article for testing. *Id.* The costs of additional first article approval tests were allocated to Northrop. *Id.* The Postal Service reserved the right to require an equitable adjustment for any extension of the delivery schedule necessitated by additional first article approval tests.

1. Installation

The First Article Test machine was the FSS machine provided by Northrop specifically for FAT. Northrop began installing that machine at a Postal Service facility in Dulles, Virginia, in May 2008.

2. Performance Criteria

SOW Section AA sets out the standards the Postal Service would apply during FAT. The Performance Criteria categories were processing availability, maintainability, reliability, mail damage, accuracy, OCR performance, REC image volume, throughput, accept rate, FICS label accuracy, FICS label placement, CASTR sort accuracy retention, and flyouts. JX 3 at 71340. The Performance Criteria provided a brief definition and description of the standard for each criterion. Of particular relevance here are throughput, maintenance, damage, accept rate, and accuracy.

Throughput would be “calculated and [] measured in a start-to-start scenario and include[d] internal container transport and handling time, and dispatch of container time.” *Id.* at 71344 (SOW AA § 3.7). The Postal Service would start the clock when the “first mail piece is processed on a feeder and stop[ped] when the first piece of a separate-different sort program is processing mail pieces at a feeder.” *Id.* The Postal Service would calculate throughput on a 2.75-hour mail run. The contract included a formula for doing so. There was no provision in the contract for adjusting the resulting throughput number for lower volumes of mail. In fact, there was no mail volume requirement for the throughput calculus.

The availability of the machine, machine jams, and corrective maintenance were all relevant at FAT. SOW AA section 3.1 provided, regarding operational availability, that “The FSS must be available to process mail when requested at least 95% of the operational request time.” *Id.* at 71343. Operational run time meant “the time the FSS is operating at a FULL functional level. Down time is any time the FSS is not operating at a FULL functional level.” *Id.* The FSS machine would also be considered “down” “any time the FSS is in a jam state or in a maintenance event, regardless of degraded or full stop condition.” *Id.* The contract also provided a formula for calculating operational availability.

Beyond availability, maintenance also relates to jams, which were defined as “a feeder interrupt or any activity requiring operator or maintenance intervention to continue processing operation that may or may not stop the carousel.” *Id.* (SOW AA § 3.1.1). Finally, corrective maintenance was “an event that begins at a machine stop or fault signal [] requires maintenance intervention, and includes response time, fault isolation, lockout tag-out, adjustment time, remove/replace, and functional test (all events leading to restart).” *Id.* (SOW AA § 3.1.2).

Mail damage was also a metric tested at FAT and is disputed between the parties. The Postal Service would measure damage by test decks and live mail. Test decks were the example mail used to test the First Article machine prior to using live mail. The Postal Service would measure damage “in both the machine jam clearance and post process bin audits.” *Id.* at 71344 (SOW AA § 3.4). The contract’s SOW D set out descriptions of mail damage in categories. The performance criteria were no more than 1 out of 1200 category two mail pieces damaged and 1 out of 2500 category three mail pieces damaged. Mssrs. Newman and Hanlon confirmed that these parameters were enforced during FAT testing.

The acceptance rate of the FSS machine during FAT is also at issue. SOW AA section 3.8 provided that the FSS machine “must accept 95.00% of all mail pieces that are within [POSTAL SERVICE] specification and presented to the system for processing.” *Id.* at 71345. Acceptance means “sorted to a non-reject destination,” and the contract included a formula for calculating pieces sequenced, input, held-out, refeed, and rejected. *Id.* This was fully enforced against Northrop during testing.

Finally, the Postal Service measured accuracy of the labels at the “final output container.” JX 3 at 71344 (SOW AA § 3.5). The FSS system had to be able to sequence mail with 99% accuracy, determined by a formula provided in the contract.

3. The Test

The Postal Service conducted FAT several months later than called for in the Mod. 2 schedule, which specified completion in September 2008.¹⁰ Instead, FAT occurred between November 23, 2008 and December 20, 2008. Northrop’s integration and testing lead, Jeffrey Newman, testified regarding plaintiff’s experience during that test. He told the court that mail not in the current sort plan was run during the test, slowing the machine down as the carousel filled with mail that was not being sorted to end-point delivery. He recalled that mail which did not fit the contractual parameters for size and weight was also run, causing jamming and errors. Tr. 4067-70 (out-of-sort-plan); 4061-62 (out-of-spec). He also recalled that a significant software problem caused mail to be moved to the preproduction machine on the first day for a period of time. Tr. 5778-79 (“not a good start to the test”). In addition to the testimony regarding the testing environment, Northrop also generated daily testing reports, which verifies much of what Mr. Newman recalled. *E.g.*, PX 4000. The Postal Service’s Test Evaluation & Quality Manager, Mr. Hanlon likewise remembered some variance in the mail volume, including low volume days, Tr. 6087-88, but he also testified that both parties practiced removing the out-of-spec mail ahead of time and did so during the live test, Tr. 6005. Daily reports detailed that low mail volumes caused some infeed starvation, inevitably slowing the results. *See* PX 4004.

4. Results

By a letter from a CO D’Orso dated January 16, 2009, the Postal Service informed Northrop that the Postal Service had reviewed the results

¹⁰ Although the responsibility for this delay is disputed, neither party currently charges the other for it.

of the FAT and determined that the system “failed to meet key performance requirements of the contract.” JX 272 at 122413. The Postal Service shared five conclusions: (1) the throughput rate was less than 13,000 pieces per hour (compared to the 16,500 contract requirement); (2) the system had more maintenance and jam time than run time (compared to a 95% availability requirement); (3) mail damage was six times greater than the contract allowed; (4) the accept rate was 90% (compared to the 94.6% FAT requirement); and (5) the accuracy rate was 98.6% (compared to the 98.7% FAT requirement). *Id.*

Due to the performance failures, the Postal Service denied Northrop’s verbal request for conditional approval. The Postal Service also informed Northrop that it was not authorized to proceed with FSS deployments. It did, however, allow Northrop to install additional FSS machines at Dulles and at four new locations, but at its own risk. *Id.* at 122413-14. The Postal Service limited operation of machines to the four at Dulles and took the position that no other machines would run live mail or be accepted “until the FSS successfully passes the First Article Test.” *Id.* at 122414.

Northrop followed up its failure with a presentation to the Deputy Postmaster General in which it offered a schedule for near term improvements to the machine and its software. DX 2236. These improvements would be in anticipation of an interim test to show progress at or after April 2009. Tr. 2878-80 (Ledford).

The parties agreed to a two-part FAT retest, essentially an interim event termed “FAT 2A” to show progress and then a final FAT re-do called “FAT 2B.” The January letter regarding FAT failure reminded Northrop of contract Clause 2-5, which provided that Northrop had to pay for all expenses associated with any First Article retests. Northrop was to submit a detailed project plan for the retests. The Postal Service also expressed its concern that FAT failure would lead to lost operational savings to the Postal Service and that Northrop could not meet schedule commitments across the program. Northrop followed up with a more detailed schedule sent by Mr. Erdman to Mr. Crone at the Postal Service. DX 2275.

C. FAT 2A

Four months passed during which Northrop worked on performance improvements to the FSS and its software. The parties disagree as to who should pay for this effort, but we need not go into any great detail regarding the disagreement, as will be made clear in the discussion below.

1. The Machine

Northrop's FAT 2A machine used its fifth software build for the test, which, although not final, was close to maturity. Other than software tweaks, the machine was in its final form by the time of this test, which took place in April and May 2009.

2. Performance Criteria

Because FAT 2A was an interim test to show progress, the Postal Service did not insist on all of the production contract SOW requirements that were tested at the initial FAT, and some of the requirements were applied in a less stringent fashion. The parties' intent was to show progress with the fixes and to give the Postal Service confidence that FAT requirements ultimately would be met in the final test, FAT 2B. Northrop specifically aimed to reduce the occurrence of jamming and maintenance downtime by half and to reach a throughput of 14,500. DX 2236 at 5.

3. The Test

The Postal Service conducted FAT 2A from April 26, 2009 to May 9, 2009, again at the Dulles Postal Service facility. The test was to sequence flat mail into delivery point sequence order for eight zones. The Postal Service tested the following performance criteria: throughput rate 2-pass; Delivery Point Sequencing ("DPS") accuracy rate; accept rate; operational availability rate; mail damage rate; flyout rates; throughput rate non-2 pass; REC image volume; FICS data accuracy; carbon insert damage rate; and static discharge. DX 2545 at 2210 (FAT 2A Test Plan).

D. Results

By a letter from CO D'Orso dated June 5, 2009, the Postal Service granted "conditional approval" of FAT 2A results because the normalized throughput surpassed the requirement of 14,500 pieces per hour and the system accuracy and accept rates were less than 1% below contract requirements.¹¹ JX 376 at 122478. The Postal Service found that the system met the requirements for Normalized Throughput, Mail Damage Category 2 Rate, Throughput Rate Non-2 Pass, REC Image Volume, and FICS Data Accuracy. Mr. D'Orso's letter noted, however, that, although not an official

¹¹ Normalization, as will be discussed later, is an adjustment to the way in which throughput was calculated to account for lower mail volumes.

pass/fail parameter for this test, the operation availability of the test machine during FAT 2B was well below the contractual requirement.

The approval was conditional in that it was contingent on Northrop meeting four conditions and was accompanied with the reminder that Northrop could not continue installations at any new sites until it met the four conditions. *Id.* The first condition was that Northrop had to submit a plan with specific actions and schedules for the FSS program for Postal Service approval. The plan was to include improvements to the FSS machine, a “fully integrated plan with adequate assurance that it meets logistics contract requirements,” new delivery dates for all outstanding deliverables, and measurable metrics. *Id.* at 122479. The second condition was that, if the new plan required changes to the contract schedule, Northrop and the Postal Service would include the changes in the next contract modification. Third, Northrop was to correct CASTR tray loading and reporting errors. The Postal Service stated that it would include this last CASTR sort parameter in the FAT 2B performance test. Fourth and finally, Northrop had to conduct periodic briefings for Postal Service management to compare planned versus actual performance for each metric set out in the plan. *Id.*

If Northrop met those four conditions, it could proceed with installation at identified facilities. Because the FSS machine at that point had not met the contract requirements, however, the Postal Service reallocated the milestone payments, withholding certain payments until Northrop successfully conducted FAT 2B. *See id.* at 122480.

E. Interim Steps

Northrop agreed to a replan but took exception to the CASTR “fixes,” taking the position that they were outside the scope of the contract. *See* JX 397 (Northrop response letter, dated June 5, 2009). Northrop listed the contract’s original CASTR manifest requirements, stated that anything beyond this was outside of the scope, and reserved the right to seek compensation for schedule and cost impacts from this new work. *Id.* at 122449-50. Plaintiff nevertheless represented that it would press forward with the final FAT test in August 2009. *Id.* at 122452.

Through the summer of 2009, the parties continued meeting. Northrop presented its progress and steps necessary to reach readiness for FAT 2B. The schedule continued to slip, however. *See* JX 396 (pushing the test till September 2009); JX 442 (pushing it until October 2009). The parties also continued to spar on the issue of the CASTR fixes during these meetings. Northrop initially did not include them prior to FAT 2B in its replan

schedules. *See* JX 442 at 51192 (block schedule showing CASTR work in software build 7, after the planned dates for FAT 2B); DX 3121; Tr. 7501 (Mr. Spira).

In September 2009, the parties met to discuss the CASTR work and Northrop's proposed schedule. The Postal Service had rejected Northrop's earlier proposed replan by letter dated September 3, 2009, because it was unhappy that Northrop did not intend to make the CASTR changes and fixes prior to FAT 2B. JX 450 (rejecting replan). The Postal Service did, however, conditionally reopen installation of FSS machines, but live mail was not to be run until the CASTR manifest issues were fixed and tested. *Id.* at 122565. During the subsequent discussions, plaintiff promised to make the CASTR improvements prior to the final FAT but continued to maintain that the work was new and not covered by the contract. Tr. 1452 (Milnes). The issue came to a head during a September 21, 2009 meeting, at which Northrop informed the government that it had stopped CASTR work for lack of an official Postal Service direction and agreement to pay for the changes. *See* JX 471 (Northrop emails regarding CASTR work). Northrop maintained, however, that it was prepared to go ahead with testing in October.

The Postal Service responded by requiring a field demonstration of readiness before it would commit to the testing dates. JX 477. The October test dates slipped, but plaintiff agreed to a readiness evaluation in November 2009. It would be conducted with software build 6 and be treated like a FAT test. Mr. Ledford told his team that success was paramount. DX 3429 (Northrop emails).

The CASTR fixes, however, remained a bone of contention between the parties. Katie Gray, a Northrop Vice President involved in the FSS project, testified that plaintiff did not believe it had sufficient contractual direction to move ahead with CASTR work in October. Tr. 7395-96. She thus escalated the issue to the relevant contracts personnel on the government side, requesting specific technical requirements and an agreement to pay for a modification. Direction came from the Postal Service by letter dated October 30, 2009. JX 496. The government was still not in agreement that the work was extra-contractual, but the Postal Service directed Northrop to proceed. Tr. 5282 (Guilfoil). The Postal Service attached a revised CASTR Output Requirements document to the letter. After reviewing the Postal Service's requirements, Ms. Gray instructed her team not to move forward with the technical work but to put together a proposal for the government in order to prompt compensation. DX 3594. These issues were eventually resolved, but they pushed into the next year, along with the final FAT test. Ultimately, as will be discussed later, the Postal Service's requirements were

further refined, the contract was modified, and Northrop was paid for the additional work.

The readiness evaluation, called "Eval I," was conducted in November 2009, and the results presented to the government on December 2, 2009. Operational availability remained nearly 30% below contract requirements, however. DX 3761. Northrop recalculated the availability figure, taking out certain jamming and overlapping events, but the resulting figure still came well short: 80.75% availability. Tr. 3001-3003 (Ledford). Normalized throughput remained high, but still slightly below the 16,500 figure required by SOW AA. The parties disagree as to the causes of these problems, but that is ultimately immaterial as this was not the contractually mandated gateway test, FAT 2B.

Northrop busied itself working on software build 7 and further negotiating with the government about the CASTR work. Another interim evaluation of the FSS machine was held in April 2010, "Eval II." All four FSS machines at Dulles were tracked for maintenance events, with the 1006 machine being used as the test machine for performance parameters. Tr. 5862 (Newman). Performance improved, but operational availability and mean time between failure continued to be a problem. DX 4444 (Eval II results). Mr. Crone saw the improvements as positive, however, and pushed for FAT 2B to be scheduled.

The preliminary evaluations over, the parties negotiated a final FAT test plan in May 2010. Several new issues were raised by Northrop after Eval II, however, such as walk-sequenced mail and the formula for calculating availability. Tr. 7446-47 (Gray). Although walk-sequenced mail was not necessarily out-of-spec, it was traditionally not machine sorted because it went to every house along a route, meaning it needed no sorting. Northrop took the position that its inclusion was causing the FSS to slow down. Plaintiff also proposed lowering the operational availability metric to 67%. DX 4341 (Northrop proposed ATP test plan). Northrop also insisted that the Postal Service remove operator-caused jamming from downtime in the availability calculation. Tr. 7449 (Gray).

Modification 15, which set the final CASTR requirements and payment, was signed on June 10, 2010. The parties also continued to discuss the FAT 2B test plan in June. These issues were resolved by the end of the month. Walk sequenced mail was not to be run during the test unless both sides agreed during the FAT and ATP tests to allow it. FAT 2B was scheduled for August 2010. The parties modified the contract schedule to reflect these agreements in Mod. 17 on July 2, 2010. The parties continued

to negotiate several of the test parameters leading up to the final FAT test. The Postal Service agreed to waive the flyout requirement. Tr. 803-805 (Littleton).

The CASTR changes were tested independently in mid-July 2010, prior to FAT 2B. Northrop passed that test. PX 1835 (CASTR test report). Several conditional ATP tests were also conducted during this period. Some with the CASTR changes and some without. The parties agreed to forego any in-plant testing in Mod. 17 in order to move more quickly to FAT 2B.

F. FAT 2B

The Postal Service conducted FAT 2B between August 15, 2010 and August 27, 2010. On September 10, 2010, the Postal Service confirmed that it was accepting the results unconditionally, meaning that Northrop had passed the test. JX 662. The final results are not particularly germane to any issues, except that, although plaintiff came up short on availability and mail damages metrics, the government accepted the results and allowed installation and acceptance testing to proceed.

G. Building and Changing Software

Throughout the performance of the contract, the Northrop software team studied, updated, and documented the software run on the FSS machines. The contract originally anticipated five software “builds,” or complete versions of the FSS machine software. The Postal Service was very involved, making a series of requests along the way. After machine testing, the number of builds expanded to eight. After Northrop provided Build 8, Software Release 2.5.3, the Postal Service reviewed it and determined that it contained deficiencies and uncorrected issues. The issues include a “green state stop” problem that occurred when the ITC had a green light on, indicating it was functional but had stopped working without any indication or alarm explaining why. The parties engaged in more technical review and eventually agreed that Northrop would submit another software release labeled 2.5.4.

Northrop developed software release 2.5.4 and delivered it to the Postal Service on a CD in August 2011. Northrop did not include updated software documentation with this CD. Northrop also did not perform alpha testing or provide on-site support for beta testing for this release. The Postal Service determined that the new version did not correct the issues identified after Build 8. Northrop did not continue software work after software release 2.5.4. Instead, the Postal Service itself corrected the green state stop and

carousel messaging function, added other features, and then released the software as its own upgraded version of 2.5.4. The Postal Service paid other contractors \$115,810 to perform this work. The parties differ as to who is responsible for this cost. Ms. Tondreau, a software engineering lead at Northrop, recalled that no machine was available for Northrop to do testing at this point, however, as all machines had been delivered to the government and were in use. The Postal Service thus conducted the software testing itself.

H. Acceptance Testing

The contract contemplated that, after successful FAT, each FSS machines would be subject to an Acceptance Test Protocol (“ATP”). These were in-field tests performed after a machine had been installed and burned in. Acceptance testing was the final milestone before a machine was paid for by the Postal Service. If an FSS system failed to meet any performance requirements of the SOW at an ATP, the Postal Service had the right to require a complete retest. Each machine was required to pass ATP prior to acceptance.

Machine numbers 1001, 1016, 1030, 1031, 1044, 1047, 1067, 1068, 1077, 1078, and 1083 failed their initial ATP tests. Machines 1016 and 1044 also failed their retests. Northrop acknowledged the ATP failures and worked with the Postal Service to plan retests. Those machines eventually passed their ATPs, however, and all of the machines were ultimately accepted by the government. We assume that the rest of the machines passed their ATP tests on the first try.

SOW A section 8.5 included a liquidated damages clause for any retesting. If an FSS machine failed to pass all of the testing requirements, or if Northrop elected to stop the acceptance test prior to acceptance, Northrop was required to reimburse the Postal Service for the costs associated with retesting. The contract set a rate of \$60 per work hour for the total time spent by the Postal Service Test Director and other test personnel, including round trip travel, to re-inspect and retest the FSS. Northrop is liable for the costs of retesting, if proven.

The Postal Service Test Director and Postal Service “Test Assistants,” who were contractors working for Serco, performed the retesting. Serco invoiced, and the Postal Service paid, for the labor hours and travel costs of the Serco contractors conducting the ATP retests. For the ATP retests, Serco used charge codes for each retest to separate these amounts from work

occurring for the original ATP. Serco also separately billed for the FAT 2A and 2B retests.

VIII. Select Deliverables

As mentioned previously, the contract obligated plaintiff to deliver a host of other deliverables related to training, documentation for maintenance and operation, spare parts, a design warranty, as well as many contract administration documents mentioned above (schedules and reports). Some of these items were dependent on information or documentation from the Postal Service prior to production by Northrop.

A. Relocation Manual

SOW F section 9.2 required Northrop to deliver a manual to the Postal Service addressing how to relocate the machines if it needed to move them after installation, presumably due to changing mail volumes. The relocation manual was to contain step-by-step procedures to disassemble, pack, ship, unpack, reassemble, integrate, align, adjust, troubleshoot, and test a complete FSS system. Steps could not be omitted or assumed. JX 3 at 73304. This manual in turn had to be drafted in conformity with SOW L-5, the Handbook Development Guide, which contains writing guidelines, including instructions on style, formatting, words and acronyms, cross-references, figures and tables, warnings, and standardized spelling and abbreviation of technical words. The guide was authored by the Postal Service. Per SOW B, Northrop was required to deliver a complete relocation manual 12 months after the acceptance of the first production FSS.

Northrop and its subcontractor, Siemens, worked on the relocation manual. Northrop and Siemens planned to use the teardown of the Logistics Reference System (“LRS”), an FSS machine at Northrop’s plant in Maryland, as its model for the manual. On April 8, 2011, almost 12 months after the acceptance of the first production FSS, Northrop submitted a draft relocation manual to the Postal Service.

The Postal Service had the right to validate the completeness and adequacy of the manual and identify corrections, additions, or clarifications. The Postal Service determined that the April 8, 2011 relocation manual was deficient because it did not address the ATMS or ITC subsystems of the machines, content which Northrop had expected to receive from Siemens. The Postal Service alerted Northrop to those errors, among others. Northrop submitted a revised relocation manual to the Postal Service on September 2,

2011. The Postal Service thereafter had the right to review the updated manual and provide acceptance or rejection within four weeks of receipt.

On November 22, 2011, the Postal Service rejected the updated version of the manual. The Postal Service provided comments and a marked-up copy, noting, among other things, that the manual lacked information on reassembly, packaging, transport, and pre-disassembly, and still contained no information about the ATMS and ITC subsystems. On February 10, 2012, Northrop submitted another updated relocation manual in response to the Postal Service's comments. The Postal Service notified Northrop on March 1, 2012, that the updated document contained seven critical and six major defects, including lack of information on installation, packing, shipping, and reassembly, several instances of inadequate content, and a failure to incorporate ATMS information received from Siemens. The Postal Service rejected the relocation manual. Ultimately the manual was completed by Siemens under a separate contract with the Postal Service.

B. Spare Parts

The FSS Production Contract required that Northrop provide a certain number of spare parts with the FSS machines. SOW H set out the spare parts and provisioning requirements of the FSS program and provided Northrop's general obligation to "provide all parts necessary to maintain the integrity and quality performance of all equipment, at or above the accepted performance level and the reliability, maintainability, and availability requirements, delivered under the terms of this contract." Northrop was required to provide three types of spare parts kits: spare part kits that would be maintained at each FSS site ("SSPKs"); supplemental site spare parts kits ("SSSPKs"); and a depot spare parts kit ("DSPKs") maintained at the Postal Service's central maintenance repository in Kansas.

Each SSPK is a repository of parts maintained on site with an FSS machine. Northrop was obligated to provide a SSPK with the delivery of FSS machines to each site. The SOW required Northrop to stock each SSPK with the parts necessary to keep two machines running continuously for six months. The DSPK is a repository of parts maintained at the Postal Service's spare parts depot in Topeka, Kansas. Parts from the DSPK were to be used to replenish supplies for the SSPKs. Northrop was required to stock the DSPK with enough spare parts to keep all of the sites running for six months. It was also to replenish the DSPK through February 10, 2012. Taken together, as of February 10, 2012, each SSPK should have contained sufficient parts for an uninterrupted six-month period of operation, and the

DSPK should have contained the same parts sufficient for six months of resupply.

The Postal Service notified Northrop on July 14, 2011, that the Postal Service was purchasing additional spare parts to supplement the incomplete part submissions that had been provided by Northrop. On November 30, 2011, the Postal Service again notified Northrop that it was purchasing additional spare parts. In total, the Postal Service purchased \$2,192,745 in spare parts.

C. Repair Specifications

The Postal Service operates a Central Repair Facility (“CRF”) in Topeka, Kansas, which repairs assemblies and subassemblies of Postal Service-owned equipment. The CRF uses detailed documentation, repair specifications, to test and repair each item. During the FSS production contract, and continuing to the present, Northrop Grumman Technical Services (“NGTS”) has operated the CRF through a contract with the Postal Service.

SOW J of the FSS Production Contract defined a “depot repairable item” as one that is field replaceable, depot stockable, repairable in an electronic or machine shop environment, and has a unit purchase price of \$250 or more and/or a purchase price of \$50 or more for subassemblies. JX 3 at 73409 (SOW J § 2.3). SOW J sections 1.0 and 4.1 required Northrop to provide the CRF with working, known good items and two copies of documentation, such as operation and maintenance manuals, so that the CRF had sufficient supporting documentation necessary to develop and maintain repair specifications for these items. If documentation was not available for a commercial item, Northrop was required to provide three domestic sources of repair. *Id.* at 73413 (SOW J § 4.1). If Northrop could not obtain repair information for a commercial item due to proprietary information restrictions, it was permitted to provide a letter from the vendor stating the unavailability of the documentation within a certain time.

For each program-specific repairable item, Northrop was required to provide a complete repair specification with associated test fixtures, programs, firmware, and specification book. *Id.* at 73409 (SOW J § 1.0). If a repairable item met the criteria for repair, Northrop was required to provide a repair specification written to the contract standard unless the item was identical to one that already had an existing repair specification, was a commercial item, or had a manufacturer provided commercial repair specification. *Id.* at 73419 (SOW J § 7.2). SOW J section 5.6 required

Northrop to provide special tools not available at the CRF. SOW J section 3.2 required Northrop to deliver 25 of each piece part not having a listing in the CRF stock catalogue but used in the repair of items.

On April 26, 2011, Northrop submitted deliverable J-48, its Repair Development Plan pursuant to SOW J. Northrop took the position that it only had obligations under SOW J to the extent that it was applicable to seven unique printed circuit boards designed for the FSS machines. Northrop stated that it had submitted piece part purchase orders for those seven circuit boards and indicated that, because none of the seven circuit boards were commercial items, the SOW J commercial items requirements and attendant deliverables were not applicable. Northrop stated that it did not anticipate adding any more items to the list. The Postal Service rejected Northrop's J-48 deliverable on May 23, 2011. On August 9, 2011 and August 18, 2011, the Postal Service provided Northrop with lists of items that it considered to be commercially repairable items and requested that Northrop provide the documentation required by SOW J section 4. Northrop did not respond.

On January 9, 2012, Northrop resubmitted its repair specifications for the seven unique printed circuit boards and other items related to these boards because its previous submission may not have been clearly marked. With this delivery, Northrop stated that it had fulfilled all open deliverables under SOW J section 7, including J-50 through J-64. Northrop also stated that there were no updates to other SOW J deliverables that it had already deemed completed.

On February 3, 2012, NGTS produced a review of the SOW J deliverables that Northrop had submitted on January 9, 2012. NGTS found that the repair specifications for the seven unique circuit boards were not properly formatted and contained an incomplete test step structure. NGTS also found that the specifications did not comply with the contractually required format. On March 9, 2012, the Postal Service requested that NGTS estimate how much it had spent or planned to spend to repair commercial items for the FSS, including documenting and gathering repair specifications and obtaining piece parts. NGTS estimated \$569,492, broken down into the categories of "repairables research," "piece part/repairable items," and "documentation expense for commercial items." These all represented asserted costs involved in FSS repairable items, including unique and commercial repairable item deliverables and services, whether or not delivered to the standard required by the SOW.

On August 9, 2013, NGTS updated its asserted "FSS claims costs" to \$789,691.48, including: (1) \$58,371.33 for repairables research, including

evaluating repairability and obtaining documentation (\$39,055.04 in actuals, \$19,316.29 in estimates); (2) an estimated \$476,024.87 in “delinquent piece parts” identified by the CRF; (3) \$14,295.29 for special tools purchased by the CRF; and (4) an estimated \$250,000 to rework the repair specifications for five of the seven unique printed circuit boards.

On January 20, 2015, NGTS updated the estimate to \$327,346.41 for non-deliverables. This number includes: (1) \$67,662.71 for repairables research (\$39,055.04 in actuals, \$28,607.67 in estimates); (2) \$245,388.42 in purchased piece parts not having a listing in the CRF stock catalogue but used in the repair of items; and (3) \$14,295.29 for the special tools purchased by the CRF. The CRF had not yet incurred costs to rework the repair specifications for five of the seven unique printed circuit boards. The estimates and actuals total \$577,346.41.

D. Design Warranty

Under the contract, Northrop agreed to provide several warranties. As relevant here, Award Data Sheet Paragraph 23 provides that Northrop warrants to correct design defects including retrofit or replacement of accepted, installed, and work in progress systems, assembly process, parts storage, site and depot kits, pending replenishment orders, maintenance and training documentation and course materials at no additional charge to the Postal Service for a period beginning at first system acceptance and ending 9 months after the acceptance of the 100th production field system. JX 1 at 3706866. This is known as the “design warranty.”

On June 9, 2011, the Postal Service sent Northrop a letter, DX 5692, invoking its design warranty rights under Paragraph 23 and attaching a list of defects. Among those listed, the Postal Service claimed that the left CASTR guiderail experienced excessive wearing under normal conditions to the point that a groove formed in the guide rail, causing misalignment and jams. The wear occurred because of different heights of guiderails manufactured by Northrop and its suppliers as well as mismatched screw sizes. The Postal Service paid a contractor \$39,208.58 to correct the left CASTR guiderail issue.

On August 10, 2011, Northrop responded to the Postal Service’s letter, disputing the substance of the Postal Service’s list. Northrop provided the Postal Service with a PowerPoint presentation, which offered recommendations to help the Postal Service reduce the quantity of carousel crashes. That did not resolve the dispute, however, and the CO’s final

decision included a claim for this item and several others.¹² On March 9, 2015, the Postal Service updated its design warranty claim during the litigation.

IX. Contract Close Out and Procedural History

Northrop completed deployment of the FSS machines in August 2011. All FSS machines were eventually delivered, deployed, inspected, and accepted by the Postal Service. Spare parts and revisions to documentation continued to be provided by Northrop thereafter, and some of these items gave rise to disputes between the parties, but performance of the contract was largely complete in late-summer 2011. Given the delay in deployment and acceptance of many of the FSS machines, the Postal Service retained over \$60 million in progress payments as a remedy for damage it allegedly suffered.

Given the unanticipated delays during the design phase and testing failures, Northrop, in turn, sought compensation before performance was complete and continued to seek adjustments thereafter. It submitted a request for equitable adjustment (“REA”) to the Postal Service on March 31, 2009, for delays that it alleged were caused by the government prior to the end of September 2008. About three months later, it certified the amount and submitted the request to the CO on July 8, 2010, seeking almost \$44 million. This claim was almost wholly denied by the CO by written decision on May 9, 2011.

Northrop went through this process again in September 2010, certifying a new claim to the CO on August 3, 2011, seeking over \$71 million in additional costs. Three months later, Northrop followed up with its third certified claim to the CO, asking for an additional \$63 million, primarily for the unpaid contract balance. On April 13, 2012, the CO issued a decision almost entirely rejecting Northrop’s second certified claim, offsetting the contract balance (third certified claim), and asserting a net claim against plaintiff for \$341 million. Northrop filed a fourth certified claim thereafter to dispute the Postal Service’s claim for damages. That claim was not responded to as of the filing of the complaint.

Northrop filed suit in this court on May 4, 2012, appealing the CO decisions and the deemed denial of its fourth certified claim. The Postal Service filed a counterclaim for lost savings, which it amended in 2018. The

¹² Defendant initially claimed three items from the June 9, 2011 letter as design warranty breaches, but at trial, it abandoned the other two claims.

parties undertook a long and laborious discovery effort. Plaintiff moved for partial summary judgment in December 2014 regarding the government's lost savings counterclaim. After several extensions of time for briefing, we denied that motion without prejudice to reassertion after more factual development on June 29, 2015 (ECF No. 65).

After the close of discovery in 2017, plaintiff sought summary judgment on its claims and dismissal of defendant's counterclaims in March 2018. Defendant also moved for partial summary judgment and to dismiss Count I of plaintiff's complaint regarding a cardinal change theory of breach because such a claim was not submitted to the CO. Neither party cross-moved on any issue. After extensive briefing, we heard argument on September 14, 2018. On October 17, 2018, we granted defendant's motion as to plaintiff's cardinal change claim, and we denied plaintiff's motion to dismiss as to the government's first count of its counterclaim. We did, however, grant plaintiff's motion to dismiss Count IV of the government's counterclaim with respect to equipment parts not originally asserted as missing. *Northrop Grumman Sys. Corp. v. United States*, 140 Fed. Cl. 249, 257-59 (2018). We also granted parts of both parties' motions for summary judgment, trimming the issues for trial and requiring plaintiff to revise its list of constructive change claims. *Id.* at 260-282. A pretrial schedule was then set.¹³

The pretrial conference was held on December 13, 2019, at which we denied the parties' motions *in limine* with the exception of plaintiff's motion (ECF No. 185) regarding defense exhibits 6243 and 6217.¹⁴ Trial began thereafter on February 3, 2020, and continued until February 14. Trial resumed February 20 through February 28, 2020. Trial was held again in March 2020 but was interrupted by the beginning of the Covid-19 pandemic. Trial eventually resumed in November 2020 via a mix of in-person and virtual proceedings. In fits and starts due to covid-related delays, eight weeks of trial time was eventually completed on March 5, 2021. After eight months of briefing, post-trial arguments were held on December 8, 2021.

¹³ The parties also attempted mediation during the pretrial process but were unsuccessful.

¹⁴ Ultimately both exhibits were excluded at trial for different reasons. Accordingly, the motion is denied as moot.

DISCUSSION

Northrop claims that the Postal Service precluded it from controlling the design, build, testing, and installation of the machines by seizing control of the design, improperly testing the first article machine, and by delaying deployment of machines after FAT 2A. This results in two tranches of claims, one for delay and another for what plaintiff characterizes as “disruption.” Included in both are a number of discrete items that do not fit neatly into the broader categories. Plaintiff also seeks the remainder of the contract balance. The Postal Service, on the other hand, argues that Northrop’s machine was not capable of meeting the SOW requirements on time, resulting in delayed delivery and lost savings for the Postal Service. It also claims direct costs for other deliverables that it claims are missing or that did not meet the contract’s specifications.

Northrop eventually produced a machine capable of performing according to the SOW requirements, but not within the time constraints agreed to in the contract. Northrop could not demonstrate that its machine would have passed FAT, even absent the Postal Services’ alleged interference. We also conclude, however, that the Postal Service precluded Northrop from moving forward to final FAT testing by imposing extra-contractual requirements, namely, a change to the CASTR output requirements which resulted in a nearly yearlong diversion. The parties’ smaller affirmative claims center on the timely and conforming receipt of the deliverables, some of which Northrop did deliver on time and in a state that fulfilled its obligations under the contract, and some of which did not. Some of Northrop’s discrete claims are interwoven with its delay and disruption claims. Others stand alone and concern delays or extra costs alleged to have been caused by the government. In any event, most of these discrete item claims fail for lack of proof, as discussed below.

Ultimately, both parties suffered the foreseeable consequences of overconfidently entering into an enormous production contract before a single successful pre-production machine had been tested. That overconfidence coupled with subsequent mismanagement by the contracts and accounting administration teams on both sides had a ripple effect that led to ten years of litigation, which ends, in this court at least, without a clear win for either party.

I. The Parties’ Claims

Plaintiff seeks recovery for two types of damage: its unpaid contract balance and extra costs incurred due to government-caused delay in installing

the machines and due to what it characterizes as “disruption” of its performance by the Postal Service. Defendant counters with its own reciprocal claim for lost savings due to the delay in machine delivery. It also seeks compensation for direct costs it allegedly incurred trying to remedy instances of non-performance by Northrop. There is no dispute that the 100th machine was delivered and accepted 10 months later than the contractually obligated date of October 2010. The bulk of the dollars at issue depend on whether that delay is compensable.

A. Delay

If plaintiff is not responsible for the late delivery and acceptance of the machines, it will at a minimum be entitled to its unpaid contract balance, less any other damages proved by defendant. Defendant, other than the discreet direct cost claims, cannot recover unless it proves Northrop’s responsibility for the machine delay and the quantum of the savings it lost. The table set, we turn to the particulars.

As detailed above, the Award Data Sheet, although not intended to serve as the final schedule, showed the parties’ initial best-case hope that deployment of the machines would be completed by mid-October 2010. Section C of the SOW, on the other hand, indicated that final deployment should be complete by the end of August 2010. JX 3 at 71458 (SOW C § 2.2). The latter was purely notional, however, because the contract also called for the parties to agree to a new schedule shortly after entering the contract. They did so in Modification 2 (“Mod 2”) on October 12, 2007. This was based on a SOW section C19 planning schedule to be produced by Northrop and then edited by the Postal Service to implement changes to the intended delivery locations. In that schedule, the parties projected deployment of all 100 machines, at 32 locations, by the end of October 2010. The precise deployment schedule thereafter changed 13 times during the iterative and collaborative planning process called for in SOW C 21. Although the schedule changed with respect to locations for particular machines, until Mod 17, the end date remained fixed at October 2010.

As an initial matter, we disagree with plaintiff’s assertion that these schedule manipulations shifted responsibility for delay to the government. The contract gave the Postal Service the right to change the delivery schedule nearly *carte blanche*, at least with respect to the locations and numbers of machines at locations. Although the delivery schedules were Northrop deliverables, the Postal Service had both a veto right—it could simply refuse to accept a schedule from plaintiff—and the unfettered discretion to direct changes to the schedules. Notice was only a precondition to changing the

schedule without a cost impact. And, even if there were cost impacts, plaintiff had no right to refuse to implement the changes; it could only seek recompense after the fact.¹⁵

Further, plaintiff did not complain at the time about any of the schedule changes, and it did not invoke the contract clause allowing it to be compensated if it was given less than 120 days of notice. We thus find no remedy available under that clause.

That leaves the issues of first article testing and CASTR.¹⁶ As explained below, we find that the delays traceable to FAT failure and CASTR changes to be offsetting.

1. FAT Testing

We have already discussed in some detail the results of the FAT tests. It was not until FAT 2B in August 2010 that plaintiff's machine met all of the contract's performance specifications, at least to the Postal Service's satisfaction. Thus, unless the failure to pass FAT testing is excused, the 10 months of project delay are charged to Northrop. It is important to note that, although Northrop's delay in passing FAT took longer than 10 months, the ultimate conclusion of the project, acceptance of the 100th machine, was only late by 10 months.¹⁷ Plaintiff asserts that this delay is excused because it was

¹⁵ The result might have been different had defendant changed the schedule in bad faith or in such a way as to deal unfairly with plaintiff. Here, however, the Postal Service's motive was purely a business one: declining mail volumes made the deployment of FSS machines at certain locations economically unfavorable. The Postal Service reserved to itself the right to alter the schedule frequently. In any event, the parties' concurrent delays prior to FAT approval gave the Postal Service ample opportunity to do so. Plaintiff did not complain at the time that it was given insufficient notice, and it is too late now.

¹⁶ Plaintiff also argues that the Postal Service abandoned the contractual schedule in April 2009 due to the mail volume declines and that there was no contractually operative schedule again until Mod 17 in July 2010. The import of this is that there was no schedule against which to measure the delay in passing FAT and thus no delay chargeable to plaintiff. We reject that argument.

¹⁷ It is helpful to understand that defendant's theory rests, not purely on an overall 10-month calendar delay, but on a machine-by-machine comparison

prevented from designing the machine by the Postal Service's disruptive oversight and because mail used during the FAT tests did not meet the parameters supplied by the contract for those tests. Even granting some deviation from the contract's test plan, however, we find insufficient impact to change the result—delay in passing FAT was plaintiff's responsibility. Nor do we find that plaintiff has proven a breach due to the Postal Service's asserted disruptive management. The 10-month project delay is thus attributable to plaintiff.

a. Out-of-Spec Mail

Plaintiff's chief excuse for its inability to pass FAT was that the mail run during the initial test in 2008 did not meet the requirements of SOW AA and the contract's test plan in three respects: 1) there was insufficient mail volume; 2) improper mail was supplied by the Postal Service; and 3) there were calculation errors in determining the FAT results.

i. Mail Volume

The first avenue of attack on the test results is plaintiff's assertion that the volume of mail tested was insufficient for it to meet throughput requirements.¹⁸ A passing grade, per SOW AA, was 16,500 pieces of mail sorted per hour during a 2.75 hour run of the machine. JX 3 at 71344. As plaintiff's witnesses, Msrs. Newman and Ledford testified, simple multiplication of those two numbers reveals that just over 45,000 pieces of mail per run are necessary to meet that throughput rate consistently. Because the tests were run with live mail, however, they were susceptible to lesser volumes, i.e, the volume was uncontrolled. Plaintiff highlights four mail runs during the initial FAT period in which there were mail volumes well short of

of when a machine would have been accepted (and thus available for use), according to planning schedules, and when it actually was accepted. It tallies these delays as "machine months," and the cumulative number of machine months at the end of the contract is then priced using a formula based on lost savings of labor hours drawn from one of the Postal Service's electronic labor hour databases.

¹⁸ In its post-trial brief, plaintiff also mentions that the government did not make any other adjustments to the FAT results to account for the low volume runs. It is unclear and unexplained, however, what other metrics the lower volume of mail would have affected negatively.

that figure (2,377 to 5,103). *See* PX 4001; PX 4002, PX 4003; PX 4004 (test reports).

Defendant responds that 45,000 pieces per run figure was not a requirement in the contract. More importantly, the government points out that, even using Northrop's "normalized" throughput to account for the instances of lower mail volume, plaintiff's performance (12,100 pieces per hour) was not close to passing the throughput requirements. Extracting runs of less than 45,000 pieces similarly yields a throughput figure of 12,499 per hour. We are thus unpersuaded that the lower volume of mail during certain times during the initial test affected performance.¹⁹ The evidence instead is that, as of the August 2008 first FAT, plaintiff's machine could not meet the throughput requirement.

ii. Out-of-Sort Plan and Nonmachinable Mail

Plaintiff also argues that the Postal Service's frequent use of mail which either did not adhere to the sort plan for a particular run or which was outside of the contractually-agreed upon limitations for the types of mail (size and weight) caused problems during the runs. As to the first, mail that was out of the sort-plan, we need not go into any great detail.²⁰ Plaintiff's own Mr. Newman conceded that this issue would not have caused Northrop's failure of the first FAT test. *See* Tr. 4167. Mr. Newman also testified that both parties did their best to spot and remove such mail during the test runs. Tr. 4158; *see also* Tr. 6075 (Mr. Hanlon stating the same). Given this testimony and the absence of any real proof of when and how out-of-sort plan mail negatively impacted the test, we cannot find that out-of-sort plan mail excused Northrop's failure to meet the performance requirements. In sum, there is insufficient evidence to conclude that out-of-sort plan mail caused plaintiff to fail FAT.

As to the mail which was "nonmachinable," or "out-of-spec," meaning that the machine was not designed to sort it, we likewise find no harm proved by plaintiff. SOW D contained the specifications for mail that

¹⁹ It also makes no difference that the Postal Service agreed to use normalized throughput numbers during FAT 2A and 2B. Even using plaintiff's proffered numbers, it was short of the required throughput.

²⁰ As Mr. Hanlon explained, the sort plan was embodied in software loaded onto the machine for a particular run or runs. It included information such as how many mail carriers there were for a geographical area and how to sequence the mail for that area. Tr. 6071.

the machine was intended to sort. Although Mr. Newman recalled out-of-spec mail being run during FAT and the increased risk of machine jamming, we are unpersuaded that it made any real difference. As defendant points out, the parties agreed to remove nonmachinable mail from the calculations of the FAT results, as explained by Mr. Hanlon, and agreed to in the FAT Test Plan. DX 2156 at 2297358, 2297370 (test plan) (stating that nonmachinable mail is not chargeable against Northrop); *see also* Tr.5957-58, 6146-47 (Hanlon). Not only were any jams caused by such mail removed from the calculations, Mr. Hanlon testified that both sides had personnel on site during the entire test whose job it was to remove out-of-spec mail. Tr. 5958. He was unequivocal that both sides had an interest in keeping this mail out of the test.

Northrop's offer of Mr. Ledford's testimony regarding a study of subsequent mail run on the machine at Dulles, and apparently elsewhere, is unpersuasive. *See* Tr. 2591. His recollection of the result of that study is not a reliable indicator of what happened during the FAT test. We do not know when precisely these tests were conducted nor were any other details offered. The study itself is not in evidence nor is there any reason why these *ex-post* results would be the same as what happened during FAT. In sum, plaintiff has not shown that nonmachinable caused it to fail FAT.

iii. Availability Calculation

Plaintiff's final explanation for its FAT failure is that the Postal Service made errors in its calculation of the results. Northrop points, however, to only one metric, the availability of the machine. It is undisputed that an error with respect to availability was initially made and reported by the Postal Service after the first FAT attempt. The negative number that the Postal Service recorded is, as the government concedes, impossible. The machine's availability could not have been less than zero; it did run mail and thus should have had an availability figure above zero. Despite this error, plaintiff cannot show that it met the availability requirement of 95 percent (run time divided by run time plus maintenance down time). Plaintiff's papers indeed make no effort to correct the formula to show what its actual performance was. Defendant, however, did so via its witness, Mr. Hanlon, who performed the calculus. He explained that the result is an availability of 46 percent during the initial FAT, less than half of what it needed to be. This testimony is uncontroverted.

We conclude that plaintiff's inability to timely pass FAT is not excused by any government errors and that it is thus responsible for the resulting delay in the deployment of the FSS machines.

A. Disruption

We likewise find that the Postal Service's involvement in the design process did not excuse non-performance by Northrop, nor did Northrop prove that defendant's involvement prevented plaintiff from meeting the performance specifications. First, plaintiff does not point to any specific change directed by the Postal Service which would have negatively impacted the throughput or any of the other metrics tested at FAT. This alone is fatal to any such claim. Second, outside of several action items highlighted in plaintiff's post-trial brief from a database of hundreds, there is no evidence of a wholesale appropriation of the design by the government. No doubt the Postal Service was highly involved in design, and the items highlighted by the plaintiff indeed show a level of interest in certain aspects to a granular level, such as the height of certain rails on the machine. Nevertheless, the overall development, especially as it concerned technical and software details, was left to the plaintiff. An important exception, treated next, is the late change to the CASTR output requirements, but even there, the question of how to implement what the Postal Service wanted was left to Northrop.

Further, Mr. Crone's statements to the Postal Service's Office of Inspector General ("OIG") do not amount to an admission that the Postal Service took over design of the machine. Notwithstanding the cherry-picking of his comments in plaintiff's brief, Mr. Crone's statements recorded in the OIG report concerned the TRM process and its utility to the project. The report records that Mr. Crone was asked whether Postal Service management had considered a hands-off approach, letting Northrop run the project. His answer: "Never. God knows what we would have got." JX 709 at 3639882. That is not an admission that the government impermissibly took over design of the machine. At most, it confirms what we already know: the Postal Service was heavily involved in the management of the contract effort. We find, nevertheless, that plaintiff did not prove that the Postal Service's involvement in design of the machine, even if heavy-handed, excused Northrop's inability to pass FAT until the third try.

Northrop is left without an excuse for its failure to pass FAT on the first try and is thus responsible for the extra time it took to bring the first article machine up to specification. While the delay between the time plaintiff initially failed FAT (December 2008) and when the Postal Service eventually accepted FAT (September 2010) amounts to almost two years, delay in deploying the last machine was considerably shorter, 10 months. This is in part due to plaintiff's being granted conditional approval to install several machines prior to final passage of FAT and presumably due to acceleration. Whatever the delay period, however, those months are

chargeable to the plaintiff, assuming damages proven to a reasonable certainty, unless the government's actions also delayed the project.²¹

2. CASTR Changes

As the machine neared the end of its design, the Postal Service realized it did not have the CASTR functionality it desired. As detailed earlier, it sought a master manifest and other fixes that would alleviate the issue of a particular carrier's mail being divided across trays. This was not required by the original contract, however, which contained a scant 18 lines of text regarding CASTR output.²² The parties signed Mod. 15 on June 10, 2010, which expanded the requirements for CASTR functionality to 17 pages. JX 1 at 3708663. Mod. 15 provided Northrop with an additional \$4.3 million to accomplish the new work. Although the government is now reticent to admit that these CASTR output requirements were not required by the original SOW, the evolution of the contract and the parties' conduct is conclusive. A comparison of the original 18 lines of CASTR requirements with the 17 pages of Mod. 15 is plain enough. Chief among the changes that the Postal Service required were that a CASTR not be loaded with trays for more than one delivery unit and that the trays within each CASTR be arranged in delivery order sequence. Further, the Postal Service's agreement

²¹ We also find it no answer to allege, as plaintiff does now, that defendant abandoned the contract schedule in April 2009 and that no schedule was in place against which it could be measured until Mod. 17 was adopted in July 2010. We find no evidence of any waiver then or thereafter. All of the critical communications from the government regarding the schedule after plaintiff failed the initial FAT came with a proviso that the Postal Service was not waiving any rights under the original Mod. 2 schedule and that it remained in place as the operative schedule for contract purposes. Mod. 17 likewise came with a similar caution that the Postal Service was not waiving its right for delay compensation due to delay measured against the Mod. 2 schedule. The frequent planning schedules that changed the delivery schedule are not evidence of any abandonment of the schedule by the government. It was merely taking advantage of its contractual right to change the delivery schedule in the extra time afforded by Northrop's failure to pass FAT in 2008.

²² Those 18 lines can be found at: (i) SOW AA § 3.11, "CASTR Sort Accuracy Retention"; (ii) SOW D § 1.6(o)(2), "Production Control System"; (iii) SOW D § 4.1.8, "Tray Label Placement and Accuracy"; and (iv) SOW D20 § 6.4.2, "Manifest (CASTR)." JX0003 at 71345, 71494-97, 71504, 73074.

to pay Northrop for the changes is evidence that both parties understood that these were new requirements. The question thus becomes whether CASTR independently delayed the project such that delay attributable to CASTR changes ran concurrently with plaintiff's FAT failure delay.

A year prior to Mod. 15, on June 5, 2009, the Postal Service sent a contract letter to Northrop, signed by CO D'Orso, which conditionally accepted the second FAT attempt (2A), but suspended any machine deployments and the final FAT test until, among other things, Northrop corrected "the CASTR tray loading and reporting errors and have the system correctly load and report accurate within a CASTR." JX 376 at 122479. The letter also directed plaintiff to include this functionality in the FAT 2B test. *Id.*

These directives were repeated in a September 3, 2009 letter from CO David Milnes, which informed Northrop that it could continue with installation of FSS machines but that no live mail could be run until the CASTR issues had been resolved and the new software to do so had been tested and installed on the machines. JX 450. The letter also stated that "the dispatch and CASTR manifest errors must be fixed prior to conducting FAT-2B." *Id.* Mr. Milnes confirmed these directives in his trial testimony. *See* Tr. 1358, 1949-502. Both Mr. D'Orso and Mr. Milnes confirmed on the stand that they did not rescind these directives at any time. Tr. 1949-50 (D'Orso); Tr. 1442 (Milnes). This is also consistent with internal contemporaneous government documents which show that the Postal Service intended the CASTR improvements to be implemented prior to FAT 2B and the completion of machine deployments. DX 3152 (Outline of response to a Northrop presentation to the Postal Service in August 2009); PX 3057 (September 8, 2009 Briefing sheet to Postal Service Vice President Susan Brownell); DX 3253 (September 11, 2009 Postal Service briefing sheet).

On September 16, 2009, plaintiff sent a letter to the Postal Service seeking permission to proceed with FAT testing and representing that it was prepared to move ahead in October 2009. PX 1335. On September 21, 2009, the parties held a meeting at which Northrop responded to the September 3 letter by asserting that the CASTR changes were extra-contractual and that it was not moving ahead without direction and funding from the government. *See* JX 496 at 4771 (October 30, 2009 letter responding to Northrop's assertions at the meeting).

Defendant officially responded to the September 16, 2009 letter and assertions made during the September meeting on October 9, 2009. In its letter, the Postal Service addressed, among other things, the request to move

ahead with FAT testing. It detailed 10 areas in which it found the then-current state of the FSS machine and other deliverables (handbook and spare parts) to be deficient. It stated that plaintiff would be required to make a demonstration of readiness before the Postal Service would commit to another test. JX 477 at 122672-73. The parties disagree as to the import of this letter. Defendant argues that this letter was effectively a rescission of the government's earlier insistence on CASTR changes before FAT. Because the Postal Service was at least notionally willing to proceed with FAT, and because, according to defendant, the new CASTR functionality was not among the items that had to be addressed prior to testing, the Postal Service was therefore backing off its demand that the CASTR changes precede FAT and live mail deployment.²³ Defendant further points to the testimony of Mr. Guilfoil, the author of the letter, who testified that he was not referencing the CASTR changes in the letter nor stating that they were a precondition to FAT testing. *See* Tr. 5253-57. That testimony only goes so far, however.

We view the letter as having no bearing on the question of whether the new CASTR changes were preconditions to FAT testing. Mr. Guilfoil's testimony was short of affirmatively stating that he intended to rescind the CASTR change precondition to FAT 2B. Mr. McGrath's testimony was likewise underwhelming in this regard. He could not point to any specific verbiage in the letters affirmatively stating that the Postal Service was rescinding its earlier CASTR-first requirement. *See* Tr. 8845-47 (McGrath discussing JX 477). Further, when we look at the Postal Service's subsequent communication to plaintiff about the issue, we are persuaded that it did not intend to rescind the "CASTR changes before FAT" demand.

On October 16, 2009, the Postal Service sent another letter to plaintiff, signed by Mr. Milnes, which again stated that the Postal Service did not intend to run any live mail on installed machines until the conditions in the September 3 letter were met. JX 490 at 2058271810. The September 3 letter (JX 376) was attached as reference (c). As pointed out by plaintiff, live mail being run on the machines was necessary for both FAT and ATP testing. JX 3 at 71320 (SOW A section 8.2) (requiring ATPs to be run under standard operating conditions). Without ATP testing, the Postal Service would not accept the machines for contractual and payment purposes, and without processing live mail, defendant's meter for lost savings would continue to run. We view this letter as consistent with the earlier September 3rd directive

²³ The parties are not in agreement on whether the CASTR work identified in the October 9 letter was new. We need not resolve the issue, however, because we do not read the letter as backing off the earlier demand for the CASTR changes nor did subsequent events confirm any such rescission.

that the new CASTR changes had to be completed before FAT and ATP testing.

The next Postal Service statement on the matter came two weeks later in a letter dated October 30, 2009. In it, Mr. Milnes reiterated the Postal Service's position that Northrop needed to fix the "known dispatch and CASTR manifest errors . . . prior to performing the next First Article Test." JX 496 at 4771. The letter was attached to an email along with a more detailed list of CASTR work that the Postal Service required to be done. The September 3 letter was again referenced. This was followed a month later with a November 30, 2009 letter, stating that the government had previously directed the CASTR fixes and referencing the October 30 letter. JX 520. Only 3 days after that, the Postal Service reiterated its position that no live mail could run prior to the work identified in the September 3 letter. JX 525. It is abundantly clear from the series of letters that the Postal Service had no intention of proceeding to FAT 2B, ATP, or running live mail on any more machines prior to plaintiff performing the fixes and changes to CASTR.²⁴

Northrop responded to these last two Postal Service communiques by a letter dated January 19, 2010, which contained a proposal to do the work called for in the Postal Service's October 30 letter. PX 1526. Northrop proposed a two-phase approach to accomplish all of the CASTR changes desired by the government. Phase 1 would cost approximately \$4.7 million and phase 2 would cost \$4.9 million.

The parties continued to work towards definitizing the Postal Service's CASTR requirements and determining what it would cost for Northrop to implement them. During this period, Spring of 2010, the parties identified software build 2.4 as the version in which the CASTR changes were to appear and be tested. A May 21, 2010 email from a Postal Service contractor, Chris Nikpora, to various individuals at Northrop and at the Postal Service, instructed that the "CASTR manifest functionality" would not be

²⁴ The parties also presented several block planning schedules in this regard, authored by Northrop, most of which showed CASTR fixes before FAT and some of which that were less clear. Regardless of whether any of those showed a willingness by plaintiff to proceed to FAT 2B without the CASTR fixes, the Postal Service's contract letter statements cannot be ignored. The COs involved all testified that they did not rescind the CASTR directive. Northrop was obligated to provide the services that the government wanted, and the Postal Service effectively had control over when final FAT testing would occur.

part of ATP testing but would be validated at software version 2.4's acceptance test "and at FAT." JX 605 at 1164-0009680. Mr. Nikpora confirmed that version 2.4 was selected for FAT testing in his trial testimony.²⁵ See Tr. 7875; see also DX 5048 (emails regarding software version at FAT 2B).

At trial, defendant attempted to explain away these emails by asking Mr. Nikpora whether the test of software version 2.4 and then FAT 2B would be measuring the same things. He answered in the negative because FAT testing was judged against the SOW AA performance parameters, such as throughput rate and sorting accuracy, while software tests were concerned with whether the new software ran the machines in the manner intended and added any new features, such as CASTR manifest changes, to the machine. This is not inconsistent, however, with the Postal Service telling Northrop that CASTR was a precondition to proceeding to final FAT testing. It appears to have been unnecessary to tie these two events together, although the Postal Service did so.

Ultimately, the final requirements for CASTR were agreed to and added to the contract via Mod. 15 on June 10, 2010. This change in hand, the parties agreed to a new contract schedule and certain other modifications on July 4, 2010, which were added to the contract in Mod. 17. A near term schedule attached to Mod. 17 placed CASTR testing as part of software version 2.4's testing at the end of July 2010 with FAT 2B and ATP testing following shortly thereafter. JX 1 at 3708723. CASTR output was tested at the end of July, prior to FAT 2B, which took place in the latter half of August 2010.

Although there was little testimony regarding how the CASTR output requirements were changed over the year that it took to definitize them, their history can be traced through 13 revisions of a document by that same name (CASTR Output Requirements). Ms. Tondreau, a software engineering lead for Northrop, testified that each version of that document would have to be analyzed to make sure that her team's work met those requirements and to see whether anything new was to be added. Tr. 880. Ms. Tondreau stated that this was a significant effort for her team, requiring diversion from other projects.

²⁵ To be clear, it was Northrop that selected the version of its software that would be used at FAT 2B, but these communications clarify that, during this period, the parties continued to operate under the assumption that the updated CASTR performance was married to FAT 2B.

The government takes the position that the final CASTR changes are to be found in the November 2009 Rev I of the CASTR Output Requirements rather than the later Rev L adopted six months later in Mod. 15. Mr. Nikpora testified, however, that Rev L was different from Rev I, and the government's own briefing asserts that Northrop pushed back against certain CASTR Output Requirements, particularly how they would be tested, until after Rev I and up until the final modification. There is no need for a detailed comparison, however, because the timeline makes it irrelevant. The CASTR output requirements were new work, not anticipated in the original SOW, and as such, the Postal Service controlled the timeline by not making the necessary contract modification until June 10, 2010.

Defendant also argues, pointing to billing records, that no real work was performed by Northrop on the CASTR changes until after November 2009, the bulk of it coming after Mod 15. Ms. Tondreau said otherwise on the stand, although her testimony was imprecise in this regard and she did not detail any specific work that had been previously performed prior to that time, other than reviewing the ever-changing CASTR Output Requirements. It matters not, however, because the documentary record establishes that defendant wanted CASTR outputs changed prior to FAT 2B, and it did not agree to the precise scope of the work and to how much to pay for it until June 2010.²⁶

We view these facts as establishing the Postal Service's responsibility for delaying FAT until Mod. 15 and the resulting software version 2.4. Defendant argues that CASTR cannot have delayed the project because Northrop was not ready to test its machine, a fact we view as well established. That response is not telling, however, because that was not the only cause of delay. Had Northrop been ready to meet the performance specifications of SOW AA prior to July 2010, FAT 2B would not have taken

²⁶ We do not take seriously any implication drawn from the chronological correlation between the uptick in charge codes for the CASTR work in November 2009 and Rev I also having been issued that month. Plaintiff's January 2010 letter proposed a two-phased plan to accomplish the work. Rev L and Mod. 15, however, left off the second phase. This tells us that there were still major questions unresolved between the parties as to the scope of the CASTR changes in late 2009 and early 2010. Further, although work was performed prior to the contract modification, it is hard to aim at a moving target, and thus Northrop cannot be charged delay for not having finalized CASTR changes before the final statement from the government (the modification) of what it desired.

place at that point because the Postal Service had married CASTR changes to FAT testing.²⁷ In other words, in the hypothetical “but for” world absent Northrop’s breach (its inability to timely pass FAT), the Postal Service would have delayed final FAT testing pending CASTR output changes that satisfied its needs.

3. Concurrent Delay

Ultimately, contract completion—acceptance of the 100th machine—was delayed by 10 months. The first FAT test was failed in December 2008. FAT was finally passed in August 2010, a gap of almost 20 months attributable to Northrop’s failure to bring the machine up to specification. But, in June 2009 and repeatedly thereafter, the Postal Service insisted that Northrop make changes to the CASTR system to give it functionality not agreed to in the contract previously, and it directed that this take place prior to the final FAT test. Definitization of the new requirements and the final version of the CASTR software were not completed until July 2010, over a year later. Given the Postal Service’s insistence that CASTR was joined at the hip to FAT testing, the government is concurrently responsible for delaying the project during that period—the evidence shows that Northrop was not allowed to proceed to FAT 2B until the CASTR issue was resolved to the government’s satisfaction.

We are thus left with the question of the legal significance of these two, partially overlapping, delay periods. Plaintiff delayed FAT for 20 months while it brought the FSS machine up to contractual specifications, and the Postal Service concurrently delayed FAT testing for a year while it insisted on changes to the machine that were not in the contract. Both of these delay periods are longer than the periods that the parties claim delay compensation for. Northrop claims 7.5 months of delay, as measured by its expert Mr. Groves, which represents the difference between the projected completion date as of June 2009, when the CASTR directive was issued by the government, and the projected completion date in Mod. 17. *See* Tr. 4323-26 (Groves). Defendant claims 10 months of delay by comparing the final deployment of the 100th machine in Mod. 2 and what ultimately happened. Neither party’s theory is predicated on the precise periods of time on the calendar that the other was holding up performance. Both instead look to the delay in the completion of machine deployment. Each party’s claimed delay

²⁷ It does appear from the documentary record that the Postal Service realized that it did not need CASTR to be part of the ATP testing process. That does not matter, however, as FAT testing came before ATP testing in the contract schedule.

period is exceeded, however, by the period of time that each caused the other delay. The inescapable conclusion is that both parties are to blame and that neither party can charge the other for the delay.

We note that Northrop's 20 months of FAT failure exceeded the period it was delayed by the Postal Service's CASTR changes. That delta is not awardable, however, because, as mentioned above, defendant's delay damages are not tied to that those precise months on a calendar. It cares only that the FSS machines were delayed later on the project's calendar. It cannot claim that delay, however, because it too caused delay to the project exceeding the period that the machines were delayed. The government's schedule expert, Mr. McGovern, in fact, stated that his conclusions regarding delay would remain unchanged even if the CASTR changes were on the critical path and attributable to the Postal Service. In other words, defendant's delay analysis does not account for the possibility that the Postal Service caused any delay.²⁸ Thus, Mr. McGovern's testimony provides no basis on which we could calculate our own measure of damages for the period of time during which defendant was not concurrently delaying the final FAT test. That being the case, the court need not consider either party's respective proof on how to value the delay.²⁹

4. Plaintiff's Other Delay Claims

Although we have already determined that plaintiff cannot maintain a delay damage claim because of its own responsibility for delaying the project, there are certain elements within its delay claim that are not dependent on the issue of the timing of the delivery of the FSS machines. For the sake of clarity, we begin by listing those claims for which causation is lacking due to Northrop's FAT failure delay. Plaintiff's \$15,978,709 level of effort claim fails for lack of causation because Northrop's delays cannot be segregated from the government's asserted delays and, in any event, because the Postal Service had the right to change the deployment schedule. The result is the same for plaintiff's investment claim for the financial impact of receiving milestone payments later than it would have absent delay, as well as for the proposal preparation costs for Northrop's request for equitable adjustment. None of those damages are available because they stem from

²⁸ Nor has defendant argued in its briefing, at any point, that it is entitled at a minimum to the eight months of time after the initial FAT failure but before its CASTR directive.

²⁹ We note, however, that we have serious misgivings about how defendant calculated the financial impact of each month of delay in machine delivery.

delay for which plaintiff is, at a minimum, concurrently responsible.³⁰ That leaves Northrop's deployment related claims, storage and transportation claim, spare parts claim, and training related claim.

a. Deployment

Plaintiff seeks \$19,849,028 for inefficiencies suffered because of government delays and site access restrictions. As stated above, delay will not support a claim for increased costs. That leaves whatever portion of these claims can be segregated as resulting solely from an increase in the number of sites or specific site inaccessibility. Defendant's objection to deployment related costs is chiefly that plaintiff has not segregated out costs due to plaintiff-caused delay from costs stemming from the additional installation sites. The CO who considered Northrop's certified claim, Mr. Milnes, agreed to government responsibility for \$250,978 of plaintiff's affiliate's, Northrop Grumman Technical Service ("NGTS"), costs to install machines at additional locations and for \$216,983 in costs billed by plaintiff's subcontractor Siemens to assist in that effort. At trial, defendant, through Mr. Lesch, conceded causation for that extra effort and adjusted these figures, finding just over \$700,000 of government responsibility for increased costs. We agree with Mr. Milnes and Mr. Lesch that the government is responsible for extra installation and deployment costs associated solely with an increase in the number of sites. The remainder of the money sought for NGTS's and Siemens' work is unavailable, however, because Northrop is at fault for delay. The same goes for plaintiff's claim for sums it paid to Solystic, an engineering firm hired to assist with deployment. Solystic was idled when deployment was halted due to FAT failure. The government is not responsible for that delay because FAT passage was a precondition to ATP testing in the contract.

Also embraced within the \$20 million sought for deployment damages, plaintiff maintains a claim for increased site coordination efforts and supplemental engineering support, which are not wholly attributable to delay. Mr. Tucker testified that those costs were associated with both increased time (unawardable) and the increased number of sites (awardable). We cannot award damages, however, because there was no effort to segregate hours due to delay from those due to the increased number of sites, and we have no basis in the record on which we could do the separation ourselves. In sum, we will award only those costs shown to be solely due to the Postal Service's decision to increase the deployment sites from 34 to 47.

³⁰ There is also no evidence that the Postal Service's "capital freezes" delayed the project or prevented Northrop from undertaking any work.

Only the government offered figures segregated in this way. We thus adopt those numbers. Plaintiff is entitled to increased deployment costs incurred by NGTS and Siemens due to an increase in the number of deployment sites: \$560,675 for increased operations and maintenance (“O&M”) costs and \$201,119 for extra installation and integration costs, for a sum of \$761,894 for plaintiff’s deployment related claims.

b. Transportation and Storage

Plaintiff next claims \$7,728,327 for the costs allegedly incurred for storing completed FSS machines when deployments were paused and for the cost of shipping the machines to a warehouse first instead of directly to the sites. Both claims fail for lack of causation because the comparison to the “but for” schedule is unavailing when Northrop is to blame for the pause in deployments.

c. Spare Parts

Next in this “delay” tranche is plaintiff’s \$5,496,785 claim for the increased number of supplemental site spare part kits and the loss of economic ordering caused by alleged government dithering in deciding what parts should be included in the kits. As to the increase in the number of SSSPKs due to the increased number of deployment sites, plaintiff seeks \$3,745,792. Defendant does not dispute Northrop’s entitlement to costs, but it views the true cost to be \$3,398,206 based on certain adjustments made by its expert Mr. Foux. Mr. Foux testified that he adjusted the claim downwards to account for differences in various versions of the spare part parts list, known as the “H-30.” Plaintiff’s Mr. Tucker used the “Rev I” version and Mr. Foux used the earlier “Rev G” version. The CO, Mr. Milnes, also relied on Rev G in his CO’s decision, but his sum is higher for the claim at \$3,481,234. We cannot, and need not, resolve that difference, however, because we see no reason to deviate from the most recent version of the H-30 list, the Rev I (JX 758). It was meant by the parties to reflect the parts used in the kits. Rev G was superseded by Rev I, and we thus conclude that Rev I is the most reliable and probative on the question of what was in the kits. Mr. Tucker relied on that version, and thus we adopt his number of \$3,745,792.

Plaintiff also asks for \$1,750,993 as compensation for the loss of bulk ordering discounts because it could not order all the spare parts at once. According to plaintiff, this is not because of any overall project delay, but instead is the result of the Postal Service’s tardy final decision regarding the specific parts and their quantities to be included in the kits. There is no real

dispute that the Postal Service did not finalize its decision on the contents of the spare parts kits until final delivery, rather than the earlier meetings contemplated by the contract. Plaintiff established through Mr. McNelis that Northrop intended to bulk order all of the parts as early as possible. Tr. 3781, 3784. Mr. McNelis used an efficiency curve adopted by the Defense Contract Management Agency to figure out the extra costs associated with the delay, and Mr. Tucker reviewed those figures and made only minor adjustments.

Defendant's position is that plaintiff has not established a breach of any contract provision nor has it shown any extra-contractual work required by the government in this regard. Although we think that plaintiff has established a breach due to defendant's failure to finalize the parts list at the post-deployment provisioning conference, a contractually agreed upon event, we do not see the direct link between this failure and plaintiff's claimed damages. Mr. McNelis' methodology is not based on the assumption that the spares parts should have been ordered as of the date of the final provisioning conference. Instead, he told the court that Northrop would have liked to order the spares along with the original parts for the 100 FSS machines. That may have made perfect economic sense for Northrop, but we see no indication that defendant was required to have finalized its parts requirements until the final meeting. Thus, the damages sought are not tied to the breach asserted and the claim fails for lack of causation.

d. Training

The final delay-related claim is plaintiff's \$4,113,423 request for Postal Service "interference" with maintenance training that Northrop was to conduct for Postal Service personnel. This claim stems from plaintiff's efforts to develop and implement two of the three phases of maintenance training required by the contract: Phase II and Phase III training. Plaintiff alleges that the government: improperly rejected the Phase II validation course because it exceeded the time set aside in the agenda; unreasonably required Phase II to be validated before Phase III could be validated; required a level of maturity beyond what was anticipated for the preliminary handbook for Phase III, which allegedly cost Northrop a year of delay in developing Phase III training; rejected a preliminary version of the Phase III course; and ultimately improperly rejected the final Phase III validation course. Mr. Tucker priced the impact of the delay and extra work due to course rejections at over \$4 million.

At trial Northrop established the difficulty it faced arising from the level of government input and the number of government personnel that

interjected themselves into the training development process. Although the contract (SOW K) called for a single point of contact at the Postal Service for training matters, at least four Postal Service employees and contractors had major involvement. The government official nominated to be the contact for training was Dean Roth, the Training Development Specialist from the National Center for Employee Development. Mr. Roth, in fact, praised Northrop's efforts to complete the training courses in spite of "constant adjustments." PX 849. Despite this glowing review, Mr. Soloway and Ms. Poole from Northrop testified regarding the voluminous inputs, often conflicting, from others at the Postal Service, such as Mel Kosler and Sean Hall at the MTSC and Dominc Bratta and Warren Reeves at the MPLP. Northrop's FSS Logistics Program Manager, Mr. Soloway, testified that, in fact, there was no single point of contact or unified government position regarding training issues. Tr. 2058.

The question remains, however, whether any of that caused delay or was otherwise a breach. Northrop points first to the rejection of its Phase II validation course because the lessons were too long and the course too short as a breach. JX 414 at 12087 (rejection of Phase II training course). Jennifer Poole explained that this problem was driven by Postal Service insistence on, among other things, too many demonstrations and group labs during the course. *See, e.g.*, PX 3331 at 13, 148-153, 158-59, 224, 242, 246 (Poole Deposition). She also explained that many of these requirements were ultimately removed from the final course or moved to the Phase III course at defendant's request, indicating that this was unnecessary at the time and improperly delayed the validation of the Phase II course.

The government's expert, Mr. Fuchs, responded by explaining that the Phase II course was rejected because the training materials and handbook were incomplete and not sufficient to train Postal Service employees. The Postal Service took this position at the time. *See* JX 414 at 12087 (Postal Service July 6, 2009 letter rejecting Phase II validation). There is no dispute that the preliminary handbook, as discussed below, was incomplete at the time, *see* JX 367 (May 22, 2009 letter from CO D'Orso), thus it is unsurprising that the course was also incomplete. The Postal Service's rejection letter, in fact, noted that the course contained many missing links to handbook materials. JX 414 at 12087. Neither Ms. Poole nor any other plaintiff witness explained away these problems as they relate to Phase II validation. In light of the competing evidence of who was responsible, we find that plaintiff has not proven a breach by the Postal Service when it rejected the Phase II course as incomplete.

The second breach alleged concerns the preliminary handbook (“PH1”), a training deliverable from Northrop that was to precede Phase III training. JX 1 at 3707824 (Mod. 7). Mod. 7 covered training deliverables and required the handbook to be completed prior to Phase III validation. Northrop asserts that this was only to be a preliminary document and that the parties had agreed to prioritize only certain portions prior to Phase III training. Instead, the Postal Service insisted on a “complete full content preliminary handbook.” JX 348 at 38457 (May 8, 2009 letter from the Postal Service regarding Phase III validation). Plaintiff believes that this was an effort to delay training and thereby put off government responsibility for machine maintenance. Bringing the handbook to the Postal Service’s satisfaction took nearly a year and delayed Phase III validation by the same amount of time. Defendant responds that it had every right to insist on a complete PH1 and that its collaboration with plaintiff on which parts of the book to focus on first was not a waiver of that right. We agree with defendant.

After reviewing the documents cited by plaintiff, we find no agreement by the government to limit the scope of PH1 or to waive its completeness. The Postal Service understood that the handbook would be updated as the machine’s design progressed, but that is short of an agreement to accept an incomplete deliverable prior to Phase III validation. Mod. 7 required a government-validated preliminary handbook prior to the validation of the third phase of training. We find no waiver of that requirement. The Postal Service’s insistence on a substantially complete handbook prior to course validation therefore was not a breach and Northrop’s costs during that period are not chargeable to defendant.

The third breach offered by plaintiff is that the Postal Service delayed the Phase III validation due to additional changes it requested after a pre-validation “shakedown” course in the fall of 2009. The shakedown course was meant to be a preview of what the Postal Service would validate after what Ms. Poole explained were disagreements within the Postal Service regarding the course. These disagreements ultimately led to a variety of additions, subtractions, and reorganizations of the course at the government’s behest. PX 3331 at 124-128, 160 (Pool Depo.).

As defendant points out, however, the shakedown course was an extra-contractual event offered by plaintiff. The Postal Service’s collaboration in that effort was thus no breach. Further, the testimony from Ms. Poole’s deposition and the parties’ letters regarding training development do not reflect a dissatisfaction with the shakedown course process itself. Northrop’s July 16, 2010 letter reflects that plaintiff offered

the shakedown course as an opportunity for the Postal Service to provide specific and pointed critiques of the Phase III course that it would be testing for official validation. PX 1820 at 3211. According to Ms. Poole, that was precisely what Northrop was looking for: an opportunity for direct feedback from the Postal Service to hopefully avoid a failed validation of Phase III. PX 3331 at 160 (stating that the shakedown process was an effort to get Postal Service involvement in course development to avoid a failed validation). Northrop got what it asked for. It cannot charge the government for that now.

The fourth and final breach alleged in this regard is the Postal Service's ultimate rejection of the Phase III validation course. Plaintiff argues that the scores during the student test for the validation course show that the course was sufficient to convey the knowledge and skill transfer necessary for the Postal Service to maintain the machines. This allegation, even if true, is unavailing.

The Postal Service identified 15 of the course lessons as needing minor corrections, two lessons as being inaccurate or incomplete, and 12 lessons as failing to meet the objectives of the course. PX 1813 at 1851-52 (Postal Service July 14, 2010 letter). This evidence is un rebutted. The only response plaintiff offers is the test scores of the Postal Service customers who took the validation course. As the government argues in its brief, however, that test was not comprehensive and not designed to answer the question of whether Northrop's training course met contractual muster. The July 14, 2010 letter stands un rebutted that there was missing content.

The testimony of Ms. Poole and Mr. Soloway regarding the laborious and frustrating (to both parties) process of bringing the training courses up to the Postal Service's satisfaction engenders sympathy, but not a remedy at law. Again, the parties got what they bargained for. The purpose of the training courses was to equip the Postal Service to be able to maintain the FSS machines. Northrop undertook drafting of these courses while the design of the machines was still in progress. That the development of the training courses was similarly iterative was to be expected. That it cost plaintiff more than it bargained for is neither a surprise nor a breach.

e. Summary of "Delay" Damages

In sum, we reject Northrop's delay damages with respect to overall program delay and deployment schedule changes and its claim for training course development time. It is entitled to extra costs incurred due to the increased number of installation sites and spares kits. Northrop will recover

\$3,745,792 for extra spare parts, \$560,675 for increased O&M costs, and \$201,119 for extra installation and integration costs: \$4,507,586 in total for delay and deployment related claims.

B. Northrop's Other Claims

With overall delay resolved in favor of neither party, we are left with plaintiff's affirmative disruption claim and claim for the contract balance, and the portion of defendant's counterclaim unrelated to overall project delay. We will resolve the remainder of plaintiff's claims and then defendant's direct cost claims.

1. Breach of Contract or Changes: "Disruption"

Touched upon above, Northrop's "disruption claim," spanning parts of Count 2, Count 3, and Count 5 of its amended complaint, is that the Postal Service either breached or changed the contract through its alleged excessive contract administration actions and interference with the design process. In plaintiff's words, the Postal Service's "seizure of design control, excessive Action Items and meetings, failure timely to review and approve deliverables, and other breaches of the duty to cooperate" give rise to a claim for disruption. Pl.'s Memo. of Contentions of Fact and Law 90. Plaintiff calculates that it is entitled to just under \$27.8 million by using a mix of modified total cost pricing for non-software engineering impacts and direct costs for software engineering, hardware changes, and handbook changes.³¹ Defendant responds that there is neither legal support for the claim in the contract clauses at issue (changes and delay clauses) nor any other breach theory, such as bad faith, and that plaintiff has otherwise wholly failed to prove any element of a disruption claim or its costs associated with it.

The parties agree as to the general legal parameters to succeed on a disruption claim, which is that, taken together, individual changes to agreed upon performance directed by one party "can have such a disruptive effect on the contractor's performance that the contractor has a compensable claim for costs in addition to the amounts of its individual change orders." *Jackson Const. Co. v. United States*, 62 Fed. Cl. 84, 103-104 (2004). In order to price such an impact via a modified total cost approach (comparing what the

³¹ In its pretrial memorandum, plaintiff offered an alternative pricing for its disruption claim of approximately \$11 million, which represented discrete pricing for three items. Plaintiff did not present proof at trial as to those three items and does not raise the alternative claims in its post-trial briefing.

plaintiff bid with what it actually cost to perform—a generally disfavored approach) plaintiff must show both the government’s responsibility for the extra costs (a breach or a change) and that “no other method was available” to price the claim. *Servidone Const. Corp. v. United States*, 931 F.2d 860, 862 (Fed. Cir. 1991).

We also note that only the non-software engineering components of this claim are presented on a total cost basis. The other items were priced discretely by Northrop employees through *post hoc* estimates of the level of effort expended. Those claims are more properly considered as discrete changes or requests for equitable adjustments rather than disruption or cumulative effect claims. Thus, they will be treated separately. We deal with the total cost claim first.

a. Modified Total Costs

The claim for non-software engineering costs totals \$9,096,890, which plaintiff’s quantum of damages expert, Mr. Tucker, explained consisted of extra work associated with the engineering of the Automated Tray Management Systems, Stand Alone Mail Preparation Assembly, Flat Sorting Machine, Integration and testing, and drafting.³² Tr. 4978. Plaintiff avers that the great quantity of changes imposed on the design of these elements makes any attempt to separately price them impractical, if not impossible. It goes on to argue the reasonableness of its original bid based on Northrop’s experience in the manufacture of large, complex systems, the reasonableness of the costs incurred, citing to the experience of its personnel in putting together the pricing data, and an audit performed by Defense Contract Audit Agency. Lastly, plaintiff argues that it put great effort into deducting those costs for which Northrop itself was responsible. We reach none of those questions, however, because the premise behind these claims was not established at trial.

Despite the indisputably high number of action items and the level of involvement from the Postal Service, plaintiff has made no effort to tie action items to specific changes associated with the elements of the FSS identified above. Moreover, it has not proven that these action items were in fact changes under the contract or would otherwise entitle it to an equitable adjustment for increased costs. The fact that it spent more than anticipated is

³² The Flat Sorting Machine, or “FSM,” although similar in name to the larger machine, the FSS, is a distinct component of the FSS machine rather than a synonym for it.

no proof of entitlement, particularly given the parties' incomplete understanding of what Northrop had agreed to build.

Although plaintiff made the case that the Postal Service was highly involved, had a high level of input during the engineering phase of work, and required a multitude of meetings, it is also true that all of that was permitted and even contemplated by the contract. Northrop agreed to the action item process, it agreed to a monthly TRM schedule, it agreed to provide a host of deliverables to update the government and propose next steps, and it agreed to give the government the right to approve or disapprove much of the end product. Moreover, plaintiff agreed to undertake building an incredibly complex machine that was only 75 percent mature in its design, all for a fixed price. The possibility that the engineering required to fully mature the machine would exceed the costs assumed in its bid was a risk that Northrop accepted. Nor do we think that the late or missing responses to action items by the government entitle plaintiff to damages.³³ Although we are sympathetic, we have not heard or seen evidence tying any tardy or missing response to a cost impact that would support a claim. Plaintiff did not establish that any of this was either a breach of any contract provision or so different from what it might have expected that it constituted a constructive change.

The trial presentation in this regard centered wholly on putting together and pricing the total cost claim but was otherwise devoid of any specificity as to how the contract was changed or how Northrop was damaged by delay or changes to design. Further, the contract's changes clause required Northrop to respond to any Postal Service directive that it thought constituted a change with a "written notice stating (a) the date, circumstances, and source of the order and (b) that he supplier regards the order as a change order." JX 1 at 3706828. There was no evidence presented at trial of the necessary notice nor any indication in the record that the Postal Service waived this provision. Other than generalities and citation to offhand remarks from government personnel during the OIG investigation, there is general lack of proof on this claim, and it must therefore be denied.

b. Direct Costs

Next in plaintiff's bundle of "disruption" claims are discretely priced items of what it alleges were constructive changes to the contract. These are

³³ The Action Item process was two-way, meaning that Northrop could also add items to the database as a way of requesting government action, often a required approval of some submittal or design element.

loosely categorized as software engineering, hardware, and handbook changes. For these claims, at least some effort was made to show how the work directed by defendant was not contemplated in the SOW and that compensation might be owing. We consider first the software engineering claim.

i. Software Engineering

The claim for extra software engineering costs is broken into two areas: 1) software integration and testing and 2) meetings necessitated by these changes. The first of these categories, the software integration and testing, was a result of changes to the engineering reference system and first article machine, the former being an initial build and the latter a mature system ready for testing and, if earning a passing grade, full production. Plaintiff's software engineering manager, Henry Wagner, told the court that those systems were delayed due to Postal Service-directed changes to design. These changes delayed the production of the machines, which in turn delayed Northrop from integrating and testing the software on these machines. Tr. 3936-38. The delay was five months. Mr. Wagner put together an estimate of the cost impact of that delay by consulting with other involved team leads, such as Ms. Tondreau and Mr. Ledford, and isolating time spent by individuals involved in software testing and integration during the five-month delay period.

Here, once again, the predicate is missing. While plaintiff draws the link between the costs and a specific delay period, there is no direct proof as to who was at fault for that delay period other than Mr. Wagner's *ipse dixit*. He made no effort to explain what changes the Postal Service directed and whether they were in fact not traceable to the SOW. Absent that proof, we cannot assume the costs are compensable.

Also unexplained is why the tabulation of actual costs during the supposed delay period is the proper measure of any damage suffered by Northrop. Mr. Wagner explained that he tried to select only those software engineers who were working on this aspect of the project during this time. But when asked by the court whether this work would have been avoided had the machines been available earlier, the answer was unclear. It was the same work, only pushed back in time: "this 13,000 hours wouldn't have been expended because we would have been completed with the work [I]t would have occurred earlier in time, and it would not have been required to have been done in this time frame." Tr. 3947. This is an unsatisfactory explanation. Even assuming delay caused by defendant's changes, the work plaintiff charges to the breach was the same testing and integration it would

have had to do even absent delay. The final version of the software that would be loaded on these machines would still have to be integrated and tested before completion. Northrop does not assert that this work was extra due to the delay. Plaintiff has not established the causal link between these hours and any breach on defendant's part.

That leaves the extra meetings for which Northrop claims costs of just over \$1.2 million. These meetings are associated with the SRS document. As explained by Ms. Tondreau, the SRS defined "what requirements the software will meet." Tr. 930-31. In August 2007, the Postal Service rejected Northrop's initial SRS deliverable and, according to plaintiff, this resulted in defendant-required meetings to go over the SRS line-by-line. These meetings, according to Northrop, were unnecessary and not called for by the contract. Mr. Wagner explained that, in Northrop's view, the changes that the Postal Service required were verbiage preferences rather than substantive critiques or other required formatting, such as using the IEEE template.³⁴

Defendant responds, first, that the SRS meetings after the initial deliverable was rejected were not mandated by the Postal Service, and rather were a collaborative effort made necessary due to plaintiff's inability to deliver a document that conformed to the IEEE standard required by SOW E. The government presented the testimony of its expert, Mr. Trivett, who examined several versions of the SRS, including the initial version, and detailed numerous problems that he found as measured against the IEEE standard.

The first major problem found by Mr. Trivett was that Northrop's SRS did not correlate software requirements to the "states and modes" of the FSS machine. As he explained, states and modes "are a setting or configuration of a computer system having distinct functionality and functional requirements." Tr. 8398. IEEE standard section 3.1, JX 4 at 119, requires requirements to be correlated to the states and modes of operation of the software that are relevant to each requirement. This gives the programming or maintenance personnel the opportunity to assess which requirements are relevant to what operating states or modes of the system. *Id.* at 8398-99.

His next criticism dealt with Northrop's failure to identify functional requirements as design constraints, which Mr. Trivett opined was required

³⁴ "IEEE" stands for the Institute of Electrical and Electronics Engineers, and is an industry standard for such documentation required by the contract in SOW E section 4.1. The IEEE standard was introduced into evidence as JX 4.

by IEEE standard section 3.12, JX 4 at 124. He found several aspects of the SOW that he concluded should have been identified by Northrop as design and implementation constraints. Mr. Trivett identified the programming language required by the contract as a necessary constraint that should have been listed; he also found the contract's requirements regarding operability by the disabled, as required by the Rehabilitation Act, to be a constraint that should have been identified in the SRS. Mr. Trivett also identified interface requirements from SOW E section 4.1 as necessary constraints missing from Northrop's SRS. Lastly, using a sampling of the requirements listed in the SRS, he found a significant number, over 21 percent, of the requirements to be insufficiently decomposed, which is a way of saying that requirements were grouped together or compounded rather than each being individually identified as required by the SOW. He explained that his standard for deciding whether a compound requirement was sufficiently decomposed was whether it created any ambiguity or difficulty testing a particular requirement. Tr. 8441-44.

Plaintiff's reply to these criticisms is that Mr. Trivett failed to consider the flexibility inherent in the IEEE standard; in effect, Mr. Trivett's reading of the IEEE standard elevates form over function, per plaintiff. Ms. Tondreau explained that the use of compound sentences to list requirements is not a problem because the requirements were decomposed to a level sufficient to allow testing. Tr. 10090-91. As to the missing internal interfaces, Ms. Tondreau responded that the IEEE allows them to be part of the design and need not be separately called out in the SRS. Tr. 10114-16. Lastly, Northrop argues that we need not resolve any of these disputes because the line-by-line meeting process was not required by the contract and was thus extra work imposed solely at the whim of the government for which plaintiff is owed compensation.

Although some of Mr. Trivett's criticisms did seem to involve a particularly rigid application of the IEEE standards, and while the use of compound sentences to list requirements does not itself seem to be *per se* problematic, we find much of his criticism to be unmet in Ms. Tondreau's rebuttal testimony. Further, plaintiff's larger argument that the meetings were uncalled for is unavailing. Plaintiff did not object at the time under the changes clause of the contract to the meetings nor to the required revisions to its SRS. The Postal Service's eventual acceptance of the machine is likewise not evidence that the SRS met muster. Nor is the fact that Northrop's final revision of the SRS was rejected evidence that the meeting process was fruitless. If the SRS document did not meet the contract's required standard, Northrop's work to go over it collaboratively with government at these meetings was not unnecessary. Mr. Trivett's testimony

was direct on these points. Although Ms. Tondreau was credible, her testimony was less precise and more general in nature. Given that disparity, we find that plaintiff has not established by a preponderance that the SRS met the contract's requirements. It was thus no breach for the government to review line-by-line the SRS requirements with Northrop.

ii. Hardware

Plaintiff's next discrete claim relates to extra hardware it alleges was required at a cost of \$4,325,683. Mr. Tucker testified that he put together that figure by examining the costs charged by Northrop's subcontractors and any settlements between Northrop and its subcontractors for these hardware items. Utterly missing, however, is any tie between those costs and the government's responsibility for them. We do not know what hardware was unnecessary, other than a chart with categories of hardware in plaintiff's post-trial brief, or why they exceeded what was bargained for. We can only speculate that this hardware is alleged to have been necessary due to changes to the machine required by the government, but no effort was made at trial to link the additional hardware to any specific change. Again, plaintiff's gestalt theory of causation is insufficient. Even were many changes proven, absent proof of costs directly associated with each claim, we could not award damages. This claim fails for a lack of proof of causation.

iii. Maintenance Handbook

The last of plaintiff's discrete item claims concerns the electronic maintenance handbook, another of Northrop's deliverables. Plaintiff avers four areas of deficient performance by the Postal Service in this regard. They are 1) incomplete specifications that delayed the deliverable, 2) conflicting directions regarding the theory of operations for the maintenance process, 3) action item disruption that resulted in constant design changes, and 4) government insistence on defective software for 3D drawings. The cumulative effect of these delays and changes, according to plaintiff, via Mr. Tucker, was nearly \$9.6 million in increased costs.

The contract required Northrop to produce the electronic maintenance handbook to conform to specifications to be provided by the government in the Handbook Development Guide ("HDG"), as stated in SOW L5. At the time of contract award, the HDG was immature and required a series of updates and modifications by the Postal Service; it was not finalized until September 2009. Northrop could not wait until the guide was finalized, however, to work on the handbook. The result was a moving target that, according to plaintiff, resulted in increased costs to produce the handbook.

Northrop also believes that Postal Service interference during plaintiff's drafting of the "theory of operations" section of the handbook upped the cost to produce.³⁵ Here, the Postal Service's matrixed approach to management is clearly seen in action. Ms. Poole and Mr. Soloway from Northrop testified regarding the various stakeholders within the Postal Service that gave non-uniform, and sometimes conflicting, directions regarding aspects of the theory of operations and how it should be diagrammed. PX 3333 at 359-361 (Poole Depo.); Tr. 2115-19 (Soloway). Their testimony also agreed that the Postal Service generally was slow in giving direction regarding handbook sections.³⁶ There were personnel from at least four different Postal Service offices communicating preferences for the handbook.

Lastly, plaintiff attributes cost overruns to the 3D graphic modeling software used to produce the three-dimensional models of the FSS in the electronic handbook. The Postal Service directed Northrop to use a particular version of the software, Inventor 10, which Mr. Crone admitted did not work, Tr. 3536-3538. The Postal Service eventually changed course and agreed to pay plaintiff the added cost of upgrading to the more current Inventor 2009 version of the software. Plaintiff argues that its efforts prior to using the newer software were, in effect, extra work for which it should be now reimbursed.³⁷

³⁵ Ms. Poole explained that the theory of operations "breaks the system into functions and then details all of those functions through text and functional block diagrams." PX 3333 at 360 (Poole Depo.).

³⁶ It also bears mentioning that Mr. Soloway prefaced his testimony in this regard by explaining that the contract itself was somewhat inconsistent about the contents of the theory of operations, at least as it concerned functional block diagrams, which were an integral part of the theory of operations. Both SOW A and L discuss the theory of operations and functional block diagrams. He stated that the "[functional block diagrams] are in both places, and unfortunately it's one of those items that there's inconsistencies and ambiguities, which led to a year of iterations" Tr. 2116 (Soloway).

³⁷ Plaintiff also offers its general theory that action items caused cost impact, but, again, we do not find this theory to be availing because no specific action items are tied to the handbook nor are any shown to be a breach. Although we can understand the idea that many small changes to the design made over time would cause those same changes to need to be reflected in the electronic maintenance handbook, without tying changes to the handbook we cannot

Defendant responds by arguing again that Northrop has not shown any breach on the government's part in any of the actions it took regarding the electronic handbook. It further argues that these issues were settled by the parties through bilateral Modification 9 ("Mod. 9"), in which plaintiff agreed not to receive any compensation for the HDG delays and pursuant to which it received \$790,578 for the modeling software update. JX 1 at 1206-18 (Mod. 9).

The government also points to the testimony and email evidence regarding Northrop's own problems and disagreements with its handbook subcontractors, Siemens and Technology Transfer Services ("TTS"). TTS, in fact, prepared the estimate upon which Mr. Tucker relied for the handbook costs claim, but the government argues that TTS was not tasked with nor instructed to consider who was at fault for particular work included in its estimate of costs. It thus sees a lack of evidence of causation for these costs. Lastly, defendant urges the court to consider Northrop's FAT delay and associated design changes in response to that failure as inextricably linked with the handbook process. Not having made an effort to zero out handbook updates that resulted from changes made in response to the FAT failure, the causal link is too remote and the damages amount sought too unreliable, per defendant. We agree.

Although the Postal Service's iterative approach to the HDG and its insistence on using faulty software might have driven Northrop's handbook costs beyond those that it should have borne, the record is clear that Northrop's and its subcontractor's own performance was also problematic. In 2010, while the effort was ongoing, Northrop accused Siemens of not following the HDG specifications and causing delay and disruption to the handbook effort by not completing the theory of operations and other sections it was contracted to complete in the handbook. *See* DX 5073 at 4-7 (documenting Northrop's claim against Siemens caused delay and disruption). Mr. Soloway likewise testified that Siemens' work on the handbook was deficient. Tr. 2322, 2372-73. The other subcontractor, TTS, complained that Northrop failed to provide adequate editorial oversight of the handbook drafting done by TTS. DX 1973 at 504426 (email from TTS to Northrop concerning the handbook). TTS also listed the iterative design of the machine as problematic for handbook drafting. *Id.* (listing the fact that the machine had "changed dramatically from what was planned" as a reason why the quality of the handbook was not as intended). Further, defendant's point that many changes to the machine were necessitated by Northrop's own

assume any damage to plaintiff nor a breach by the government regarding the handbook.

inability to design the machines to meet performance specifications is well taken. We are unable to extract from the claimed costs those attributable to plaintiff's and its subcontractors' fault. This claim is yet another example of the larger narrative of this project: having undertaken a production contract for a design that was not yet mature, including specifications yet unfinished by the government, the parties got what they bargained for, uncertainty. Extra handbook costs are wound from both parties' yarn. We cannot untangle them now.

2. Breach of Contract: Unpaid Contract Balance

Plaintiff's remaining claim is Count 2 for the unpaid contract balance. Northrop claims that the United States breached the FSS Production Contract by failing to pay the remaining \$63.4 million in unpaid invoices. The parties agree that a valid contract between them exists. The contract provides the obligation that the Postal Service must pay Northrop at certain milestones in the contract in exchange for delivering machines and associated deliverables. JX 1 at 3706796-806. Preeminent among those milestones is the delivery of the FSS machines. Northrop delivered the machines and the Postal Service accepted them. The Postal Service had a duty to pay Northrop for accepted machines. The Postal Service has not paid \$63.4 million of the contract price. Northrop submitted invoices totaling \$63,433,910, which are unpaid. These invoices are anticipated by the contract, the Postal Service has failed to pay them, and defendant's damages expert, Mr. Lesch, agreed as to the amount due.

The government has no real problem with the amount of the unpaid invoices or that Northrop would otherwise be entitled to payment. Its only response is that these payments were properly withheld to offset the damage that the Postal Service incurred during performance due to Northrop's delay. As held above, however, that delay is not chargeable against plaintiff because of the Postal Service's mandated CASTR related changes. Plaintiff delivered all 100 machines, each was tested and accepted by the Postal Service, and there is no dispute as to the reasonableness or quantum of the payments owed to Northrop. The result is that Northrop is entitled to its balance of \$64,433,910 minus any direct costs proved by defendant for its discrete cost claims. We thus turn to those now.

II. The United States' Counterclaims

We have already dealt with the bulk of defendant's counterclaim with our holding on delay. What remains are five discrete direct cost claims relating to allegedly missing spare parts, retesting costs, deficient repair

specifications, faulty software and missing documentation, and work that should have been covered by the design warranty.³⁸ To recover damages on any of these claims, the Postal Service must establish: “(1) a valid contract between the parties, (2) an obligation or duty arising out of the contract, (3) a breach of that duty, and (4) damages caused by the breach.” *San Carlos Irrigation & Drainage Dist.*, 877 F.2d at 959. To be recoverable, damages must be (1) reasonably foreseeable at the time of contracting, (2) caused by the breach of the promisor, and (3) proved with reasonable certainty. *Bluebonnet Sav. Bank, F.S.B. v. United States*, 266 F.3d 1348, 1355 (Fed. Cir. 2001). The claimant bears the burden to establish each element by a preponderance of the evidence.

A. Count 4: Breach of Contract: Failure to Provide Spare Parts

Defendant claims that Northrop breached the contract by failing to provide required spare parts. The Postal Service points to SOW H, which provides that Northrop must supply the Postal Service with spare parts in the SSPKs, SSSPKs, and the DSPK. The Postal Service maintains that Northrop breached its contractual obligations by failing to strictly adhere to the SOW in the number of parts provided. Defendant claims \$2,192,745 as the reasonably estimated amount incurred to address Northrop’s failure to comply with its spare parts obligations.

For this claim, the government offered the testimony of its expert, Mr. Foux, who examined the Postal Service’s records of parts ordered through its eMARS system and compared it to the Postal Service’s records of parts received from Northrop during the contractual period. The delta between the two lists—more parts ordered through eMARS than those recorded as provided by Northrop—was then priced by Mr. Foux using a weighted average price for the parts from the eMARS database. Tr. 6850. He found \$1,121,523 for the parts needed to adequately stock the SSPKs and another \$1,017,222 for parts needed to keep the depot spare parts kit fully stocked. He also concluded, based on his interviews with several Postal Service employees involved in spare parts management, that the inventory management system was good enough to assure him that parts were not disappearing from the system for nefarious reasons, meaning that defendant was not over-ordering parts for which Northrop ought not be responsible. *See* Tr. 6945-46.

³⁸ As mentioned in the Background section, several other discrete cost claims were rejected during trial when the court granted plaintiff’s oral motion under Rule 52(c) at the conclusion of defendant’s affirmative case on February 26, 2021. Tr. 9758-62.

Plaintiff answers this charge in two ways. First, it argues that defendant has not carried its burden due to a lack of direct evidence of causation. It finds Mr. Foux's *post hoc* analysis insufficient because he was agnostic about why the parts were ordered, meaning that no judgment was made whether Northrop ought to have been responsible for the parts he identified as missing. The eMARS system does not record the reason that a part was ordered. Fault was assumed. Northrop offers the testimony of Stanley Lipinski, who is a former Asset Management Planning manager at the Postal Service during the relevant period. Mr. Lipinski was in charge of approving orders from FSS sites through eMARS and forecasting needs based on order data. He was asked about an email in which he wrote that the FSS site maintenance teams would "pad" their parts orders. He explained that he observed that field maintenance personnel would order more parts than necessary with respect to parts that were repeatedly ordered. Tr. 9847. Although he further explained that such ordering was "not indiscriminate" and that he and his team would investigate, and sometimes cancel, particularly suspicious orders, Tr. 9847-48, it is apparent that neither he nor the maintenance teams in the field were attempting to keep their orders strictly constrained to the terms of Northrop's contractual obligation to provide parts.

Second, plaintiff attacks the damages figures calculated by Mr. Foux because the prices he used were not the actual prices paid for the parts when they were ordered. Instead he used an average price pulled from the Postal Service's inventory system from which he calculated a new daily price per part. It is not clear whether the prices Mr. Foux used are from a date certain during Northrop's obligation to provide parts or from some later date when Mr. Foux was compiling his data. The import of this is that the prices used are not reasonably certain. Northrop also argues that Mr. Foux did not, or was unable to, segregate out from his calculation spare parts that were part of an earlier claim disposed of by the court on summary judgment.

There is no debate that Northrop had an obligation to provide all of the parts necessary to keep the spare parts kits stocked at levels that would enable the Postal Service to repair and keep the machines running for 30 weeks post-February 10, 2012. There is also no question that the Postal Service ordered more parts than those delivered by Northrop. Mr. Foux stands un rebutted in that regard. The record is silent, however, as to why. The government asks the court to assume that it was Northrop's obligation to have supplied the extra parts. Although the simplicity of comparing total parts ordered to those supplied by Northrop is appealing, without some

evidence that Northrop failed to deliver parts it was required to under the contract, causation is not established. We cannot assume it.

The parties undertook a process after delivery to use contemporaneous data to negotiate what would be necessary for the kits to contain to achieve the 30-week supply, and then Northrop had to keep the kits stocked to that level during the performance period. We have no idea whether Northrop met this obligation because the record is silent on the point. We do, however, have some evidence from Mr. Lipinski's testimony that Postal Service maintenance personnel ordered parts beyond those necessary to keep the kits at the agreed upon levels. The only direct evidence thus points away from a Northrop breach. Defendant's spare parts counterclaim fails for lack of causation.

B. Count 5: Breach of Contract: FAT and ATP Retest Costs

Because the Postal Service required retests following the failure of FAT and retested many individual machines prior to acceptance (ATP tests), the Postal Service claims the cost of those retests. The government relies on SOW A section 8.5, which requires that Northrop reimburse the Postal Service for retest costs at \$60 per hour of labor. Defendant argues that the retests were caused by Northrop's failure to produce conforming field machines and thus Northrop must bear the retest costs of \$1,589,747.41, which consists of \$669,549.44 for FAT 2A costs, \$329,816.91 for FAT 2B, and \$590,380.65 for ATP retests of 11 FSS machines. Those amounts are for labor hours, charged at \$60 per hour per the contract, and actual travel costs for government personnel. Mr. Crone testified regarding how he determined which machines failed their ATPs and how he worked with Msrs. Ledford and Erdman at Northrop to schedule retests.

The Postal Service used a contractor, Serco, to perform much of its FAT and ATP testing around the country. The damages claimed now represent hours billed or estimated to have been billed by Serco. For FAT 2A, defendant introduced its actual invoices from Serco. DX 2776. For FAT 2B and the ATPs, defendant relies on summary exhibits prepared by Serco and sent to the Postal Service's team lead for Quality Program Coordination, Mr. McGovern. DX 5277 (FAT 2B); DX 6016; DX 6017; DX 5566; DX 5555; DX 5562; DX 6019; DX 5563; DX 6020; DX 6022; DX 6024; DX 6026; DX 6028. Mr. McGovern testified that he believed these spreadsheets were accurate because he had inspected the invoices at the time and believed them to be accurate. He also told the court that he asked Serco, at the time, to set up and use separate charge codes for each machine ATP retest, and Serco did so. He did not, however, have personal knowledge regarding the

preparation of the spreadsheets nor independent recollection of the amounts billed by Serco for these tests. Tr. 7027-30.

Plaintiff attempts to rebut this claim by arguing that the FAT retests were not its fault given the design disruption and faulty testing performed. Both of these arguments were discussed at length above and rejected. Northrop's other defense is that the proof on damages for FAT 2B and all of the ATP retests is unreliable. On the latter point, as to those two tests, but not FAT 2A, we agree.

Though we have no reason to question the sincerity of Mr. McGovern's belief that the spreadsheets supplied him by Serco accurately represent costs charged to the Postal Service, he was not able to verify any of the information on the stand, nor were we offered any of the underlying invoices, other than for those for first FAT retest. Thus, the fact that the spreadsheets are in evidence as business records does not answer the question of whether they accurately represent retest costs charged to the government. Mr. McGovern was asked about what appeared to be discrepancies in these sheets for certain ATP retests, and he demurred, citing his lack of knowledge. Tr. 7085. No Serco employees nor any other government personnel were called to testify on these questions. CO Milnes, in fact, recalled that he had asked Mr. McGovern for underlying documentation, but neither he nor Mr. McGovern could recall whether it was supplied. Tr. 7077-78 (McGovern); Tr. 7273 (Milnes).

There is no question that Northrop was responsible under the contract to reimburse the Postal Service for retest costs. For FAT 2A, we have actual billing records submitted to the Postal Service for the work performed on that retest by Serco. Plaintiff did not seriously challenge that evidence. As to the remainder of the claimed retest costs, we find that the quantum was not established with reasonable certainty. No witness was able to testify directly regarding what was billed to the Postal Service or paid by it. The sponsoring witness of the calculations was unable to answer questions about the figures. It would be fundamentally unfair to charge plaintiff for those amounts without it being given an opportunity to probe their accuracy.³⁹ The claim for FAT 2B and ATP retesting fails for lack of proof of damages, but defendant has proven entitlement to and quantum of FAT 2A costs. We thus

³⁹ Plaintiff notes in its post-trial brief that it asked for any supporting documentation for the retests costs during discovery but was supplied only the same spreadsheets we saw at trial. *See* PX 2480 (Defendant's Response to First Set of Interrogatories).

find that defendant has established entitlement to those costs in the amount of \$669,549.44.⁴⁰

C. Count 6: Breach of Contract: Repair Specifications

The Postal Service continues its case with the claim that Northrop failed to determine which items were repairable or to provide documentation necessary to perform repairs of certain parts listed in the contract, in accordance with SOW J. Defendant argues that Northrop breached the contract by not providing both a list of the commercial repairable parts and a full set of repair specifications called for under the contract. The Postal Service's Central Repair Facility ("CRF") in Topeka, Kansas had to fill in the gap left by Northrop. The actual work and estimate of its cost was performed by an affiliate of plaintiff, NGTS, which operated as the Postal Service's CRF contractor. Defendant seeks \$577,346.41 to put it in the position it would have been in if Northrop had performed under SOW J. This figure is comprised of \$67,662.71 for research, \$245,388.42 for piece parts purchased to repair items, \$14,295.28 for special tools not delivered by Northrop, and an estimated \$250,000 to re-write repair specifications for five custom circuit boards. DX 6199 (Letter from NGTS to the Postal Service). These figures were prepared by Gary Brown and Susan Smith at NGTS as a mix of actual expenses and estimates, and, as to the specification re-write for the five circuit boards, what the effort would take.⁴¹

Plaintiff responds that defendant has not proven a breach with respect to any of these items nor has it proven damages to any level of certainty for the items that are priced based on the NGTS estimates. Further, according to Northrop, the \$250,000 for the re-write is purely speculative and does not represent any real damage to the Postal Service because the work was not performed. We consider each item in turn, except for the claim for special tools, which defendant abandoned at trial.

⁴⁰ Given that the contract built in a labor reimbursement rate for any retesting, there is no question that the damages were foreseeable. We find the same for the travel cost element of those damages.

⁴¹ The initial cost estimate for these claims was prepared by Ms. Smith at NGTS in April 2012 and delivered to Mr. Kumar by email. DX 6046. Mr. Brown then updated that list twice by formal letter on NGTS letterhead, first in August 2013 and then finally in January 2015. DX 6146 (2013); DX 6199 (2015).

The research costs are for work done by NGTS to determine whether FSS parts were repairable and to prepare the documentation needed to be able to repair them. According to defendant, \$39,055.04 of the amount claimed is actual costs billed to defendant by NGTS and the remaining \$28,607.67 is an estimate of the remainder of the work performed on this effort. The government is correct that Northrop owed such a list to the Postal Service. Northrop's principal excuse is that defendant did not prove that the items researched are in fact repairable. If they are not, then Northrop was not responsible for compiling them in the repairables list, it argues. Although Mr. Milnes, the sponsoring witness for the document itself, DX 6199, was unable to testify regarding how or why the items on the list were selected, we find plaintiff's argument unpersuasive in this regard. SOW J required a list of repairable parts to be produced by Northrop, both for commercial and non-commercial parts. See JX 3 at 73410, 73413 (SOW J §§ 2.5, 4.0). Mr. Milnes testified that the Postal Service received no such list for commercial items. Defendant's Exhibit 6199, prepared by Mr. Brown, a program manager at NGTS, explains the effort that he and his team undertook to compile a list of repairable parts. The effort began with Postal Service personnel and contractors compiling a list of 193 parts that were stocked for the FSS machines for which research was needed to determine whether they were repairable. DX 6199 at 40. Mr. Brown records that that effort resulted in a list of 117 parts that were ultimately repairable and for which additional research into repair was needed. *Id.* at 40-41. That is sufficient. We also have a record of actual costs for some of that effort and an estimate of the cost for the balance.

Northrop adduced no evidence to show why the list went beyond what it owed the government, and we heard no other testimony that gives us pause regarding the basis for this claim. The fact that the Postal Service had to examine more parts than were ultimately included in the repairables list is not problematic because it would not have had to do that work had Northrop delivered the repairables list that it owed. There is likewise no question regarding the foreseeability of such damage given that the missing list was a contract deliverable.

We thus award defendant the costs it incurred to produce the repairable parts list. It presented records of \$39,055.04 for NGTS' effort in this regard. We award that amount. We are unable to award the additional \$28,607.67, however, because we heard no testimony from which we could conclude that it was a reasonable estimate other than Mr. Milnes' generalized statements about trusting an experienced person. Although the document itself contains an explanation of how the estimate was made, it also states that NGTS did not track research time separately. *Id.* at 41. How the 12%

estimate for average research time was developed is unexplained, and we have no assurance that the government in fact incurred these costs. Thus defendant is awarded \$39,055.04 for the research element of its Count VI claim, which represents actual costs incurred.

For the piece parts element of the claim, SOW J section 3.2 required plaintiff to deliver 25 of each part used to repair FSS components but not including those parts already listed in the CRF stock catalogue. JX 3 at 2108. Mr. Brown put together a list of missing parts, DX 6199, and attached it to his submittal, dated January 20, 2015. He calculated the total cost of these parts to be \$245,388.42. Mr. Milnes explained that these parts were not delivered by Northrop. Tr. 7178.

Plaintiff challenges this claim on the basis that Mr. Milnes was unable to tie the parts to the list required by SOW J section 2.5. The damages summary from Mr. Brown notes that it was not complied using the repairable parts list required by SOW J, but defendant explains that that is the case only because Northrop did not deliver the complete list. It is neither a surprise nor an excuse, thus, that the Postal Service based this claim on its own after-the-fact list. No other list was available, and that was plaintiff's fault. We have evidence of an incomplete list of repairable parts and missing deliveries of pieces to keep those parts in working order. We have cost information for those missing piece parts from Mr. Brown at the CRF and no evidence to the contrary from plaintiff. Without any other reason to question the missing parts or their cost, we award their value to defendant: \$245,388.42.

That leaves the estimated \$250,000 to produce complete repair specifications for the five unique circuit boards.⁴² It is unclear from the record whether the Postal Service has ever sought to produce these specifications. We know that, as of 2015, it had not. The claim is priced on NGTS's estimate of what it would take to prepare them. Defendant presents this claim now as expectancy damages for the loss of value of Northrop's performance. Plaintiff responds that there is no evidence that the Postal Service has been damaged by the lack of specifications for the five circuit boards. It points out that Mr. Milnes did not know whether any expense had been incurred nor whether the boards are even still in use in the FSS machines. Absent proof of loss, no damages can be awarded, argues plaintiff.

⁴² Defendant dropped its claim for the cost of unique tools in its post-trial briefing because that cost was not part of any CO's decision against Northrop.

This was a fixed price contract. For the price paid, plaintiff was to have produced repair specifications for these five circuit boards. It did not. Plaintiff seeks the contract balance in this action. It would be unfair to award it the whole balance when the evidence shows incomplete performance. So long as we have a reliable basis on which to value the missing deliverable, that value is awardable to defendant as, in essence, an offset. It presented the work of NGTS through the CO, Mr. Milnes, to value the missing performance. The estimate that he relied on in his CO's decision, which was then updated later, DX 6199, lays out an estimate of the labor cost to draft the missing specifications. Plaintiff presented no basis to question that estimate. Expectation damages put a party in the position it would have been had performance been full, which is to say that it would have received the value of full performance by the other party. *Stockton E. Water District. v. United States*, 109 Fed. Cl. 760, 779 (2013). Here the missing value is that of five repair specifications. Defendant presented a reasonable estimate of what it would take to produce them itself.⁴³ Absent a reason to second guess that figure, we find that cost awardable. Defendant is entitled to \$250,000 as the value of the missing repair specifications.

D. Count 7: Breach of Contract: Software

The Postal Service alleges that Northrop breached the contract by failing to provide software testing, bug fixing, and software documentation for its final software release, version 2.5.4. Because Northrop delivered version 2.5.4 without updated documentation and did not perform or assist with testing, the Postal Service ran its own beta testing and allegedly fixed certain errors. The government claims that Northrop is responsible for the \$115,810 paid to its contractor, 21st Century, to test and perform any fixes to the final software release and complete the related documentation.

Plaintiff argues that updated documentation was not required because the final software version was not meaningfully different, and it argues that final beta testing was impossible because it no longer had access to a machine upon which to test it. We need not evaluate the competing evidence and arguments on these points, however, because we find that the claim fails for lack of certainty as to damages.

⁴³ The claim pricing document from Mr. Brown explains that the \$50,000 per circuit board figure was drawn from internal Postal Service figures it uses for planning funding of projects. He found five similar repair specification projects and their costs, averaged them, which came out to \$48,612.87 per specification, and rounded up to \$50,000. DX 6199 at 42-43.

Defendant priced this claim via a one-page spreadsheet prepared by Mr. Nikpora. PX 2480 at 626. He testified that he put this document together based on after-the-fact discussion with 21st Century employees. Tr. 7962. He disclaimed relying on any invoices or other documents from 21st Century.⁴⁴ Tr. 7961. We heard no other details about the figures or work performed by 21st Century. We find the proof insufficient. We do not know whether these costs were actually incurred by the government. We do not know whether the Postal Service or its contractor limited itself to documentation and testing required by the contract. We know almost nothing about this work. Count VII of defendant's counterclaim fails for lack of proof of damages.

E. Count 8: Breach of Contract: Design warranty

Finally, the Postal Service claims that Northrop breached the contract by failing to comply with its design warranty obligations as set forth in Paragraph 23 of the Award Data Sheet. The Postal Service incurred costs to correct design defects through modifications to the FSS hardware and software by purchasing hardware and investing maintenance hours, material, and engineering effort. Before trial, defendant stated that it was seeking damages of \$1,547,076.45 to put it in the position it would have been in if Northrop had performed its design warranty obligations. After trial, that claim has narrowed to \$39,205.58 for engineering and maintenance labor as well as materials involved in raising a CASTR guide rail on the left side of the machine to the height of the rail on the right side.

On June 9, 2011, Mr. Milnes sent Northrop a letter invoking the design warranty provisions of the contract and listing several items to be corrected, one of which was the left guide rail on the CASTR. DX 5692. Northrop declined to provide assistance, however, recommending that the rail be replaced when worn. *See* JX 756. A Postal Service engineer, Leung Shiu, explained that Northrop's uneven guide rails at the point where the CASTR carts met the ITC, caused the lower left side rail to wear more quickly than that on the right side. Tr. 7542-47. This in turn caused jamming of the ITC. The Postal Service fixed this issue itself by raising the left rail and using heavier mounting hardware. Tr. 7546-57. Edward Houston, a mechanical engineer and project manager for the Postal Service, put together the \$39,205.58 estimate for the cost of the work to fix the issue. DX 6213

⁴⁴ He explained that the 21st Century invoices that he did review were unhelpful because they were non-specific as to the work being billed for. He did not know whether any hours billed were associated with this software testing and documentation. Tr. 7963 (Nikpora).

(Basis of Estimate 15). He explained that he arrived at this number by estimating the engineering time involved and then adding in actual maintenance hours and materials from records he obtained. Tr. 7599-7608.

Plaintiff responds that the design warranty is not implicated by this issue because the CASTR guide rails are normal wear items and are, in fact, included in the depot spares kits, indicating that both parties understood that they were to be regularly replaced. Mr. Shiu agreed on cross-examination that normal wear parts would not be covered by a design defect warranty, Tr. 7566, but it was his opinion that the left rail was covered by the warranty because it wore faster than the rail on the right side, Tr. 7595-97. Further, plaintiff contends that there is, like the software testing claim, no evidence of actual costs incurred by the Postal Service. We disagree on both points.

Although we think that Northrop is correct that the inclusion of the CASTR guide rails in the spare parts kits is good evidence that both parties understood this part to be a wear item needing replacing at regular intervals, as Mr. Shiu stated, the fact that one side wore faster than the other is good reason to think a design error was made. Plaintiff offered no evidence why the left rail was shorter nor whether it would have been expected to wear more quickly. We find causation established. Foreseeability is no issue because it is eminently foreseeable that a part wearing faster than it ought would lead to damage incurred by the buyer. Northrop warranted such damage, and must pay for it now, at least to the extent that damages are proved.

We find approximately two-thirds of the claimed damages established to a reasonable certainty by Mr. Houston's work gathering the relevant inputs from the Postal Service's records. He explained how he queried a specific Maintenance Work Order associated with this fix in the Postal Service's eMARS system, which allowed him to collect the maintenance labor hours and materials costs associated with government employees or contractors installing the new rails. Tr. 7601-602. This cost \$11,311.88. We find this amount reasonably certain. For the cost of the new rails themselves, Mr. Houston recalled that he asked the Material Distribution Center in Topeka, Kansas for the amount spent to have the new rails fabricated. Tr. 7603-604. That amount was \$17,256.70. We find this amount well established. The amount of engineering work done to solve the problem was an estimate performed by Mr. Houston and his team with a cost of \$10,640. On cross-examination, however, he could not provide any further clarity on how he reached that estimate. *See* Tr. 7634-35. We find that element unproven. Defendant has proven and is entitled to \$28,568.58 in damages for this count.

CONCLUSION

In sum, plaintiff has proven entitlement to the balance owing under the contract in the amount of \$63,433,901.73 and the \$4,507,586 for discrete cost claims that were part of its delay claim, for a total of \$67,941,487.73. Applied against those sums are the direct cost items proven by defendant in the amount of \$1,227,561.48. The total awardable to plaintiff is \$66,713,926.25 plus interest allowable under the Contract Disputes Act. Accordingly, the parties are directed to file a joint status report on or before July 18, 2022, indicating the agreed upon, if possible, amount for judgment pursuant to this opinion. As noted earlier, plaintiff's remaining motion *in limine* (ECF No. 185) is denied as moot.

s/Eric G. Bruggink
ERIC G. BRUGGINK
Senior Judge