ARMED SERVICES BOARD OF CONTRACT APPEALS

Appeal of --	)	
	)	
Clark Construction Company	)	ASBCA No. 53914
	)	
Under Contract No. DACA03-97-C-0006	)	

APPEARANCE FOR THE APPELLANT: Timothy J. Lemen, Esq.
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APPEARANCES FOR THE GOVERNMENT: Thomas H. Gourlay, Jr., Esq.
Engineer Chief Trial Attorney
Jennifer Jones Dalton, Esq.
Engineer Trial Attorney
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Little Rock

OPINION BY ADMINISTRATIVE JUDGE TUNKS

This is a pass-through claim brought by Clark Construction Company (Clark) on behalf of a subcontractor and a supplier. The amount of the claim is $481,954. Only entitlement is before us.

FINDINGS OF FACT

1. On 2 January 1997, the U.S. Army Corps of Engineers (COE) awarded Contract No. DACA03-97-C-0006 in the amount of $13,677,000 to Clark. The work included construction of a 50 Airlift Squadron (AS) building, a 53AS building, and a Petroleum Operations Laboratory (POL). The contract called out light gauge steel roof trusses. The contract completion date (CCD), as extended, was 1 May 1999, and the contracting officer (CO) deemed the work substantially complete on 15 June 1999 (compl. and answer ¶¶ 2, 4).

2. Clark subcontracted the structural steel to Steel Services Corporation (SSC). The record does not reflect the date of the subcontract. No one from Clark or SSC testified. On 19 March 1997, TCI submitted a quotation to SSC in the amount of $323,637.33 for the trusses. The quotation excluded overframing, truss blocking, and bracing. (App. supp. R4, tab 6) SSC awarded the purchase order to TCI on 10 April 1997 (app. supp. R4, tab 7).

3. The contract included FAR 52.246-12, INSPECTION OF CONSTRUCTION (AUG 1996) which provided, in part, as follows:

> (a) Definition. "Work" includes, but is not limited to, materials, workmanship, and manufacture and fabrication of components.
>
> (b) ...All work shall be conducted under the general direction of the [CO] and is subject to Government inspection and test at all places and at all reasonable times before acceptance....
>
> ....
>
> (e) The Contractor shall promptly furnish, at no increase in contract price, all facilities, labor, and material reasonably needed for performing such safe and convenient inspections and tests as may be required by the [CO]....
>
> (f) The Contractor shall, without charge, replace or correct work found by the Government not to conform to contract requirements, unless in the public interest the Government consents to accept the work with an appropriate adjustment in contract price.

(R4, tab 3 at 00700-100, -101)

4. Paragraph 1.2 of specification section 01030, "METRIC MEASUREMENTS," indicated that this project used the metric system (ex. G-5; tr. 1/161).

5. Paragraph 1.2 of section 01300, "SUBMITTAL PROCEDURES," prohibited changes to approved submittals without the concurrence of the CO (R4, tab 3).

6. Paragraph 3.1 of specification section 01300 provided, in part, as follows:

> The Contractor shall make submittals as required by the specifications. The [CO] may request submittals in addition to those specified.... Each submittal shall be complete and in sufficient detail to allow ready determination of compliance....

(R4, tab 3)

7. Paragraph 3.2 of section 01300 required the contractor to maintain a submittal register. Resubmittals were identified with a letter after the submittal number. The submittal register for specification section 05410 listed 23 submittals and resubmittals (R4, tab 49, ex. A).

8. Paragraph 3.3 allowed the COE a minimum of 30 days in which to review submittals. No maximum time was specified. The COE took more than 30 days to review submittal nos. 81 (65 days), 81C (69 days), 116C (69 days), 337 (56 days), 337A (69 days), and 384 (35 days) (R4, tab 49, ex. A).

9. Paragraph 3.4 required that submittals be transmitted to the COE on ENG Form 4025. The action codes on the back of the form were as follows:

> A - Approved as submitted.
> B - Approved, except as noted on the drawings.
> C - Approved, as noted on the drawings. Refer to attached sheet, resubmission required.
> D - Will be returned by separate correspondence.
> E - Disapproved.

(R4, tabs 2 at 5, tab 3)

10. Paragraph 1.1 of specification section 05410, "COLD-FORMED STEEL STRUCTURAL ROOF TRUSSES AND FRAMING," incorporated the "Cold Formed Steel Design Manual" issued by the American Iron and Steel Institute (AISI) (R4, tab 3).

11. Paragraph 1.2 of specification section 05410 listed two types of submittals that required government approval (GA):

> SD-01 Data
> Calculations: GA.
>
> Design calculations, signed and sealed by a licensed professional engineer...indicat[ing] compliance with load-bearing requirements for the following:
>
> a. Roof Trusses and Framing.
> b. Studs.
> c. Joists.
> d. Runners.
> e. All Connections.

SD-04 Drawings
Cold-Formed Steel Roof Trusses and Framing; GA.

Detail drawings shall indicate all member gages, spacings, and sizes; shop and field assembly details including cut and fastenings; type and locations of welds, bolts, and fastening devices; and panel fabrication, with individual panel drawings for each condition including configuration, dimensions, materials, attachments, structural calculations, and panel locations.

(R4, tab 3 at 05410-1, -2)

12. The contract did not specify the type of fasteners to be used. However, paragraph 2.1.4 of specification section 05410 required that they have a C90 galvanized coating. (R4, tab 3; tr. 1/107)

13. Paragraph 2.2 of specification section 05410, "DESIGN AND FABRICATION," required that cold-formed steel structural framing be designed and fabricated in accordance with the AISI Cold Formed Steel Design Manual that was incorporated into the contract (R4, tab 3).

14. Note 2 on drawing S301.1 provided as follows:

[L]IGHT GAUGE METAL TRUSS SUPPLIER SHALL PROVIDE DETAILED SHOP DRAWINGS TO INCLUDE THE FOLLOWING:

A. TRUSS LAYOUT.

B. WEB CONFIGURATION AND SIZES, TOP AND BOTTOM CHORD SIZES, CONNECTIONS, SPLICE LOCATIONS, DETAILS AND BLOCKING.

C. BRIDGING MEMBERS AND LOCATIONS.

D. DETAILS SUFFICIENT FOR FIELD CONSTRUCTION AND ERECTION OF TRUSSES.

E. FIELD WELDING REQUIREMENTS.

(Drawing S301.1 was submitted after the hearing and has been added to R4, tab 3.)

The Submittals

15. Mr. William S. Cato of Carter & Burgess, reviewed the truss submittals for the COE. He testified that he had "[n]ot a lot, but some" experience reviewing light-gauge steel trusses submittals (tr. 2/89). Mr. Rodney G. Garner, the contracting officer's representative, also reviewed the submittals (tr. 2/109-10). He had reviewed the submittals for one light gauge steel truss project prior to this one (tr. 2/121).

16. Clark submitted TCI's submittal no. 81 (POL/design calculations) on 16 June 1997 (R4, tab 4). TCI used a pre-packaged design software program put out by MiTek Industries Inc. (MiTek) to prepare its submittals (tr. 2/116). Mr. Michael A. Pellock, a licensed professional engineer employed by MiTek, stamped and sealed the design (R4, tab 52; tr. 2/96). Mr. Pellock's truss design was based on a safety factor of 3.0 and required that #10-16 (T/3) self-drilling screws be used for the trusses (R4, tabs 52, 85). His design indicated the number and location of the screws within a connection, but did not contain a detail showing the spacing of the screws (R4, tab 52; tr. 1/51-52; ex. G-5). The design also set forth the screw values or single shear strength required to penetrate various thickness of material (with 14 gauge being the heaviest gauge on this project and 20 gauge the lightest):

20 ga 243 lbs
18 ga 419 lbs
16 ga 513 lbs
14 ga 519 lbs

(R4, tab 52)

17. On 21 June 1997, the COE asked for a detail showing the spacing of the screws, a point of contact for the truss supplier, and documentation of the computer program. On 11 July 1997, the COE advised that the truss connection was too complicated. Between 14 July and 6 August 1997, the COE and Clark had several conversations regarding end connections and eave struts. On 12 August 1997, the COE and Clark met and discussed the revised truss detail. (R4, tab 53 at 9) On 13 August 1997, TCI resubmitted submittal no. 81 as submittal no. 81A (R4, tab 4). TCI did not provide a detail showing the spacing of the screws or document its computer program. The submittals were coded C on 20 August 1997 and returned with the following comments:

> SUBMITTAL APPROVED FOR DESIGN CALCULATIONS ONLY SUBJECT TO CONTRACTOR CERTIFYING THAT THE DESIGN OF THE TRUSSES IS IN ACCORDANCE WITH THE CURRENT EDITION OF

> [AISI'S] "SPECIFICATION FOR THE DESIG[N] OF COLD-FORMED STEEL STRUCTURAL MEMBERS
>
> COMPLETE, DETAILED DRAWINGS FOR SHOP FABRICATION AND FIELD ASSEMBLY STILL MUST BE SUBMITTED FOR REVIEW AND APPROVAL INCLUDING SPECIFIC DETAILS FOR HOLD DOWNS, OUTLOOKERS, AND PURLINS.

(R4, tab 4 at 1, tab 49, ex. A)

18. The AISI "Specification for the Design of Cold-Formed Steel Structural Members" (AISI Design Specification) was not part of the contract.

19. Mr. Walter Harrington, TCI's truss technician, testified that it is contrary to the practice within industry to provide a detail showing the spacing of the screws:

> A. Usually the way it works, you do a submittal. It is reviewed. As long as you have the actual number of the screws required for that connection...it is accepted in the industry.
>
> ....
>
> Q. [W]hat's the problem with [connection details]?
>
> A. It's just not something that's done. [I]f someone asks you for a layout[,] how do you determine what the layout is. You have to fit so many screws in a connected area. And the guys in the shop know not to put them on top of each other, but lay them out with at least a half-inch or quarter-inch somewhere between, where they're not touching each other.
>
> I guess I don't know really how to answer your question, because it's not something that's done in the industry. There is no such creature.
>
> Q. So that type of layout just does not exist.
>
> A. Does not exist.

(Tr. 1/36-37)

20. At the hearing, Mr. Cato conceded that submittal No. 81 contained enough information to document the computer program (tr. 2/101).

21. Submittal no. 116 (53AS/design calculations) was submitted on 28 July 1997, coded C, and returned on 20 August 1997. The comments reiterated that TCI had to certify that the design met the requirements of the AISI Design Specification to be approved. (R4, tab 49, ex. A, tab 50 at 112)

22. Submittal no. 81B (renumbered 81-1) (POL/shop drawings) was submitted on 19 September 1997, coded C, and returned on 25 September 1997 with the following comments:

> INFORMATION SUBMITTED IS INCOMPLETE.
>
> AS THIS IS A COMPUTER GENERATED SHOP DRAWING, PROVIDE A KEY THAT EXPLAINS/CLARIFIES ALL INFORMATION ON THE DRAWINGS.
>
> AS THIS IS TO BE THE COMPLETE SHOP DRAWING...ALL TRUSS LAYOUT DETAILS/DIMENSIONS MUST BE PROVIDED.
>
> WHILE THE SHOP DRAWING INDICATES THE SCREW QUANTITIES, IT DOES NOT PROVIDE JOINTING DETAILS, SCREW PATTERN, ETC. – PROVIDE COMPLETE DETAILS FOR EACH TYPE OF JOINT [BOTH THE SHOP CONNECTIONS AND THE CONNECTIONS THAT WILL BE MADE IN THE FIELD (THE PIGGYBACK TRUSSES, ETC.].
>
> TRUSSES WITH HOLD DOWN AREAS MUST BE CLEARLY INDICATED….
>
> ALL COLD-FORMED STEEL FRAMING THAT SUPPORTS THE ROOF DECK PAN MUST BE...COMPLETELY IDENTIFIED[,] SIZED, AND SHOW LAYOUT DIMENSIONS, ATTACHMENTS, ETC.
>
> ****THIS IS NOT TRANSMITTAL 81B—TRANSMITTALS 81 AND 81A WERE FOR THE TRUSS CALCULATIONS (SD-01).... [S]HOP DRAWINGS ARE A SEPARATE

SUBMITTAL AND I HAVE RENUMBERED THIS [SHOP DRAWING] TRANSMITTAL AS 81-1****

(R4, tab 5 at 1, tab 49, ex. A)

23. TCI delivered the POL trusses at the beginning of October 1997. However, they were misfabricated and had to be remanufactured (R4, tabs 54, 55).

24. By 8 October 1997, Clark had received the POL truss layout and a detail for the misfabricated trusses, but still lacked (1) fastener layout criteria; (2) purlin location; (3) a key for the shop drawings; (4) Mitek product brochures; (5) truss height and dimension from top of steel to top of chord; (6) calculations showing that holding down top chords did not affect truss strength; (7) locations of all dormer hold downs and purlins on shop drawings (R4, tab 57 at 2).

25. TCI provided a key for its shop drawings on 9 October 1997 (R4, tab 56).

26. On 20 October 1997, Mr. Daniel E. Clemans, the Administrative Contracting Officer (ACO), wrote Clark that with the onset of fall he was becoming increasingly concerned about the trusses. He noted that they had been shipped despite unresolved problems with the shop drawing and that, upon inspection, they had numerous defects:

> a. The POL trusses were [misfabricated].
>
> b. An inspection of the connections revealed no pattern to the screw installation, screws that appeared to be missing, screws that were not fully tightened and screws that do not connect the truss member metal to metal....
>
> ….
>
> [T]o resolve the[se] issues[,] I am proposing a site inspection.... [I]t is especially critical that the...engineer who stamped the...drawings be in attendance [so] that he can inspect and certify that the trusses as fabricated (and in particular the connections) comply with his design and the contract[,] and will perform as required when installed.

(App. supp. R4, tab 5 at 2; tr. 2/93)

27. Submittal no. 81B (POL/design calculations) was submitted on 24 October 1997, coded C, and returned the same day with the following comments:

IS THIS BEING SUBMITTED AS COMBINED CALCULATIONS, SHOP FABRICATION, AND FIELD ERECTION DRAWINGS??

CALCULATIONS

STILL MUST SUBMIT CERTIFICATION AS INDICATED BY MR. CATO'S COMMENT WITH TRANSMITTAL NO.S [SIC] 81 & 81A.

INCLUDE REVISED PERIMETER BEAM CONNECTION AS VARIATION. THIS IS A ZONE 3 WIND UPLIFT AREA AND IT DOES NOT APPEAR THAT TWO VERTICAL SCREWS WILL PROVIDE THE SAME PROTECTION? MUST BE JUSTIFIED WITH COMPUTATIONS....

IDENTIFY/MARK TRUSSES THAT ARE TO RECEIVE PIGGY BACKS ON THE COMPUTATION SHEETS AND ON THE LAYOUT DRAWING.

INCLUDE CALCULATIONS FOR PIGGY BACK TRUSS CONNECTIONS.

IDENTIFY ALL HOLD-DOWN TRUSSES/AREAS.

CALCULATIONS FOR VT TRUSSES DO NOT [SHOW] NUMBER OF SCREWS PER CONNECTION....

QUESTION GUSSET CONNECTIONS— CALCULATIONS DO NOT MENTION AT ALL?

CLARIFY CALCULATION COMPUTATION SHEETS THAT INDICATE TRUSSES 211A, 212A, ETC. VERSUS LAYOUT DRAWING INDICATING 211, 212, ETC.

SHOP DRAWINGS (FABRICATION)

NEED TO SUBMIT REVISED DRAWINGS?

INCLUDE SCREW CONNECTION/PATTERN DETAILS PREVIOUSLY REQUESTED.

NOTE: WE JUST RECEIVED MITEC [SIC] BROCHURE...[WHICH] INDICATES THAT THE USC MEMBERS HAVE G60 GALVANIZATION VERSUS G90 REQUIRED BY TP [TECHNICAL SPECIFICATION] 05410. BROCHURE DOES NOT INDICATE IF MEMBERS FABRICATED FROM STEEL SHEETS MEETING ASTM A 446. NEEDS TO BE CLARIFIED.

SHOP DRAWINGS (ERECTION)

LAYOUT DRAWING MUST INDICATE ALL PURLINS IN HOLD-DOWN AREAS AS WELL AS THE SIZE, SPACING, AND CONNECTIONS.

LAYOUT DRAWING MUST INDICATE ALL OTHER COLD FORMED STEEL FRAMING REQUIRED TO SUPPORT THE DECK (AT ALL DORMERS, AND/OR OTHER LOCATIONS), INCLUDING SIZE SPACING, AND CONNECTIONS.

CLARIFY PURPOSE OF THE LADDER FRAMING AND INDICATE SPACING.

INDICATE ALL TRUSSES TO RECEIVE PIGGY BACKS AND THE PIGGY BACKS ON THE DRAWINGS.

COMPLETE DETAILS OF ANY TEMPORARY, AND/OR PERMANENT, BRACING REQUIRED FOR ERECTION MUST BE INDICATED.

INCLUDE TRUSS MANUFACT[URER'S] RECOMMENDATIONS FOR WELDING...PER LIGHT GAUGE METAL TRUSS NOTE 7. ON...CONTRACT DRAWING S301.1.

(Emphasis in original) (R4, tab 8 at 1-2)

28. On 27 October 1997, Clark directed SSC/TCI to provide (1) calculations for the connection between the 1" shim at the beam perimeter and the trusses; (2) calculations for the piggyback attachment details; (3) bottom chord bracing details (locations, connections, sizes); (4) identification of trusses that are a piggyback design; (5) identification of all hold down areas on layout drawings; (6) clarification of the truss numbering system; (7) confirmation that the shop fabrication drawings (submitted as

information only) corresponded with the revised calculation and layout drawings; (8) size, location, and connections for purlins; (9) submit erection plan for temporary bracing; (10) submit truss manufacturer's recommendations on welding procedures; (11) provide drawings and details for all other cold formed steel framing (dormers, etc.); (12) provide clarification of fastener requirements, including numbers and spacing requirements; and (13) resolution of the G60/G90 galvanization discrepancy (R4, tab 60).

29. Submittal No. 81B[1] (POL/design calculations/shop drawings/layout drawings) was submitted on 7 November 1997, coded C, and returned on 14 November 1997 with the following comments:

> 1. WHY IS TRUSS T02, ADJACENT TO TRUSS T01, SHOWN WITH THE TOP CHORD HELD DOWN? THERE IS NO INDICATION OF THIS ON THE DESIGN CALCULATION SHEET FOR TRUSS T02?
>
> 2. COULD NOT FIND THE LOCATION OF TRUSS T09A1. IS TRUSS T09A1 TO BE PIGGY BACK WITH TRUSS T08?
>
> 3. A MEMBER MUST BE ADDED PERPENDICULAR TO "LADDER FRAMING" TO INSURE THAT THE MAXIMUM DECK SPAN IS 1.2 METERS. THE TOP OF THE ADDED MEMBER IS TO BE IN THE SAME PLANE AS THE TOP CHORD OF THE ADJACENT TRUSSES....
>
> 4. ALL COLD FORMED STEEL FRAMING AROUND THE DORMERS MUST BE SHOWN. FROM YOUR LAYOUT, ADDITIONAL HORIZONTAL STEEL WILL BE NEEDED IN THESE AREAS TO SUPPORT THE DECK. ADDITIONALLY, VERTICAL [AND] HORIZONTAL FRAMING THAT SUPPORTS THE LOUVERS AND THE METAL SIDING MUST BE SHOWN.
>
> GENERAL--COMPLETE, AND DETAILED, INSTALLATION PROCEDURES/FIELD ASSEMBLY OR ERECTION DRAWINGS, STILL MUST BE PROVIDED THAT ADDRESSES SEQUENCE OF WORK, ALL TEMPORARY AND PERMANENT BRACING, ETC.

[1] An earlier submittal was erroneously numbered 81B (19 September 1997). That submittal was renumbered as submittal no. 81-1.

(App. supp. R4, tab 35 at 2)

30. Submittal no. 218 (POL/erection plan) was submitted on 21 November 1997, coded C, and returned on 24 November 1997 with the following comments:

> 1. PLEASE VERIFY AND/OR CLARIFY THE 4292MM DIMENSION FROM COLUMN LINE 4 TO THE FIRST DORMER TRUSS (VT)—THIS ALSO ESTABLISHES THE UPPER CORNER OF THE HIP (AT THE METAL DECK) AT 4292MM. ACCORDING TO ACO LETTER DATED SEPTEMBER 30, 1997, THE DIMENSION FROM COLUMN LINE 4 TO THE FACICA [SIC] OF THE DORMER IS 3530MM--THIS ESTABLISHES THE UPPER CORNER OF THE HIP (AT THE FINISHED ROOF) AT 3592MM. CONSIDERING THAT BACK SIDE OF THE VERTICAL WALL (COLD-FORMED STEEL FRAMING) IS AT 3844MM (3530 + 160 + 92) FROM COLUMN LINE 4 AT THE DORMER AS INDICATED ON SECTION 11 OF A202.1 AND DETAIL 9 ON A206.2, IT DOES NOT APPEAR THAT THE LOCATION FOR TRUSS VT IS CORRECT, OR, THE HIP LOCATION AS INDICATED AT THE INTERSECTION OF THE TRUSSES IS NOT CORRECT? PER PREVIOUS COMMENTS FOR THE TRUSS FABRICATION DRAWINGS, IT IS NECESSARY THAT ALL COLD-FORMED STEEL AROUND THE DORMERS BE INDICATED.... THE SAME COMMENTS ARE APPLICABLE TO THE DIMENSIONS AND LOCATIONS, AS WELL AS THE OTHER COLD-FORMED STEEL THAT MUST BE INSTALLED, AT THE TWO OTHER SIMILAR LOCATIONS WHERE THERE IS VERTICAL FACIA [SIC] FROM THE ROOF PEAKS TO THE ROOF BELOW.
>
> 2. SECTION 3 MUST CORRECTLY PORTRAY THE REVISED TRUSS/PERIMETER BEAM CONNECTION AND AFF DIMENSION.
>
> 3. THIS DRAWING INDICATES THE TRUSSES THAT ARE HELD DOWN BUT DOES NOT SHOW THE COLD-FORMED STEEL CHANNELS (SIZE/TYPE MUST BE SHOWN) [TO] BE INSTALLED ON THE TRUSSES NOR THE CONNECTION BETWEEN CHANNELS AND THE TRUSSES. THIS COMMENT, AS WELL AS THE

NECESSITY TO INCLUDE ALL OTHER COLD-FORMED STEEL FRAMING, HAS BEEN CONSISTANTLY [SIC] MADE SINCE THE FIRST SUBMISSION FOR THE TRUSSES WAS RECEIVED AND REVIEWED.

4. ONLY ONE COPY OF THE DRAWING ACCOMPANIED THE TRANSMITTAL. PROVIDE 6 COPIES UPON RESUBMISSION.

5. YOUR COMMENT ON TRANSMITTAL NO. 220 THAT TRUSS ERECTION PLANS ARE NOT REQUIRED, ONLY INSTALLATION INSTRUCTIONS, IS NOTED. **THIS INFORMATION IS A REQUIRED GA SUBMITTAL AND WILL BE REQUIRED FOR THE 50AS AND 53AS BUILDINGS ALSO**—WHILE THE USE OF THE TERMINOLOGY "ERECTION PLANS" MAY NOT APPEAR IN THE SPECIFICATION...SUBMITTAL REQUIREMENTS FOR SD-04 REQUIRE SHOP AND **FIELD ASSEMBLY DETAILS**—YOU CAN CALL THEM BY WHATEVER TERM YOU WOULD LIKE BUT "COMPLETE, DETAILED, INSTALLATION PROCEDURES/FIELD ASSEMBLY OR ERECTION DRAWINGS" ARE REQUIRED PRIOR TO INSTALLATION OF THE TRUSSES IN ACCORDANCE WITH PREVIOUS COMMENTS SINCE THE FIRST TIME TRUSS SHOP DRAWINGS WERE SUBMITTED.

6. REVIEW COMMENTS FOR THE TRUSS SHOP DRAWINGS (81B) THAT AFFECT THIS SUBMISSION ARE STILL APPLICABLE.

(Emphasis in original) (R4, tab 9 at 1-2)

31. TCI submitted a "fabrication" drawing for the 53AS building to Clark on 3 December 1997. The drawing was returned the next day because the truss quantities and elevations were incorrect. TCI resubmitted it on 9 December 1997. Clark returned it again, stating that "[t]he problems encountered are too numerous to detail[,]" but noted that (1) hip ridgelines were incorrect in both elevation and location; (2) adjacent truss components were not at the same elevations; (3) the elevation of the ridgelines between the main part of the building and the wings were inconsistent; (4) truss quantities on the detail sheets did not match the layout drawing; (5) the pitch of the roof was incorrect; and (6) there were missing detail sheets. Clark concluded by saying that the problems were

"a matter of dimensions being off by up to three feet, not just a millimeter or two." (R4, tab 66)

32. Submittal no. 116A (53AS/design calculations/shop drawings) was submitted on 24 December 1997, coded E, and returned on 10 January 1998 with the following comments:

> UNABLE TO VERIFY DESIGN CALCULATIONS AND SHOP DRAWING COMPLIANCE FROM INFORMATION PRESENTED.... [T]HE HORIZONTAL AND VERTICAL DIMENSIONS...ON THE CONTRACT DRAWINGS HAVE NOT BEEN CORRECTLY IMPLEMENTED INTO/USED FOR THE DESIGN CALCULATIONS AND SHOP DRAWINGS. REVISE AND RESUBMIT. GENERAL COMMENTS ARE AS FOLLOWS:
>
> --DURING THE REVIEW, NEITHER THE A/E [N]OR THE CORPS WAS ABLE TO REPRODUCE/VERIFY THE CONTRACT PLAN DIMENSIONS. BOTH THE SHOP DRAWING LAYOUT AND THE COMPUTER GENERATED TRUSS ELEVATIONS MUST INDICATE ALL COLUMN (GRID) LINES, SUPPORT POINTS, AND APPLICABLE DIMENSIONS FROM THE COLUMN (GRID) LINES—ADDITIONALLY, THE DIMENSIONS (AND COMPLETE DETAILS) FROM THE CENTERLINE OF THE EXTERIOR COLUMN LINES TO THE OUT[ER] EDGE (END) OF THE TRUSSES MUST BE PROVIDED....
>
> --UNABLE TO VERIFY THE ROOF PITCH AND THE VERTICAL DIMENSION.... THE COMPUTER GENERATED COMPUTATIONS INDICATE VARIOUS ROOF PITCHES OF 41.43 DEGREES, 41.43 DEGREES, 41.44 DEGREES, 41.47 DEGREES, ETC WHICH IS INCORRECT--THE TRUE ROOF PITCH IS A 4 ON 12 (1:3 SLOPE) OR 18.4349 DEGREES. THE TRUE VERTICAL DIMENSIONS FOR THE ROOF IS 4867MM (ROUNDED TO THE NEXT MM)....
>
> --TYPICAL DETAILS NEED TO BE ADDED TO SHOP DRAWINGS REFLECTING A TYPICAL BOTTOM AND PIGGY BACK TRUSS AND HOW THEY WILL BE ASSEMBLED WITH COMPLETE CORRELATING DIMENSIONS AND DETAILS. ADDITIONALLY, PROVIDE

ELEVATION VIEW WITH DETAILS SHOWING HOW “A” TRUSSES ARE ERECTED AND CONNECTED TO THE OTHER APPLICABLE TRUSSES WITH COMPLETE CORRELATING DIMENSIONS AND DETAILS.

--A TYPICAL DETAIL MUST BE ADDED REFLECTING THE SECTION REQUIRED AT COLUMN LINE C WITH THE 500MM OVERHANG.

--COMPLETE DETAILS MUST BE PROVIDED FOR ALL HOLD DOWN AREAS/ADDED PURLINS (SHOW TYPE, SIZE, GAGE, FASTNERS [SIC], ETC. OF ALL MISC COLD FORMED STEEL THAT IS REQUIRED AND SPACING).

--SHOP DRAWINGS DETAILS MUST BE PROVIDED SHOWING THE ERECTED POSITION OF TRUSSES H, K1, HH, AND M.

--VERIFY THAT TRUSSES HAVE BEEN DESIGNED FOR ARCHITECTURAL LOADS INDICATED IN DETAILS 2/S305, 2/306, AND OTHERS.

--VERIFY/COORDINATE THAT TRUSSES HAVE BEEN DESIGNED FOR ALL MECHANICAL LOADS...AND VERIFY THAT TRUSS WEB OPENINGS WILL ACCOMMODATE DUCTWORK.

--ADDRESS TRUSS NOTE 9 ON DRAWING S301.1 AND NOTE 11 MAXIMUM SPACING AS CORNER TRUSSES EXCEED 1220MM.

--ADDRESS/COORDINATE LATERAL TRUSS BRACING BY OTHERS REQUIRED BY MODIFICATION P00010.

> --VERIFY THAT GAGE OF TOP CHORDS HAS BEEN COORDINATED WITH THAT REQUIRED FOR ROOF FASTNERS [SIC] PULLOUT CRITERIA.

(R4, tab 14 at 1-2)

33. On 9 February 1998, Mr. Pellock wrote TCI that MiTek would not certify that the truss design was in accordance with the AISI Design Specification as requested by the COE, stating that the company "d[id] not provide infield...certification services" (R4, tab 75). It is not clear whether or not TCI ever provided this certification.

34. Submittal no. 116B (53AS/design calculations/shop drawings) was submitted on 21 February 1998, coded C, and returned the same day with the following comments:

> LAYOUT MUST CLEARLY REFLECT WHICH PARTIAL SEGMENTS...MAKE UP EACH COMPLETE TRUSS [AND] WHERE [EACH TRUSS WILL BE INSTALLED]....
>
> THE SHOP DRAWINGS MUST REFLECT A[N] ELEVATION VIEW OF EACH COMPLETE TYPE OF TRUSS (STICK DRAWING) AS IT IS TO BE FIELD ASSEMBLED WITH ALL OF THE PARTIAL SEGMENTS INDICATED AS WELL AS COMPLETE HORIZONTAL AND VERTICAL DIMENSIONS FOR EACH PARTIAL SEGMENT AS WELL AS FOR THE COMPLETE TRUSS....
>
> COMPLETE DIMENSIONS MUST BE PROVIDED FOR THE ENDS OF THE PIGGYBACK TRUSSES AND FOR THE EXTENDED TOP CHORD AREAS AT HOLD DOWN AREAS.
>
> LAYOUT SHOULD ACTUALLY SHOW HOLD DOWNS (PURLINS), IN LIEU OF SHOWING THE AREA WITH A[N] ASTERI[S]K, WITH THE SIZE, SPACING, AND CONNECTIONS[.]
>
> IT IS CRITICAL THAT SPECIFIC CONNECTION DETAILS (RATHER THAN GENERAL AS HAS BEEN PROVIDED) FOR EACH TYPE (AND...LOCATION) OF FIELD CONNECTION (SUCH AS BACK TO BACK TRUSSES AND TRUSSES THAT INTERSECT AT RIGHT ANGLES) BE PROVIDED WITH THE CONNECTION TYPE INDICATED ON THE LAYOUT....

A NOTE NEEDS TO BE ADDED AT THE TWO END AA TRUSSES (AT THE CORNERS) THAT THE EXTENDED TOP CHORD WILL HAVE TO BE FIELD MODIFIED (SHORTENED) TO FIELD FIT.

THE TOP CHORDS OF SEVERAL TRUSSES ARE NOT 18 GAUGE AS IS NEEDED FOR ROOF CONNECTION. EXAMPLES GIVEN AT THE MEETING WERE E2, H1, H2, K3---ALL NEED TO BE CHECKED.

SPECIFIC TRUSSES/DIMENSIONS DISCUSSED:

CANNOT VERIFY K1 (AND SIMILAR PIGGY BACK [TRUSSES]) FOR SURE AS THE ENDS ARE NOT FULLY DIMENSIONED AND OVERALL DIMENSIONS ARE NOT PROVIDED.

THE LL TRUSS SEGMENT (WHICH IS CONNECTED ON TOP OF THE M TRUSS SEGMENT) HAS A HORIZONTAL DIMENSION OF 15252 VERSUS THE M TRUSS HORIZONTAL DIMENSION OF 15326.

THE W1 TRUSS SEGMENT...INCLUDED WITH SEGMENTS H, K1, W1, & M IS NOT CORRECT.... ALL W1 TRUSS SEGMENTS (AND SIMILAR TYPES) MUST BE CHECKED AND VERIFIED.

THE K1 TRUSS CALCULATION/DRAWING INDICATES A HORIZONTAL LENGTH OF 6420 VERSUS 6374 ON THE K1 SHOP FABRICATION/DRAWING.

THE DIMENSION TO POINT E ON THE TRUSS SEGMENT H7 CALCULATION DRAWING IS SHOWN AS 6601 VERSUS 6901 ON THE SHOP FABRICATION DRAWING.

THE 371 VERTICAL DIMENSION GIVEN FOR THE END OF THE U1 TRUSS DOES NOT MATCH THE 391 VERTICAL DIMENSION OF THE ADJACENT U1A TRUSS SEGMENT.

> NEED TO CHECK THE 5025 HORIZONTAL DIMENSION (6420 – 1395) OF THE HOLD DOWN AREA ON TRUSS SEGMENT H1- -SHOULD BE 5082?
>
> THE DIMENSION FROM C TO E ON THE P1 TRUSS SEGMENT CALCULATION DRAWING IS SHOWN AS 1662 VERSUS 1630 SHOWN ON THE SHOP FABRICATION DRAWING- -NEED TO CHECK WHICH IS CORRECT (1630 I BELIEVE) AND IF THIS REQUIRES OTHER TRUSS SEGMENT DIMENSION CHANGES.
>
> IN VIEW OF THE ABOVE ITEMS FOUND BY VERY LIMITED CURSORY SPOT CHECKS, IT IS IMPERATIVE THAT ALL TRUSS SEGMENTS AND ASSEMBLED TRUSS DETAILS AND DIMENSION BE DOUBLE CHECKED FOR ACCURACY.

(R4, tab 19 at 1-2)

35. On 17 March 1998, Clark noted the following errors in the 50AS truss drawings: (1) the stamped drawing and detail drawings for truss A5 were missing; (2) truss W2 was a quantity of 8 not 7; (3) truss H7 did not show the required extension at the hip; (4) composite drawings for trusses H4+M4+G3+G2, H4+M4+W2, and H4+M+W1+K1 were missing; (5) the dimensions for composite drawings H4+M4+K2+N2 and H4+M4+K2+T2+T2A needed to be corrected; (6) trusses H4, E2, F2, J3, and K2 were missing dimensions; (7) trusses A2. A3, and A4 did not show end conditions; (8) column lines needed to be added to almost every drawing; (9) the COE's comments from the 53AS drawings were not addressed on the 50AS drawings; and (10) drawings for trusses P1 and P2 were printed upside down (R4, tab 81).

36. On 6 April 1998, SSC advised TCI as follows:

> [T]he latest A2 and A4 fabrication drawings...[for the 53AS building] do not match the trusses that have been installed. [I]t appears that twenty one (21) trusses on the North wing...have [been] rebuilt in the field or remanufactured.... [F]orward a complete resubmittal of the 53AS truss drawings that accurately correspond to the installed trusses.

(R4, tab 86)

37. Submittal no. 337 (50AS/design calculations/shop drawings) was submitted on 11 May 1998, coded B, and returned on 6 July 1998 with the following comments:

1. In the calculations, the loading column is in PSF while the loads in the column have kpa units. The screw values are in lbs. Units need to be checked to ensure that these consistency problems have not yielded a design error.

2. Several dimensions have been revised by hand on the calculation sheets.... You need to verify all calculations where revisions affect the original calculations.

3. The truss designs need to be verified to ensure that the architectural loads indicated in detail 2/S305, 2/S306, and others have been incorporated.

4. Screws at truss connections shall be installed [per] previous discussions and correspondence....

5. Applicable revisions shall be made to the applicable contract drawings to reflect the as-build [sic] changes....

(R4, tab 50 at 178)

38. In the spring of 1998, SSC hired Mr. Raymond L. Vinson of Mediation Services to assist with the submittals. Mr. Vinson is a licensed mediator in the State of Georgia. (Tr. 1/153, 158) During his review of the submittals, Mr. Vinson discovered that TCI did not work in the metric system. As a result, the drawings had to be rerun in feet and inches and the connection points had to be renumbered. (Tr. 1/161)

39. At the hearing, Mr. Harrington testified that TCI was also required to detail the truss bracing and overframing even though it had excluded those items from its quotation. He also testified that TCI had to perform work ordinarily performed by other subcontractors, such as detailing the purlins, dormers, and outlookers, and preparing the erection drawings. (Tr. 1/44, 64-67)

The Fasteners

40. On 13 March 1998, Mr. Robert Harris, Jr., the erector, bumped an A2 truss while sliding it onto an assembly rack at the 53AS building, shearing off all 12 screw heads on the bottom chord connection (R4, tab 85; app. supp. R4, tab 57; tr. 1/200-04, 2/49). Mr. Harris testified that it was "very unusual" for screw heads to pop off as a result of bumping (tr. 2/49-50). Prior to and after this incident, he observed a lot of screw heads on the ground. He described the problem at the AS53 building as "widespread" (tr. 2/51-52). According to Mr. Harris, ASE swept up one or two Dixie cups full of

screw heads every day, totaling maybe 1,000 screw heads. He estimated that ASE installed over 10,000 screws at the 50AS and 53AS buildings. (Tr. 2/49-54) The broken screws were marked with concentric circles on the heads and identified as SkyPro screws (tr. 2/10-11).

41. Mr. Harrington testified that TCI used SkyPro screws to fabricate the trusses in its plant because the Buildex screws specified by MiTek cost three times as much as other screws (tr. 1/133). With the exception of one box of screws, ASE used Buildex screws to assemble the trusses at the site. Buildex screws were identified with a "BX" on the head. (Tr. 1/141) Mr. Harris testified that he did not have a problem with Buildex screws breaking on the project (tr. 2/56).

42. On 2 April 1998, the COE's structural engineer reported that he had "turned up 3 or 4 suppliers...whose #10 screw capacity was substantially less than 419#," the number of pounds of shear strength specified for 18 gauge material on the approved design (R4, tab 52 at 2). He also obtained a copy of the MiTek specification data sheet, which required that "[a]ll truss member connections...be made with Buildex...screws or equivalent substitute." The data sheet indicated that a #10-16 Buildex screw had the following minimum ultimate shear strength (single shear strength x safety factor):

20 ga.—803
18 ga.—1208
16 ga.—1268
14 ga.—1400

(R4, tab 30; app. supp. R4, tab 82; tr. 1/248, 256)

43. Based on the MiTek specification data sheet and the screw values reflected on the approved design, we find that shear strength decreases as the gauge of the material increases.

44. Neither TCI nor Clark was able to obtain a specification data sheet for the SkyPro screws. The COE traced the SkyPro screws to a distributor in Florida, but the distributor refused to provide any information regarding the source or manufacturer of the screws. (R4, tabs 26, 86; app. supp. R4, tabs 79, 82, 160 at 5; tr. 1/134-35, 206-07, 257)

45. On 8 April 1998, Clark sent two groups of screws to The St. Louis Testing Laboratories for shear tests. Group 1 consisted of six screws from the 53AS building and group 2 consisted of six screws from the 50AS building. Based on the average of two shear tests, the SkyPro screws exhibited an average shear value of 1,235 pounds (1,135 pounds + 1,335 pounds divided by 2) in 10 gauge material. (R4, tab 94)

46. TCI sent four splice joint connections fabricated with SkyPro screws to MiTek for tension pull tests. Three connections were 18 gauge to 16 gauge with an 18 gauge splice piece. The fourth connection consisted of two 20 gauge pieces with a 20 gauge splice piece. No splices with heavier gauge material were tested. The tests indicated that the splices had 98 percent, 98 percent, 91 percent, and 92 percent of the design value respectively. (R4, tab 27)

47. Using a Buildex screw as the benchmark, Mr. Pellock also performed shear tests on a SkyPro (3/8) screw, a SkyPro (3/20) screw, an ISC screw, and a POL screw. The tests were performed in each of 20 gauge, 18 gauge, and 14 gauge material. Notably, Mr. Pellock did not testify. The record does not reflect which SkyPro screw TCI used in its plant or how, if at all, the ISC and POL screws are relevant. The letter reporting Mr. Pellock's test results did not include the raw data from the shear tests (in pounds), so his test results could not be compared to the MiTek specification data sheet or the test results from The St. Louis Testing Laboratories, all of which reported shear strength in pounds (R4, tabs 27, 30, 94). Mr. Pellock's test results were as follows:

Screw	Ga	% of benchmark:
Sky (3/8)	20	92%
	18	96%
	14	101%
Sky (3/20)	20	96%
	18	98%
	14	100%
ISC	20	102%
	18	99%
	14	104%
POL	20	90%
	18	100%
	14	92%

(R4, tab 27 at 2)

48. After reviewing his test results and the test results from The St. Louis Testing Laboratories, Mr. Pellock issued a stamped letter dated 17 April 1998 which stated that the "tested structural characteristics of the screws used in the trusses...are within the acceptable ranges as required by the MiTek engineering drawings [and] will produce connections between the truss members capable of safely resisting axial forces due to design loads" (R4, tab 28).

49. On 20 April 1998, Clark submitted a corrective action plan (CAP) to the COE:

> [T]he problem...has been limited to heavy gauge material where splice plates are installed.... Accordingly, additional #10-16 "BX" screws (equal to the number required by design) have been added at all such splices on the bottom chords of the 53AS trusses.... The same procedure will be used on all top chord splices....
>
> Fasteners will be added (equal to the number required by design) to splice plates on the 50AS trusses prior to erection. A 100% check of the 50AS truss connections will be performed [on the ground].

(R4, tab 29 at 1)

50. On 1 May 1998, Mr. Clemans agreed to the CAP with the understanding that a safety factor of 3.0 would be maintained for 16 and 14 gauge splice connections and that no SkyPro screws would be used in heavier gauge connections. Mr. Clemans also rejected Mr. Pellock's conclusion regarding the equivalency of the screws:

> Based on the shear test results [from The St. Louis Testing Laboratories, the SkyPro screws have] an average shear value of 1235 lbs[.] Since this value was obtained in 10 gage material, it's doubtful if it would be as high as 1235 lbs in 14 gage material. The MiTek Spec Data lists an ultimate shear capacity of 1400 lbs for a #10-16 screw in 14 gage material, although a figure of 1557 pounds was used in the design based on a factor of safety of 3 (3 x 519 lbs. = 1557 pounds shear). [Thus,] the ultimate shear capacity [of the SkyPro fasteners] in 14 gage material...is no[t] more, and probably less than 79% of the capacity for the Buildex...fastener used as a basis for the MiTek design [1,235 divided by 1,557 or 79%].

(R4, tab 31)

51. On 11 May 1998, Clark learned that ASE was not adding screws to the top chord splice plates in the 50AS building and directed that #10-16 Buildex screws be added (equal to the number required by the design) to all truss connections 16 gauge or heavier, including top and bottom chord splices and connector plates (R4, tab 103).

52. On 1 July 1998, Clark advised SSC that no additional fasteners had been installed in the top chord connector plates of the A2 and A4 trusses at the 53AS building

and that the number of bottom chord fasteners in the splices in the 50AS building could not be doubled due to a lack of space (R4, tab 110).

53. On 29 July 1998, Clark and the COE agreed to the following plan:

> 1. [TCI will]...provide...a set of fabrication drawings....[2]
>
> 2. [T]he existing fasteners [will] be inspected with a wrench or screw gun to determine if fracturing or breaking of heads has occurred.... Based on the amount of problem fasteners found...this inspection requirement [may] be eliminated. (50AS & 53AS)
>
> 3. Twenty eave connections will be inspected in each building.... If no missing fasteners are noted in...twenty random trusses, no further...eave connections will be inspected. (50AS & 53AS)
>
> 4. Several bottom level rectangular trusses (similar to types M and M4) have a heavy gauge splice plate in their top chord. 100% more fasteners than shown on the shop drawings will be added to these...connections. (50AS & 53AS)
>
> 5. 20% more fasteners...will be added to the "elbow point" connector plate in the top chord of most lower level trusses (similar to types A2, A4, H, H4).
>
> 6. A check of the fasteners in all connections at 12 of the "major" trusses (similar to types A2, A4, H, H4, M, M4) will be performed to ensure that the correct number of fasteners have been installed. (6 trusses in 50AS & 6 trusses in 53AS)

(R4, tabs 38, 39)

54. In July and August 1998, Mr. John L. Keith, the COE's project engineer, and Mr. Harris of ASE inspected 6 trusses (1,526 screws) in the 50AS building. On 23 August 1998, Mr. Harris reported the following deficiencies: 2 joints were missing 3 screws; 126 screws (8%) were stripped; all screws in joints G-F and G-H in truss A4

[2] Mr. Harrington testified that TCI's "fabrication drawings" or "cut sheets" were what TCI used to build a truss and that they were not ordinarily "released out to the public or the Government" (tr. 1/44, 124).

were stripped; 12 screws or approximately 0.8% of the total number of screws were broken; 4 of the 21 screws at joint K-M in truss A4 had broken screws. (R4, tab 41) Following inspections conducted on 27-28 and 31 August 1998 in the 53AS building, Mr. Harris reported the following deficiencies: screw requirements for the end joints of trusses A4, M, and M4 differed from the screw count shown on the design drawing; trusses H and M, which required a total of 514 screws, had 11 stripped screws (2%) and 13 broken screws (2.5%); A2 and A4 trusses, which required 507 screws, had 8 stripped (1.6%) and 45 broken screws (8.9%); and trusses H4 and M4, which required 468 screws, had 17 stripped screws (3.7%) and 9 broken screws (1.9%) (R4, tab 42).

55. On 16 September 1998, a number of A2 and A4 trusses in the 53AS building were visibly bowing (R4, tabs 44, 117). Mr. Harris acknowledged that he had missed the detail for the bracing, but by that time, he had demobilized due to nonpayment (R4, tabs 118, 122, 123). Since TCI was no longer being paid, TCI agreed to install the bracing to get enough money to stay "afloat" (R4, tab 118; tr. 1/68, 72-73).

56. On 16 October 1998, Mr. Clemans advised Clark as follows:

> a. On both the 50AS and 53AS, random connections were found with a high percentage of screw failures. On the 53AS, the most serious connection found was E-P on the Type A4 truss with a 33%...failure rate. [I]n some cases the 50AS was even worse and several web connections were found with a 50% to 56%...failure rate. Another concern on the 53AS was evidence of some screw heads shearing off since the trusses were inspected...earlier....
>
> b. On the 53AS, Messrs. Keith and Harris found [numerous] instances...where the screw count did not equal the screw count...on the fabrication drawings....
>
> ....
>
> On the 50AS the only undercount found was on the A-2 truss at connection A-B which reflected a count corrected for 21% of 23 screws and 21 were actually counted.

(R4, tab 124)

57. On 30 October 1998, SSC advised that screws and bracing had been added to the trusses in both buildings and that all quality control issues had been resolved (R4, tab 45).

58. On 19 November 1998, Mr. Clemans wrote Clark that the deficiencies identified in his 16 October 1998 letter had not been adequately addressed and directed Clark to perform as follows:

> It is [our] opinion that the deficiencies...require correction prior to acceptance [and] that the prescribed factor of safety of 3.0 for connections should not be knowingly encroached upon.... Based on [the July/August] inspections[,] a very high percentage of the...connections do not meet the factor of safety of 3.0....
>
> ....
>
> [Y]ou are directed to [inspect] 100% [of the] truss connection[s;] correct any missing screws; correct any broken or stripped screws; inspect and correct all lateral and diagonal bracing; correct for any Sky Pro screws in 16 and 14 gage connections[;] and furnish certification by a Professional Engineer [that the truss system is constructed in accordance with the design, and that it is capable of carrying the loads specified].

(R4, tab 46)

59. In response to Mr. Clemans' directive, SSC hired Huval & Associates, Inc. (Huval) to inspect the connections and analyze the design. The Huval report was issued on 14 December 1998. For unexplained reasons, no one from Huval testified. Of the 258 connections jointly inspected by the engineers in December 1998 and the 44 connections flagged by Messrs. Harris and Keith during the July/August 1998 inspections as having some kind of a problem, the report found that, except for six connections that had safety factors of less than 2.0, the connections had an installed safety factor equal to or greater than 2.0. (R4, tab 47; app. supp. R4, tab 160 at tab 6) In addition, the report computed the actual dead load to be 12 psf, about half that specified and pointed out that the metal decking above the trusses had the capacity to distribute roof loads beyond the specified four feet truss spacing, effectively doubling the installed truss dead load safety margin (R4, tab 47 at 2).

60. Based on the Huval report, the COE accepted the trusses on 11 January 1999 and released funds withheld for the trusses subject to receipt of acceptable "as built" drawings (R4, tabs 47-48; app. supp. R4, tabs 159, 160; tr. 1/109-10, 164-65).

61. On 12 June 2001, Clark submitted a certified claim to the CO on behalf of TCI and SSC (R4, tab 50). TCI's portion of the claim consisted of $290,542.56. SSC's

portion of the claim consisted of $78,671.38. With mark-ups, the claim totaled $481,953.83 (app. supp. R4, tab 50 at 204).

DECISION

This is a pass-through claim brought by Clark, the prime contractor, on behalf of its structural steel subcontractor (SSC), and SSC's supplier, TCI. TCI supplied the light gauge steel roof trusses which are the subject of this dispute. TCI presents three arguments in support of its claim. First, TCI argues that the COE improperly rejected submittal nos. 81, 81A, 81B (24 October 1997), 81B (7 November 1997), 81B (renumbered 81-1), 116, 116A, 116B, 218, and 337. Second, TCI argues that the COE unreasonably delayed processing submittal nos. 81, 81C, 116C, 337, 337A, and 384. Finally, TCI argues that the SkyPro screws it used to fabricate the trusses in its plant were "equal to" the Buildex screws required by the approved design. As a result, Clark asserts entitlement to $290,542.56 on behalf of TCI and $78,671.38 on behalf of SSC. With Clark's mark-ups, the claim totals $481,953.83. The COE denies liability.

When a contractor seeks increased costs arising from the government's disapproval of a submittal, the government bears the burden of proving that it properly rejected the submittal. In order to carry this burden, the government must prove that the contract prescribed certain requirements and that the submittal failed to meet one or more of those requirements. *W.G. Yates & Sons Construction Co.*, ASBCA No. 47213, 98-2 BCA ¶ 29,742 at 147,414; *Colville Contractors*, ASBCA No. 45157, 96-1 BCA ¶ 28,098 at 140,251; *Orbas & Associates*, ASBCA No. 32922 *et al.*, 87-3 BCA ¶ 20,051 at 101,521.

Specification section 05410 required government approval of two types of submittals in connection with the cold-formed steel structural roof trusses and framing. SD-01 submittals included the design calculations indicating compliance with the load-bearing requirements for the roof trusses and framing, studs, joists, runners and connections. SD-01 submittals had to be stamped and sealed by a licensed professional engineer. SD-04 submittals included the shop drawings. Among other things, SD-04 submittals were required to indicate the "type and locations of welds, bolts, and fastening devices." SD-04 submittals did not have to be stamped and sealed by a licensed professional engineer. Paragraph 3.1 of specification section 01300 authorized the CO to "request submittals in addition to those specified" and required that "submittals be complete and in sufficient detail to allow ready determination of compliance."

TCI's first truss submittal, SD-01 submittal no. 81, was submitted to the COE on 16 June 1997. During its review, the COE requested TCI to provide a detail showing the spacing of the screws. TCI did not provide the detail. The COE asked TCI to certify that its truss design was in accordance with AISI's Specification for the Design of Cold-Formed Structural Steel Members, which was not part of the contract. The COE

also asked TCI to certify its truss design in connection with submittal nos. 81A (POL design calculations), 81B (24 October 1997) (POL design calculations), and 116 (53AS design calculations). There is no evidence that TCI ever certified its design. The certification was an additional submittal within the meaning of paragraph 3.1 of specification section 01300 and TCI's failure to provide it justified rejection of the submittals.

At the hearing, TCI argued that the requirement to indicate the "type and locations of welds, bolts, and fastening devices" in paragraph 1.2 SD-04 of the specification is ambiguous. According to TCI, the practice in the industry is to indicate only the number of screws at each connection, rather than to provide a detail showing the spacing of the screws at each connection. In order for us to accept TCI's trade practice evidence, it must first prove reliance. *Metric Constructors, Inc. v. NASA*, 169 F.3d 747, 752 (Fed. Cir. 1999). This means that TCI must show that Clark relied on TCI's interpretation when it entered into the contract. No one from Clark testified and Clark's bid documents are not in evidence. Accordingly, TCI's trade practice argument fails for lack of proof.

Combined SD-01 and SD-04 submittal nos. 81B (7 November 1997) (POL design calculations/shop drawings), 116A (53AS design calculations/shop drawings), 116B (53AS design calculations/shop drawings), and 337 (50AS design calculations/shop drawings) also failed to meet one or more the requirements of the specification. For example, submittal no. 81B (7 November 1997) did not show all the cold-formed steel framing around the dormers and there were inconsistencies between the design calculations and the shop drawings. The COE indicated that it was "unable to verify design calculations and shop drawing compliance from information presented" in connection with submittal no. 116A. Submittal no. 116B contained dimensional errors relating to the piggyback trusses and the comments noted that "the top chords of several trusses are not 18 gauge as is needed for roof connection." Submittal no. 337 was returned for, among other things, verification that the loading column in the calculations (expressed in PSF) was consistent with the loads (expressed in kpa) and that handwritten revisions and other changes were properly incorporated into the design.

SD-04 submittal no. 81B (renumbered 81-1) (POL shop drawings) was incomplete and failed to include a key for reading TCI's computer-generated shop drawings. As a result, the submittal was properly rejected under paragraph 3.1. of specification section 01300 which required that submittals be complete and in sufficient detail to permit ready determination of compliance. SD-04 submittal no. 218 (POL erection plan) contained multiple dimensional errors and lacked complete details of the cold-formed steel to be installed around dormers which also justified rejection.

TCI next argues that the COE unreasonably delayed processing submittal nos. 81, 81C, 116C, 337, 337A, and 384. TCI has not cited any provision of the contract that required the COE to process submittals within 30 days. The contract allowed the COE a

minimum of 30 days for review, but did not specify the maximum number of days for the COE's review. In such cases, we look to see whether the time it took the COE to perform its review was reasonable.

Submittal no. 81, TCI's first truss submittal, was submitted to the COE on 16 June 1997. The COE determined that the connection in the submittal was too complicated and requested that it be redesigned. The COE also requested a detail showing the spacing of the screws, documentation of TCI's computer program, and contact information for the truss supplier. In addition, TCI discussed the availability and pricing of material for the end connections and the eave struts. On 13 August 1997, TCI resubmitted submittal no. 81 as submittal no. 81A. The COE coded both submittals a C on 20 August 1997, 65 days after submission of submittal no. 81. Approval was conditioned on TCI certifying that its truss design was in accordance with AISI's Specification for the Design of Cold-Formed Structural Steel Members. We find, particularly in light of the numerous submittal deficiencies, that the COE timely processed submittal No. 81.

Submittal no. 384 was processed within 35 days. We would be hard-pressed to find that five days beyond the 30-day minimum allowed by the contract was unreasonable. TCI failed to present any evidence regarding the four remaining submittals.

TCI next argues that the SkyPro screws were equal to the Buildex screws. The contractor bears the burden of proving that an "or equal" product is equal in quality and performance. *United Pacific Insurance Co.*, ASBCA No. 52419 *et al*., 04-1 BCA ¶ 32,494 at 160,744; *North American Construction Corp*., ASBCA No. 47941, 96-2 BCA ¶ 28,496 at 142,299.

Neither Clark nor TCI could locate a specification data sheet for the SkyPro screw. Mr. Pellock based the approved design on screws with an ultimate shear strength of 1,557 pounds in 14 gauge material. The MiTek specification data sheet indicated that the Buildex screws had an ultimate shear strength of 1,400 pounds in 14 gauge material. The St. Louis Testing Laboratories reported that the SkyPro screws it tested had an ultimate shear strength of 1,235 pounds in 10 gauge material. Mr. Pellock indicated that the SkyPro screws he tested had 101 percent and 100 percent respectively of the shear strength of Buildex screws in 14 gauge material. Since shear strength decreases as the gauge of the material increases, Mr. Pellock's test results are questionable. In the absence of any explanation of these discrepancies and/or the testimony of Mr. Pellock, we conclude that TCI has failed to prove that the SkyPro screws were equivalent to the Buildex screws.

CONCLUSION

The appeal is denied.

Dated: 5 January 2010

ELIZABETH A. TUNKS
Administrative Judge
Armed Services Board
of Contract Appeals

I concur

MARK N. STEMPLER
Administrative Judge
Acting Chairman
Armed Services Board
of Contract Appeals

I concur

EUNICE W. THOMAS
Administrative Judge
Vice Chairman
Armed Services Board
of Contract Appeals

I certify that the foregoing is a true copy of the Opinion and Decision of the Armed Services Board of Contract Appeals in ASBCA No. 53914, Appeal of Clark Construction Company, rendered in conformance with the Board's Charter.

Dated:

CATHERINE A. STANTON
Recorder, Armed Services
Board of Contract Appeals