UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION

BEFORE THE ATOMIC SAFETY AND LICENSING BOARD

In the Matter of TEXAS UTILITIES GENERATING COMPANY, et al. (Comanche Peak Steam Electric Station Station, Units 1 and 2)	Docket Nos. 50-445-OL and 50-446-OL

CASE'S ANSWER TO APPLICANTS' RESPONSE TO BOARD'S PARTIAL INITIAL DECISION REGARDING A500 STEEL

in the form of

AFFIDAVIT OF CASE WITNESS MARK WALSH

On page 2 of Applicants' Affidavit of John C. Finneran, Jr. Regarding A500 Tube Steel (attached to Applicants' Response to Partial Initial Decision Regarding A500 Steel), under Consideration of Cyclic Stresses, last sentence, Applicants discuss a "small revision in the yield values." This small revision is the 15% which is under consideration, which they consider "small." If the yield strength value is off by 15%, then any calculation utilizing that yield strength value will also be off by 15%. Therefore, their considerations for cyclic stresses will be in error by 15% when based on yield. And, as discussed further herein, any calculation which involves the yield strength values would be incorrect if based on the higher yield point which the Applicants have utilized.

In their Affidavit at page 2, under Consideration of Revised Yield Values at Comanche Peak, the Applicants claim that they had recognized the decrease in yield strengths of A500 tubular steel "(E)ven prior to NRC approval of Code Case N-71-10." However, Applicants' PSE group was formed in late 1981 and had no guidelines prior to that time (see discussion in CASE's Answer to Applicants' Statement of Material Facts As to Which There Is No Genuine Issue Regarding CASE Allegations Regarding Section Property Values, especially bottom of page 3 continuing on page 4). Code Case N-71-10 became effective 5/11/81 (see CASE Exhibit 751, accepted into the record at Tr. 6794). It is obvious then, that when the PSE group created their guidelines in late 1981, they should have included consideration of Code Case N-71-10 in their guidelines. They did not.

Applicants' Witness Mr. Finneran (the sole sponsor of Applicants' Affidavit in support of their Motion) was not in pipe support design until October of 1981. The Applicants have not shown through documentation how they recognized that the reduction in yield strength did not have adverse effects prior to the NRC approval. The Applicants claim that they had recognized and did consider the effects due to welding (Applicants' Affidavit at page 3). I do not believe that they did. Applicants' PSE guidelines supports my point; in section III, page 2 of 42, the PSE manual lists the allowable stresses for the supports. Under linear supports, the Applicants tabulated the allowable stresses and they indicate how the allowable stresses were determined and refer the user to the appropriate section of the ASME Code. For Fb (the allowable bending stress), the

Applicants refer to ASME Section XVII-2214.1. (See Attachment A hereto, page 2 of 42 of Section III of PSE Guidelines.) Now, referring to Section XVII-2214.1 of ASME, it states, in part:

> "(a) Tension and compression on extreme fibers of compact hot rolled or built up members symmetrical about and loaded on the plane of their minor axes and meeting the requirements of Subsection NF shall result in a maximum bending stress . . . " (Emphasis added.)

As indicated in this section of the Code, to which Applicants refer for their allowable bending stress, it is not applicable to A500 Steel, since (as Applicants have stated) CPSES never used any hot rolled steel for structural tubing. (See quoted portion, and discussion at page 4 of CASE's Answer to Applicants' Statement of Material Facts As to Which There Is No Genuine Issue Regarding CASE Allegations Regarding Section Property Values.) If the Applicants had indeed considered the effects of welding to the tubular members, the Applicants most definitely would have had to consider what portion of the code they could use in establishing their allowable bending stress. What the Applicants have not considered is that the allowable bending stress which they utilized is for hot rolled steel, and not cold formed steel such as A500 Grade B.

In normal construction, a tube steel member is not used as a bending member, but only as a column in a non-rigid frame, and does not receive any bending moments. The use of A500 Grade B tube steel as a pipe support encompasses not only column action but bending action also.

Mr. Terao of the NRC Staff also had some concerns regarding the use of A500 tube steel, which he discussed with Cygna during the Staff/Cygna

meeting in Bethesda 7/3/84 (excerpted from Tr. 53-57; see full discussion at Tr. 50-64):

> "MR. TERAO: . . . but some of the more unique concerns would include, for example, the use of the tubular steel. I know we've had many discussions of punching shear, but one has to keep in mind that the AISC code and the ASME code were really developed on a consensus of design which did not include tube steel at the time.
>
> "Really, the use of tube steel is first mentioned in the AISC (sic) code in the seventh edition, and what the seventh edition basically says is that it was starting to be used at that time, and the AISC code believed that the use of the equations were still appropriate for tube steel, and they didn't see any problem with using the AISC code for it.
>
> "And, of course, the ASME Section III, Appendix 17, excerpted the pertinent portions of the AISC code for its design.
>
> "But the concern with tube steel with punching shear is a unique, is unique to tube steel, that one cannot find either in AISC or with ASME.
>
> "So that would be another design consideration that you would have to consider--I'm not saying that you would have to use the AWS D11, but it's a unique design consideration for tube steel. . .
>
> ". . . right now, I was just giving examples of where an unconventional design you would have to use other--you would have to question the design considerations to make sure that when you use a unique design or unconventional design, that you do have design considerations to go along with it. . .
>
> ". . . I'm only giving examples. And what you're pointing out is, yes, for tube steel there were certain unique or there were certain just specific design considerations that were given toward tube steel.
>
> "That's the type of frame of mind that I would like being used to address this particular issue. . .
>
> ". . . I don't really see that there's a problem with Richmond insrts, just like there is no problem with the modeling of dual function restraints, in other words, just the Richmond insxrts alone, taken by themselves, there's no problem.
>
> "But it has to do with the design considerations that go along with it. And one of design considerations is the use of the tube steel with the holes in it as anchorage for the Richmond insert.

"And one thing that has been pointed out is when you have the axial tortion (sic) in that tube steel with the Richmond insert through it, you can induce a bolt-bending in there.

"Of course, no code that I'm aware of has been allowable for both bending, either tension or shear. So again, it's a different approach that may impact the design considerations. . . "

On page 3, first full paragraph of Affidavit, it is stated that:

". . . at the time Code Case N-71-10 was issued, Applicants recognized that the ASME reviews all Code Cases before issuance to assure that the ASME reviews all Code Cases before issuance to assure that no potential safety concerns are raised by prior practices which may be altered by the new Code Cases. In situations where such concerns may exist, the ASME will either make the Code Case mandatory or notify all parties who may be affected of the potential safety concern. In this instance, the ASME did not make the subject Code Case mandatory and did not issue a notice of a potential safety concern. This assessment was recently confirmed by the ASME in the attached interpretive letter." (Emphasis added.)

It appears that Applicants have been misinformed in regards to mandatory code cases. The Applicants apparently believe that if there were a significant problem, a code case would be mandatory. (I cannot help but wonder, if, as it appears, Applicants are awaiting a mandatory code case to determine that an item is significant, how many other significant problems may have been considered insignificant by Applicants because there was not a mandatory code case stating that it is significant, or clear language in the code prohibiting it, etc.) This is not my understanding of how code cases are handled, and I believe that the Applicants are wrong in this regard, and that they made an erroneous assumption in this instance without any basis in fact to support it. It appears that the NRC Staff's understanding is the same as mine in this regard (see NRC Staff's Response, Chen Affidavit, page 7, footnote 4).

Beginning at the bottom of page 3 and continuing on page 4 of their Affidavit, Applicants state that they believed that no reduction in yield strength was appropriate because of "several conservatisms which are not otherwise considered in the design process." On page 4, they rely on the 1/16" deflection criteria as one of those conservatisms. However, as shown in CASE's answer on generic stiffnesses (CASE's Partial Answer to Applicants' Statement of Material Facts As to Which There Is No Genuine Issue Regarding Applicants' Use of Generic Stiffnesses Instead of Actual Stiffnesses in Piping Analysis), the Applicants have not properly considered the stiffness of the supports which, if properly considered, would increase loads.

The second "conservatism" on which Applicants rely is the design of anchor bolts (Applicants' Affidavit at 4). The design of the anchor bolts depends upon an interaction value which must be less than or equal to 1. The same holds true for the design of a steel member; i.e., the interaction value must be less than 1. All the Applicants can actually say in this regard is that their anchor bolts are more likely to be overstressed than their tube steel members -- not that it is a controlling design consideration. In the design of a pipe support (or any structure), one must consider the stresses in the steel member and verify that they are not over the allowables, and if they are, change the steel member. Similarly, one must consider the stresses in the anchor bolts and verify that they are not over the allowables, and if they are, change the anchor bolts. In essence, the Applicants state that there is less of a reserve capacity in their

anchor bolts than in their A500 steel. If one were to accept Applicants' premise, they are in effect saying that if their anchor bolts are O.K., then their A500 steel is O.K. also and they do not have to consider the bending stresses in the steel members if they have already checked the anchor bolts. This shows the inadequate engineering judgement and philosophy at Comanche Peak.

On page 5 of their Affidavit, Applicants claim that they utilized a lower stress allowable as part of their conservatism; i.e., they used level B allowables with level C loads. The Applicants have not provided documentation to show that this is being done across the board and in every pipe support design. Applicants state "Applicants (sic) support designers frequently apply more conservative allowable load levels than are required." (Emphasis added.) They do not state that they do this consistently or that they do it when the supports are highly loaded. Since it is possible, and probable, that Applicants utilize this philosophy on members which have low stresses and not on members which have high stresses, Applicants' claims are immaterial. I have not seen calculations which would substantiate Applicants' claim, and, based upon my personal knowledge of the manner in which analyses are performed at Comanche Peak, I do not believe that their claim is true.

Also on page 5, Applicants claim that they utilize stronger tube steel sections than are necessary. If this were the case, the Applicants would then be in error in regards to their general deflection criteria because now their deflections would be smaller but their supports might meet their

deflection criteria. The Applicants state that they use stronger tube steel sections than necessary in order to provide a contingency for possible changes in support loads and stresses as a result of support modifications or piping reanalysis. However, in the final vendor certified analysis, they supposedly would not be having changes in the loads. The same could have held true if they had used a wide-flange (I-beams) and they had used the correct yield point. They are essentially saying that they expected changes (of a magnitude of at least 15%) and allowed that much extra for it. If that were true, the Applicants would not be required to look at the as-built loads if there were less than a 15% increase in the final loads. Applicants' premise is not logical.

It is also my understanding that ITT Grinnell did not use tube steel in its original design, but that field engineers made changes in which they used tube steel; i.e., modifications to supports were made by field engineers via Component Modification Card (CMC) process, where no permanent calculations were made prior to the change and the original design did not contain tube steel but the modifications did. It should be noted that one of the items which I requested on discovery (but which the Board did not require Applicants to provide) was what the percentage of supports was from ITT Grinnell, NPSI, and PSE which utilized tube steel in their original design. This was information which I felt (and feel) was necessary in order to adequately address this point.

Finally, Applicants claim on page 5 that their test data indicate higher yield strengths than specified in the published values. On page 8 of

their Affidavit, Applicants attempt to demonstrate their position. They state that they selected the ten highest stressed suport members from the sample of 182 supports, and determined from the certified mill test reports for those support members that the minimum actual yield strength for the A500 tube steel material in those members was 56.3 ksi. They state that they reduced that by 15% to 47.8 ksi. They assumed that the 15% would include the effects due to welding. They did not test this material to determine its actual yield point due to welding, which would have been the proper thing to have done to compare it with the actual mill test report yield strength. In addition, the Applicants have not demonstrated that the minimum specified yield point in all cases is 56.3 ksi. Therefore, the Applicants' reliance on the lowest of ten mill test reports cannot be used to show their position. When SA36 steel is ordered, the minimum specified yield point is 36 ksi. Although the manufacturer may generally supply yield strengths of 42 ksi, this would not allow the Applicants to rely on a 42 ksi yield point for SA36 steel. Just because they pull out ten test reports and they show a higher yield strength does not mean that the higher yield stength can be assumed for all other cases. Further, Applicants did not provide any documentation in the form of actual mill test reports to support their statements.

The six items discussed in the preceding are Applicants' position as to why they need not consider the reduction in yield strength due to welding for A500 grade B tube steel. The Applicants neglected to state that all six items are present either with A500 grade B tube steel or with other

structural shapes made with SA36 steel. That is to say, the 1/16" deflection criteria exists with a tube steel member or with a wide flange (I-beam).

What Applicants are consistently doing is cutting their margin on everything based on their often-erroneous assumptions that they have overdesigned everything, which means that if they are mistaken on any one or more item(s), they have exceeded their margins of safety. If the codes to which Applicants are committed suit their purposes, Applicants use them; if, however, the codes do not support their position, Applicants then attempt to come up with some way to get around the codes.

In addition, the the NRC Staff's response to the Applicants' Motion, page 6, first paragraph, the Staff argues that one of the factors to consider for meeting GDC-1 and 4 is "engineering judgement based on previous experience with the effect of material property changes." I disagree with the Staff's position in this philosophy. In addition, the Applicants have not demonstrated that they have previous experience with material property changes.

On page 7 of Applicants' Affidavit, the Applicants have provided a table showing the number of supports which have certain percentages of reduced allowable stress. Of these 182 supports, it should be noted that 88 of them were small bore supports. It should also be remembered that the stresses on these supports do not contain effects from axial restraints (i.e., trunnions welded to the pipe), an inappropriate deflection criteria has been used in lieu of actual stiffnesses, inappropriate damping factors

have been used in the pipe stress analysis, local stresses are neglected, incorrect section properties have been used, etc. If the Applicants did consider the reduction in yield strength, why were they using the WTSI values for section properties? (See pages 2 through 5 of CASE's Answer to Applicants' Statement of Material Facts As to Which There Is No Genuine Issue Regarding CASE Allegations Regarding Section Property Values.)

In addition, it is a logical assumption that all of the supports which Applicants reviewed are now vendor certified (all of the ones which were supplied to CASE on discovery were) and have had all had changes made prior to their sampling process. Therefore, we do not know whether the Applicants' original designs would have provided the same outcome from the sampling process. Further, apparently we will never know, because most of the 20 calculations which Applicants provided to CASE (for large bore, large loads both in magnitude and % of allowable, with Richmond inserts where there are two or more spans, and members which are in bending) were not performed at the time calculations should have been originally performed, but were in fact performed in July 1984 (see Attachment B hereto). This is also true for the additional three supports with intermediate Richmond Inserts which were not already included in Attachment B hereto (see Attachment C hereto). As stated by Applicants' counsel (Applicants' 9/6/84 letter to CASE, page 2):

> "CASE should note that the revised interaction values (which include consideration of revised allowables) for each of these supports are not part of the design calculations. Generation of these revised values involves the ratioing of the interaction values from the design calculations with the revised allowables. Many of these sample ratio calculations were not retained when initially performed. Thus, we have provided documentation to demonstrate the manner in which those calculations were performed." (Emphasis added.)

Also, in regards to these 182 support calculations, I was not able to review the original calculations. As the Applicants stated to CASE President Juanita Ellis, in their response to CASE's discovery requests, Applicants do not have the original calculations (see quote above and Attachment B hereto). This appears to be inconsistent with the NRC Staff's recollection of the 182 supports. Dr. Chen states that he reviewed 19 support packages of the 182 supports (pages 3 and 4 of Affidavit of W. Paul Chen on Revised A500 Steel Yield Values, attached to NRC Staff Response to Applicants' Response to Partial Initial Decision Regarding A500 Steel). These support packages were not given to CASE for review to demonstrate the Applicants' position. In addition, Dr. Chen states that three support packages did not use level B allowables with level C loads. Dr. Chen did not state that the supports which he reviewed which contained level C allowables with level C loads would be satisfactory if level B allowables had been used with level C loads. If the Applicants were to use level B allowables for all level C loads, then I would agree that there is at least some rationale not to consider the reduction in yield strength. However, there is no indication that Applicants have done this consistently, or that they have any intention of doing so. Further, if the Applicants wish to persuade the Board that level C loads with level B allowables will always give satisfactory results, then they are in error. Referring to suport CC-2-028-704-A33A (see Attachment B hereto), the Applicants show a stress ratio of .766, but this is based on a 33% increase for the level C loads and level C allowables. If level B allowables were used, this ratio would exceed 1, and would not be consistent with design requirements.

It should be noted that this is only one support which I picked at random as an example; I have not made this comparison for all the other supports.

In the NRC Staff's response (see Staff's Affidavit at pages 4 and 5), Dr. Chen proposes an unrealistic solution to the Applicants' problem. He recommends that the Applicants review all supports where the level B load is greater than the level C load. His premise is that, upon this review, if all supports satisfy the reduced level B allowable with the level B load, then the Applicants' original judgements were correct. This philosophy of Dr. Chen's is not appropriate to the problem at hand. CASE's position, and my position, has been and still is that all supports should use the reduced level B allowable with the level B load, not just when the level B load is greater than the level C load, as Dr. Chen recommends. Further, even if all supports were to satisfy the reduced level B allowable with the level B load, this would not prove that Applicants' original judgements were correct. There is nothing at this point in time which can provide this proof. This proof, as discussed previously herein, does not exist.

Finally, the Applicants' calculations which were provided to CASE did not indicate (except in one case) what load level or allowable stress was being used. The calculations were incomplete. For example, the output is provided for the STRUDL computer runs, but not the input or the math model (see Support FW-1-100-002-C62R). Stress ratios are shown, but no indication is given on how loads and stresses were obtained (see Support CC-2-028-704-A33A, Attachment B hereto).

On the bottom of page 8, continuing on page 9, Applicants refer to an ASME code interpretation. In the attached interpretation, in Reply 2, it states:

> "The revised values may be changed at such time when material data for the welded condition, as required by the Code, is presented to the Committee for consideration." (Emphasis added.)

The Applicants have not determined what the yield point will be for the welded connection; therefore, they are obligated to utilize the more conservative value of A36 steel.

The credibility of ASME has also got to be considered. The Applicants have utilized for these hearings one member of the ASME Board (Mr. Reedy) and attempted to use another (Mr. Bressler, who has done extensive work for Brown & Root; see Attachments D and E hereto). The Applicants requested their code interpretation on October 25, 1983, and the response was made within one month, on November 18, 1983. This turnaround time is not consistent with my experience with ASME code interpretations. I requested an interpretation from ASME on May 22, 1983. I did not get a response until ASME's letter of May 7, 1984 (see attachment to CASE's 5/17/84 Motion for Discovery Regarding Applicants' 4/11/84 Response to Partial Initial Decision Regarding A500 Steel). I have also been told verbally by Kevin Ennis, prior to my request for a code interpretation, that the Code interpretation committees meet quarterly and if one missed getting one's request in on time, one would have to wait for the next quarterly meeting. It would appear that the Applicants are not under the quarterly constraint, since they filed and received an answer between quarterly meetings.

Further, it should be noted that Applicants provided ASME with suggested wording which was adopted almost word for word, with few generally non-substantive changes in wording (although Mr. Ennis did stop short of adopting Applicants' proposed statement that "However, the Committee does not feel that this reduction in yield strength poses a safety concern.") (Compare ASME's 11/18/83 letter to TUSI, attached to Applicants' Affidavit, and Attachment F hereto, Applicants' 10/25/83 letter to ASME.)

Attachments:

Attachment A PSE Guidelines, Section III, page 2 of 42 -- see pages 2 and 3 of this pleading

Attachment B Drawings and incompete calculations for 20 supports requested by CASE -- see pages 11 through 13 of this pleading

Attachment C Drawings and incomplete calculations for 3 additional supports with intermediate Richmond Inserts -- see page 11 of this pleading

Attachment D 7/15/81 letter from Marcus N. Bressler to R. J. Vurpillat, Jr., Brown & Root, Houston -- see page 14 of this pleading

Attachment E 7/1_/81 letter from Marcus N. Bressler to J. P. Clarke, III, Staff Engineer, Brown & Root, Comanche Peak, Glen Rose, Texas -- see page 14 of this pleading

Attachment F 10/25/83 letter from M. R. McBay, Manager of Engineering, TUSI, to ASME, New York -- see page 15 of this pleading

The preceding CASE's Answer to Applicants' Statement of Material Facts As To Which There Is No Genuine Issue was prepared under the personal direction of the undersigned, CASE Witness Mark Walsh. I can be contacted through CASE President, Mrs. Juanita Ellis, 1426 S. Polk, Dallas, Texas 75224, 214/946-9446.

My qualifications and background are already a part of the record in these proceedings. (See CASE Exhibit 841, Revision to Resume of Mark Walsh, accepted into evidence at Tr. 7278; see also Board's 12/28/83 Memorandum and Order (Quality Assurance for Design), pages 14-16.)

I have read the statements therein, and they are true and correct to the best of my knowledge and belief. I do not consider that Applicants have, in their Motion for Summary Disposition, adequately responded to the issues raised by CASE Witness Jack Doyle and me; however, I have attempted to comply with the Licensing Board's directive to answer only the specific statements made by Applicants.

Mark Walsh

(Signed) Mark Walsh

STATE OF TEXAS

On this, the 25 day of Sept, 1984, personally appeared Mark Walsh, known to me to be the person whose name is subscribed to the foregoing instrument, and acknowledged to me that he executed the same for the purposes therein expressed.

Subscribed and sworn before me on the 25 day of Sept, 1984.

Samuel W. Nestor

Notary Public in and for the
State of Texas

SAMUEL W. NESTOR
My Commission Expires
1-31-85

My Commission Expires: 1-31-85

ATTACHMENT A

TEXAS UTILITIES SERVICES INC.	COVER SHEET FOR GUIDELINE REVISIONS	REV.	ISSUE DATE	PAGE
ENGINEERING GUIDELINE TITLE		3	3-23-82	1 OF 1
SECTION III STRESS, ELASTIC MODULUS AND SHEAR MODULUS CRITERIA FOR STRUCTURAL STEEL DESIGN		APPROVED: John C. Finneran Jr. PSE PROJ. ENGR.		

I. INSTRUCTIONS FOR FILING GUIDELINE PAGES

1. Remove the existing Section III in it's entirety and replace with the enclosed Section III, Rev.3.

2. Place this cover sheet in front of page 1 of the new Section III.

II. STATUS OF GUIDELINE PAGES

PAGE	REV	PAGE	REV	PAGE	REV	PAGE	REV	PAGE	REV	PAGE	REV
1	3	11	3	21	3	31	3	41	3		
2	3	12	3	22	3	32	3	42	3		
3	3	13	3	23	3	33	3				
4	3	14	3	24	3	34	3				
5	3	15	3	25	3	35	3				
6	3	16	3	26	3	36	3				
7	3	17	3	27	3	37	3				
8	3	18	3	28	3	38	3				
9	3	19	3	29	3	39	3				
10	3	20	3	30	3	40	3				

SECTION III: STRESS, ELASTIC MODULUS AND SHEAR MODULUS CRITERIA FOR STRUCTURAL STEEL DESIGN

1.0 GENERAL

This section is devoted to condensing the most frequent used criteria for the design of pipe supports falling under the jurisdictions of ASME subsection NF and ANSI B31.1.

When design conditions exist which are not addressed in this section, the engineer is to refer to the appropriate reference in Paragraph 2.0.

2.0 REFERENCES

ASME SECTION III, DIVISION 1.

Subsection NF

Appendix I

Appendix XVII

ANSI B31.1, Part 5

ASME CODE CASE N-71-8

MSS-SP-58

AISC MANUAL, 7th Ed.

3.0 DESIGN REQUIREMENTS, NF SUPPORTS

STRESS CRITERIA

Table in Figure 1 summarizes the allowable stresses for 300° F to be used for supports in reactor buildings. Table in Figure 2 summarized the allowable stresses for 200° which may be used for supports in other areas.

Tables in Figures 3 through 5 summarize the allowable stresses for compression in accordance with ASME Section II Appendix XVII.

MODULUS OF ELASTICITY (E) AND SHEARING MODULUS OF ELASTICITY (G)

The following values are given for materials indicated:

	300°F		200°F	
	E(psi)	G(psi)	E(psi)	G(psi)
0.30 CARBON STEEL	27.4×10^6	10.5×10^6	27.7×10^6	$10.65 \times 1($
TP 304-STAINLESS STEEL	27.1×10^6	10.4×10^6	27.3×10^6	$10.5 \times 1($

DESIGN REQUIREMENTS, B31.1 SUPPORTS

STRESS CRITERIA

The table in Figure 2 summarizes allowable stresses for commonly used materials.

MODULUS OF ELASTICITY AND SHEARING MODULUS OF ELASTICITY

Refer to 3.0

FIGURE 1

SUBSECTION NF COMPONENT SUPPORTS
DESIGN STRESS INTENSITIES & ALLOWABLE STRESSES (KSI)

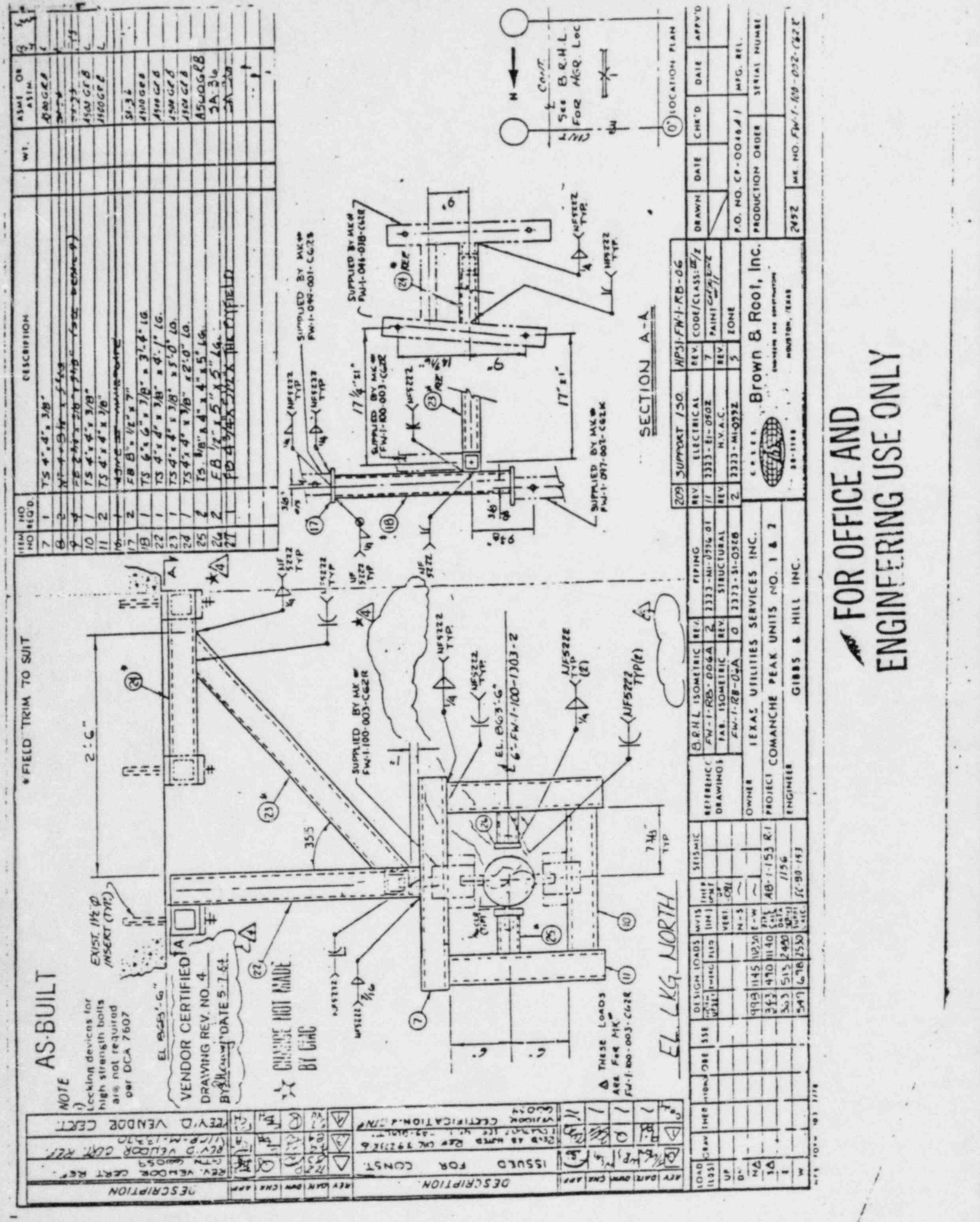
SECTION III

EMPERATURE = 300°F

STRUCTURAL FORM	SUPPORT, TYPE CONDITION / MATERIAL CLASS SPECIFICATION	PLATE & SHELL SUPPORT														LINEAR SUPPORT													
		DESIGN				NORMAL & UPSET				EMERGENCY				FAULTED		DESIGN, NORMAL & UPSET					EMERGENCY					FAULTED #				
		CLASS 1		CLASS 2 & 3		CLASS 1		CLASS 2 & 3		CLASS 1		CLASS 2 & 3		CLASS 1, 2 & 3		CLASS 1, 2 & 3					CLASS 1, 2 & 3					CLASS 1, 2 & 3				
		P_M	$P_M + P_B$	O_1	$O_1 + O_2$	P_E	$P_M + P_B + P_E$	O_1	$O_1 + O_2$	P_M	$P_M + P_B$	O_1	$O_1 + O_2$	$P_{AM} + O_1$	$P_{AB} + O_2$	F_T	F_{TL}	F_V	F_B	F_{BW}	F_T	F_{TL}	F_V	F_B	F_{BW}	F_T	F_{TL}	F_V	F_B	F_{BW}
PLATE + SHAPES	SA-36	19.3	28.9	14.5	21.7	57.9	57.9	14.5	21.7	23.1	34.7	17.4	26.1	26.0	36.0	19.3	14.3	12.7	21.0	22.9	25.4	19.0	16.9	23.0	31.8	25.9	25.3	23.8	39.4	44.9
PLATE	SA-515 GR65	22.7	31.0	16.2	24.3	62.1	62.1	16.2	24.3	24.8	37.2	19.4	29.1	37.2	37.2	18.6	12.9	12.4	22.4	23.2	24.8	18.5	16.5	27.2	30.9	37.2	27.8	24.8	40.3	46.4
PIPE	SA-106 GRB	25.0	30.0	15.0	22.5	60.0	60.0	15.0	22.5	24.0	36.0	18.0	27.0	37.2	37.2	18.6	13.9	12.4	22.4	23.2	24.8	18.5	16.5	27.2	30.9	37.2	27.8	24.8	40.3	46.4
PLATE	SA-387 GR22 CL.1	18.0	27.0	15.0	22.5	54.0	54.0	15.0	22.5	21.6	32.4	18.0	27.0	32.4	32.4	16.2	12.1	10.8	17.8	20.2	21.6	16.1	14.4	23.7	25.9	32.4	24.2	21.6	35.6	40.4
TUBE STEEL	A500 GRB U	1	—	—	—	—	—	—	—	—	—	—	—	—	—	22.3	16.7	14.8	22.3	22.3	29.6	22.3	19.7	29.6	29.6	35.9	26.9	23.9	35.9	35.9
BOLTS	SA-193 GRB7 *	1	—	—	—	—	—	—	—	—	—	—	—	—	—	56.0	42.3	37.6	62.1	70.5	74.6	56.4	50.1	82.9	94.0	77.7	58.7	52.2	86.2	97.9
BOLTS	SA-193 GR B7	1	—	—	—	—	—	—	—	—	—	—	—	—	—	51.0	38.3	34.0	56.1	63.8	68.0	51.0	45.3	74.8	85.0	72.0	54.1	48.0	79.2	90.1
PLATE	SA240 TP304	20.0	20.0	16.6	24.9	60.0	60.0	16.6	24.9	24.0	36.0	18.0	29.8	30.0	30.0	13.5	10.1	9.0	14.8	15.8	18.0	13.4	12.0	19.7	22.4	27.0	20.2	18.0	29.6	33.6
BAR	SA479 TP304																													

P_M – Membrane Stress (NB 3221-1)
O_1 – Membrane Stress (NF 3321-1a)
O_2 – Bending Stress (NB 3321-1b)
F_V – Shear Stress (XVII-2212)
F_B – Bending Stress (XVII-2214-1)
P_B – Bending Stress (NF 3221-2)
F_T – Gross Tension Stress (XVII-2211a)
F_{BW} – Bending Stress (XVII-2214-3)
P_E – Expansion Stress (NF 3222-3)
F_{TL} – Local Tension Stress (XVII-2211b)

* TO 2½ IN. DIA. INCL.
+ OVER 2½ IN. DIA. TO 4 IN. DIA. INCL.
# NON MANDATORY APPENDIX F USED AS DESIGN BASIS
□ REF. ASME CODE CASE N-71-8
△ THESE VALUES FOR NORMAL & UPSET CONDITION CAN BE INCREASED BY A FACTOR OF THREE FOR THE EFFECTS RESULTING FROM COMBINED MECHANICAL LOADS AND CONSTRAINT FROM FREE END DISPLACEMENT (NF-3231.1a)


AS-BUILT
NOTE
1) Locking devices for high strength bolts are not required per DCA 7607
VENDOR CERTIFIED
DRAWING REV. NO. 4
*FIELD TRIM TO SUIT
2'-6"
EL LKG NORTH
SECTION A-A
SUPPORT 150
Brown & Root, Inc.
TEXAS UTILITIES SERVICES INC.
COMANCHE PEAK UNITS NO. 1 & 2
GIBBS & HILL INC.
FOR OFFICE AND ENGINEERING USE ONLY

JOB NO. 3010-10-0050

SHEET ____ OF ____

CLIENT/PROJECT TUSI CPSES

ENGR. MAK DATE 7-31-92

SUBJECT MK* FW-1.100-002-C62R

CHK'D. AA DATE 7/31/92

REF.

FROM STRUDL RUN

AT MEM. (29) - LOAD (4) - JOI (30) [FLTD LOAD]
(SEE Pg. 385 OF MK* FW-1-097-002-C62R)

$F_x = 7670^{\#}$ $M_y = 57398^{\#}\,IN$ $M_z = 42153^{\#}\,IN$

TS 4x4x3/8 [ASSUME SA-36 CONSER.]

$$\frac{kl}{r} = \frac{2.1 \times 1}{1.44} = 1.5$$

$$C_c = \sqrt{\frac{2\pi^2 E}{S_y}} = 130.45$$

$$F_a = \frac{2}{3}\left[1 - \frac{(kl/r)^2}{2C_c^2}\right] \leq S_y$$

$$= 21265 \text{ PSI}$$

$$f_a = \frac{F_x}{A} = \frac{7670}{4.95} = 1550 \text{ PSI}$$

$$\frac{f_a}{F_a} = 0.07 < 0.15 \quad \text{(ok)}$$

CLIENT/PROJECT TUSI CPSES

SUBJECT Mk# FW-1-100-002.C62R

REF

$$f_b = \frac{M_Y + M_Z}{S}$$

$$= \frac{57398 + 42153}{5.1} = 19519 \text{ PSI}$$

$$\frac{f_a}{F_a} + \frac{f_b}{F_b} \leq 1$$

$$\frac{1550}{21265} + \frac{19519}{23580} \approx 0.91 < 1$$

OK

	-61.7	-1173.0	1225.1	-1132.7	-3733.2	-1749.2
	61.7	1173.0	-1225.1	1132.7	-2392.4	-4116.6
	-397.1	-5065.1	6856.9	-5966.3	-21033.6	-10197.1
	397.9	5065.1	-6856.9	5966.3	-13250.9	-23033.3
	-63.4	137.7	-137.7	-.0	2211.2	3209.5
	63.4	-137.7	137.7	.0	.0	.0
	-331.5	1013.8	-781.6	-.0	12554.3	16284.8
	381.5	-1013.8	781.6	.0	.0	.0
	-7404.1	-572.0	172.2	-4669.7	-1270.3	-23518.3
	7404.1	572.0	-172.2	4669.7	-4515.4	9078.7
	-24894.5	-3820.1	421.9	-16796.1	558.3	-141909.2
	24894.5	3820.1	-421.9	16796.1	-14734.6	13351.4
	.0	-4814.0	-.0	-12035.0	.0	-50065.6
	-.0	4814.0	.0	12035.0	.0	-.0
	.0	-16313.0	-.0	-40782.5	.0	-169655.2
	-.0	16313.0	.0	40782.5	.0	-.0
	4814.0	-.0	.0	.0	12035.0	-.0
	-4814.0	.0	-.0	-.0	-12035.0	.0
	16313.0	-.0	.0	.0	40782.5	-.0
	-16313.0	.0	-.0	-.0	-40782.5	.0
	-.0	.0	-4814.0	.0	12035.0	.0
	.0	-.0	4814.0	-.0	.0	.0
	-.0	.0	-16313.0	.0	40782.5	.0
	.0	-.0	16313.0	-.0	.0	.0
	4236.0	7404.1	172.2	4515.4	-7365.3	40966.9
	-4236.0	-7404.1	-172.2	-4515.4	6848.8	-18754.7
	12486.9	24894.5	421.9	14734.6	-23966.4	156331.8
	-12486.9	-24894.5	-421.9	-14734.6	22720.7	-81620.4
	7404.1	-4236.0	-172.2	-3491.0	1270.3	-16706.0
	-7404.1	4236.0	172.2	3491.0	-753.7	3937.9
	24894.5	-12486.9	-421.9	-14493.3	-558.3	-15737.3
	-24894.5	12486.9	421.9	14493.3	1824.0	-21723.3
	8520.5	496.7	172.2	-3349.1	-7488.5	18754.7
	-8520.5	-496.7	-172.2	3349.1	1240.5	-3937.9
	27709.6	2849.1	421.9	-11242.3	-24636.3	81620.4
	-27709.6	-2849.1	-421.9	11242.3	9327.1	21723.3
	-340.3	129.9	-131.7	400.3	2351.7	291.1
	340.0	-129.5	131.7	-400.3	3114.6	5041.4
	414.3	905.7	-853.4	2459.1	11901.3	8579.4
	-414.3	-905.7	873.4	-2459.1	23515.0	29043.9
	-1372.7	112.8	-529.3	-411.9	-6781.5	7855.1
	1372.7	-112.8	529.3	411.9	7305.8	-7672.3
	-7559.9	1103.5	-4292.4	-1392.1	-53106.0	43341.2
	7559.9	-1103.5	4292.4	1392.1	57398.4	-42152.7
	-.0	-1173.0	546.9	.0	-7101.0	-15930.0

...ANALYSIS*

...TITLE - NONE GIVEN

...USG DEGF SEC

...MEMBERS

...STRESS

	STRESS			STRESS		
	MAX NORMAL	AT SECTION	LOAD	MIN NORMAL	AT SECTION	LOAD
1	2163.2	1.000 FR	4	-2162.9	1.000 FR	4
2	2163.7	0.000 FR	4	-2162.9	0.000 FR	4
3	818.8	0.000 FR	4	-818.3	0.000 FR	4
4	11746.5	1.000 FR	4	-11742.3	1.000 FR	4
5	11746.5	0.000 FR	4	-11742.3	0.000 FR	4
6	4962.6	1.000 FR	4	501.0	0.000 FR	4
7	21321.6	1.000 FR	4	-19896.5	1.000 FR	4
8	10237.9	0.000 FR	4	-9575.3	0.000 FR	4
9	10347.3	0.000 FR	4	-9682.9	0.000 FR	4
10	7465.2	0.000 FR	4	-9943.1	0.000 FR	4
11	1371.7	0.000 FR	4	-1549.2	0.000 FR	4
12	26.3	0.000 FR	4	-24.9	0.000 FR	4
13	1129.5	1.000 FR	4	-1304.0	1.000 FR	4
14	977.9	1.000 FR	4	-925.4	1.000 FR	4
15	10.7	1.000 FR	4	-11.0	1.000 FR	4
16	870.5	1.000 FR	4	-949.1	1.000 FR	4
17	2961.0	1.000 FR	4	-2145.2	1.000 FR	4
18	2899.8	0.000 FR	4	-3241.0	0.000 FR	4
19	7234.7	1.000 FR	4	-7044.0	1.000 FR	4
20	5731.8	0.000 FR	4	-5577.7	0.000 FR	4
21	15984.5	0.000 FR	4	-7421.8	0.000 FR	4
22	12567.1	0.000 FR	4	-12567.1	0.000 FR	4
23	24.5	1.000 FR	4	-57.1	1.000 FR	4
24	40.8	0.000 FR	4	-40.8	0.000 FR	4
25	167.4	0.000 FR	4	-192.6	0.000 FR	4
26	19.6	0.000 FR	3	-48.4	1.000 FR	4
27	4356.0	0.000 FR	4	-11355.7	0.000 FR	4
28	10274.0	1.000 FR	4	-10390.3	1.000 FR	4
29	17993.3	1.000 FR	4	-17970.3	1.000 FR	4
30	24417.4	0.000 FR	4	-24392.4	0.000 FR	4

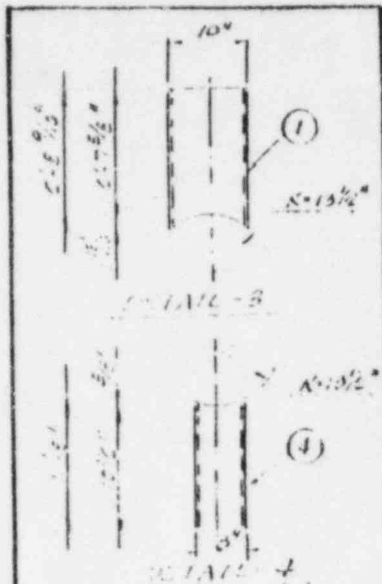
FOR OFFICE AND ENGINEERING USE ONLY

ITEM NO.	QTY. REQ'D.	MATERIAL DESCRIPTION	MATERIAL DESIG.
1	1	T.S. 10"x10"x.625"x2'-10" SEE DETAIL-3	A-500 GR. B
2	2	T.S. 10"x10"x.625"x0'-6" LG. (CUT TO SUIT)	A-500 GR. B
3	2	T.S. 10"x8"x.500"x0'-6" LG. (CUT TO SUIT)	A-500 GR. B
4	1	T.S. 10"x8"x.500"x1'-0" SEE DETAIL-4 (CUT TO SUIT)	A-500 GR. B
5	1	T.S. 8"x8"x.500", 5'-9" LG. (CUT TO SUIT)	A-500 GR. B
6	2	T.S. 8"x4"x.375"x1'-0 1/8" LG.	A-500 GR. B
7	1	T.S. 8"x4"x.500"x2'-6" LG. (CUT TO SUIT)	A-500 GR. B
8	1	T.S. 6"x6"x.500"x4'-5 1/2" LG. (CUT TO SUIT)	A-500 GR. B
9	1	T.S. 6"x6"x.500"x4'-6" LG. (CUT TO SUIT)	A-500 GR. B
10	1	T.S. 6"x6"x.500"x[illegible] LG. (CUT TO SUIT)	A-500 GR. B
11	1	T.S. 6"x6"x.500"x2'-3" LG. SEE DETAIL-5	A-500 GR. B
12	1	T.S. 6"x6"x.500"x3'-1" LG.	A-500 GR. B
13	2	T.S. 6"x6"x.500"x2'-6" LG. (CUT TO SUIT)	A-500 GR. B
14	3	T.S. 6"x6"x.500"x1'-2" LG.	A-500 GR. B
15	2	T.S. 6"x4"x.375"x0'-11 5/8" LG.	A-500 GR. B
16	1	T.S. 4"x4"x.250"x1'-1 1/8" LG.	A-500 GR. B
17	1	T.S. 4"x4"x.250"x3'-10" LG.	A-500 GR. B
18	2	PL 1 1/2"x16"x2'-8" LG. SEE DETAIL-6	SA-36
19	1	PL 1 1/2"x10"x2'-8" LG. SEE DETAIL-7	SA-36
20	1	PL 1/2"x10"x0'-10" LG. (TRIM TO SUIT)	SA-36

ITEM NO.	QTY. REQ'D.	MATERIAL DESCRIPTION	MATERIAL DESIG.
21	2	PL 1/2"x5"x0'-10" LG. (TRIM TO SUIT)	SA-36
22	1	PL 2" THK. (SEE SECTION F-F, SHT. 5)	SA-36
23	1	PL 2 1/2" THK. (SEE SECTION G-G, SHT. 5)	SA-36
24	1	PL 1 1/2" THK. (SEE SECTION H-H, SHT. 5)	SA-36
25	1	PL 1 3/4" THK. (SEE SECTION J-J, SHT. 5)	SA-36
26	1	PL 1 3/4" THK. (SEE SECTION K-K, SHT. 5)	SA-36
27	1	PL 1" THK. (SEE SECTION L-L, SHT. 5)	SA-36
28	1	PL 1 1/4" THK. (SEE SECTION M-M, SHT. 5)	SA-36
29	1	PL 2 1/2" THK. (SEE SECTION N-N, SHT. 5)	SA-36
30	1	PL 2 1/2" THK. (SEE SECTION P-P, SHT. 5)	SA-36
31	6	1 1/4"x13" SUPER HILTI-KWIK BOLT (10" MIN. EMB.)	
32	24	1 1/4"x18" SUPER HILTI-KWIK BOLT (13 3/8" MIN. EMB.)	
33	8	1"x15" SUPER HILTI-KWIK BOLT (10 5/8" MIN. EMB.)	
34	1	T.S. 8x8x.500x1'-6" LG.	A-500 GR. B
35	16	1"x12" SUPER HILTI-KWIK BOLT (8 1/2" MIN. EMB.)	
36	1	T.S. 8x6x.500x3'-7" LG.	A-500 GR. B
		APPLY ONE COAT IN CARBO ZINC [illegible]	
		ADJUST [illegible]	
		[illegible]	

REV	DESCRIPTION	DATE	DWN.	CHKD.	APPVD.
1	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
2	[illegible]				
3	REV'D VENDOR CERT.	[illegible]	[illegible]	[illegible]	[illegible]
4	REV'D [illegible] ALL CHANGES [illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	ADDED SHT. 6				

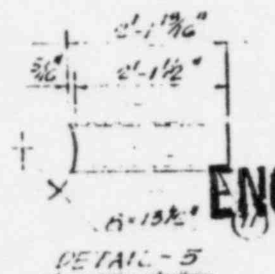
NOTE: Locking device [illegible] high strength [illegible] not required per DCA 7007

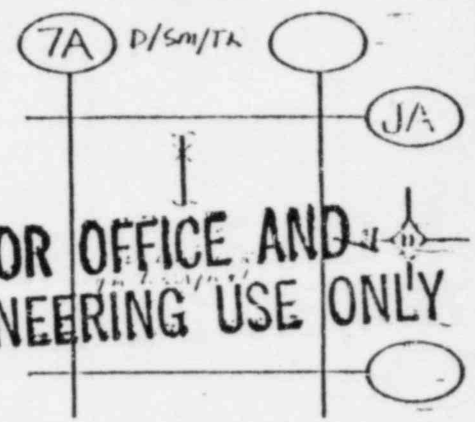


AS BUILT LOADS:

(FORCES, LBS.) (MOMENTS, IN. LBS.)

CONDITIONS	Fx	FY	Fz	Mx	My	Mz
NORMAL	-5622 +2937	-5080 -4118	-3471 +3315	-218328 -122340	-425310 +805441	-27[illegible] +64[illegible]
UPSET	-10105 +7411	-11935 +2737	-9152 +9677	-809446 +468804	-715304 +1123920	-137[illegible] +175[illegible]
EMERGENCY	-13511 +10827	-17967 +8768	-13603 +13527	-1340140 +1644463	-1041780 +1422384	-241110 +278[illegible]





FOR OFFICE AND ENGINEERING USE ONLY

LOCATION PLAN

DATA PT.	SUPPORT DESIGN	LOADS (lbs) LEVEL A	B	C	D	PIPE MVTS (INCHES)
[illegible]						
VERT						
N-S		SEE TABLE ABOVE				
E-W						

AUTHORIZED NUCL. INSP. YES [X] NO [ ]

ASME CODE CLASS 3

REF. DWGS	ISO.	REV	MECHANICAL	REV	ELECTRICAL	REV
	CC-2-AB-[illegible]	1	MI-0721	10	EI-0713-01	4
	FAB. ISO.	REV.	STRUCTURAL	REV	H.V.A.C.	REV.
	CC-2-AB-[illegible]	—	S-07[illegible]	12	MI-0751	5

REV	DESCRIPTION	DATE	DWN.	CHKD.	APPVD.
0	ISSUED FOR CONSTR. REF.	[illegible]	VIH	[illegible]	[illegible]
[illegible]	PSE R.[illegible] & CPPAI [illegible]	[illegible]			
[illegible]	[illegible] DCA 7007 [illegible]	[illegible]			

Brown & Root, Inc.
HOUSTON, TEXAS

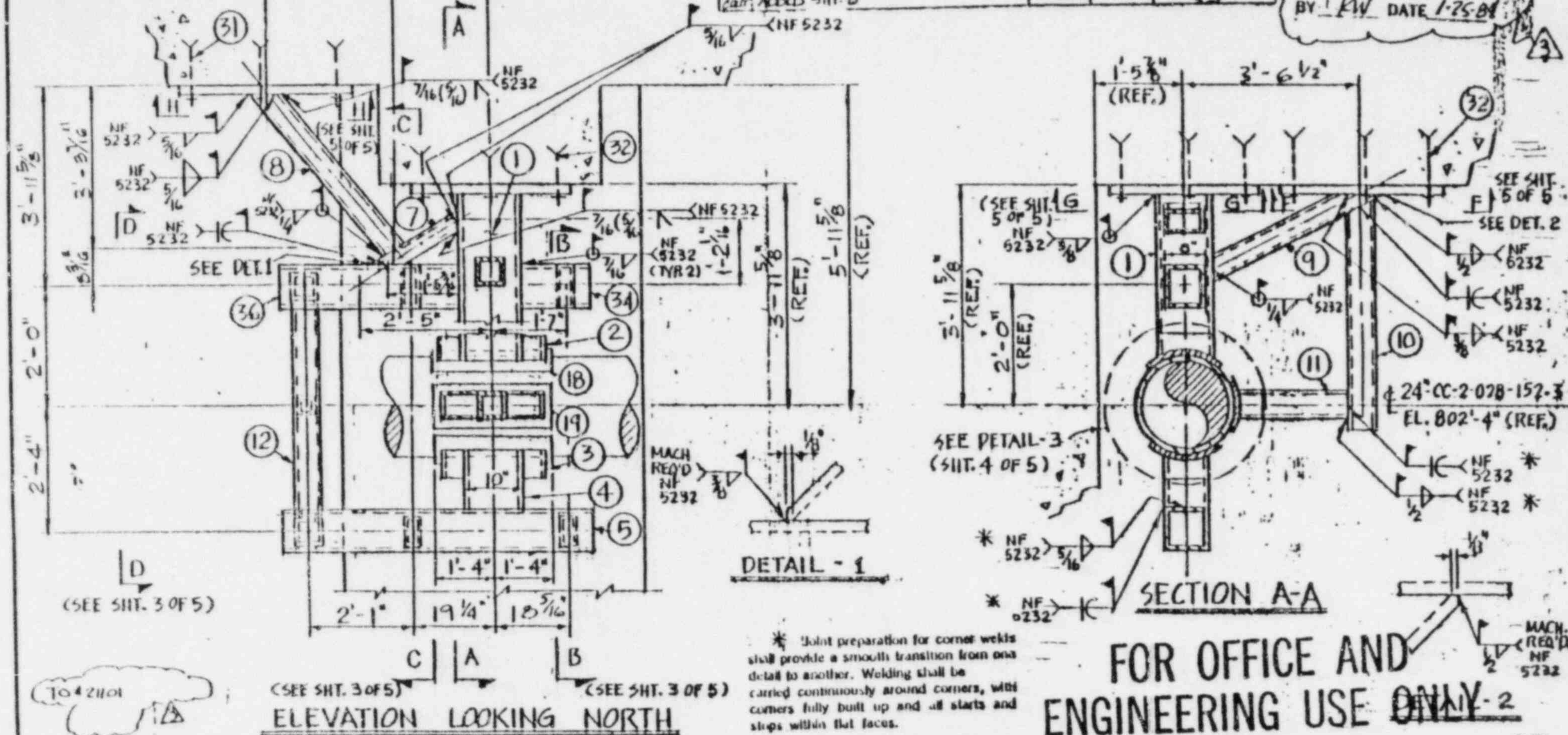
PLANT: COMANCHE PEAK
JOB NO: 2323

SUPPORT NO. CC-2-028-704-A33A
SHEET 1 OF 6 REV. 3

FOR OFFICE AND ENGINEERING USE ONLY

REV	DESCRIPTION	DATE	DWN.	CHKD.	APPVD.
1	REV. VENDOR CERTIFICATION	[illegible]	[illegible]	[illegible]	CBD
[illegible]	REF: CMC-94918 [illegible]	—	—	—	—
2	REV'D VENDOR CERT.	12/1/83	[illegible]	[illegible]	[illegible]
3	REV'D VENDOR CERT. REF. CMC-94780	[illegible]	[illegible]	[illegible]	RCH
[illegible]	ADDED SHT. 6	~	~		

VENDOR CERTIFIED
DRAWING REV. NO. 3
BY: RW DATE 1-25-84



* Joint preparation for corner welds shall provide a smooth transition from one detail to another. Welding shall be carried continuously around corners, with corners fully built up and all starts and stops within flat faces.

FOR OFFICE AND ENGINEERING USE ONLY

DATA PT.	SUPPORT LOADS (lbs) DESIGN	SERVICE LEVEL LIMITS A	B	C	D	PIPE MVTS (INCHES)
VERT.						
N-S						
E-W						

NOTE: FNE, UN / SW, DN

AUTHORIZED NUCL. INSP. YES ☑ NO ☐
ASME CODE CLASS 3

REF. DWGS.	ISO.	REV.	MECHANICAL	REV.	ELECTRICAL	REV.
	FAB. ISO.	REV.	STRUCTURAL	REV.	H.V.A.C.	REV.

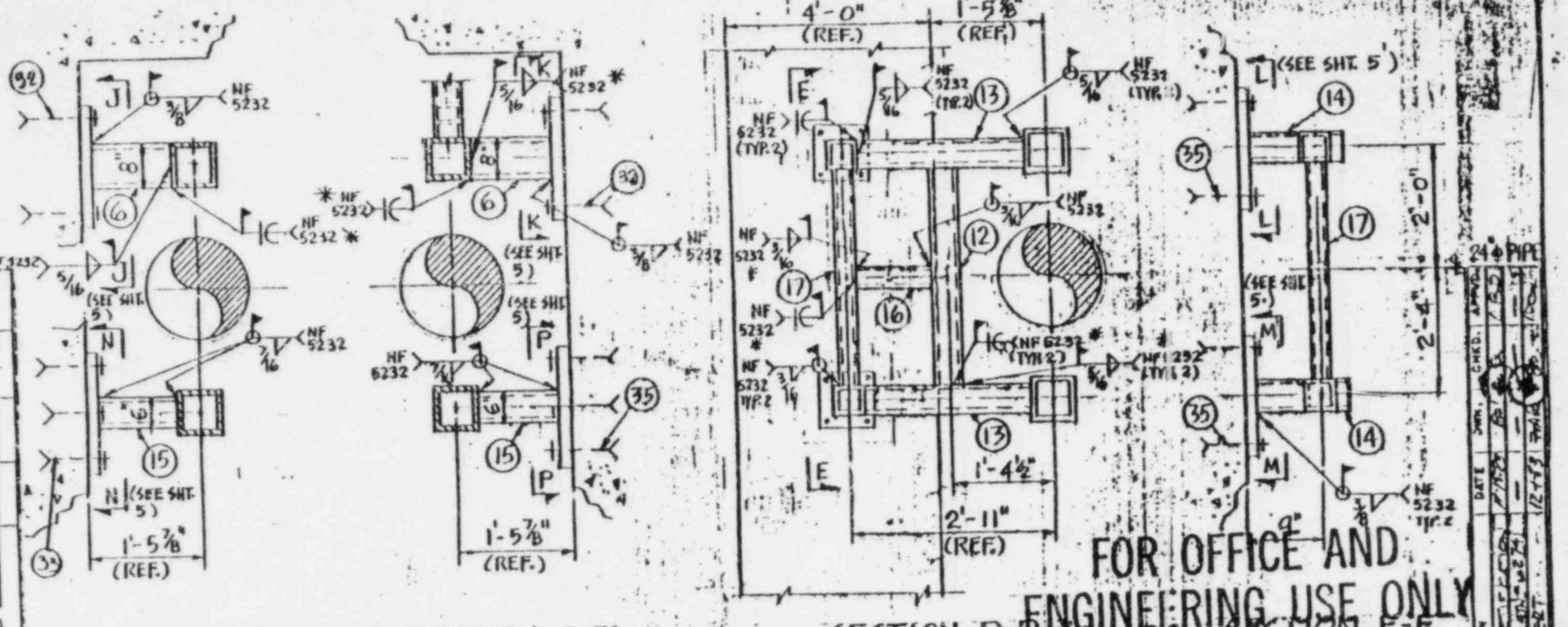
REV	DESCRIPTION	DATE	DWN.	CHKD.	APPVD.
0	ISSUED FOR CONST. REF. PSE R. 0 & CPPA# 33167, VENDOR CERTIFICATION, DCA-7607 SEE NOTE 1	8-11-83	[illegible]	HP	[illegible]

Brown & Root, Inc.
HOUSTON, TEXAS

PLANT: COMANCHE PEAK
JOB NO: 2323

SUPPORT NO. CC-2-028-704-A33A
SHEET 2 OF 6 REV. 3

FOR OFFICE AND
ENGINEERING USE ONLY



FOR OFFICE AND
ENGINEERING USE ONLY

* Joint preparation for corner welds shall provide a smooth transition from one detail to another. Welding shall be carried continuously around corners, with corners fully built up and all starts and stops within flat faces.

VENDOR CERTIFIED
DRAWING REV. NO. 3
BY: BW DATE 1-25-84

REV	DESCRIPTION	DATE	DWN.	CHKD.	APPVD.
0	ISSUED FOR CONST. REF.	5-31-83	VLH		
1	PSE R. 0 & CPRT 53 LT. VENDOR CERTIFICATION, DEA 1607 SEE NOTE 1				

DATA PT.	SUPPORT LOADS (lbs) DESIGN	SERVICE LEVEL LIMITS A	B	C	D	PIPE MVTS (INCHES)
VERT.						
N-S						
E-W						

NOTE: N, E, UP = (+) S, W, DN = (-)

AUTHORIZED NUCL. INSP. YES [V] NO [ ]
ASME CODE CLASS 3

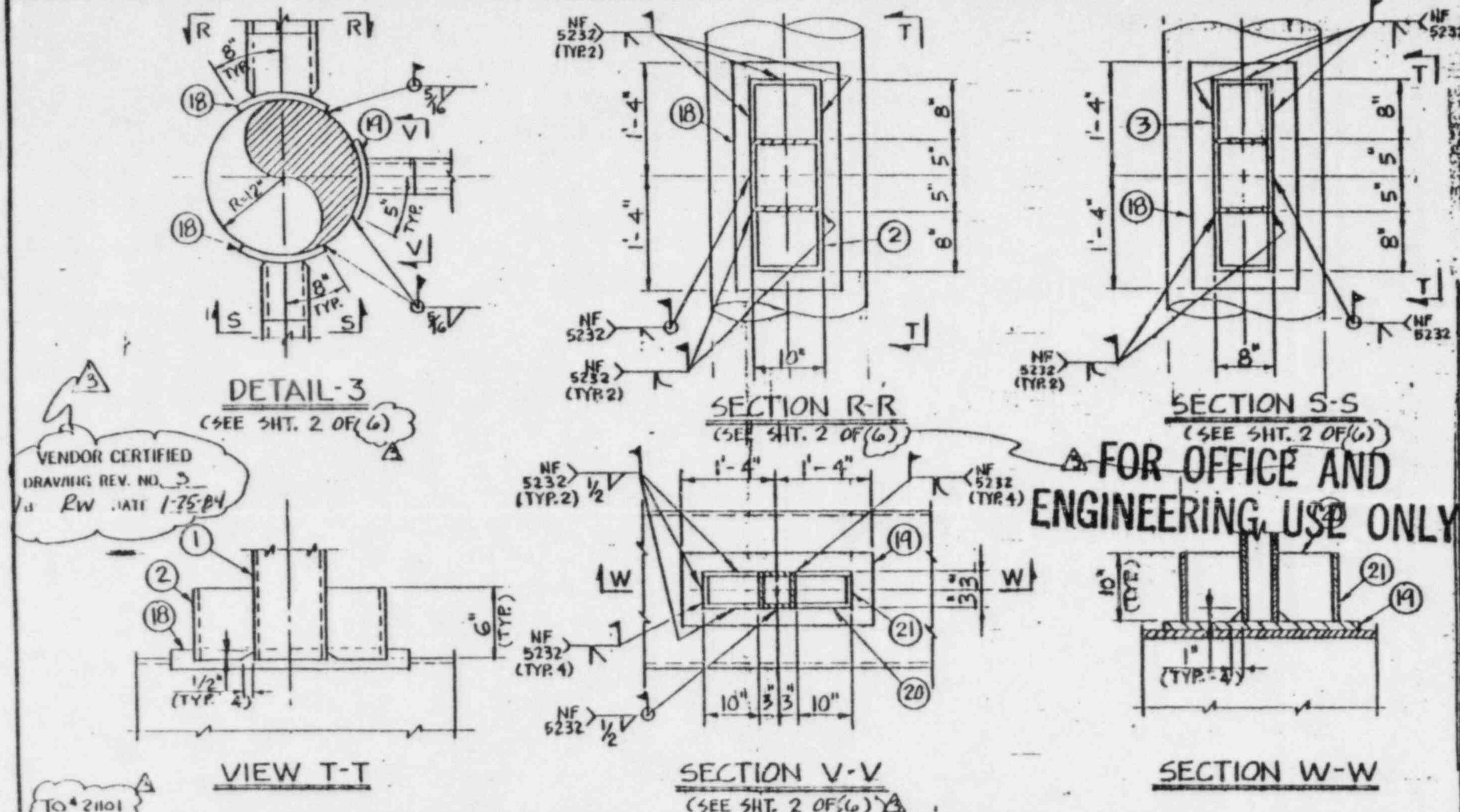
REF. DWGS.	STRESS ISO.	REV.	MECHANICAL	REV.	ELECTRICAL	REV.
	FAB. ISO.	REV.	STRUCTURAL	REV.	H.V.A.C.	REV.

Brown & Root, Inc.
HOUSTON, TEXAS

PLANT: COMANCHE PEAK
JOB NO: 2323

SUPPORT NO. CC-2-02B-704-A33A
SHEET 3 OF 6 REV. 3

FOR OFFICE AND
ENGINEERING USE ONLY



FOR OFFICE AND
ENGINEERING USE ONLY

REV	DESCRIPTION	DATE	CHKD.	APPVD.
1	REV. VENDOR CERTIFICATION			
2	REV'D VENDOR CERT.			

DATA PT.	SUPPORT LOADS (lbs) DESIGN	SERVICE LEVEL LIMITS A	B	C	D	PIPE MVTS INCHES
VERT.						
N-S						
E-W						

NOTE: +N, E, UP; -S, W, DN

AUTHORIZED NUCL. INSP. YES ☑ NO ☐

ASME CODE CLASS 3

REF. DWGS	REV	DESCRIPTION	DATE	DWN.	CHKD.	APPVD.
	A	REV'D VENDOR CERT. REF. CMC 96232	12/68?			
	cont.	ADDED SHT. 6				

REV	DESCRIPTION	DATE	DWN.	CHKD.	APPVD.
0	ISSUED FOR CONSTR. REF. PSE R. 0 & CPPA# 33167 VENDOR CERTIFICATION, DCA-7607 (SEE NOTE 1)	8-31-83	VLH		SL

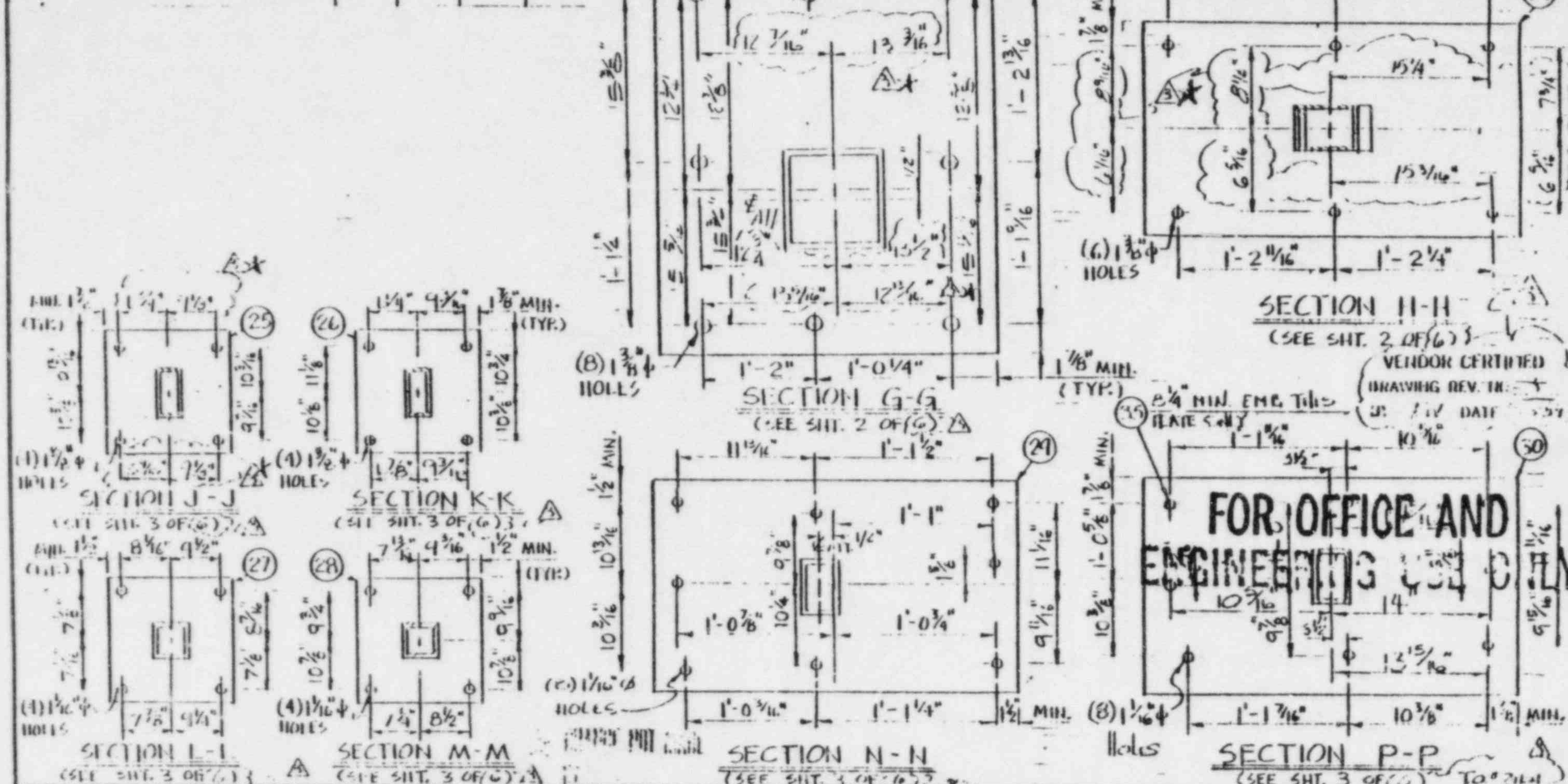
Brown & Root, Inc.
HOUSTON, TEXAS

PLANT: COMANCHE PEAK
JOB NO: 2323

SUPPORT NO. CC-2-028-704-A33A
SHEET 4 OF 6 REV. 3

FOR OFFICE AND ENGINEERING USE ONLY

REV	DESCRIPTION	DATE	DWN.	CHKD.	APPVD.
3	REV TO VENDOR CERT. REF. CMC 96233 ADDED SHT. 6	1-26-84	[illegible]	[illegible]	[illegible]



FOR OFFICE AND ENGINEERING USE ONLY

DATA PT.	SUPPORT DESIGN	LOADS (lbs) SERVICE LEVEL LIMITS A	B	C	D	PIPE MVTS (INCHES)
VERT.						
N-S						
E-W						

AUTHORIZED NUCL. INSP. YES [x] NO [ ]
ASME CODE CLASS 3

REF. DWGS.	REV	DESCRIPTION	DATE	DWN.	CHKD.	APPVD.
	1	REV. VENDOR CERTIFICATION	[illegible]	[illegible]	[illegible]	[illegible]
	2	REF: CMC-99915, [illegible]				
	3	REVD VENDOR CERT	12/83	[illegible]		

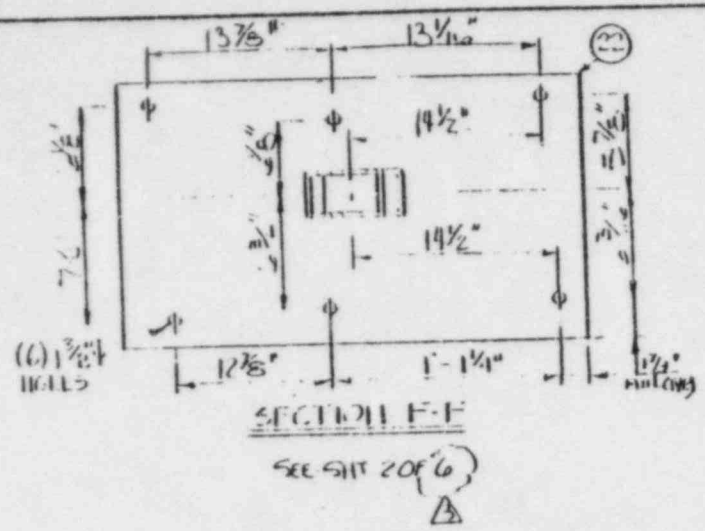
REV	DESCRIPTION	DATE	DWN.	CHKD.	APPVD.
0	ISSUED FOR CONST. REF.	[illegible]	VLH	[illegible]	[illegible]
[illegible]	PSE R.0 & CPPA# 13167, [illegible]				
[illegible]	CERTIFICATION, DCA [illegible]				

Brown & Root, Inc.
HOUSTON, TEXAS

PLANT: COMANCHE PEAK
JOB NO. 2323

SUPPORT NO. CC-2-028-704-[illegible]3A
SHEET 5 OF 6 REV. 1

FOR OFFICE AND
ENGINEERING USE ONLY



VERIFIED ELECTRICAL
DRAWING REV. NO. 3
BY RW DATE 1-15-81

FOR OFFICE AND
ENGINEERING USE ONLY

REV	DESCRIPTION	DATE	DWN.	CHKD.	APPVD.
3	REVISED FOR VENDOR SRC REF.	1-14-81	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]

ANCHOR PT.	SUPPORT LOADS (lbs) DESIGN	SERVICE LEVEL A	LEVEL B	LIMITS C	LIMITS D	PIPE MVTS (INCHES)
VERT.						
N-S						
E-W						

NOTE: AUTHORIZED NUCL. INSP. YES [ ] NO [ ]
ASME CODE CLASS 3

REF. DWGS.

STRESS ISO.	REV.	MECHANICAL	REV.	ELECTRICAL	REV.
FAB. ISO.	REV.	STRUCTURAL	REV.	H.V.A.C.	REV.

Brown & Root, Inc.
ENGINEERS AND CONSTRUCTORS
HOUSTON, TEXAS

CLIENT T.U.S.I.
PLANT COMANCHE PEAK
JOB NO. 2323

SUPPORT NO. CC-2-023-H4-1331
SHEET 6 OF 6 REV. 3

FORM DHE-5

TEXAS UTILITIES SERVICES INC.
COMANCHE PEAK S.E.S.
Agent For
DALLAS POWER & LIGHT COMPANY
TEXAS ELECTRIC SERVICE COMPANY
TEXAS POWER & LIGHT COMPANY

Date 7-30-84
Calc By GMC
Chk'd/Apprd. By
Filing Code
Sheet No. 1 Of 1
G & H Job. No.

Subject CC-2-028-704-A33A Ref. Dwg./Spec. No.

A500 REVIEW

$$\frac{17655}{28800} + \frac{2899}{18900} = 0.766$$

1.) $2899 = 19075^{\#} / 6.58\ IN^2 = 2899\ \#/IN^2$

WHERE: 19075 = AXIAL LOAD

$6.58\ IN^2$ = AREA OF T.S. 6X4

2.) $28800 = (32.8\ KSI)(.66)(1.33)$

WHERE: - 32.8KSI IS S_y @ 200°

- 0.66 MULTIPLIER BY S_y

-(1.33) MULTIPLIER TO FIND GIVEN ALLOW

3.) $18900\ PSI = F_a = 22{,}000(.856)$

WHERE: (.856) IS 32.8/38.3

THIS IS A RATIO OF THE OLD ALLOWABLE TO THE NEW

FORM DHE-5

TEXAS UTILITIES SERVICES INC.
COMANCHE PEAK S.E.S.
Agent For
DALLAS POWER & LIGHT COMPANY
TEXAS ELECTRIC SERVICE COMPANY
TEXAS POWER & LIGHT COMPANY

Date 6 OCT 1983
Calc By REP
Chk'd/Apprd. By SAN 10/15/83
Subject CC-2-028-704-A33A REV 1 AS-BUILT

Filing Code ____
Sheet No. 2 of 19
G & H Job. No. 2323
Ref. Dwg./Spec. No. ____

NOTE: THESE CALCULATIONS IN COMBINATION WITH CC-2-028-704-A33A REV. 0 CALCS. SHALL BE USED FOR SUPPORT QUALIFICATION

REF
PSE GUIDELINES

DEFLECTION & ROTATION

STRUDL V513A 15 AUG 83

ALL DEFLECTIONS < 1/32"

ALL ROTATIONS < 1/2°

∴ O.K.

MEMBER STRESSES

DESIGN CALCS REV. 0 & SEC. III PP 14/17, R 4

MEMBERS 28 & 29 : BENDING & NORMAL

$f_a/F_A = \frac{19075}{22000\,(6.58)} = .132 < .15$

∴ from max/min $\sigma_{MAX/MIN} = 17655$ psi

17655 psi < 22000 psi ∴ ok

MEMBERS 28 & 29 : TORSION & SHEAR

$f_v = \frac{T}{2bdt} + \frac{F_{Vy}}{A_{Vy}} + \frac{F_{Vz}}{A_{Vz}}$

$= \frac{2095}{2(0.625)(3.625)(.375)} + \frac{1599}{2(6)(.375)} + \frac{12484}{2(4)(.375)}$

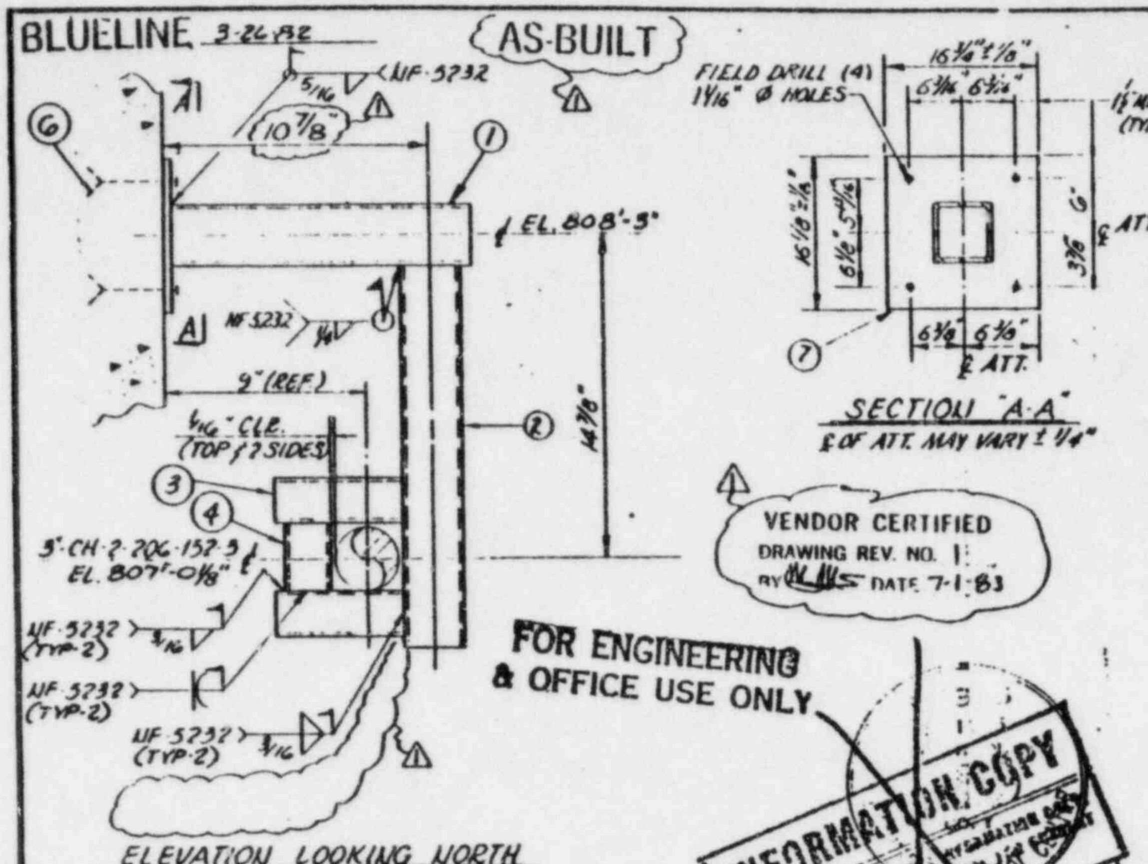
SEC III pp. 6/17, R 4

= 4654 psi < 15300 psi ∴ O.K.

FOR OFFICE AND ENGINEERING USE ONLY

BLUELINE 3-26-82

AS-BUILT



VENDOR CERTIFIED
DRAWING REV. NO. 1
BY [signature] DATE 7-1-83

FOR ENGINEERING & OFFICE USE ONLY

INFORMATION COPY

NOTE:
1) Locking devices for high strength bolts are not required per DCA 7607

ITEM NO.	QTY REQ'D	MATERIAL DESCRIPTION		PBS		CSS	PRIM	SEC.	AISC
1	1	TS 4 x 4 x 1/4" x 14" LG.	A500 GR.B		X		X		
2	1	TS 3 x 3 x 1/4" x 19" LG.	A500 GR.B		X		X		
3	2	TS 2 x 2 x 1/4" x 7" LG.	A500 GR.B		X		X		
4	1	TS 2 x 2 x 1/4" x 3 3/16" LG.	A500 GR.B		X		X		
6	4	1" x 9" HILTI KWIK CONCRETE ANCHOR (6 1/4" MIN. EMB.)				X	X		
7	1	C.S. PL 1/4 THK. PER SECT. A-A	SA-36/SA515GR65	X			X		

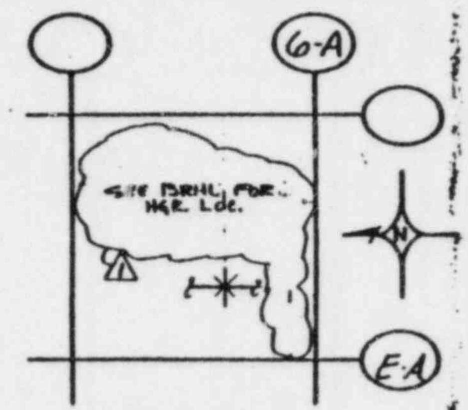
REV	DESCRIPTION	DATE	DWN.	CHKD.	APPVD.
CONT.	VENDOR CERTIFIED; REF CTP# 29075	—	—	—	—

APPLY ONE COAT OF CARBO ZINC #11 TO ABOVE MAT'L EXCEPT THREADS WHICH SHALL BE TREATED WITH A RUST PREVENTATIVE.

PROJ# AB-1-N100, R.0

ASME CODE EDITION: 1974
ADDENDA: WINTER
DESIGN SPEC: MS-46A

P.E. CERTIFICATION



LOCATION PLAN

T.O. 23101

DATA PT 270	DESIGN	SUPPORT LOADS (LBS) SERVICE LEVEL LIMITS A	B	C	D	PIPE MVTS (INCHES)
VERT.		-124 / 2180	-312 / 72	-349 / 85		
N-S						
E-W		-12 / 2	-98 / 105	-134 / 120		

NOTE +N,E,UP -S,W,DN

AUTHORIZED NUCL. INSP. YES [X] NO [ ]
ASME CODE CLASS 3

REF. DWGS.	DRILL ISO.	REV	MECHANICAL	REV	ELECTRICAL	REV
	CH-2-EC-0058	0	M1-0704-03	9	E2-0713-13	2
	FAB. ISO.	REV	STRUCTURAL	REV	H.V.A.C.	REV
	CH-2-EC-0030	0	S-0703	12	M1-0754	6

REV	DESCRIPTION	DATE	DWN.	CHKD.	APPVD.
1	REVD AS NTD; REF CMC 70683, DCA 7607	7/1/83	GLL	GAP	
0	REV AS NT'D REF EA NHS. ISSUE FOR CONST.	3-26-82	RKM		

Brown & Root, Inc.
ENGINEERS AND CONSTRUCTORS
HOUSTON, TEXAS

CLIENT T.U.S.I.
PLANT COMANCHE PEAK
JOB NO. 2323

SUPPORT NO. CH-2-206-716-A33R
SHEET 1 OF 1 REV. 1

FORM DHE-5

TEXAS UTILITIES SERVICES INC.
COMANCHE PEAK S.E.S.
Agent For
DALLAS POWER & LIGHT COMPANY
TEXAS ELECTRIC SERVICE COMPANY
TEXAS POWER & LIGHT COMPANY

Date 7-31-84
Calc By GMC
Chk'd/Apprd. By
Filing Code
Sheet No. 1 Of
O & M Job. No.
Subject CH-2-206-716-A33R
Ref. Dwg./Spec. No.

A500 REVIEW

$$\frac{17202}{28800} + \frac{476}{17890} = 0.623899$$

1.) $28,800 = S_y(.66)(1.33) = (32.8)(.66)(1.33)$

2.) 17890 FIND $Kl/r = \frac{(2.10)(18")}{1.1} = 34.36$

PER SECTION III, PAGE 10 OF 17

$F_A = 17.89$ KSI (THIS IS N#U ALLOWABLE)

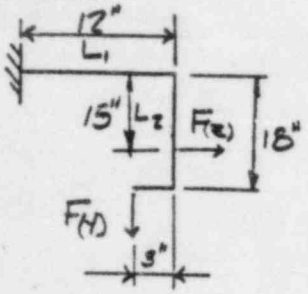
FORM DHE-5

TEXAS UTILITIES SERVICES INC.
COMANCHE PEAK S.E.S.
Agent For
DALLAS POWER & LIGHT COMPANY
TEXAS ELECTRIC SERVICE COMPANY
TEXAS POWER & LIGHT COMPANY

Date 4/24/81
Calc By B.B. WADLEY
Chk'd/Apprd. By H. PATEL
Subject CH-2-206-716-A33R REV.0

Filing Code
Sheet No. 3 of 5
G & H Job. No.
Rel. Dwg./Spec. No.

6. STRESS



ASSUME ALL MEMBERS T.S. 3x3x1/4 (CONSERV.)
T.S. 3x3x1/4 $A = 2.68\ in^2$ $S = 2.24\ in^3$ $I = 5.36\ in^4$

TENSION: $f_t = F_z/A = 1276/2.68 = 476$ psi

$f_b = (F_z)(15)/S = (1276)(15)/(2.24) = 8545$ psi

$f_b = (F_y)(12)/S = (1616)(12)/(2.24) = 8657$ psi

$f_b = (F_y)(3)/S = (1616)(3)/(2.24) = -2164$ psi
(NEGATIVE, SO NEGLECT)

$F_{tw} = .476 + 8.545 + 8.657 = \underline{17.7\ ksi < 30.5\ ksi\ ALLOW.}$

SHEAR: $f_v = F_y/\frac{1}{2}A = 2(1616)/2.68 = 1.206$ ksi
$\underline{f_v < 20.4\ ksi\ ALLOW.}$

7. DEFLECTIONS

$$\Delta z = \frac{F_z L_2^3}{3EI} + \frac{F_z L_2^2 L_1}{EI} + \frac{F_y L_2^2 L_2}{2EI} + \frac{M_y L_1 L_2}{EI}$$

$$= \frac{(870)(15^3)}{3E(3.36)} + \frac{(870)(15^2)(12)}{E(8.58)} + \frac{(1186)(12^2)(15)}{2E(8.58)} + \frac{(1186)(3)(12)(15)}{E(8.58)}$$

$$= \underline{.028 < .063}$$

$$\Delta y = \frac{F_y L_1^3}{3EI} + \frac{M_y L_1 (3)}{EI} = \frac{(1186)(12^3)}{3E(8.58)} + \frac{(1186)(3^2)(12)}{E(8.58)}$$

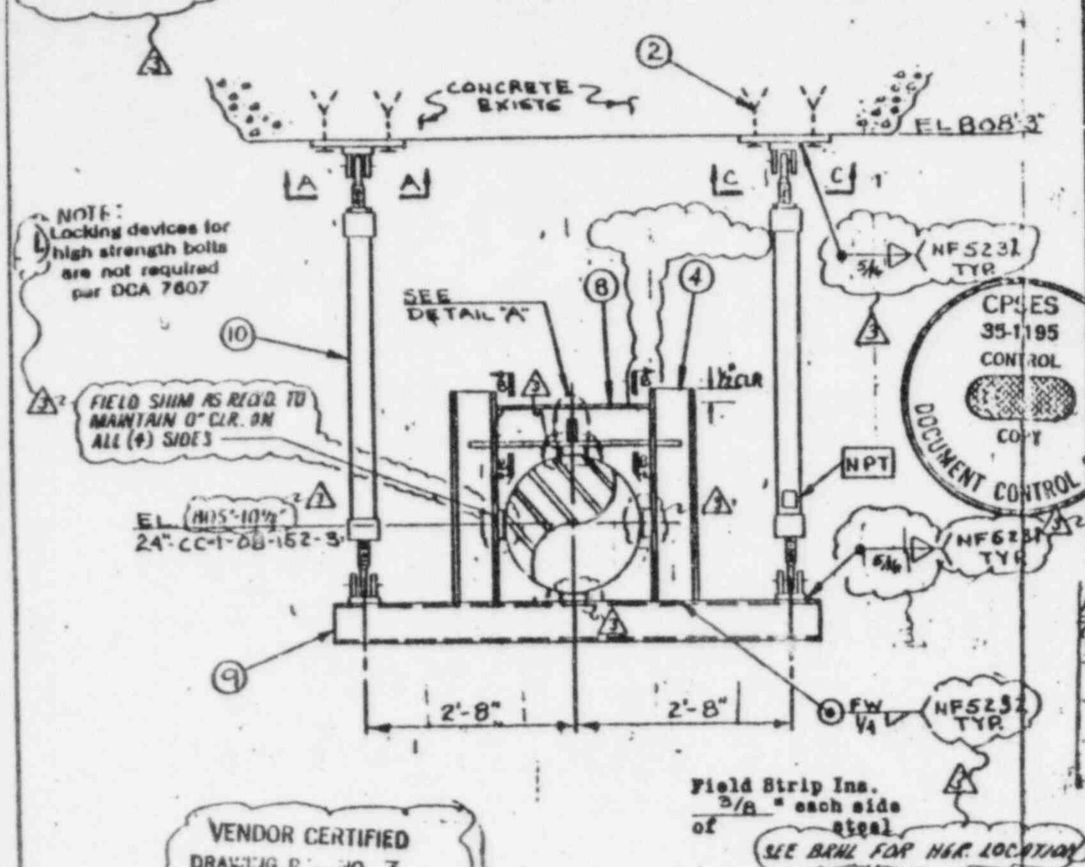
$$= \underline{.003 < .063}$$

8. FUB II INPUTS

$F_{xL} = F_{zG} = 1276^{\#}$
$F_y = 1616^{\#}$
$M_z = (F_x)(15) + F_y(12) = (1276)(15) + (1616)(9) = 33,684\ in^{\#}$

FOR OFFICE AND ENGINEERING USE ONLY

AS-BUILT



ITEM NO.	MATERIALS & OPERATIONS	QUAN	SHIP		P&S	L	CSS	PRIM
	SEISMIC SWAY STRUT ASSEMBLY CONSISTING OF	ONE						
~~1~~	~~[illegible]~~	~~2~~					X	
2	3/4"x10" Hilti-Kwik Concrete Anchor (1)44)	8					X	
~~3~~	~~W6x20 (SA-36), 3'-0" Long, TW-40~~	~~1~~				X		X
~~4~~	~~W8x20 (SA-36), 2'-8 7/8" Long, TW-110~~	~~2~~				X		X
~~5~~	~~1/4"x8"x8" Structural Tubing (A500-76 Gr. B) 4'-4" Long, TW-110~~	~~1~~				X		X
6	Carbon Steel (SA-515 Gr. 65 or SA-36) Stiffener Plate per Detail "A", TW-7	6			X			X
7	PL1"x1'-1"x1'-1"LG (SA515 GR.65 OR SA-36)	2			X			X
8	W18x20" 2'-0⅛" LG (SA-36)	1				X		X
9	TS 7½" 18" [illegible] 6'-0" LG (A-500 GR.B)	1				X		X
	SEISMIC ASSEMBLY SKETCH AND ENGINEERING	1						
	BUNDLE AND TAG	1						
	MARK # CC-1-008-015-S33R							
	Apply one coat of Carbo Zinc #11 to above mat'l except W's which shall be coated w/a rust preventative							
(10)	SRS-14 STRUT (TYPE 8A) C-C 2'-7⅝" (FIELD TO ADJUST C-C DIM. MAX ± 3½")	2						X

REV	DATE	DWN	CHK	APP	DESCRIPTION
CONT	~	~	~	~	REF 6TN 60612

FOR ENGINEERING & OFFICE USE ONLY

INFORMATION COPY

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CPSES 35-1195 CONTROL COPY DOCUMENT CONTROL CENTER

Approved By: CFC
Date: 8-7-79

FOR MATERIALS AND OPERATIONS SEE SKETCH NO. SHEET OF

VENDOR CERTIFIED
DRAWING REV. NO. 3
BY [illegible] DATE 11/4/82

BRHL ISO CC-1-SB-05 R.4
I.P.D. Iso. CC-1-SB-05-REV.6
Data Point 774/PBOB* AB+6XA R.1
Pipe Mat'l. SA106 GR.B
Insul. ½" Bldg. SB

T.O. 1101

THIRD PARTY INSPECTION
CODE CLASS: ASME III-3

Brown & Root, Inc.

REF. DRAWING NUMBERS
PIPE: M1-0604-REV.14 ELECT: E1-0601-01-REV.6
STEEL: S1-0605-REV.3 H.V.A.C.: M1-0601-REV.3

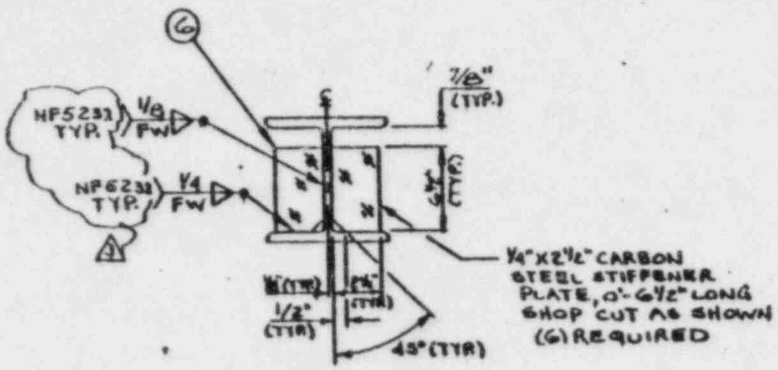
CONDITIONS	Fx	Fy	Fz	Mx	My
DESIGN					
NORMAL & UPSET		-1809 / 960			
EMERGENCY		3379 / 2218			
FAULTED					

REV	DATE	DWN	CHK	APP	DESCRIPTION
0	4-13-79	JW			ISSUE FOR CONST. F.W.'S 1-14
1	8-16-80				REINSTATED, VOIDED IN ERROR [illegible] 1183 4 CMC 11202 R.1
2	11/81				REV. AS N'T'D REF: CMC 41253. DCA 7607 (SEE NT. 1) AS BUILT
3	11/4/82	PM			REV'D AS BUILT, REF CMC# 79442 R.1 DEL FW'S 1-14 VENDOR [illegible]

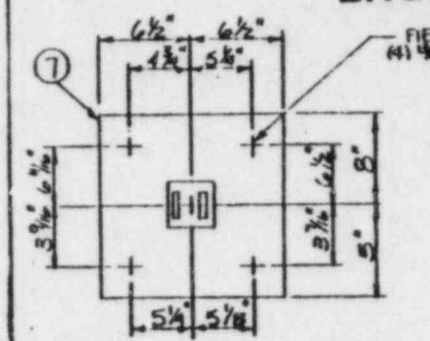
CUSTOMER Texas Utilities Service,
ORDER OR CONT. NO. CP-0046
JOB NAME Comanche Peak 1 & 2
MARK NO. CC-1-008-015-S33R
SKETCH NO.
SHEET 1 OF 2 REV. 3

AS-BUILT

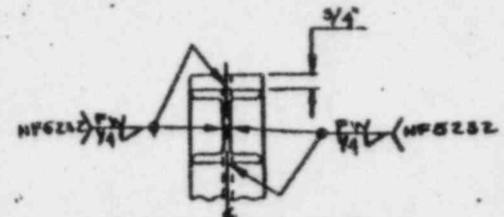
FOR OFFICE AND ENGINEERING USE ONLY



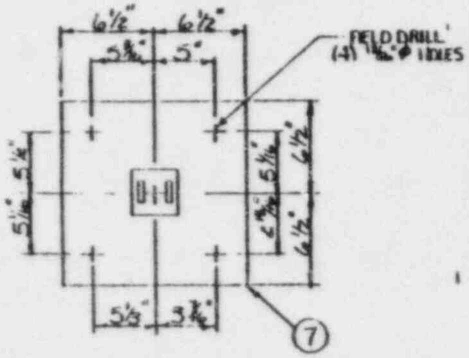
DETAIL "A" TYP (3) PLACES



SECTION A-A
NORTHWEST PLATE LKG. UP



SECTION B-B (TYP)



SECTION C-C
SOUTHEAST PLATE LKG. UP

T.O. 1101

VENDOR CERTIFIED
DRAWING REV. NO. 3
BY JD DATE 11/4/82

FOR ENGINEERING & OFFICE USE ONLY

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CPSES DOCUMENT CONTROL CENTER

Approved By: CPC
Date: 8-7-79

REV	DATE	DWN	CHK	APP	DESCRIPTION
CONT	~	~	~	~	REF GTN 60612

REV	DATE	DWN	CHK	APP	DESCRIPTION
0	4-?-79				ISSUE FOR CONST. P.O. 8
1	8-16-80				REINSTATED VOIDED IN ERROR REF. ITTR 54 CMC 11202 R.2
2	7-?-81				REV. AS NTD. REF: CMC 41253
3					REV'D AS BUILT, REF. CMC; DEL. PM 1-14 VENDOR CERTIFIED

THIRD PARTY INSPECTION YES NO
CODE CLASS: ASME III-3

Brown & Root, Inc

REF. DRAWING NUMBERS
PIPE: ______ ELECT: ______
STEEL: ______ H.V.A.C.: ______

CUSTOMER Texas Utilities Servi
ORDER OR CONT. NO. CP-0046
JOB NAME Comanche Peak 1 & 2
MARK NO. CC-1-008-015-3
SKETCH NO.
SHEET 2 OF 2 REV.

FORM DHE-5

TEXAS UTILITIES SERVICES INC.
COMANCHE PEAK S.E.S.
Agent For
DALLAS POWER & LIGHT COMPANY
TEXAS ELECTRIC SERVICE COMPANY
TEXAS POWER & LIGHT COMPANY

Date 7/31/84
Calc By P. CLARK
Chk'd/Apprd. By
Filing Code
Sheet No. 1 Of 1
G & H Job. No. 2323
Subject CC-1-008-015-533R
Ref. Dwg./Spec. No.

$\frac{1}{2} \times 8 \times 8$ T. ST'L

$$\frac{f_a}{F_a} + \frac{f_b}{F_b} < 1.00$$

$\frac{f_a}{F_a} = 0$

$f_b \approx 11{,}941\ \#/in^2$ (Ref. V.C. Calc's pg 2 of 10)

$F_b = .6(32{,}800\ \#/in^2) = 19{,}680\ \#/in^2$ (@ 200° for SA36)

$$\frac{f_b}{F_b} = \frac{11{,}941\ \#/in^2}{19{,}680\ \#/in^2} = .607 < 1.00 \checkmark$$

FORM DHE-5

TEXAS UTILITIES SERVICES INC.
COMANCHE PEAK S.E.S.
Agent For
DALLAS POWER & LIGHT COMPANY
TEXAS ELECTRIC SERVICE COMPANY
TEXAS POWER & LIGHT COMPANY

Date 8/14/82
Calc By DLS
Chk'd/Apprd. By SG 10126/82
Subject CC-1-008-015-533R

Filing Code
Sheet No. 2 of 10
G & H Job. No.
Rel. Dwg./Spec. No.

Load has been changed. /

Load	condition	New load	Old load	% change
Y	N/A	-16098 / +960 /	-16534 / +311 /	9.4 ↑
Y	Emergency	-23210 / +6072 /	-20821 / +4597 /	11.4 % ↑

Calculations done before does not hold good. Redesign entire structure / / calculations.

+9', Ts 1/2 x 8 x 8 /

SA-631

$$f_b = \frac{23210 \times 64}{4 \times 31.1} = 11940.836 \text{ psi} /$$

< 22980 psi. OK (.6 x 38300)

Bending stresses OK /

Shear stresses

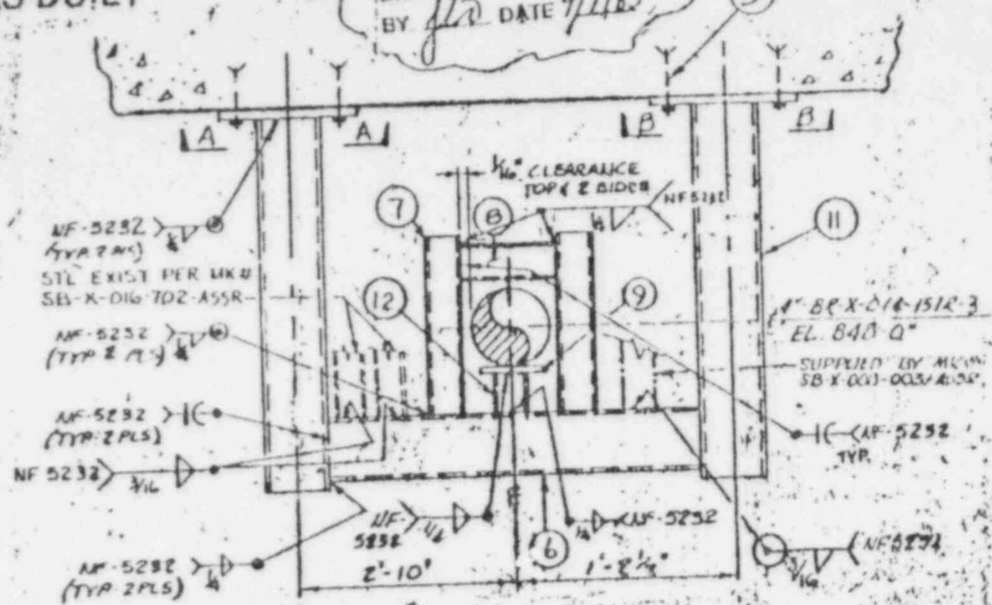
$$\frac{23210}{2} = 11605 /$$

$$f_v = \frac{11605}{2 \times 8 \times 0.5} = 1451 \text{ psi} < 0.4 \times 38300 \text{ psi} /$$

OK

AS-BUILT

VENDOR CERTIFIED
DRAWING REV. NO. 4
BY [illegible] DATE 9/14/83



CPSES 35-1195 CONTROL COPY DOCUMENT CONTROL CENTER

MVTS X & T.469

4 ★ CHANGE NOT MADE BY CMC

SEE BRHL FOR HANGER LOCATION

NOTE:
6.) LOCKING DEVICES FOR HIGH STRENGTH BOLTS ARE NOT REQUIRED PER DCA 7607

BRHL ISO. BR-X-AB-55 Rv 3
I.P.D. Iso. BR-X-AB-55 Rev 3
Data Point 160/AB-1-093 R0
Pipe Mat'l. A312-TP 304
Insul. ~ Bldg. B

T.O 5601

ITEM NO.	MATERIALS & OPERATIONS	QUAN	SHIP
	SEISMIC PIPE RESTRAINT CONSISTING OF:	ONE	
5	3/4" x 7" HILTI KWIK CONC. ANCHOR	8	
6	TS-4x4x1/2 x 3'-8 1/2" LG. A-500 GR.B	1	
7	TS-2x2x1/4 x 1'-0" LG. A-500 GR.B	2	
8	TS-2x2x1/4 x 0'-4 3/8" LG. A-500 GR.B	1	
9	1/2 x 3 x 8 PL SA-36 OR SA-515 GR 65	1	
10A	1/2" THK. C.S. PLATE SA-36 OR SA-515 GR 65 (SECT A-A)	1	
10B	1/2" THK C.S. PLATE SA-36 OR SA-515 GR 65 (SECT B-B)	1	
11	TS 4x4x1/2 x 3'-0" LG. A-500 GR.B	2	
12	TS 2x2x1/4 x 0'-2" LG. A500 GR.B FIELD TRIM TO SUIT	1	
	SEISMIC ASSEMBLY SKETCH AND ENGINEERING	1	
	BUNDLE AND TAG	1	
	MARK # BR-X-044-006-A33R		
	Apply Carbo-Zinc #11 to above mat'l except th'ds which shall be treated with a rust preventative		

FOR OFFICE AND ENGINEERING USE ONLY

REV	DATE	DWN	CHK	APP	DESCRIPTION
4	[illegible]	[illegible]	Q	[illegible]	REV'D AS NT'D, REF CMC 84844 R-3 & DCA 7607. (SEE NT. 6).
	~	~	~		ADDED SHEET 2 of 2. VENDOR CERTIFICATION GTN [illegible]
3	[illegible]	[illegible]	[illegible]	[illegible]	REV'D VENDOR CERT. REF CMC 92949
1	[illegible]	SL	[illegible]	[illegible]	REV'D VENDOR CERTIFICATION

Approved [illegible]
Date: 2-6-79

FOR MATERIALS AND OPERATIONS SEE SKETCH NO. SHEET

Brown & Root, Inc.

CONDITIONS	Fx	Fy	Fz	Mx
DESIGN				
NORMAL & UPSET	—	247	±78 / ±101	
EMERGENCY	—	263	[illegible]	
FAULTED				

REF. DRAWING NUMBERS
PIPE: M1-0709 REV 5 ELECT: E1-0702 REV 6
STEEL: S1-0708 REV 2 H.V.A.C.: H1-0702 REV 6

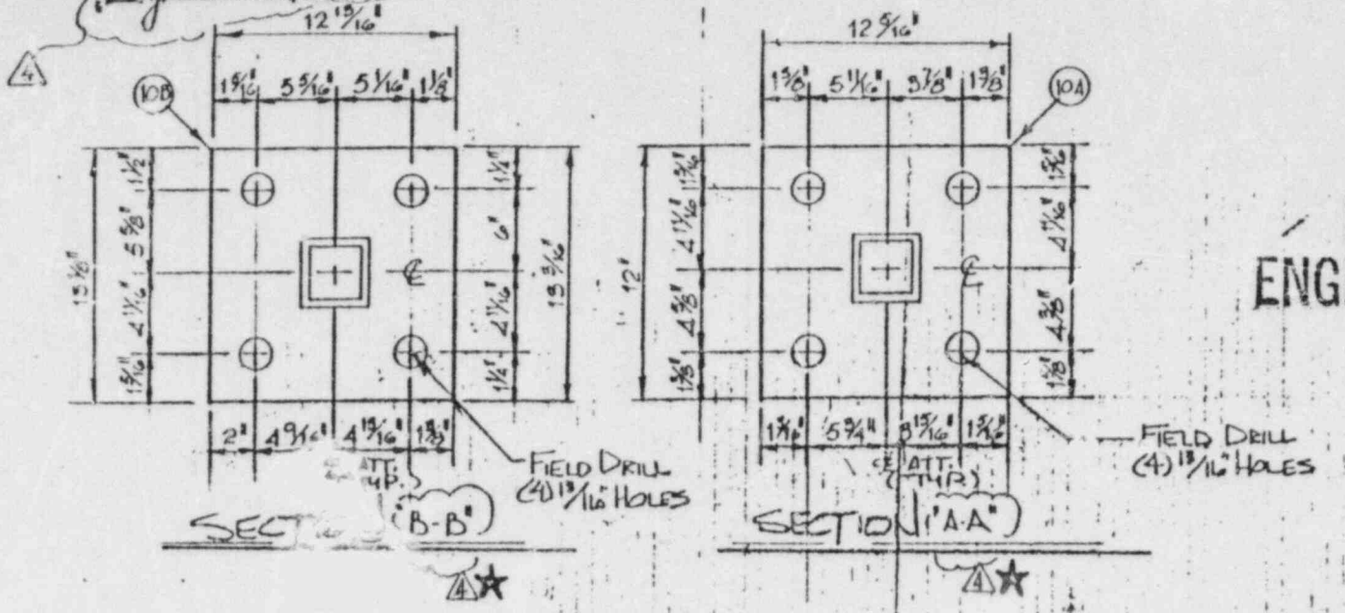
THIRD PARTY INSPECTION YES
CODE CLASS: ASME III-3

REV	DATE	DWN	CHK	APP	DESCRIPTION
0	[illegible]	[illegible]	[illegible]	[illegible]	ISSUE FOR CONST EVL 1-8
1	[illegible]	[illegible]	KC	[illegible]	REV'D LOADS, STR ISO, BASE PLATES, & PER CMC-34844
					VOIDED PHASE [illegible]
					[illegible] C 2 & PROB NO. REV [illegible]

CUSTOMER [illegible]
ORDER OR CONT. NO. [illegible]
JOB NAME Comanche Peak 1 & [illegible]
MARK NO. BR-X-044-00[illegible]
SKETCH NO. ~
SHEET 1 OF 2

AS-BUILT

VENDOR CERTIFIED
DRAWING REV. NO. 4
BY JLD DATE 9/11/83



FOR OFFICE AND ENGINEERING USE ONLY

CPSES
3611103
CONTROL

FOR OFFICE AND ENGINEERING USE

CHANGE NOT MADE BY CMC

TQ 5601

THIRD PARTY INSPECTION
CODE CLASS: ASME-III-3

REV	DATE	DWN	CHK	APP	DESCRIPTION
2	11/28		Q		ISSUED FOR AS-BUILT REF CMC 34894 R3 DCA 7607 SEE NTS
3	12/13/83				VENDOR CERTIFICATION GTN 61331
4	4-1-83				REV'D VENDOR CERT. REF CMC 92949
					REV'D VENDOR CERTIFICATION.

BROWN & ROOT
ENGINEERS & CONSTRUCTORS

REF. DRAWING NUMBER
PIPE: ELECT:
STEEL: H.V.A.C.:

CUSTOMER TEXAS UTILITIES GE
ORDER OR CONT. NO. CP-0046
JOB NAME COMANCHE PEAK
MARK NO. [illegible]-X-044-0016
SKETCH NO.
SHEET 2 OF 2 REV

FORM DHE-5

TEXAS UTILITIES SERVICES INC.
COMANCHE PEAK S.E.S.
Agent For
DALLAS POWER & LIGHT COMPANY
TEXAS ELECTRIC SERVICE COMPANY
TEXAS POWER & LIGHT COMPANY

Date 7-31-87
Calc By GMC
Chk'd/Apprd. By
Filing Code
Sheet No. 1 Of
G & H Job. No.

Subject 3R-X-044-006-A53R Ref. Dwg./Spec. No.

$$\frac{10465}{(32.8)(.6)} + .054 = .58$$

$32.8 = S_y @ 200°$

FORM DHE-5

TEXAS UTILITIES SERVICES INC.
COMANCHE PEAK S.E.S.
Agent For
DALLAS POWER & LIGHT COMPANY
TEXAS ELECTRIC SERVICE COMPANY
TEXAS POWER & LIGHT COMPANY

Date 8/10/83
Calc By GD
Chk'd/Apprd. By ✓
Subject # BR-X-044-006-A53R

Filing Code
Sheet No. 5 Of 16
G & H Job. No.
Ref. Dwg./Spec. No.

REF	PG
ES-17	

4. $\frac{L}{r} = \frac{24.25}{.649} = 53 < 240$ ∴ ok for tension member

5 Member Normal Stress

$Max_{N.} = 10465\ \#/in^2$ @ member 13

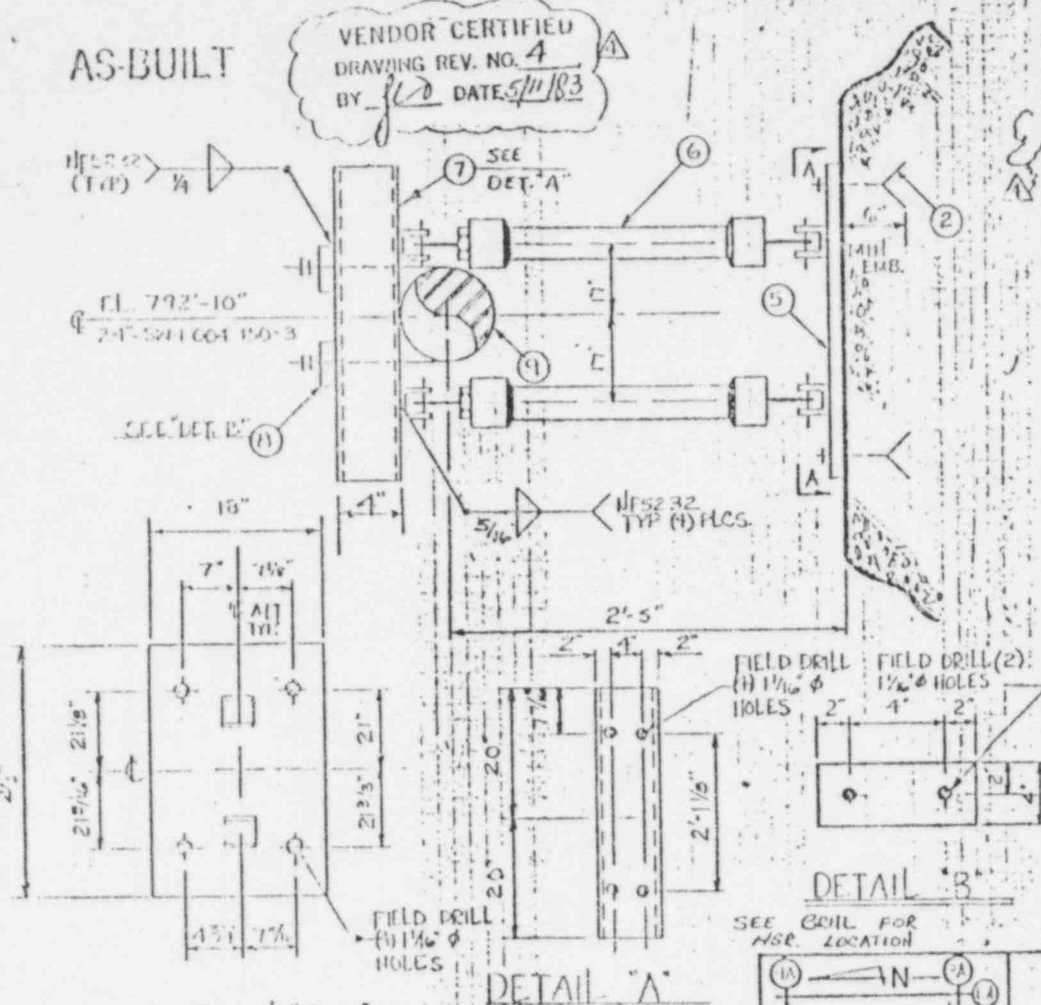
$Fa = 11500\ \#/in^2$ for $\frac{KL}{r} = 111$ [conservative]

$\frac{Axial}{Fa} = \frac{\frac{893}{1.59}}{10465} = 0.054 < 0.15$

Hence ok for axial comp. one bending and axial tension one bending

AS-BUILT

VENDOR CERTIFIED
DRAWING REV. NO. 4 △4
BY [illegible] DATE 5/11/83



NOTES:
1) Locking devices for high strength bolts are not required per DCA 7607

BCIIL Iso. SW-1-AB-07 R.5
I.P.D. Iso. SW-1-AB-07 REV 7A
Data Point [illegible] △4
Pipe Mat'l. [illegible]
Insul. — Bldg. A

10"401

THIRD PARTY INSPECTION YES NO
CODE CLASS: ASME III-3

ITEM NO.	MATERIALS & OPERATIONS	QUAN	SHIP	PBS	L	CS9	PRIM
2	1"x12" HILTI KWIK CONCRETE ANCHORS (1144)	4				X	
5	1 1/2" THK CS PL PER SECTION "A-A" (SA36/SA515GR65)	1		X			X
6	SPS-10-RA SWAY STRUT	2				X	
7	TS 4"x8"x3/8" x 2'-4" LG. (A500GRB)	1			Y		
8	3/4" THK CS PL PER DETAIL "B" (SA36/SA515GR65)	2		X			X
9	UIS-240 U-BOLT	2					

FOR OFFICE AND ENGINEERING USE ONLY

REV	DATE	DWN	CHK	APP	DESCRIPTION
△	[illegible]	Q	RM	[illegible]	REVD ASBUILT REF: CMC 39713R2, CITA 5424, GREENLINE, VENDOR CERTIFICATION. REF: CPPA 20191
CON'T	~	~	~	~	
△4	5/11/83	TH	RM	Q	REV. VENDOR CERTIFICATION, REF. CPPA # 26917

FOR ENGINEERING & OFFICE USE ONLY

INFORMATION COPY

MARK # SW1-004-013-A33R
PAINT: CARBO ZINC # II

FOR MATERIALS AND OPERATIONS SEE SKETCH NO. SHEET OF

BROWN & ROOT, INC.
ENGINEERS & CONSTRUCTORS

REF. DRAWING NUMBERS
PIPE: MI-0704 R.II ELECT: [illegible]
STEEL: SI-0700 R.II H.V.A.C.: MI-0752 R5

CONDITIONS	Fx	Fy	Fz	Mx	My
DESIGN	—	△4		—	—
NORMAL & UPSET	—	—	[illegible]	—	—
EMERGENCY	—	—	[illegible]	—	—
FAULTED	—	—		—	—

REV	DATE	DWN	CHK	APP	DESCRIPTION
△0	[illegible]	DJ	[illegible]	DM	ISSUE FOR CONST FIELD FAB FWT-6
△	[illegible]	KSB	[illegible]	[illegible]	REV. PLATE PER CMC-15597
△	[illegible]	[illegible]	MO	M	REV AS NOTED REF CPPA 5327, DCA7607 (SEE NOTE 1(P)) AS BUILT
△4	~	~	~	~	& PER CPPA-5900

CUSTOMER Texas Utilities Service, I[illegible]
ORDER OR CONT. NO. CP-0046
JOB NAME Comanche Peak 1 & 2
MARK NO. SW1-004-013-A33R
SKETCH NO.
SHEET 1 OF 1 REV. 4

TEXAS UTILITIES SERVICES INC.
COMANCHE PEAK S.E.S.
Agent For
DALLAS POWER & LIGHT COMPANY
TEXAS ELECTRIC SERVICE COMPANY
TEXAS POWER & LIGHT COMPANY

Date 7/31/84
Calc By P. CLARK
Chk'd/Apprd. By
Filing Code
Sheet No. 1 Of 1
G & H Job. No. 2323
Subject SW-1-004-013-A33R
Ref. Dwg./Spec. No.

REF. V.C. CALC'S pg 4 of 10

$f_b = 10,771\ \#/in^2$

$F_B = .6(32,800) = 19,680\ \#/in^2$

$f_b/F_B = 10,771/19,680 = .547 < 1.00$ ✓

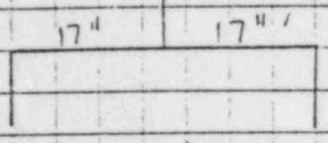
FORM DHE-5.

TEXAS UTILITIES SERVICES INC.
COMANCHE PEAK S.E.S.
Agent For
DALLAS POWER & LIGHT COMPANY
TEXAS ELECTRIC SERVICE COMPANY
TEXAS POWER & LIGHT COMPANY

Date 05/02/83
Calc By F.I.F
Chk'd/Apprd. By BG 5/5/83
Filing Code
Sheet No. 4 of 10
G & H Job. No.
Subject SW-1-004-013-A33R Ref. Dwg./Spec. No.

THIS CALC SUPERSEDE VENDOR CERTIFICATION REV 0 CALC.

CHECK ITEM 7 TEMP @ 130°F / AISC



$f_b = \frac{12672 \times 34}{4 \times 10} = 10771\ \#/in^2 < .6\,Sy$

f_b at reduced section is less

$.6 \times 40890 = 24534\ \#/in^2$ /

5046 N&U 5046' $f_v = \frac{6336}{2(.375)(4)} = 2112\ \#/in^2 < .4\,Sy$ /
6336 BMER 6336'

$\Delta = \frac{12672 \times (34)^3}{48 \times 27810000 \times 20.1} = 0.02" < 0.0625"$ ✓ O.K

CHECK ITEM 8

PLATE IS IN COMPRESSION. THEREFORE IT IS O.K

WELD IS PER ASME 3391-1 THUS $f_w = \frac{6336}{2 \times 6.5}$ /

/ $= 487\ \#/in < 1810\ \#/in$

CHECK ITEM 9 PUS 240 / NPX CODES PUS

9920 # > 5046 # LEVEL A & B /

1.33 x 9920 = 13194 # > 6336 # LEVEL C /

COMPONENT LOAD $= 3.33 \times 24.49 + 3 \times 8 + 2 \times \frac{8 \times 4 \times .75}{1728} \times 490$
$+ 16.7 = 135.9$ SAY 136 #

240 # > 68 # LEVEL A & B

1.33 x 240 = 319 # > 68 # LEVEL C

$\frac{5046}{9920} + \frac{68}{240} \leq 1$ $\qquad$ $\frac{6336}{13194} + \frac{68}{319} < 1$

$0.79 < 1$ $\qquad$ $0.69 < 1$ /

O.K $\qquad$ O.K

FOR OFFICE AND ENGINEERING USE ONLY

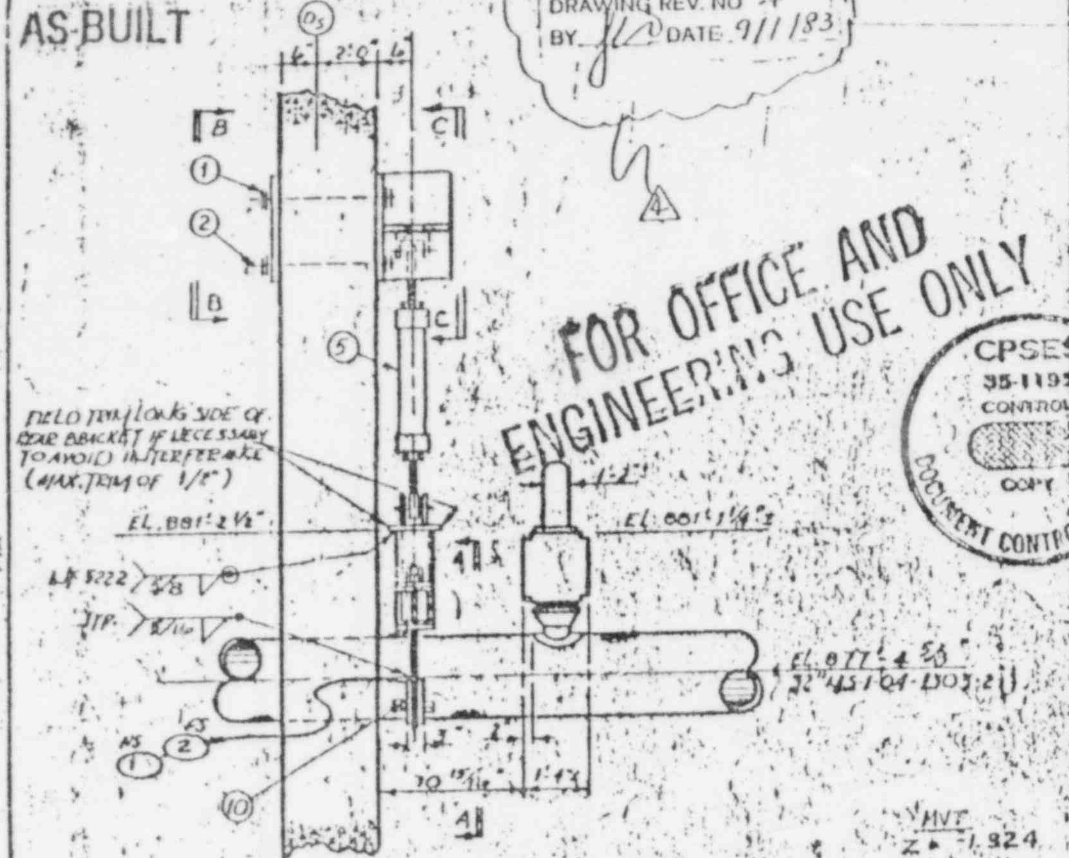
BLUELINE: 5 NOV 81

AS-BUILT

VENDOR CERTIFIED
DRAWING REV. NO 4
BY [illegible] DATE 9/1/83

FOR OFFICE AND ENGINEERING USE ONLY

CPSES 35-1195 CONTROL COPY DOCUMENT CONTROL CENTER



SEE BRHL FOR HGR. LOCATION

LOCATION PLAN

ITEM NO.	MATERIALS & OPERATIONS	QUAN	SHIP		PBS
1	FXN 1 1/2" HEX NUT	16			
2	1 1/2" 6 UNC x 3'-7" ROUND ROD (SA-193 GR. B7) W/6" THREAD BOTH ENDS	4			
	1 3/4" C.S. PL PER SECTION B-B SA515 GR 65 or SA-36	1			X
[illegible]	[illegible] A500 GR.B	1			
5	FIG 211 N, #9, SWAY STRUT ASSEMBLY, OPTION #2 H=1'-6", LOAD = 59548#	1			
6	T.S. 8"x4"x1/2" x 2'-6" LG. A500 GR.B	1			
7	FIG. 137 SN, U BOLT C.S. (SA-36) A=3 1/2" B=2'-10 1/8", C=3'-0 7/8", D=2'-7 3/8", E=1'-6" DEVELOPED LENGTH=10'-0 1/4" W/HEX NUTS	1			
8	1" C.S. PL PER DETAIL "C" SA-515 GR 65 or SA-36	2			X
9	T.S. 8"x4"x3/8"x 3'-4 1/4" PER DETAIL "B" A500 GR.B	1			X
10	1" C.S. PL 9 1/4" x 4'-5 5/8" SA515 GR65 / SA-36	1			X
11	FXN 2 1/2" HEAVY HEX NUT	2			
12	1 1/4" C.S. PL PER SECTION "C-C" SA515 GR 65 or SA36	1			X
13	ASME III NAME PLATE	1			
14	1" C.S. PL 8 3/4" x 12" LG. SA515 GR65 or SA36	4			X
15	C.S. PL 1" x 2 1/2" x 2 1/2" (SA36 / SA515 GR65)	4			X
16	[illegible] ANGLE PER [illegible] (SA 36)	2			
17	[illegible]	4			
18	1/2" C.S. PL x 5" x 2'-0" LG SA36	1			
19	1/2" C.S. PL x 5" x 11 [illegible] LG SA36	1			
20	T.S. 1/2" x 4" x 6" LG A500 GR B	1			
21	T.S. 1/2" x 4" x 6" LG A500 GR B	1			
22	1/2" C.S. PL x 5" x 9" LG SA36	6			
23	T.S. 1/2" x 4" x 6" LG A500 GR B	1			
24	T.S. 1/2" x 4" x 6" LG A500 GR B	1			
25	T.S. 1/2" x 4" x 8" LG A500 GR B	1			

REV.	DATE	DR.	CHK	APR	DESCRIPTION
3	1/25/83	JC	[illegible]	[illegible]	REV. VENDOR CERTIFICATION REF: EMC-91471R-1 ADD SHT3
	—	—	—	—	
4	9-1-83	M	[illegible]	[illegible]	REV. VENDOR CERT.

FOR MATERIALS AND OPERATIONS SEE SKETCH NO. SHEET

BROWN & ROOT, INC.
ENGINEERS & CONSTRUCTORS

REF. DRAWING NUMBERS
PIPE: M1-0600 R5 ELECT: E1-0603 P1
STEEL: S1-0604 R3 H.V.A.C.: M1-0655 R6

CONDITIONS	Fx	Fy	Fz	Mx
DESIGN				
NORMAL & UPSET	—	59548		
EMERGENCY	—	[illegible]		
FAULTED				

REV	DATE	DRN	CHK	APP	DESCRIPTION
					ISSUED FOR CONST. REF. F.M. 7.5
					REVISED TO REPLACE [illegible]
					VENDOR CERTIFICATION; REF. [illegible]
4					REV. VENDOR CERT.

CUSTOMER TEXAS UTILITIES SERVICES
ORDER OR CONT. NO. CP-0046
JOB NAME COMANCHE PEAK
MARK NO. MS-1-004-003-S7
SKETCH NO.
SHEET 1 OF 3 REV

NOTE:
2) Locking devices for high strength bolts are not required per DCA 7607

BRHL 150-MS-1-SB-017 R0
B.R.P. 150-MS-1-SB-17 R1
DATA POINT 495 [illegible] AB-1-280 R0
PIPE MAT'L SA-155 KC70 CL1
INSUL. 2.33" BLDG. SB

THIRD PARTY INSPECTION
CODE CLASS: ASME III-2

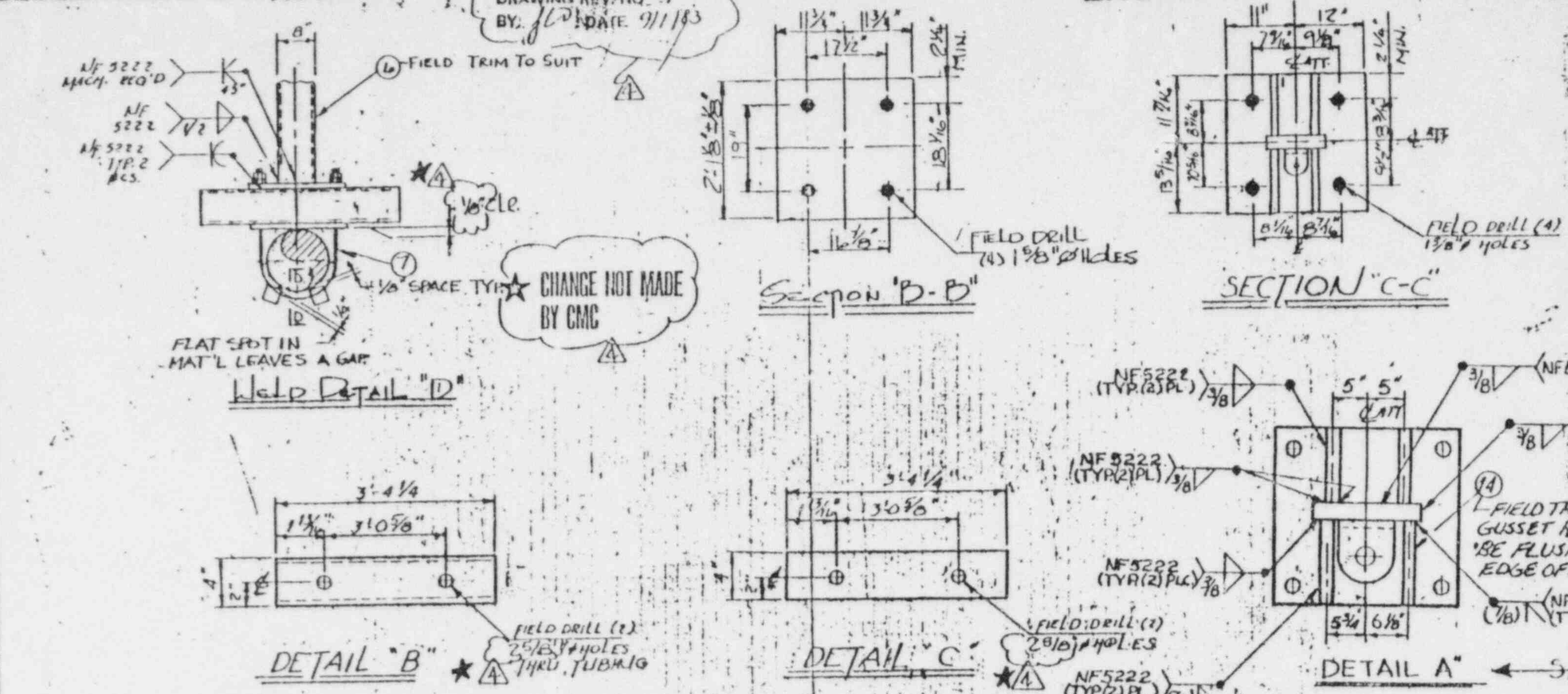
10" 3101

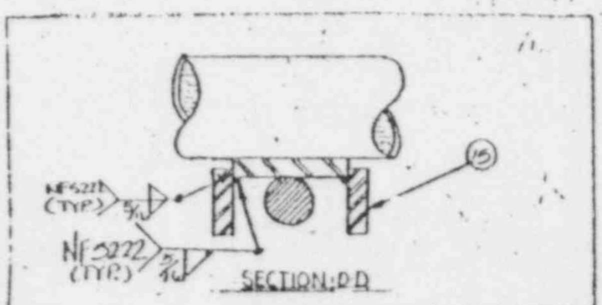
FOR OFFICE AND ENGINEERING USE ONLY

FOR OFFICE AND ENGINEERING USE ONLY

BLUELINE: 5 NOV. 81 AS-BUILT

VENDOR CERTIFIED
DRAWING REV. NO. 4
BY: JLD DATE 9/1/83





THIRD PARTY INSPECTION YES NO
CODE CLASS: ASME III - 2

REV.	DATE	DR.	CH'K	APP.	DESCRIPTION
3	2/23/83				REV. VENDOR CERTIFICATION REF: CMC-91471B-1 APR SHT 3
	—	—	—	—	
4	9-1-83	VM			REV. VENDOR CERT.

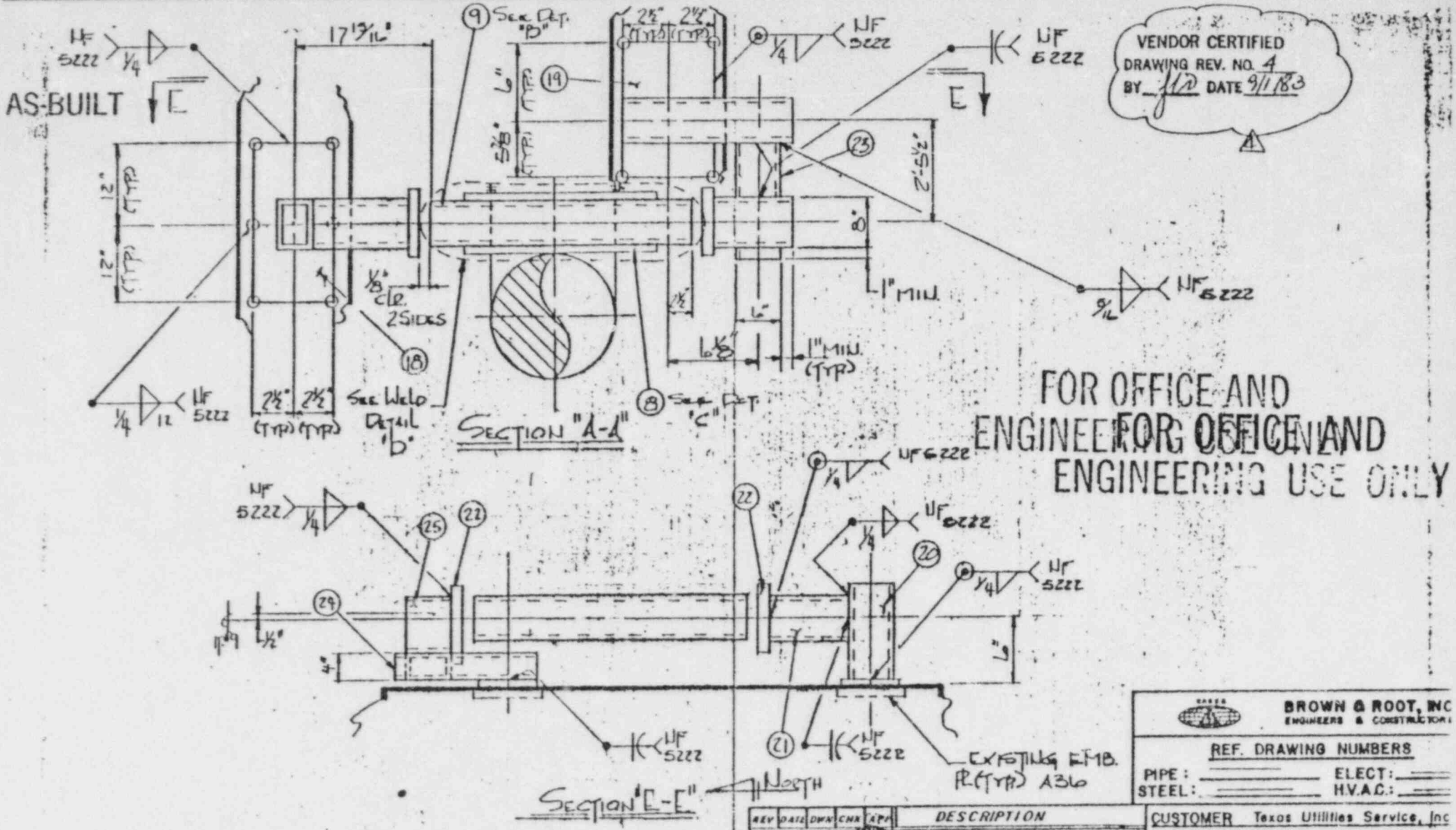
REV	DATE	DWN	CHK	APP	DESCRIPTION
0	11/3/81				ISSUED FOR CONST.; REF ...
1					REVISED ... REF CMC 62236 R11 DCA 7607 SEENT 2 "AS-BUILT"
					VENDOR CERTIFICATION, REF DTN W005
2					REV. VENDOR CERT.

BROWN & ROOT, INC.
ENGINEERS & CONSTRUCTORS

REF. DRAWING NUMBERS
PIPE: ______ ELECT: ______
STEEL: ______ H.V.A.C.: ______

CUSTOMER TEXAS UTILITIES SERVICE,
ORDER OR CONT. NO. CP-0046
JOB NAME COMANCHE PEAK 1&2
MARK NO. MS-1-004-003-S72R
SKETCH NO.
SHEET 2 OF 3 REV.

TO# 3401



REV	DATE	DWN	CHK	APP	DESCRIPTION
4	9/2/83	JC	[illegible]	[illegible]	ISSUE VENDOR CERTIFICATION ELEC: EMC-9147 R-1
3	7-1-83	VM	RC	[illegible]	REV. VENDOR CERT.

BROWN & ROOT, INC
ENGINEERS & CONSTRUCTORS

REF. DRAWING NUMBERS
PIPE: ELECT:
STEEL: H.V.A.C.:

CUSTOMER Texas Utilities Service, Inc
ORDER OR CONT. NO. CP-0046
JOB NAME Comanche Peak 1&2
MARK NO. MS-1-004-023-5721
SKETCH NO.
SHEET 3 OF 3 REV. 4

FORM DHE-5

TEXAS UTILITIES SERVICES INC.
COMANCHE PEAK S.E.S.
Agent For
DALLAS POWER & LIGHT COMPANY
TEXAS ELECTRIC SERVICE COMPANY
TEXAS POWER & LIGHT COMPANY

Date JULY 31, 1984
Calc By P. CLARK
Chk'd/Apprd. By
Subject MS-1-004-003-S72R

Filing Code
Sheet No. 1 Of 1
G & H Job. No. 2323
Ref. Dwg./Spec. No.

Ref. VC CALC'S pg 2 of 8

$f_b = 9510\ \#/in^2$

$F_B = .6(32,800\ \#/in^2) = 19,680\ \#/in^2$

$f_b/F_B = 9510/19,680 = .438 < 1.00$

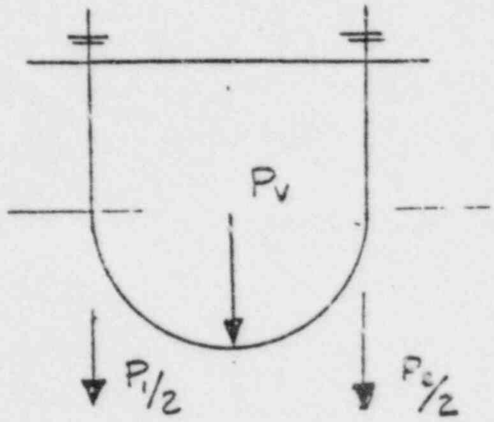
$= 0.483$

$$F_y = \begin{matrix} -47777^{\#} \\ +28940^{\#} \end{matrix}$$

CHECK OF U-BOLT (IT.#

ASSUME TENSION ONLY

$$F_t = \frac{P/2}{A};$$



A - AREA OF U BOLT

$$F_t = \frac{23889}{3.719} = 6423^{\#}$$

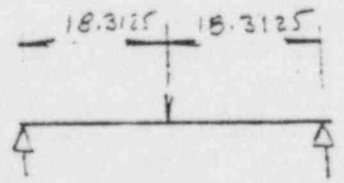
$6423 < .6(S_y) = .6(26.6) = 15960$ ∴ OK

CHECK OF IT. # 09

$P = 47777^{\#}$

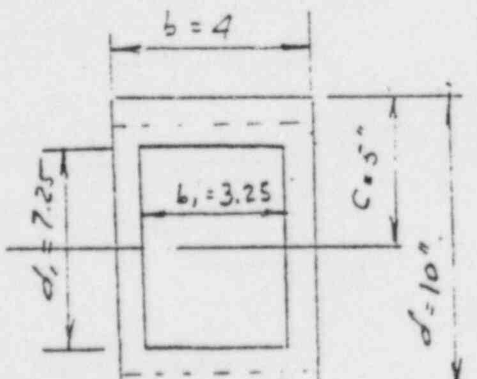
$$M = \frac{P\ell}{4} = \frac{47777 \times 36.625}{4} = 437458^{\#}\text{IN}$$

MAX OF ALL MEMB.



$$S = \frac{bd^3 - b_1 d_1^3}{6d} =$$

$$= \frac{4 \times 10^3 - (3.25)(7.25)^3}{6 \times 10} = 46 \text{ IN}^3$$



AISC 6-25

$$f_b = \frac{437458}{~~46~~\ 43.7} = ~~9510~~\ 10{,}010 \text{ psi}$$

~~9510~~ 10,010 $< .6(S_y) = 15960$ psi ∴ OK

Revised for Nagpur
BMR
6-22-84

$$f_{v_y} = \frac{P}{A};\quad A = bd - b_1 d = 4 \times 10 - (3.25)(7.25) = 16.43$$

$$A_y = 2 \times 10 \times .375 = 7.5$$

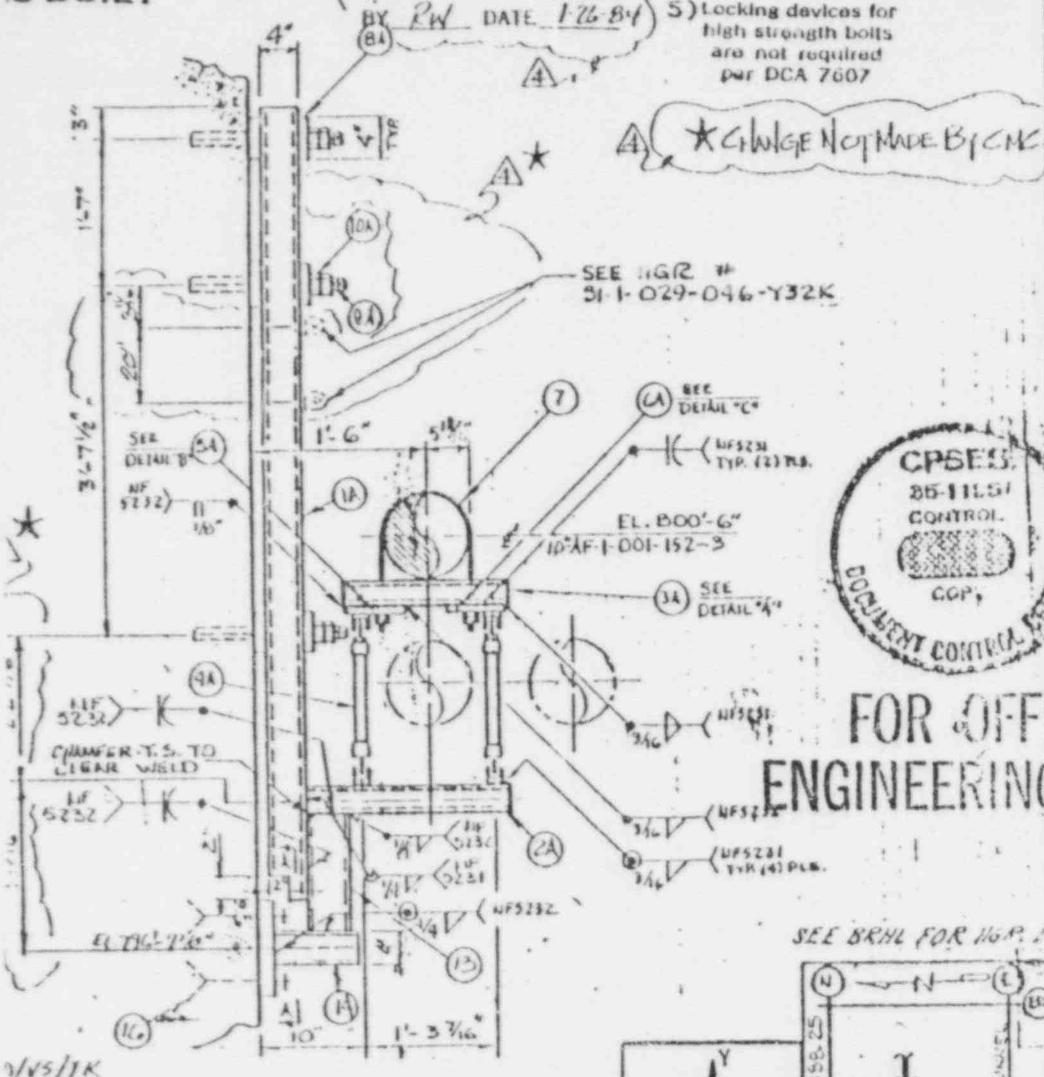
FOR OFFICE AND ENGINEERING USE ONLY

AS-BUILT

VENDOR CERTIFIED
DRAWING REV. NO. 4
BY RW DATE 1-26-84

NOTES
5) Locking devices for high strength bolts are not required per DCA 7607

4 ★ CHANGE NOT MADE BY CMC



CPSES 85-11151 CONTROL COPY DOCUMENT CONTROL CENTER

FOR OFFICE AND ENGINEERING USE ONLY

ITEM NO.	MATERIALS & OPERATIONS	QUAN	SHIP		PBS	L	CSS	PRIM
1A	TS 4"x6"x1/4"x7'-11" LG. (A500 GR B)	1				X		X
2A	TS 3"x3"x1/4"x1'-11 1/4" (A500 GR B)	1				X	X	X
3A	TS 3"x3"x1/4"x1'-8 7/8" LG. (A500 GR B)	1				X	X	X
4A	SRS-06-BA C-C = 1'-6 3/4"	2					X	
5A	1/4" CS PL 4"x5 1/4" (SA36/SA515 GR 65)	1			X	X		X
6A	1/4" CS PL 4"x6 7/8" (SA36/SA515 GR 65)	1			X	X		X
7	PUS-100 UBOLT Bell" PL 2 3/4 4 1/4 (SA-36)	1					X	
8A	1/4" CS PL 4"x6" (SA36/SA515 GR 65) W/(1) 1 1/8" ø HOLE O.C.	6			X			X
9A	RAT-06 9" LG.	3					X	
10A	FXN-1 HEX NUT	6					X	
11A	1"x12" HILTI KWIK CONC. ANCHORS	7					X	
12A	1/4" CS PL 3"x6" (SA36/SA515 GR 65)	1						X
13	TS 3"x3"x1/4"x8" LG FIELD CUT TO SUIT (A-500 GR B)	1				X		X
14	TS 6"x4"x1/4"x10" LG (A-500 GR B)	1				X		X
15	3/4" THK CS PL PER SECTION "A-A" (SA-36/SA-515 GR B)	1			X			
16	3/4"x10" HILTI KWIK BOLT MIN EMB. = 7"	4					X	

REV	DATE	DWN	CHK	APP	DESCRIPTION
3	[illegible]		Q	[illegible]	REV'D AS BUILT, REF: CMC 00619 R-2 VENDOR CERTIFIED [illegible]
4	[illegible]			[illegible]	REV'D VENDOR CERT.

MARK # AF-1-001-035-Y33R
PAINT: CARBO ZINC #11

FOR MATERIALS AND OPERATIONS SEE SKETCH NO. SHEET OF

BROWN & ROOT, INC.
ENGINEERS & CONSTRUCTORS

REF. DRAWING NUMBERS
PIPE: AI-1006 R-7 ELECT: ______
STEEL: [illegible] R-B HV.A.C.: ______

CONDITIONS	Fx	Fy	Fz	Mx	My
UPSET		1310 / -166			
NORMAL		787 / -590			
EMERGENCY		1135 / -111			
FAULTED					

REV	DATE	DWN	CHK	APP	DESCRIPTION
0	[illegible]				ISSUED FOR CONST.
1		CO			REV'D AS NOTED [illegible]
2					REV'D AS PER FIELD MODIF. [illegible] SKETCH
3					REV'D AS NOTED PER [illegible] DCA 7607 SEE NT 5. "AS-BUILT"

CUSTOMER Texas Utilities Service, I[illegible]
ORDER OR CONT. NO. CP-0046
JOB NAME Comanche Peak 1 & 2
MARK NO. AF-1-001-035-Y33R
SKETCH NO.
SHEET 1 OF 2 REV. 4

THIRD PARTY INSPECTION
CODE CLASS: ASME III-3

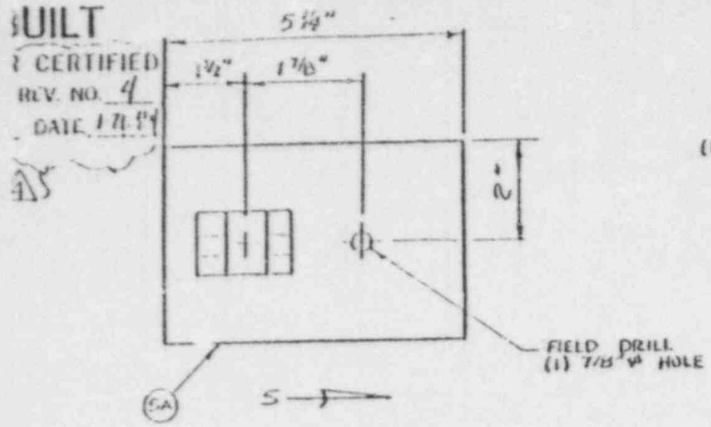
SEE BRHL FOR HGR LOC.

BRHL Iso. AF-1-YD-002 R2
I.P.D. Iso. AF-1-YD-02- R2
Data Point 12047 / 28-E-1IA R0
Pipe Mat'l. SA106 GR B
Insul. ____ Bldg. YD

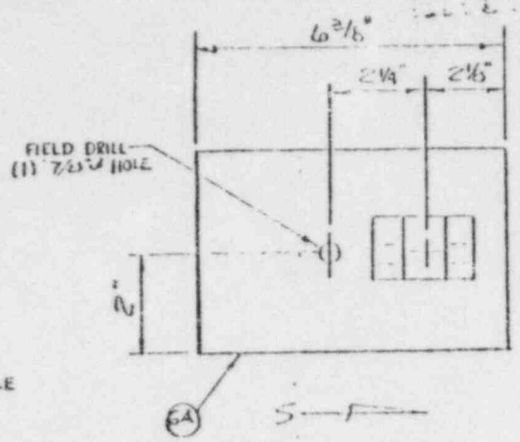
10.3702

MVMTS:
... 7.207
... .2
EV (2) 1.026 / -.087

1/85/1K



DETAIL "B"



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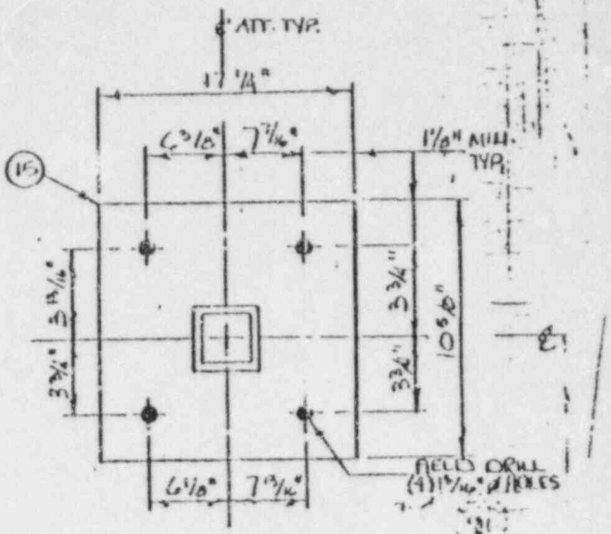
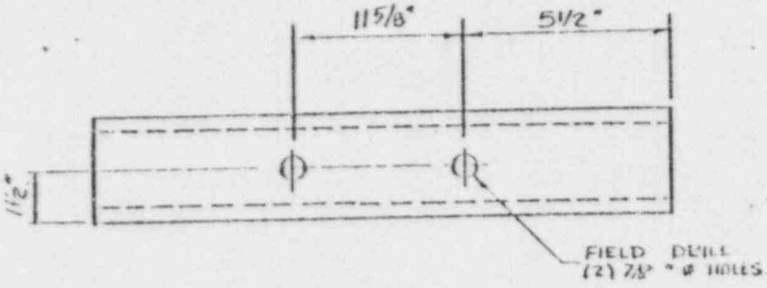


SECTION "A-A"



DETAIL "A"

FOR OFFICE AND
ENGINEERING USE ONLY

T.O. 3702

THIRD PARTY INSPECTION
CODE CLASS: ASME III - 3

REV	DATE	DRWN	CHK	APP	DESCRIPTION
4					REVD AS BUILT, REF. CMC 3059
3					REVD VENDOR CERT.

REV	DATE	DRWN	CHK	APP	DESCRIPTION
2					ISSUE FOR CONST.
1					REVD AS NOTED REF NPST REVDD
					REVD TO REFLECT FIELD MODIFIED
					REVD AS NOTED PER CMC 3059

BROWN & ROOT, INC.
ENGINEERS & CONSTRUCTORS

REF. DRAWING NUMBERS
PIPE: ELECT:
STEEL: H.V.A.C.:

CUSTOMER TEXAS UTILITIES SERVICE, INC.
ORDER OR CONT. NO. CP-0046
JOB NAME COMANCHE PEAK 1&2
MARK NO. AF-1-001-035-Y36R
SKETCH NO.
SHEET 2 OF 2 REV. 4

FORM DHE-5

TEXAS UTILITIES SERVICES INC.
COMANCHE PEAK S.E.S.
Agent For
DALLAS POWER & LIGHT COMPANY
TEXAS ELECTRIC SERVICE COMPANY
TEXAS POWER & LIGHT COMPANY

Date 8-31-84
Calc By GMC
Chk'd/Apprd. By
Filing Code
Sheet No. 1 Of 1
G & H Job. No.
Subject AF-1-001-035-Y33R
Ref. Dwg./Spec. No.

REVIEW INTERACTION EQUATIOIN DONE 8-13-83 FOR A500 REVIEW.

$$\frac{10414^{PSI}}{21600} + \frac{0}{} = 0.48$$

1.) WHERE 10414 PSI WAS DERIVED FROM PAGE 4 OF CALCS. IN THE CALCS NOTE THAT THE MOMENT IS SHOWN AS $2532^{\#} \times 18'' = 45576\ IN^{\#}$. THIS IS CONSERVATIVE BECAUSE THE 18" IS ACTUALLY THE DISTANCE TO THE WALL. THE DISTANCE TO THE FACE OF THE TUBE STEEL BOLTED TO THE WALL COULD HAVE BEEN USED. ALSO, THE $2532^{\#}$ IS THE EMER. LOAD. THE N&U LOADS WERE USED IN THE STUDY. THE N&U LOAD IS $1647^{\#}$.

$\therefore M = 1647^{\#}(13.25'') = 21689\ IN^{\#}$

& $f = M/S = 21869/2.1 = 10,414\ PSI$

2) 21600 IS ALLOWABLE f_b FOR A-36

FORM DHE-5

TEXAS UTILITIES SERVICES INC.
COMANCHE PEAK S.E.S.
Agent For
DALLAS POWER & LIGHT COMPANY
TEXAS ELECTRIC SERVICE COMPANY
TEXAS POWER & LIGHT COMPANY

Date 5-13-82
Calc By A. Kamal
Chk'd/Apprd. By E. Aber
Filing Code 1-
Sheet No. 4 of 8
G & H Job. No. -
Subject AF-1-001-035-Y33R & SI-1-029-046-Y32K 'AS BUILT' Pwr. Plng. Spec. No.

Ref.

TS 6×4×¼

$M_{max} = 8533 \times 9.625 = 82,130^{"-\#}$

$A = 4.59\ in^2,\quad I_y = 11.7\ in^4,\quad S_y = 5.87\ in^3$

Max. Normal Stress $= \frac{82,130}{5.87} + \frac{2532}{4.59}$

$= 14,543^{psi} < 30,500^{psi}$ (OK) — PSE Guidelines Sect III Rev. 3

Shear stress $= \frac{10,957}{4.59 \times 0.5} =$

$= 4,774^{psi} < 20,400^{psi}$ (OK) — Sec. III Rev. 3

TS 3×3×¼

$M_{max} = 2532 \times 18 = 45,576^{"-\#}$

$A = 2.59\ in^2,\quad S = 2.1\ in^3$

Max. Normal Stress $= \frac{45,576}{2.1}$

$= 21,703^{psi} < 30,500^{psi}$ (OK)

Shear stress $= \frac{2532}{2.59 \times 0.5}$

$= 1,955^{psi} < 20,400^{psi}$ (OK)

WELDS

(i) Between TS 6×4×¼ & TS 3×3×¼

$M = 2532(18 - 4.25) = 34,815^{"-\#}$

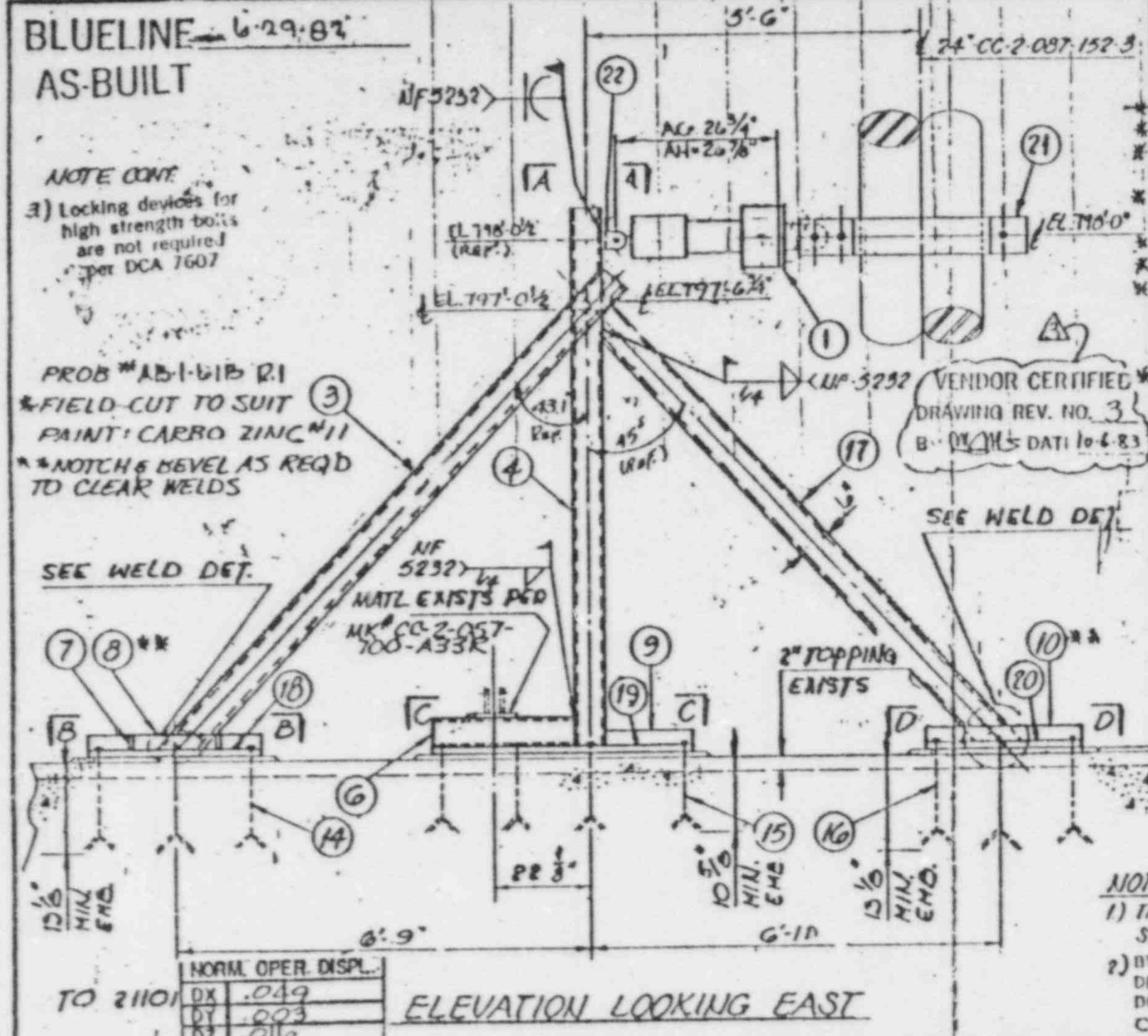
$S_w = 3 \times 3 + \frac{3^2}{3} = 12.0\ in^2,\quad L_w = 12\ in$

$f_t = \frac{34,815}{12} = 2901\ \#/in$

BLUELINE 6·29·83
AS-BUILT

NOTE CONT.
3) Locking devices for high strength bolts are not required per DCA 7607

PROB #AB-1-61B R1
*FIELD-CUT TO SUIT
PAINT: CARBO ZINC #11
**NOTCH & BEVEL AS REQD TO CLEAR WELDS



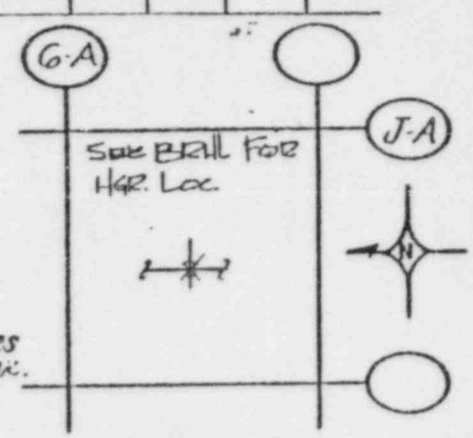
NORM. OPER. DISPL.	
DX	.049
DY	.003
DZ	.016

ITEM NO	QTY REQ'D	MATERIAL DESCRIPTION		PBS	J	CSS	PRIM	SEC.	AISC
1	1	SNUBBER, SMF-3550,	11"-1/8"			X			
2	1	TS 5"x5"x1/2"x 8'-6" LG.	A500 GR.B		X		X		
3	2	TS 5"x5"x1/2"x10'-9" LG.	A500 GR.B		X		X		
4	1	TS 6"x6"x1/2"x 7'-9 1/4" LG.	A500 GR.B		X		X		
6	1	TS 6"x6"x1/2"x 2'-6" LG.	A500 GR.B	X			X		
7	4	3/4" CS.PL.3"x 10 1/2" LG.	SA36/SA515GR65	X			X		
8	4	3/4" CS.PL.3"x 3'-2" LG.	SA36/SA515GR65	X			X		
9	2	3/4" CS.PL.3"x10" LG.	SA36/SA515GR65	X			X		
10	2	3/4" CS.PL.3"x 2'-1" LG.	SA36/SA515GR65	X			X		
14	8	1 1/4"x15" SUPER KWIK HILTI BOLT.				X			
15	8	1 1/4"x15" SUPER KWIK HILTI BOLT.				X			
16	6	1 1/4"x15" SUPER KWIK HILTI BOLT.				X			
17	1	T.S. 6"x4"x5/16"x10'-5" LG. A500 GR.B			X		X		
18	1	1 1/4" CS.PL. PER DET. "1" SA36/SA515 GR.65		X			X		
19	1	1 1/4" CS.PL. PER DET. "2" SA36/SA515 GR.65		X			X		
20	1	1 1/4" CS.PL. PER DET. "3" SA36/SA515 GR.65		X			X		

REV	DESCRIPTION	DATE	DWN.	CHKD.	APPVD.
1	REVD AS NTD; REF: CMC 76115	8/4/83	...		CBD
2	REVD PER DCA 7607 NT.3 AS BUILT	~	~		~
3	VENDOR CERTIFIED REF. CMC 8 ...	~	~	~	~
3	REV'D VENDOR CERT.	10-6-83	3/23	RCA	RRL

ASME CODE EDITION: 1974
ADDENDA: WINTER
DESIGN SPEC: MS-46A

NOTES:
1) THIS SUPPORT VOIDS & REPLACES SUPPORT NO. CC-2-081-001-A33K.
2) BY ISSUE OF REV. 1 OF THIS DRAWING, THE FOLLOWING DOCUMENTS ARE VOIDED. CMC 66790



LOCATION PLAN

DATA PT	SUPPORT DESIGN	LOADS SERVICE LEVEL A	B	(LBS) LIMITS C	D	PIPE MVTS (INCHES)
1158						
VERT.						
N-S		11123	11776			
E-W						

NOTE +N,E,UP -S,W,DN

AUTHORIZED NUCL. INSP. YES [X] NO [ ]
ASME CODE CLASS 3

REF. DWGS	PSDG. ISO.	REV	MECHANICAL	REV	ELECTRICAL	REV
	CC-2-AB-014	1	M1-0704	13	E1-0700-015	3
	FAB. ISO.	REV	STRUCTURAL	REV	H.V.A.C.	REV
	CC-2-AB-014	2	S-0700	11	M1-0752	6

REV	DESCRIPTION	DATE	DWN.	CHKD.	APPVD.
0	ISSUED FOR CONST. REF PSDG R1	8-18-81	JLR	83	
1	REV'D AS NT'D. REF. EMHS SEE NT.2		ZI		
2	ADDED SHEET 3.	~	~	~	~

Brown & Root, Inc
ENGINEERS AND CONSTRUCTORS
HOUSTON, TEXAS

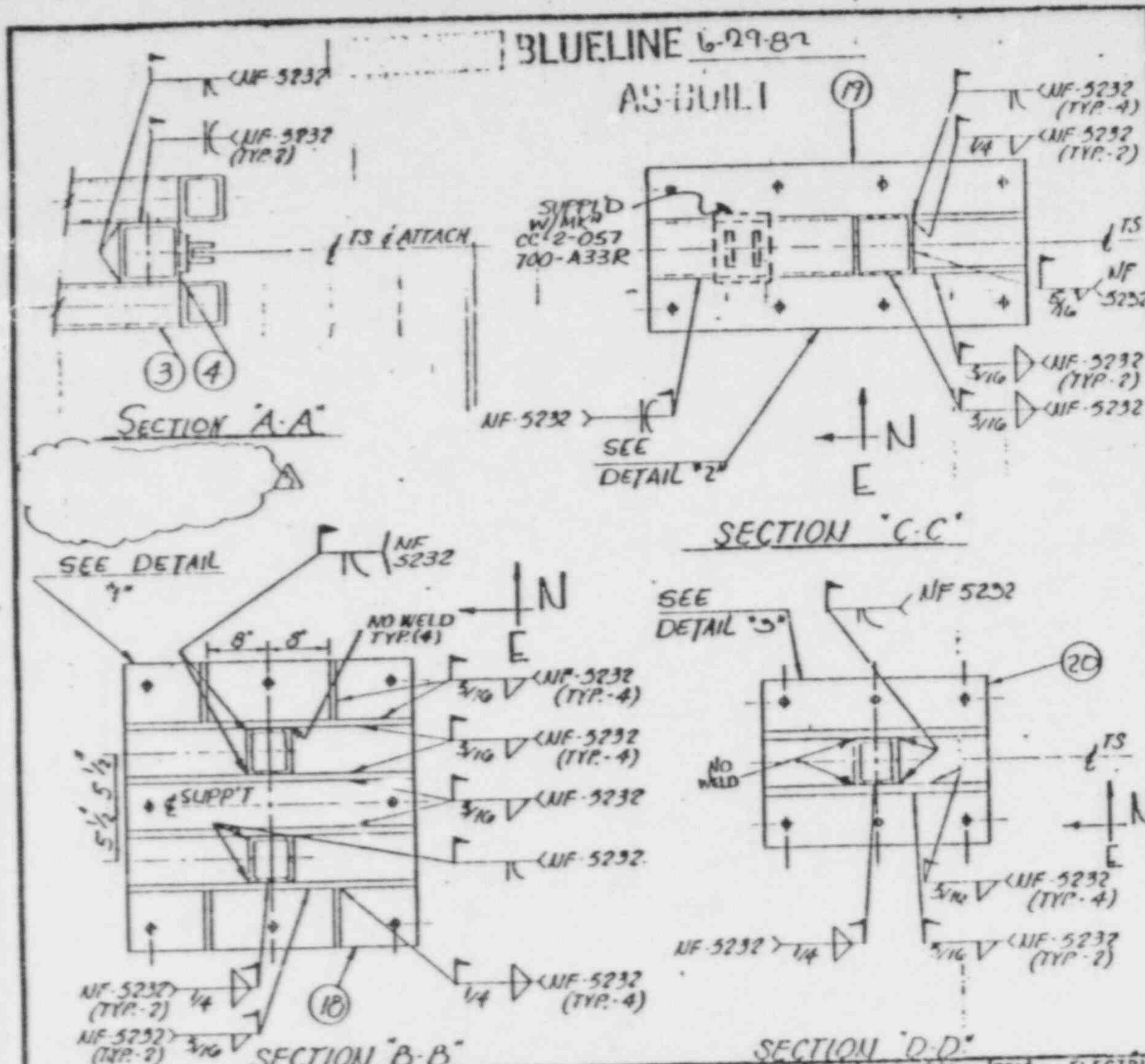
CLIENT T.U.S.I.
PLANT COMANCHE PEAK
JOB NO. 2323

SUPPORT NO. CC-2-087-700-A33K
SHEET 1 OF 3 REV. 3

FOR OFFICE AND ENGINEERING USE ONLY

BLUELINE 6-29-82

AS-BUILT



ITEM NO	QTY REQ'D	MATERIAL DESCRIPTION	PBS	L	CS	PRIM	SEC	AISC
21	1	SPC-24-240 PIPE CLAMP SA36			X			
22	1	XRB-24 REAR BRACKET (SA36)			X			

REV	DESCRIPTION	DATE	DWN.	CHKD.	APPVD.
Δ	REV'D VENDOR CERT.	10-6-83			

REV	DESCRIPTION	DATE	DWN.	CHKD.	APPVD.
Δ	REVD AS NTD; REF: CMC-76115		GIL		CBD
	R5; DCA-1607 NT 3 AS BUILT				

VD. DRAWING REV. 3 10-4-83

ASME CODE EDITION:

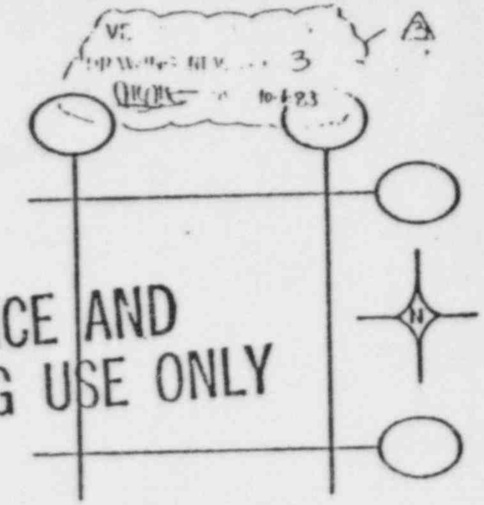
ADDENDA:

DESIGN SPEC:

P.E. CERTIFICATION

FOR OFFICE AND ENGINEERING USE ONLY

TO 21101



LOCATION PLAN

DATA PT	SUPPORT LOADS (LBS)					PIPE MVTS (INCHES)
1158	DESIGN	SERVICE LEVEL LIMITS A	B	C	D	
VERT.						
N-S						
E-W						

NOTE +N,E,UP -S,W,DN

AUTHORIZED NUCL. INSP. YES [X] NO [ ]

ASME CODE CLASS 3

REF. DWGS.	ISO.	REV	MECHANICAL	REV	ELECTRICAL	REV
	FAB. ISO.	REV	STRUCTURAL	REV	H.V.A.C.	REV
	CC-2-AB-014	2				

REV	DESCRIPTION	DATE	DWN.	CHKD.	APPVD.
0	ISSUED FOR CONST. USE PSDG PI		JTK		
Δ	REVD AS NTD. REF. FNHS (SEE SHT 2)				
	ADDED SHEET 3.				

Brown & Root, Inc.

HOUSTON, TEXAS

CLIENT T.U.S.I.

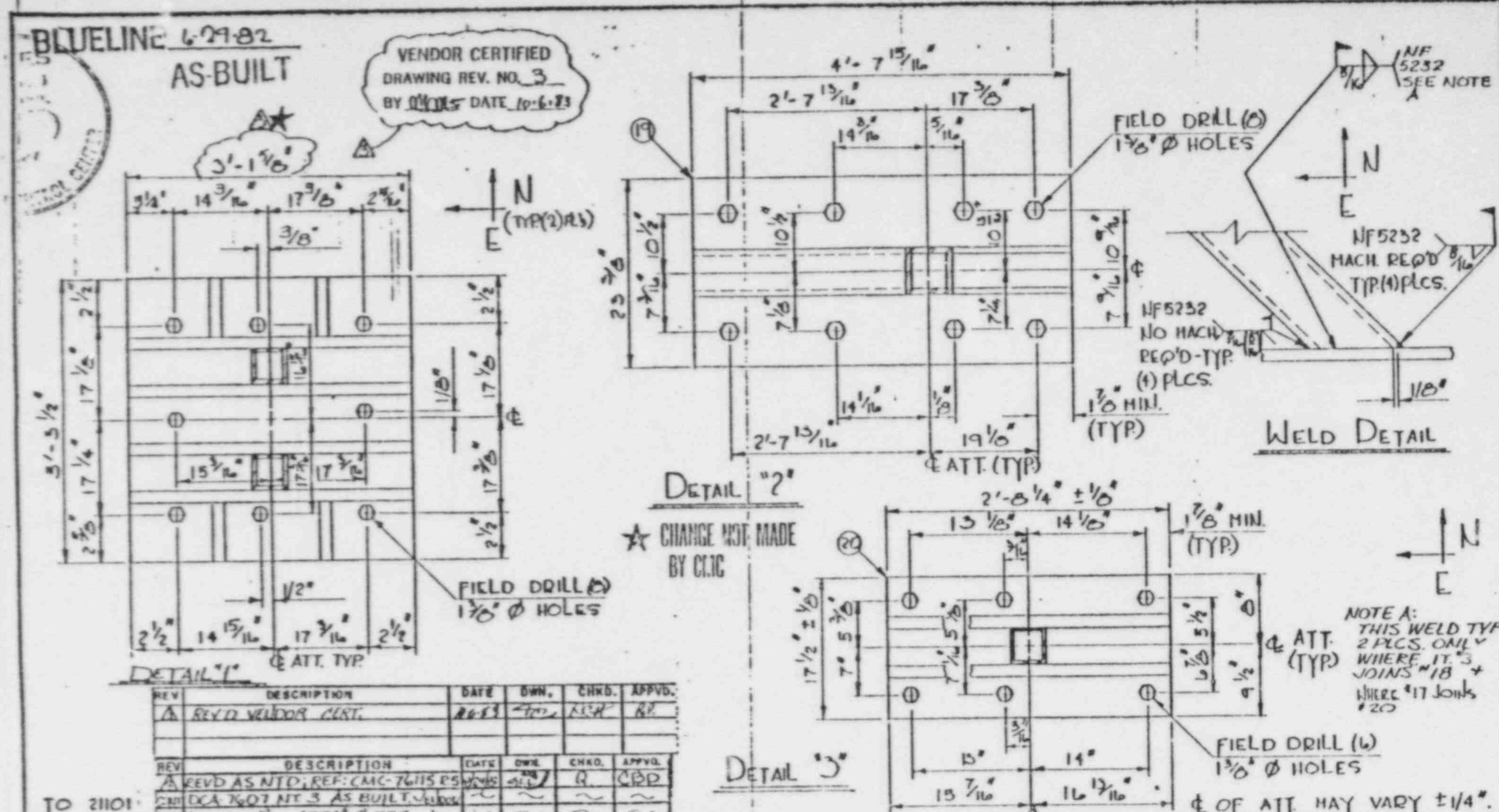
PLANT COMANCHE PEAK

JOB NO. 2323

SUPPORT NO. CC-2-087-700-A33K

SHEET 2 OF 3 REV. 3

FOR OFFICE AND ENGINEERING USE ONLY



REV	DESCRIPTION	DATE	DWN.	CHKD.	APPVD.
A	REV'D VENDOR CERT.				

REV	DESCRIPTION	DATE	DWN.	CHKD.	APPVD.
A	REV'D AS NTD; REF: CMC-76115 R5				CBD
	DCA-7607 NT 3 AS BUILT				

TO 21101

REV	DESCRIPTION	DATE	DWN.	CHKD.	APPVD.
A	ISSUE FOR CONST. REF. FHIIS (SEE NT. 2)				
	CONT. ABOVE				

DATA PT. 1158 — SUPPORT LOADS (lbs): DESIGN; SERVICE LEVEL LIMITS A B C D; PIPE MVTS (INCHES); VERT.; N-S; E-W

REF. DWGS.: ISO.; FAB. ISO. CC-2-AB-014 REV. 2; MECHANICAL; STRUCTURAL; ELECTRICAL; H.V.A.C.

AUTHORIZED NUCL. INSP. YES [X] NO [ ]
ASME CODE CLASS 3

Brown & Root, Inc.
HOUSTON, TEXAS

CLIENT T.U.S.I.
PLANT COMANCHE PEAK
JOB NO. 2323

SUPPORT NO. CC-2-081-700-A33R
SHEET 3 OF 3 REV. 3

FOR OFFICE AND
ENGINEERING USE ONLY

ENGINEERING USE ONLY

FORM DHE-5

TEXAS UTILITIES SERVICES INC.
COMANCHE PEAK S.E.S.
Agent For
DALLAS POWER & LIGHT COMPANY
TEXAS ELECTRIC SERVICE COMPANY
TEXAS POWER & LIGHT COMPANY

Date 7-30-87
Calc By GMC
Chk'd/Apprd. By: _____
Filing Code _____
Sheet No. 1 Of _____
G & H Job No. _____

Subject CC-2-087-700-A33K Ref. Dwg./Spec. No. _____

A500 REVIEW

$$\frac{8994}{28800} + \frac{1846}{14750} = 0.437$$

1) 8994# = SEE PAGE 5 OF CALCS, MAX BENDS

2) 28,800# = $S_y(0.66)(1.33)$ = (32.8KSI)(0.66)(1.33)

3) 14,750# $K\ell/r$ = 74 FOR A36 @ 200°

4) 1846 PAGE 19 OF CALCS

FORM DHE-5

TEXAS UTILITIES SERVICES INC.
COMANCHE PEAK S.E.S.
Agent For
DALLAS POWER & LIGHT COMPANY
TEXAS ELECTRIC SERVICE COMPANY
TEXAS POWER & LIGHT COMPANY

Date 4-28-83
Calc By br. Warden
Chk'd/Apprvd By SM 8.1.83
Subject CC-2-037-700-033K (2) As Built

Filing Code
Sheet No. 5 Of 19
G & H Job. No.
Ref. Dwg./Spec. No.

STRESS

MAXIMUM STRESS OCCURS IN MEMBER ③ LOADING 4

BENDING = 8993.8 < 22,900 #/in² OK

SHEAR = P/A = 17776/6 = 2963 < 15,300 #/in² OK

NOTE SEISMIC 'Z' CONTRIBUTION IS NEGLIGIBLE ie

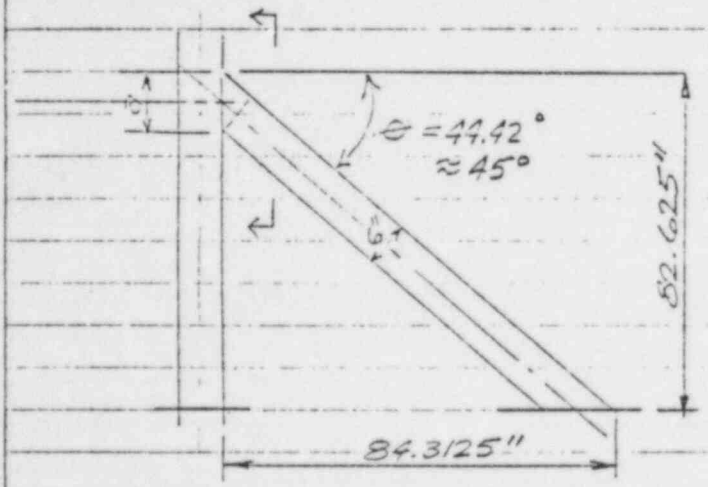
SHEAR = 98.1 x .40 = 39# } DISREGARD

BENDING = 155.8 x .40 = 62 in# }

REF: PSE SIDE SECT III FIG 2

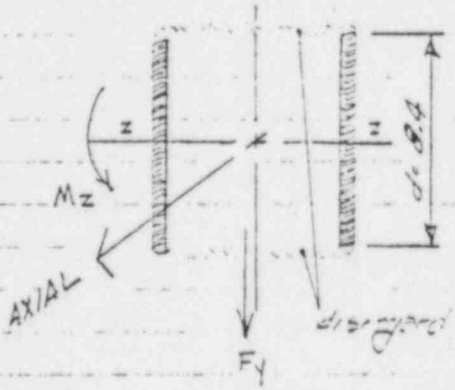
WELDING

CONSIDER JOINT 3. BETWEEN UPRIGHT AND SEAT LEG



TAN θ = 82.625/84.3125
= 44.42°

δ = 6 ÷ cos θ = 8.4"



properties: Aw = 16.8"

$S_{wz} = d^2/3 = 8.4^2/3 = 23.52$

$$f_r = \left[\left(\frac{F_a}{A_w} + \frac{M_z}{S_{wz}}\right)^2 + \left(\frac{F_y}{A_w}\right)^2\right]^{\frac{1}{2}} =$$

$$\left[\left(\frac{8390}{16.8} + \frac{57361}{23.52}\right)^2 + \left(\frac{8755}{16.8}\right)^2\right]^{\frac{1}{2}} = 2984 < 4242 \text{ \#/in} \quad \text{OK}$$

weld required (w) = 2984/.707x 18KN = .234 < .25" OK

NOTE: ABOVE ANALYSIS IS CONSERVATIVE IE WELD PROPERTIES COULD BE INCREASED BY TAKING ADVANTAGE OF THE TOE & HEEL WELD WHICH WERE PREPED AND WELDED PER SPEC.

TEXAS UTILITIES SERVICES INC.
COMANCHE PEAK S.E.S.
Agent For
DALLAS POWER & LIGHT COMPANY
TEXAS ELECTRIC SERVICE COMPANY
TEXAS POWER & LIGHT COMPANY

Date 5-3-83
Calc By D. Woden
Chk'd/Apprd. By SM 8.1.83
Subject CC-2-087-100-A33K (2) AS BUILT

Filing Code
Sheet No 19 Of 19
G & H Job No
Ref. Dwg./Spec. No

BUCKLING

CONSIDER MEMBER 7

f_a = Axial Force / Area = 12147 / 6.58 = 1846

KL/R = 1.0 x 113 / 1.54 = 73.4 $\Rightarrow F_A$ = 16,680

f_a / F_a = 1846 / 16,680 = 0.111 < 0.15 $\therefore$ COMBINE STRESS

So: $\frac{f_a}{F_a} + \frac{f_{by}}{F_{by}} + \frac{f_{bz}}{F_{bz}} = < 1.0$

$f_{by} = \frac{M_y}{S_y} = \frac{0}{S_y} = 0$

$f_{bz} = \frac{M_z}{S_z} = \frac{29400}{9.90} = 2970$ psi

$\frac{1846}{16,680} + \frac{2970}{22900} = .24 < 1.0$ $\therefore$ OK

MEMBER GOOD FOR COMPRESSION

ALL OTHER MEMBER STRESSES LESS CRITICAL
THEREFORE OK BY COMPARISON

ALL OTHER WELDS LESS CRITICAL $\therefore$ 'OK BY COMPARISON'

CONCLUSION

AS BUILT SUPPORT IS ADEQUATE FOR LOADS AS STATED

PSE GUIDE SECT II FIG 4 & 6

REF. 2.0.A 5.22 SECT. 1.6.1

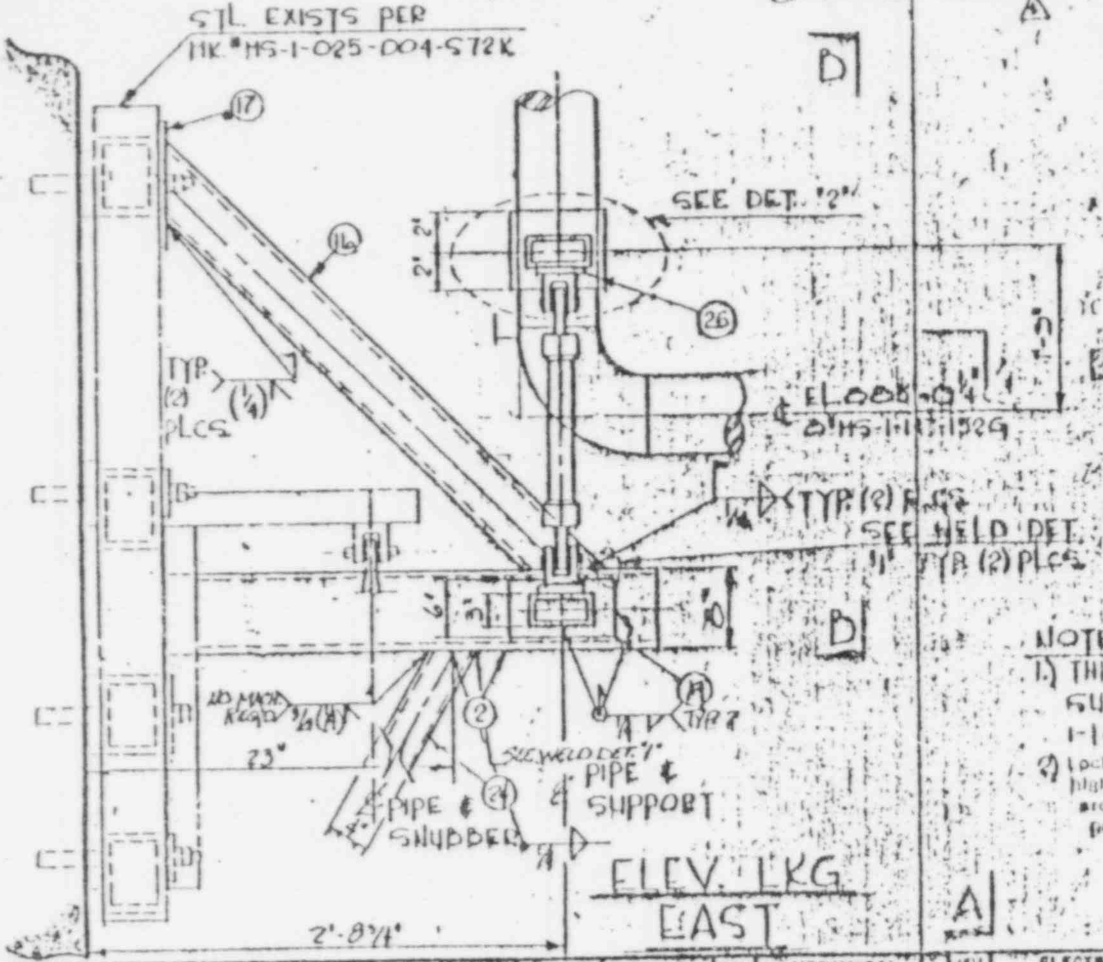
FOR OFFICE AND ENGINEERING USE ONLY

BLUELINE

AS-BUILT

FOR OFFICE AND ENGINEERING USE ONLY

VENDOR CERTIFIED
DRAWING REV. NO. 4
BY. RYV DATE 1-17-84



ITEM NO.	QTY. REQD.	MATERIAL DESCRIPTION
2	1	TS 10"x8"x.50x1'-8¼" LG (CUT TO SUIT) A500 GR.B
12	2	STRUT SPF-14-DA
15	2	℞ ½"x4"x1'-0" LG A36
16	1	TS 8"x6"x½"x3'-8" LG (FIELD CUT TO SUIT) A500 GR.B
17	1	½" CS ℞ 12"x12" LG A36
18	4	TS 6"x3"x3/8"x8" LG (FIELD TRIM TO SUIT) A500 GR.B
19	2	¾" CS ℞ 6"x10" LG SA-36
21	1	1½" CS ℞ PER DETAIL "B" A-36
22	4	1½" Ø x 12" LG FULL THREADED ROD A-36
23	8	1½" Ø HEAVY HEX NUT
24	1	TS 6"x4"x½"x3'-9" LG (A500 GR.B)
26	4	℞ 1"x4½"x7"

REV	DESCRIPTION	DATE	DWN.	CHKD.	APPVD.
A	ISSUED FOR CONST. BEF. P.S.E.R.O. 11,900	[illegible]	YCM	[illegible]	[illegible]
	CONSTRUCTION				

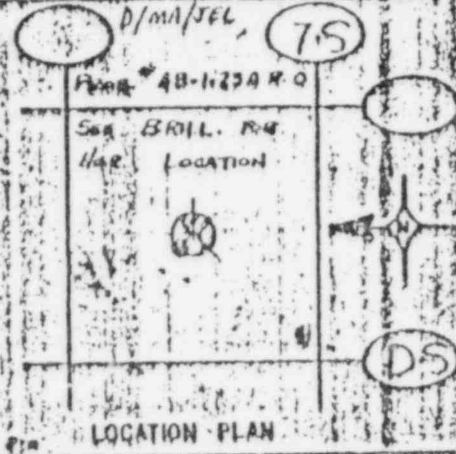
REV	DESCRIPTION	DATE	DWN.	CHKD.	APPVD.
A	REV'D VENDOR CERT.	[illegible]	BOB	ZE-H	[illegible]
3	REV'D VENDOR CERT.	[illegible]	[illegible]	[illegible]	[illegible]
A	REV'D VENDOR CERT.	1-18-84	RB	[illegible]	[illegible]

ASME CODE EDITION:
ADDENDA:
DESIGN SPEC: MS-46B

NOTES:

1. THIS SUPPORT VOIDS & SUPERCEDES MK # HS-1-147-001-S75R.
2. Locking devices for high strength bolts are not required per DCA 7607

D/MA/JEL, 7S



LOCATION PLAN

DATA PT.	SUPPORT DESIGN	LOADS (lbs) SERVICE LEVEL LIMITS A	B	C	D	PIPE MVTS (INCHES)
2350						
VERT.		[illegible]	[illegible]	[illegible]		[illegible]
N-S						
E-W						

AUTHORIZED NUCL. INSP. YES ☐ NO ☒
ANSI CODE CLASS B31.1

REF. DWGS.	ISO./FAB. ISO.	REV.	MECHANICAL / STRUCTURAL	REV.	ELECTRICAL / H.V.A.C.	REV.
	BRILL ISO. HS-1-SB-047	2	M1-0L00	5	E1-0L02-0?	7
	FAB. ISO. HS-1-SB-047	1	S1-0L14	3	M1-0L55	6

REV	DESCRIPTION	DATE	DWN.	CHKD.	APPVD.
A	REV'D AS-BUILT PER CMC [illegible]	[illegible]	[illegible]		CBC

Brown & Root, Inc.
HOUSTON, TEXAS

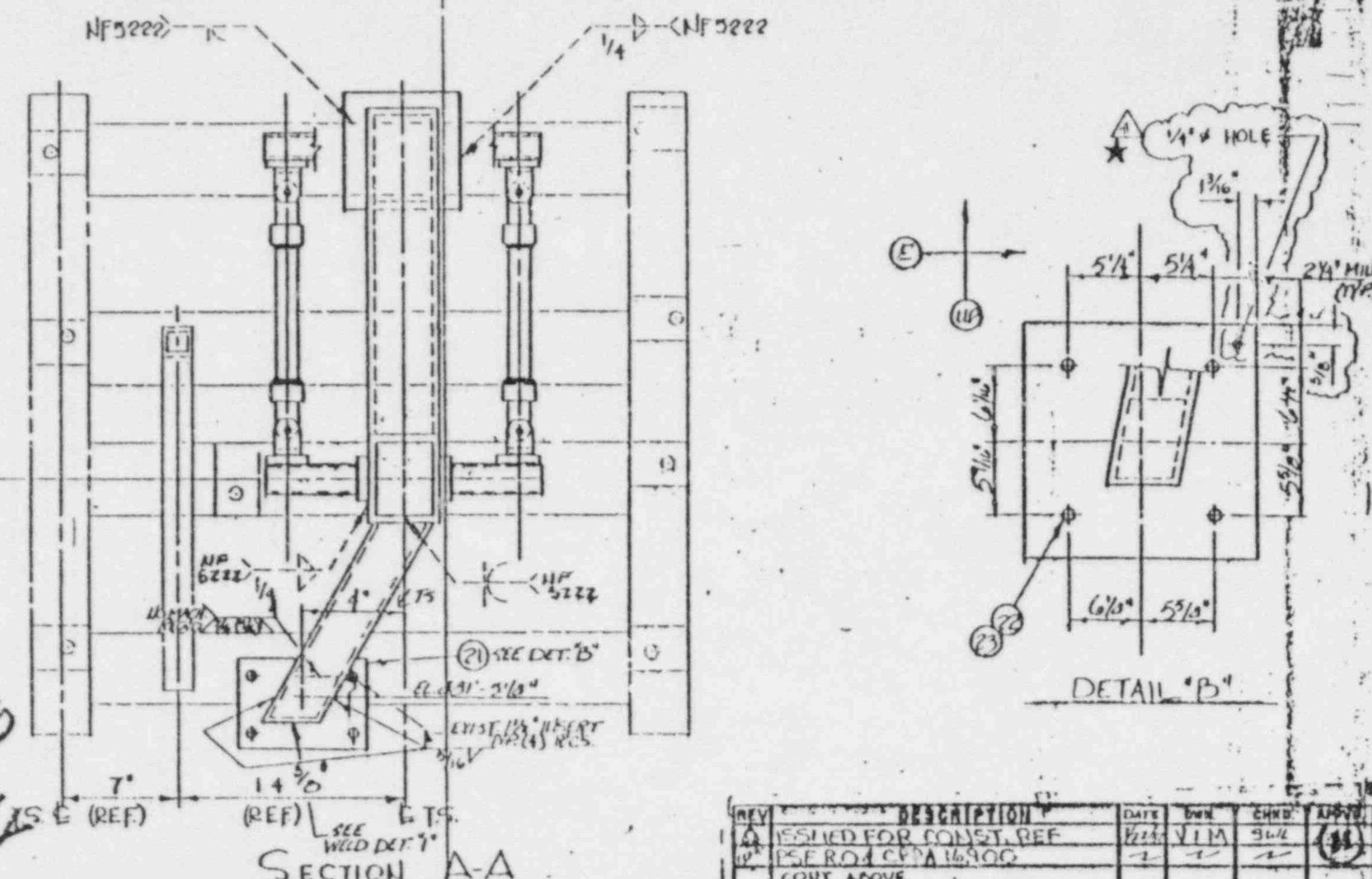
CLIENT T.U.S.I.
PLANT COMANCHE PEAK
JOB NO. 2323

SUPPORT NO. HS-1-147-700-S15R
SHEET 1 OF 3 REV. 4

BLUELINE EXEMPT

AS-BUILT
VENDOR CERTIFIED
DRAWING REV. NO. 4
BY RW DATE 1-17-84

★ CHANGE NOT MADE BY CMC



REV	DESCRIPTION	DATE	DWN.	CHKD.	APPVD.
2	REV'D VENDOR CERT.	[illegible]	RK		
3	REV'D VENDOR CERT.	11-10-83	RK		
4	REV'D VENDOR CERT.	1-18-84	RK		

REV	DESCRIPTION	DATE	DWN.	CHKD.	APPVD.
0	ISSUED FOR CONST. REF.	[illegible]	VLM	[illegible]	
1	PSE R0.4 CPPA 16900				
	CONT. ABOVE				

REV	DESCRIPTION	DATE	DWN.	CHKD.	APPVD.
1	REV'D AS NT'D. REF. CHC 69689,	10-10-83			CBD
[illegible]	RY2, DCA 7607 (NT 1) AS-BUILT				
[illegible]	VENDOR CERTIFICATION, CPPA # 23637				

DATA PT.	SUPPORT DESIGN	SERVICE LOADS A	(lbs) LEVEL B	LIMITS C	D	PIPE MVTS (INCHES)
VERT.						
N-S						
E-W						

NOTE: * N, E, UP - S, W, DN

AUTHORIZED NUCL. INSP. - YES ☐ NO ☒

ANSI CODE CLASS B31.1

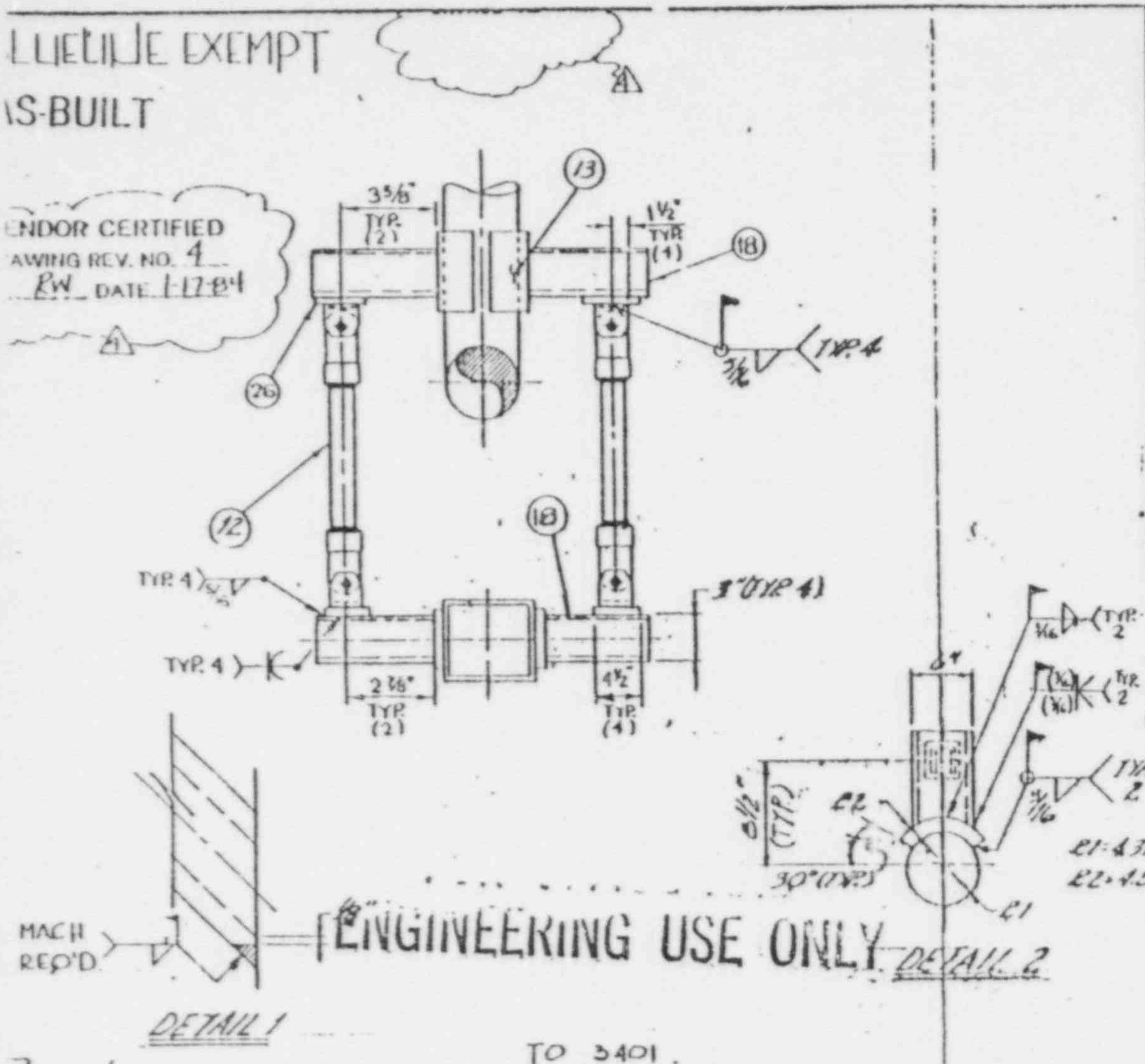
REF. DWGS.	ISO.	REV.	MECHANICAL	REV.	ELECTRICAL	REV.
	FAB. ISO.	REV.	STRUCTURAL	REV.	H.V.A.C.	REV.

Brown & Root, Inc.
ENGINEERS AND CONSTRUCTORS
HOUSTON, TEXAS

CLIENT T.U.S.I.
PLANT COMANCHE PEAK
JOB NO. 2323

SUPPORT NO. MS-1-147-700-S75R
SHEET 2 OF 5 REV. 4

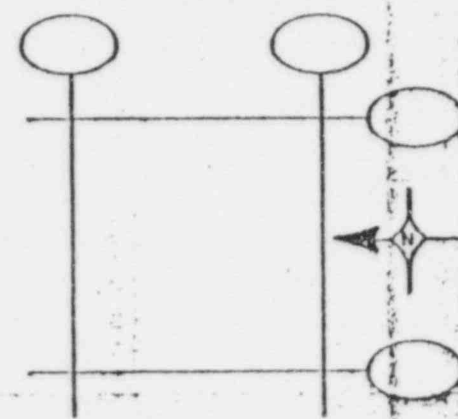
FOR OFFICE AND
ENGINEERING USE ONLY



ITEM NO.	QTY. REQ'D.	MATERIAL DESCRIPTION	

REV	DESCRIPTION	DATE	DWN.	CHKD.	APPVD.
Δ	REV'D AS IIT'D REF CMC 49689 REV	11-4-83			
	DCA 7607 (IIT'D) AS-BUILT VENDOR				
	CERTIFICATION, CPPA# 23637				
Δ	REV'D VENDOR CERT.	10-28-83	RWB		
3	Rev'd Vendor Cert.	11-10-83			
Δ	REV'D VENDOR CERT.	1-18-84			

ASME CODE EDITION: ____
ADDENDA: ____
DESIGN SPEC: ____



LOCATION PLAN

CPSES 35-1195 CONTROL ... CENTER

REV	DESCRIPTION	DATE	DWN.	CHKD.	APPVD.
Δ	ISSUED FOR CONST. REF. PSE RO	12-3-82	VLM	S.I.T.	
	1CPPA 16900				
	CONT ABOVE				

SUPPORT LOADS (lbs)					PIPE MVTS (INCHES)	REF. DWGS.
DESIGN	SERVICE LEVEL LIMITS A	B	C	D		

ISO.	REV.	MECHANICAL	REV.	ELECTRICAL	REV.
FAB. ISO.	REV.	STRUCTURAL	REV.	H.V.A.C.	REV.

AUTHORIZED NUCL. INSP. YES ☐ NO ☒
ASME CODE CLASS B31.1

Brown & Root, Inc. HOUSTON, TEXAS

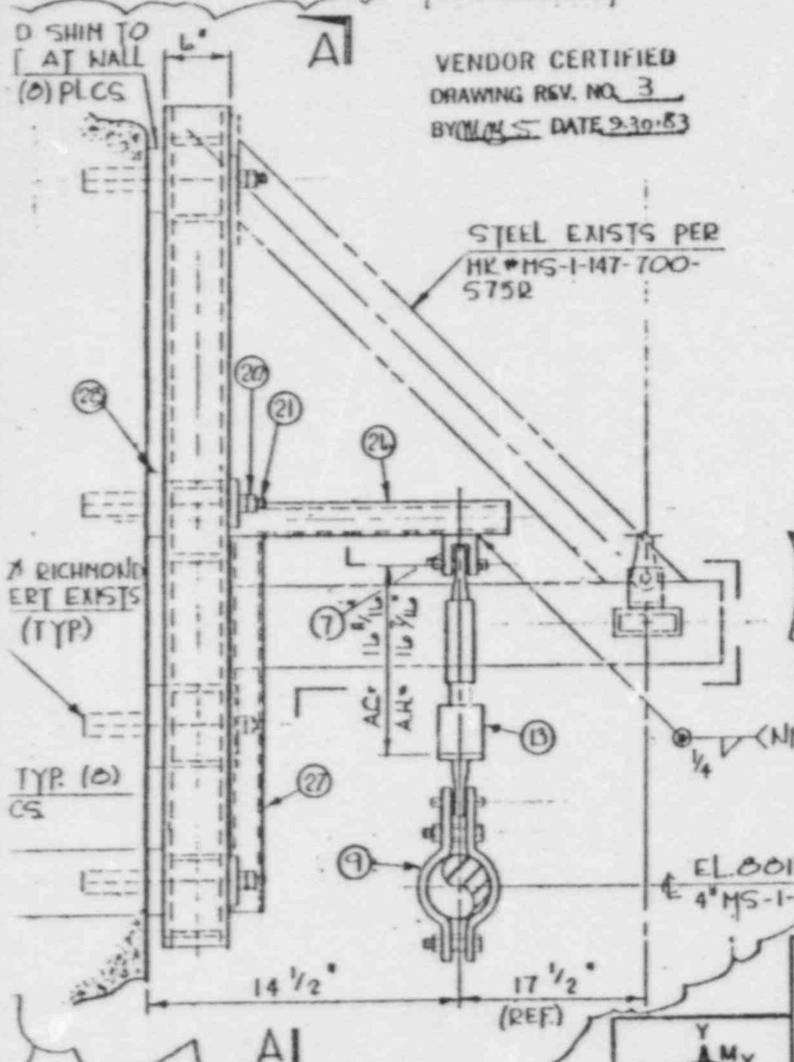
PLANT COMANCHE PEAK
JOB NO. 2323

SUPPORT NO. MS-1-1ST-700-ST...
SHEET 2 OF 2 REV. ...

BLUELINE 13 Sept. 81

AS-BUILT

VENDOR CERTIFIED
DRAWING REV. NO. 3
BY M.M.S. DATE 9-30-83



NOTES:

4) Locking devices for high strength bolts are not required per DCA 7607

5) FIELD TRIM ITEM (21) THESE LOC. TO SUIT WITH A MIN. OF (2) EXPOSED FULL THREADS & USE (1) HEX NUT (ITEM 20) ONLY AT THIS LOCATION WITH THREADS UPSET ON ITEM (21).

MOVEMENTS

X = +.314
Y = +.250
Z = +.210

ITEM NO.	MATERIALS & OPERATIONS	QUAN	SHIP
7	ARB-10 REAR BRACKET (A-6L-B-D/SA-36)	1	
9	SPC-10-040 PIPE CLAMP (SA-36)	1	
13	SNF-3-50 SNUBBER	1	
19	1/2" CS PL PER DET 19 FIELD TRIM TO SUIT (A36)	8	
20	FBN-1 1/2" Ø HEAVY HEX NUT	14	
21	BFT-12 x 18" LG THREADED ROD 4" HIL EMB FIELD TRIM TO SUIT	8	
23	TS 8"x10"x1/2"x 3'-10" LG FIELD CUT TO SUIT (A500 GR.B)	2	
24	TS 8"x6"x1/2"x 2'-1" LG FIELD CUT TO SUIT (A500 GR.B)	4	
26	TS 4"x4"x1/2"x 15" LG FIELD TRIM TO SUIT A500 GR.B	1	
27	TS 4"x4"x1/2"x 23" LG (A500 GR.B)	1	
28	1 1/4" CS 16"x8" W/ 1 5/8" Ø HOLE IN CTR (A36/SA515 GR.65)	8	
29	SHIM PL PER DET. B (A36)	1	
30	SHIM PL PER DET. C (A36)	1	

REV	DATE	DWN	CHK	APP	DESCRIPTION
1					ISSUE FOR CONST EW1
2					REVD AS NOTED PER IT HEW 1
3					REV'D. AS NOTED - F.M.H.S. COIL BELOW

MARK # MS-1-025-004-S72R
PAINT: CARBO ZINC # 11

FOR OFFICE AND ENGINEERING USE ONLY

FOR MATERIALS AND OPERATIONS SEE SKETCH NO. ____ SHEET ____ OF ____

BROWN & ROOT, INC.
ENGINEERS & CONSTRUCTORS

REF. DRAWING NUMBERS
PIPE: M-0600-R5 ELECT: E1-0603-R
STEEL: S1-0614-R3 HV.A.C.: M-0655-R

CONDITIONS	Fx	Fy	Fz	Mx	My	Mz
DESIGN						
NORMAL & UPSET	—	747				
EMERGENCY	—	1945				
FAULTED						

REV	DATE	DWN	CHK	APP	DESCRIPTION
1	9-30-83		Q		REVD AS NTD. PER CMC 50661 R5; DCA 7607 (NT 4) ADDED SHEET 2 OF 2 AS-BUILT VENDOR CERTIFICATION; CMC# 8561

SEE BRK. FOR HANG. LOC.

LOCATION PLAN

THIRD PARTY INSPECTION
CODE CLASS: ASME III-2

B&HL Iso. MS-1-SB-07-R3
I.P.D. Iso. MS-1-SB-07-R2-H
Data Point 5951/AB-1-800 R0
Pipe Mat'l. SA-333 GR6
Insul. 2" Bldg. SB

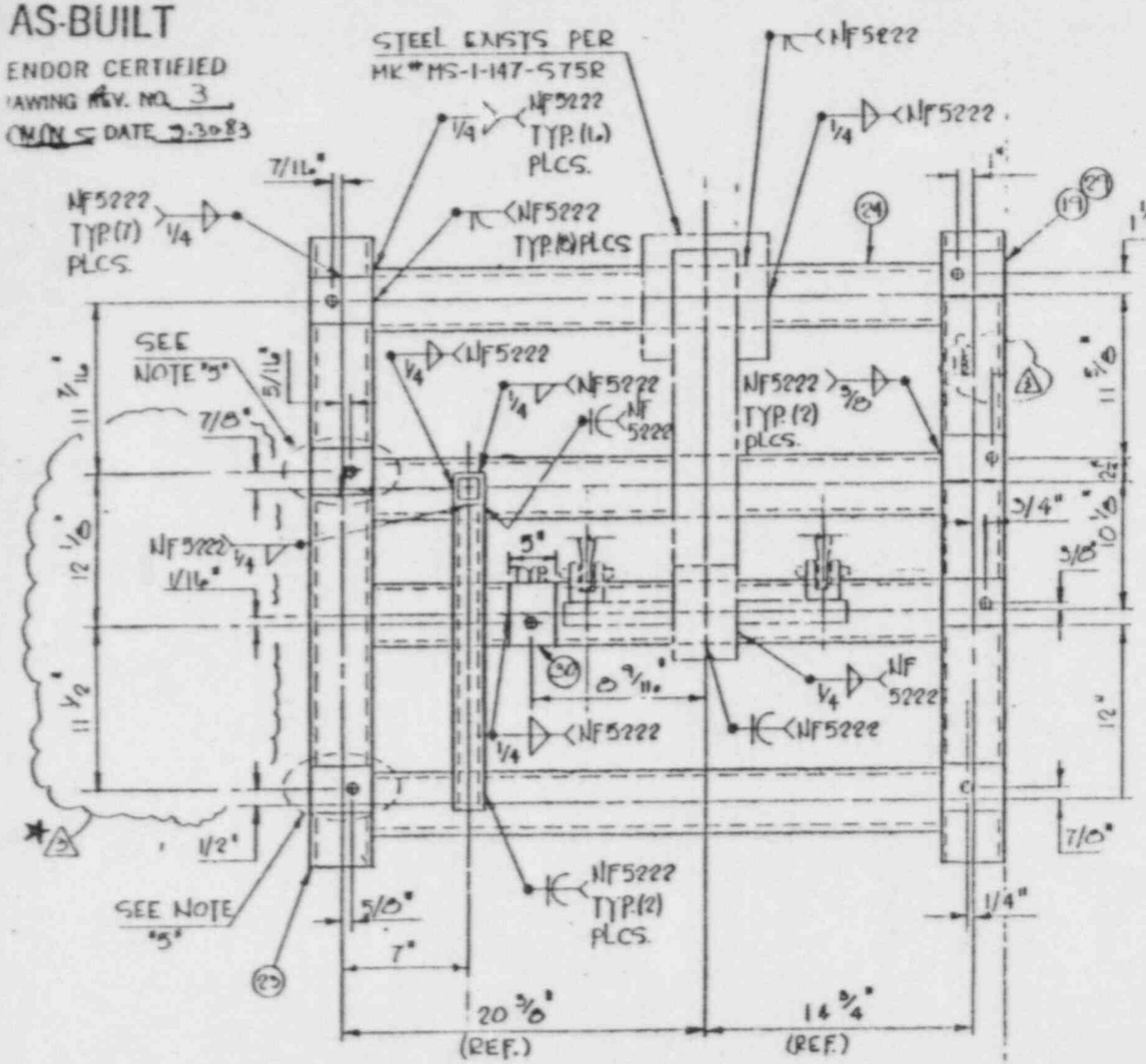
CUSTOMER Texas Utilities Service, Inc.
ORDER OR CONT. NO. CP-0046
JOB NAME Comanche Peak 1 & 2
MARK NO. MS-1-025-004-S72R
SKETCH NO.
SHEET 1 OF 2 REV 3

AS-BUILT

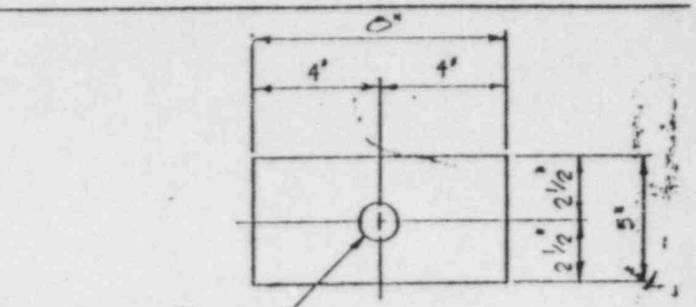
ENDOR CERTIFIED

AWING REV. NO. 3

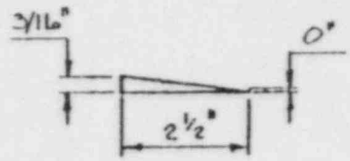
DATE 3-30-83



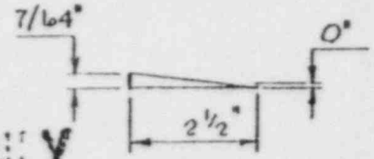
SECTION A-A



DETAIL #19



DETAIL B



DETAIL C

FOR OFFICE AND ENGINEERING USE ONLY

☆ CHANGE NOT MADE BY CMC

BROWN & ROOT, INC.
ENGINEERS & CONSTRUCTORS

REF. DRAWING NUMBERS

PIPE: ELECT:

STEEL: H.V.A.C.:

REV	DATE	DWN	CHK	APP	DESCRIPTION
3	3-30-83	RD	Q	GD	ISSUE FOR AS-BUILT. REF CHG. DOCUMENTS DCA 76070 II 4
~	~	~	~	~	VENDOR CERTIFICATION REF. CPPA 83-601

CUSTOMER Texas Utilities Service, Inc.

ORDER OR CONT. NO. CP-0046

JOB NAME Comanche Peak 1&2

MARK NO. MS-1-025-004-S72R

SKETCH NO.

SHEET 2 OF 2 REV. 3

THIRD PARTY INSPECTION ☒ YES ☐ NO

CODE CLASS: ASME III - 2

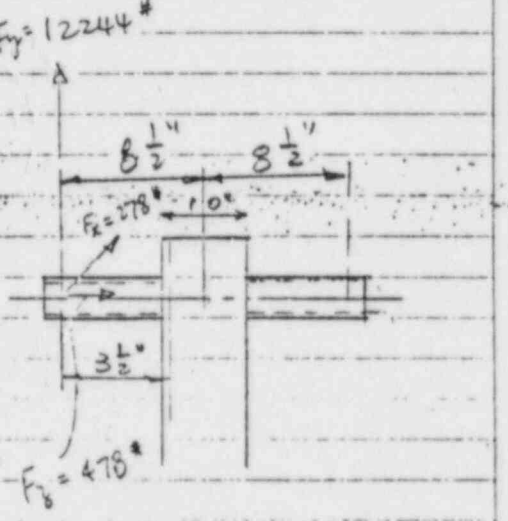
TO 3705

FORM DHE-5

TEXAS UTILITIES SERVICES INC.
COMANCHE PEAK S.E.S.
Agent For
DALLAS POWER & LIGHT COMPANY
TEXAS ELECTRIC SERVICE COMPANY
TEXAS POWER & LIGHT COMPANY

Date 10.13.83
Calc By T. HILO
Chk'd/Appvd. By SM 10-13-83
Filing Code
Sheet No. Of
G & H Job. No.
Subject MS-1-025-004-S72K
MS-1-147-700-S75R
Ref. Dwg./Spec. No.

ON STRUDL SHOWN.
MEMBER 4 HAS HIGHEST STRESS



$M_x = F_y \times \ell$
$= 1224 \times 3.5 = 4285$ "#

$M_y = F_x \times \ell$
$= 278 \times 3.5 = 973$ "#

$F_y = 1224$ #

$F_x = 278$ #

$F_z = 478$ #

MEMBER TS 6×3×3/8": $A = 5.83$ $A_y = 2.25$ IN² $A_x = 4.5$ IN²
$S_y = 7.92$ IN³ $S_x = 5.19$ IN²

$f_a = \frac{F_z}{A} = \frac{478}{5.83} = 81$ PSI

$\frac{K\ell}{r} = \frac{2.1 \times 2.5}{1.16} = 45.34$ — $F_a = 19410$ PSI

$f_{bx} = \frac{M_x}{S_x} = \frac{42854}{5.19} = 8257$ PSI (ADD)

$f_{by} = \frac{M_y}{S_y} = \frac{973}{7.92} = 123$ PSI

$\frac{f_a}{F_a} + \frac{f_{bx} + f_{by}}{F_b} = \frac{81}{19410} + \frac{123 + 8257}{21600} = 0.392 < 1$

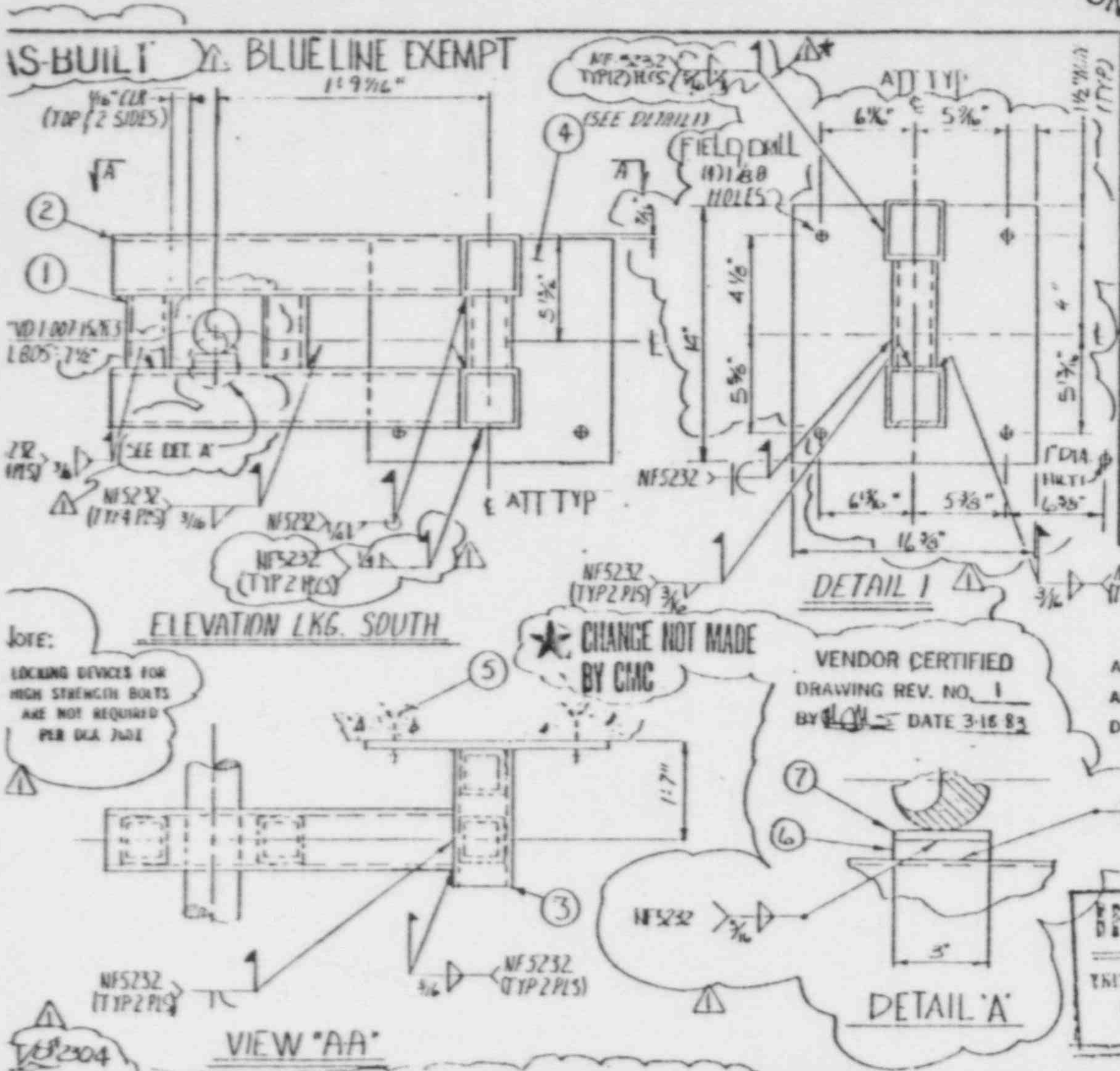
O.K

SHEAR STRESS

$f_v = \left[\left(\frac{F_y}{A_y}\right)^2 + \left(\frac{F_x}{A_x}\right)^2\right]^{\frac{1}{2}} = \left[\left(\frac{1224}{2.25}\right)^2 + \left(\frac{278}{4.5}\right)^2\right]^{\frac{1}{2}} = 544.2$ PSI

FOR ENGINEERING & OFFICE USE ONLY

FOR OFFICE AND ENGINEERING USE ONLY



ITEM NO.	QTY. REQ'D.	MATERIAL DESCRIPTION	PBS	L	CSS	PRIM	SEC.	AISC
1	4	TS 2 x 2 x 1/4" x 0'-6" LG (CUT TO SUIT) A500 GRB		X		X		
2	2	TS 4 x 4 x 3/8" x 2'-2" LG (CUT TO SUIT) A500 GRB		X		X		
3	2	TS 4 x 4 x 3/8" x 1'-11" LG (CUT TO SUIT) A500 GRB		X		X		
4	1	PL 1" THK (SEE DETAIL 1) SA-36/SA515 GR 65	X			X		
5	4	1" x 12" SUPER HILTI KWIK CONCRETE ANCHOR (MIN EMB = 8 1/2")			X	X		
6	1	1/4" CS PL 3" x 4 1/2" LG SHIM SA36	X			X		
7	1	5/8" CS PL 3" x 5 1/4" LG SHIM SA36	X			X		

REV	DESCRIPTION	DATE	DWN.	CHKD.	APPVD.
	VENDOR CERTIFICATION REF SPEN Z 2190				

PROB.# AB-1-N048, R.0

VENDOR CERTIFIED
DRAWING REV. NO. 1
BY [illegible] DATE 3-16-83

ASME CODE EDITION: 1974
ADDENDA: WINTER
DESIGN SPEC: MS-46A

LOCATION PLAN

INFORMATION COPY

VD 2304

REF. DWGS.	BRHL ISO.	REV.	MECHANICAL	REV.	ELECTRICAL	REV.
	VD-1-SB-005	1	M1-0733	2	E1-0700-01	6
	FAB. ISO.	REV.	STRUCTURAL	REV.	H.V.A.C.	REV.
	VD-1-SB-005	2	S-0711	6	M1-0752	6

REV	DESCRIPTION
	[illegible]
	REVD AS NTD REF. CMC [illegible]
	DCA 7601 "CONT ABOVE"

Brown & Root, Inc.
HOUSTON, TEXAS

CLIENT T.U.S.I.
PLANT COMANCHE PEAK
JOB NO. 2323

SUPPORT NO. VD-1-007-706-A33R
SHEET 1 OF 1 REV. 1

FORM

TEXAS UTILITIES SERVICES INC.
COMANCHE PEAK S.E.S.
Agent For
DALLAS POWER & LIGHT COMPANY
TEXAS ELECTRIC SERVICE COMPANY
TEXAS POWER & LIGHT COMPANY

Date 7-31-84
Calc By GMC
Chk'd/Apprd. By
Subject VD-1-007-706-A33R

Filing Code
Sheet No Of
G & H Job No
Ref. Dwg./Spec. No

1.) 11700 SEE CALCS

2) 28800 F_B PER D.G. Sec III, PAGE 6 OF 17

TEXAS UTILITIES SERVICES INC.
COMANCHE PEAK S.E.S.
Agent For
DALLAS POWER & LIGHT COMPANY
TEXAS ELECTRIC SERVICE COMPANY
TEXAS POWER & LIGHT COMPANY

Date 8/21/81 | Filing Code
Calc By BBWADLEY | Sheet No. 2 of 8
Chk'd/Apprd. By H. PATEL | G & H Job. No.
Subject VD-1-007-706-A33P REV. 0 | Rel. Dwg./Spec. No.

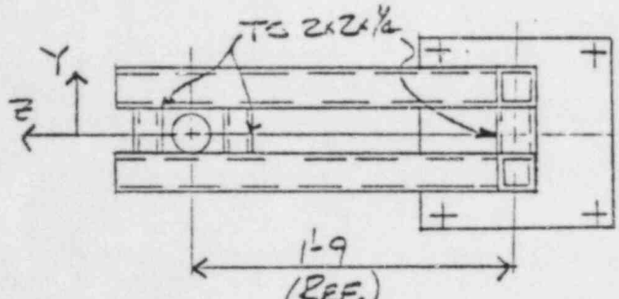
1. NOTE: ORG. DESIGN W/2 STRUTS FOR THIS SUPPORT HAS BEEN CHANGED TO THIS DESIGN AS REQUESTED BY THE FIELD

2. LOADING

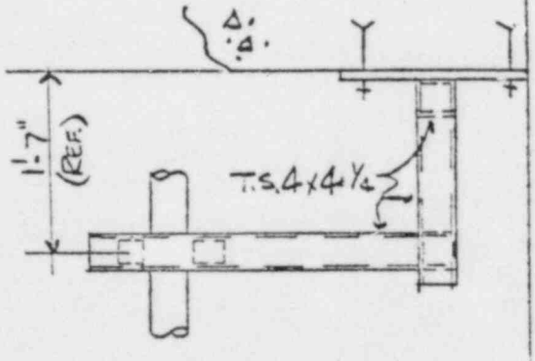
	(Y)	(Z)
LEVEL A	121#	880#
B	893#	1241#
C	1216#	1415#
D	1216#	1415#

	T.S. 4x4x¼	T.S. 2x2x¼
A	2.68	1.68
I	5.58	.852
S	4.29	.852
J	13.2	

3. SUPPORT CONFIGURATION

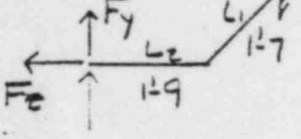


ELEV. LKG. SOUTH



PLAN VIEW ⊥H

4. DEFLECTIONS SEE STRUDL ANAL. J1217A SEPT 23-81 BY GCUG & GM



ASSUME THIS CONFIG. AND DOUBLE "I."

$$\Delta y = \frac{F_y L_2^3}{3EI} + \frac{F_y L_1^3}{3EI} + \frac{F_y L_2^2 L_1}{GJ}$$

$$\Delta y = \frac{(893)(21)^3}{3(27.7\times10^6)(2)(8.58)} + \frac{(893)(19)^3}{3(27.7\times10^6)(2)(8.58)} + \frac{(893)(21)^2(19)}{(10.5\times10^6)(2)(13.2)}$$

$$\Delta y = 0.037" < 0.063" (1/16")$$

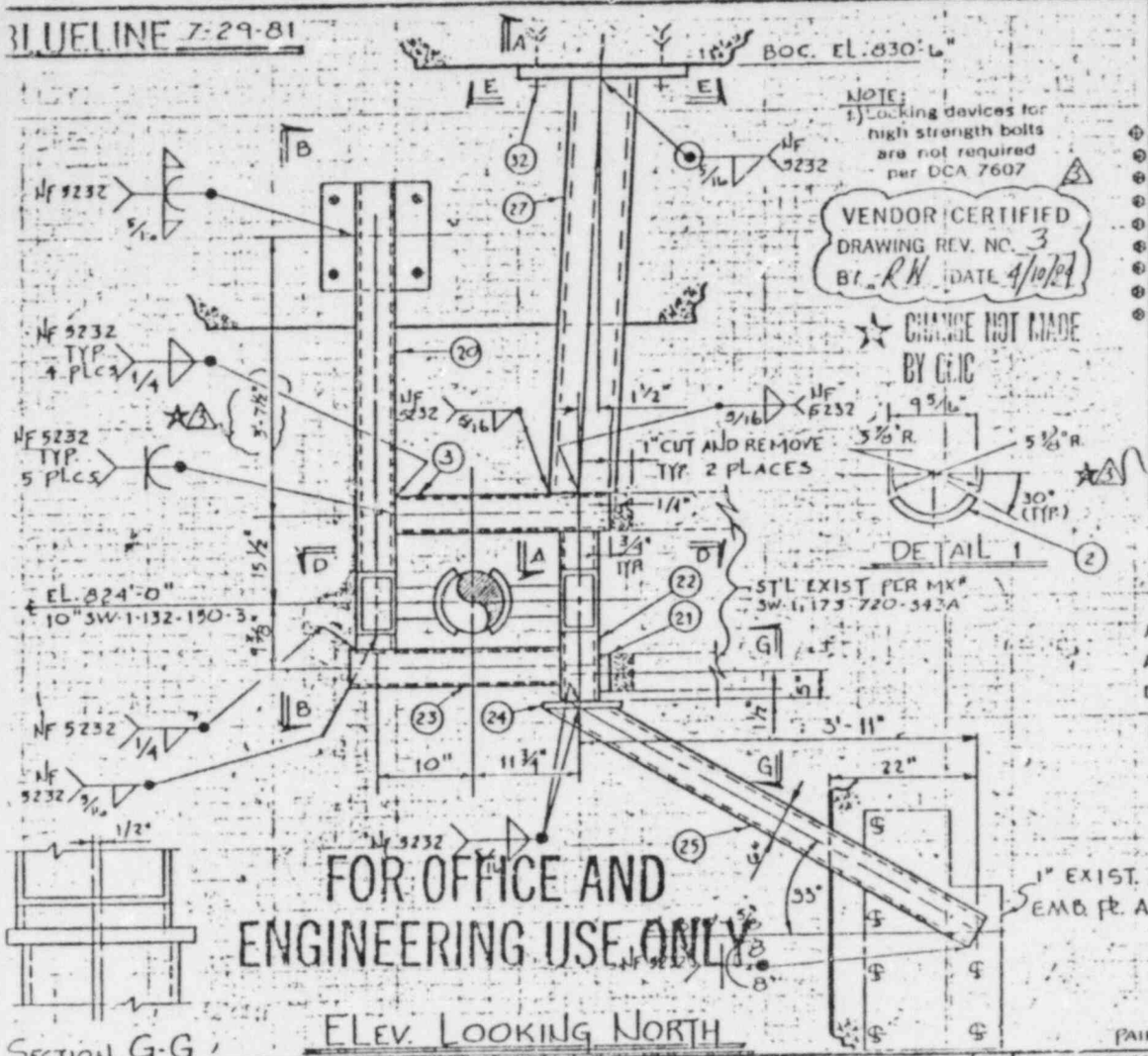
$$\Delta z = \frac{F_z L_1^3}{3EI} = \frac{(1241)(19)^3}{3(27.7\times10^6)(8.58)} = 0.01" < 0.063" (1/16") \text{ (CONSERV.)}$$

5. STRESS: MAX. AT BASE PL (CONSERVATIVE CALC.)

$$f_b = M/S = (1216)(19) + (1415)(19)/4.29 = 11.7 \text{ ksi} < 30.6 \text{ ksi}$$

NOTE: FOR WELD TUBE SIZE IS INCREASED TO TS 4"x4"x3/8" CALCS. NOT CHANGED AS IT IS CONSERVATIVE.

BLUELINE 7-29-81



ITEM NO.	QTY. REQ'D.	MATERIAL DESCRIPTION	PSS	CSS	PSW	SEC.	MISC.
1	2	6"ø SCH. 80 PIPE SA-106 GR. B					
2	2	1/2" THK. PL 12"x 19" LG. SEE DETAIL					
		ASME-NJD SA-36					
3	1	T.S. 10"x6"x 1/2"x 8'-9" FIELD CUT TO SUIT A500 GR. B					
4	1	T.S. 10"x6"x 1/2"x 8'-9" FIELD CUT TO SUIT A500 GR. B					
11	4	1 1/4"ø x 18" SUPER HILTI KWIK BOLTS MIN. EMB. 13 1/8"					
15	1	1" C.S. PL PER SECTION "C-C" SA 36/SA515 GR. 65					
17	1	1" C.S. PL PER. SECTION "F-F" SA-36/SA515 GR. 65					
20	1	T.S. 10"x6"x 1/2"x 6'-9" FIELD CUT TO SUIT A500 GR. B					
21	1	T.S. 10"x6"x 1/2"x FIELD CUT TO SUIT A500 GR. B					
22	1	T.S. 10"x6"x 1/2"x 2'-6" A500 GR. B					
23	1	T.S. 10"x6"x 1/2"x 23" FIELD CUT TO SUIT A500 GR. B					
24	1	1" THK. C.S. PL. x 12" x 12" SA-36/SA515 GR. 65					
25	1	T.S. 10"x6"x 1/2"x 5'-6" FIELD CUT TO SUIT A500 GR. B					
27	1	T.S. 10"x6"x 1/2"x 5'-3" LG. FIELD CUT TO SUIT A500 GR. B					
28	1	1" THK. C.S. PL. PER SECTION "E-E" SA36/SA-515 GR. 65					
29	1	T.S. 10"x6"x 1/2"x 9'-0" FIELD CUT TO SUIT A500 GR. B					
30	1	1" THK. C.S. PL. PER SECT "C-C" SA36/SA515 GR. 65					
31	B	1 1/4"ø x 15" LG. SUPER HILTI KWIK BOLT MIN. EMB. 8 5/8"					
32	4	1 1/4"ø x 12" LG. SUPER HILTI KWIK BOLT MIN. EMB. 8 5/8"					

REV	DESCRIPTION	DATE	DWN.	CHKD.	APPVD.
1	VENDOR CERTIFICATION REF. CMC 56844	10/1/83	[illegible]	[illegible]	C.E.D.
2	PER DCA 7607 SEE NT "1, CPPA 33197	~	~	~	~
3	REVD VENDOR CERT. REF. CMC 55827, E.5	4-10-84	BAR	[illegible]	[illegible]

ASME CODE EDITION: 1974
ADDENDA: WINTER
DESIGN SPEC: MS-46A

① ST'L PREVIOUSLY SUPPL'D W/ SW-1-173-720-543A
② ST'L PREVIOUSLY SUPPL'D W/ SW-1-173-720-543A AS ITEM "2

PROB." AB-1-068X R-1
AB-1-068Y R-0

TO "402
PAINT: CARBO ZINC "11

B-S D/EN/TGT
B-S
SEE BRHL FOR HGR LOCATION
N
LOCATION PLAN

DATA PT.	SUPPORT LOADS (lbs) DESIGN	SERVICE LEVEL LIMITS A	B	C	D	PIPE MVTS (INCHES)
1857						
VERT.						
N-S	FOR DESIGN LOADS SEE SHEET 2 of 2					
E-W						
NOTE N,E,UP S,W,DN						

AUTHORIZED NUCL. INSP. YES ☒ NO ☐
ASME CODE CLASS 3

REF. DWGS.	BRHL ISO.	REV.	MECHANICAL	REV.	ELECTRICAL	REV.
	SW-1-SB-008	B	M1-0603	12	E1-0602-01	1
	FAB. ISO.	REV.	STRUCTURAL	REV.	H.V.A.C.	REV.
	SW-1-SB-008	4	S1-0605	10	M1-0652	6

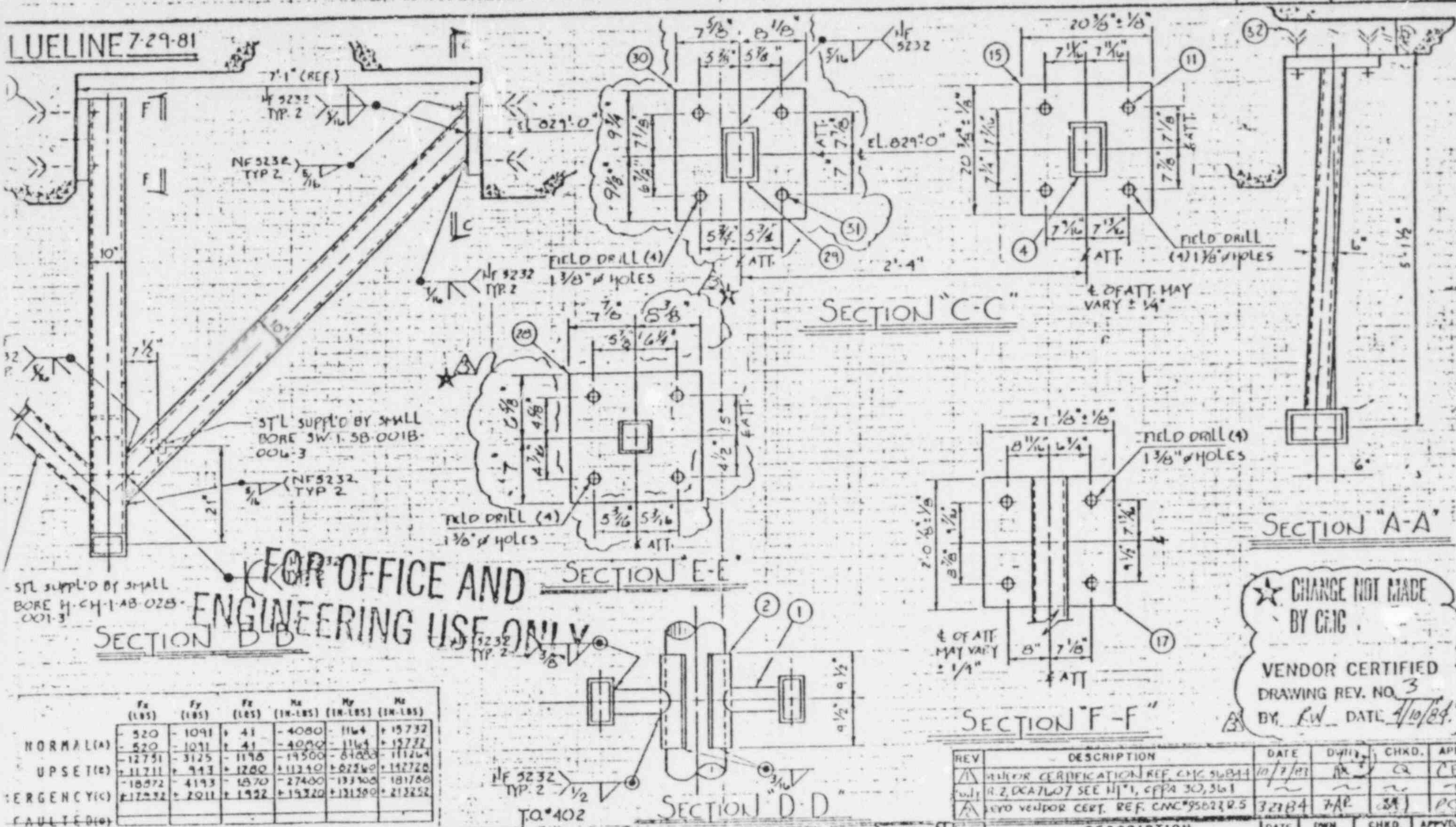
REV	DESCRIPTION	DATE	DWN.	C-KD.	APPVD.
3	PER VENDOR CERT.	4-10-84	BNB	RC	RC

CP&L 88-1198
Brown & Root, Inc.
ENGINEERS AND CONSTRUCTORS
HOUSTON, TEXAS

CLIENT T.U.S.I.
PLANT COMANCHE PEAK
JOB NO. 2323

SUPPORT NO. SW-1-132-720-543A
SHEET 1 OF 2 REV. 3

FOR OFFICE AND ENGINEERING USE ONLY



	Fx (LBS)	Fy (LBS)	Fz (LBS)	Mx (IN-LBS)	My (IN-LBS)	Mz (IN-LBS)
NORMAL(A)	- 520 - 520	- 1091 - 1091	+ 41 + 41	- 4080 - 4080	- 1164 - 1164	+ 15732 + 15732
UPSET(B)	- 12751 + 11711	- 3125 + 943	- 1198 + 1280	- 19500 + 11340	- 61000 + 02560	- 111264 + 142728
EMERGENCY(C)	- 18872 + 17932	- 4193 + 2011	- 1870 + 1922	- 27400 + 19320	- 133108 + 131560	- 181788 + 213252
FAULTED(D)						

REV	DESCRIPTION	DATE	DWN.	CHKD.	APPVD.
1	VENDOR CERTIFICATION REF. CMC 56844	10/7/83			CBD
2	R.2, DCA 17607 SEE N1, CPPA 30,361				
3	REV. VENDOR CERT. REF. CMC 95823 R.5	3/21/84			
0	ISSUE FOR CONSTRUCTION REF. P.S.D.G. R.1 C F.M.H.S. CONT. ABOVE		KWS		

REV	DESCRIPTION	DATE	DWN.	CHKD.	APPVD.
3	REV. VENDOR CERT.	4/10/84	RWB		

DATA PT.	SUPPORT LOADS (lbs)					PIPE MVTS (INCHES)
357	DESIGN	SERVICE LEVEL LIMITS A	B	C	D	
CERT.						

AUTHORIZED NUCL. INSP. YES ☒ NO ☐
ASME CODE CLASS 3

Brown & Root, Inc.
ENGINEERS AND CONSTRUCTORS
HOUSTON, TEXAS

CLIENT T.U.S.I.
PLANT COMANCHE PEAK
JOB NO. 2323

SUPPORT NO. SW-1-132-720-S43A
SHEET 2 OF 2 REV. 3

FORM DHE-5

TEXAS UTILITIES SERVICES INC.
COMANCHE PEAK S.E.S.
Agent For
DALLAS POWER & LIGHT COMPANY
TEXAS ELECTRIC SERVICE COMPANY
TEXAS POWER & LIGHT COMPANY

Date 7-31-84
Calc By GMC
Chk'd/Apprd. By
Filing Code
Sheet No. 1 Of
G & H Job. No.

Subject SW-1-132-720-543A
Ref. Dwg./Spec. No.

A500 REVIEW

1.) 5823 = 1184 + 4639

2) 22360 SEE CALCS

3) 21600 D.G. SEC III, PAGE 6 OF 17

4) 16890 $Kl/r = 49$ SEE D.G. SEC III, PAGE 10

FORM DHE-5

TEXAS UTILITIES SERVICES INC.
COMANCHE PEAK S.E.S.
Agent For
DALLAS POWER & LIGHT COMPANY
TEXAS ELECTRIC SERVICE COMPANY
TEXAS POWER & LIGHT COMPANY

Date 7-18-83
Calc By Ken Worden
Chk'd/Apprd. By MB
Subject SW-1-132-720-S434 (1)

Filing Code
Sheet No. 8 Of 48
G & H Job. No.
Ref. Dwg./Spec. No.

BUCKLING

CONSIDER * MEMBER (24) ENVELOPE FORCES
* TREAT MEMBER (24) & MEMBER (23) AS ONE CONTINUOUS BEAM

REF.

f_a = AXIAL FORCE/AREA = 32195/14.4 = 2236

$\frac{KL}{r} = 1.2\frac{(73^2+61.5^2)^{1/2}}{237} = \frac{115}{237} = 48.5 \approx 49 \Rightarrow F_A = 19360$

REF. AISC GUIDE SECT II FIG 5

f_a/F_A = 2236/19360 = .12 < .15 ∴ COMBINE STRESSES

WHERE: $f_a/F_A + f_{by}/F_{By} + f_{bz}/F_{Bz} = < 1.0$

REF. 2.0.A PAGE 5.22 1.6.1

$f_{by} = M_y/S_y$ = 31839/26.9 = 1184

$f_{bz} = M_z/S_z$ = 167958/36.2 = 4639

$\frac{2236}{19360} + \frac{1184}{25200} + \frac{4639}{25200} = .35 < 1.0$ ∴ OK

ALL OTHER MEMBER STRESSES ARE LESS CRITICAL
THEREFORE 'OK BY COMPARISON'

STIFFNESS

MAX DEFLECTIONS AT JOINT 20 LOADING CASES 1 THRU 6

$\Delta_x = 0.00603^{2}$ $\quad \theta_x = 0.00167^{4}$
$\Delta_y = 0.00136^{1}$ $\quad \theta_y = 0.02109^{5}$
$\Delta_z = 0.00151^{3}$ $\quad \theta_z = 0.05268^{6}$

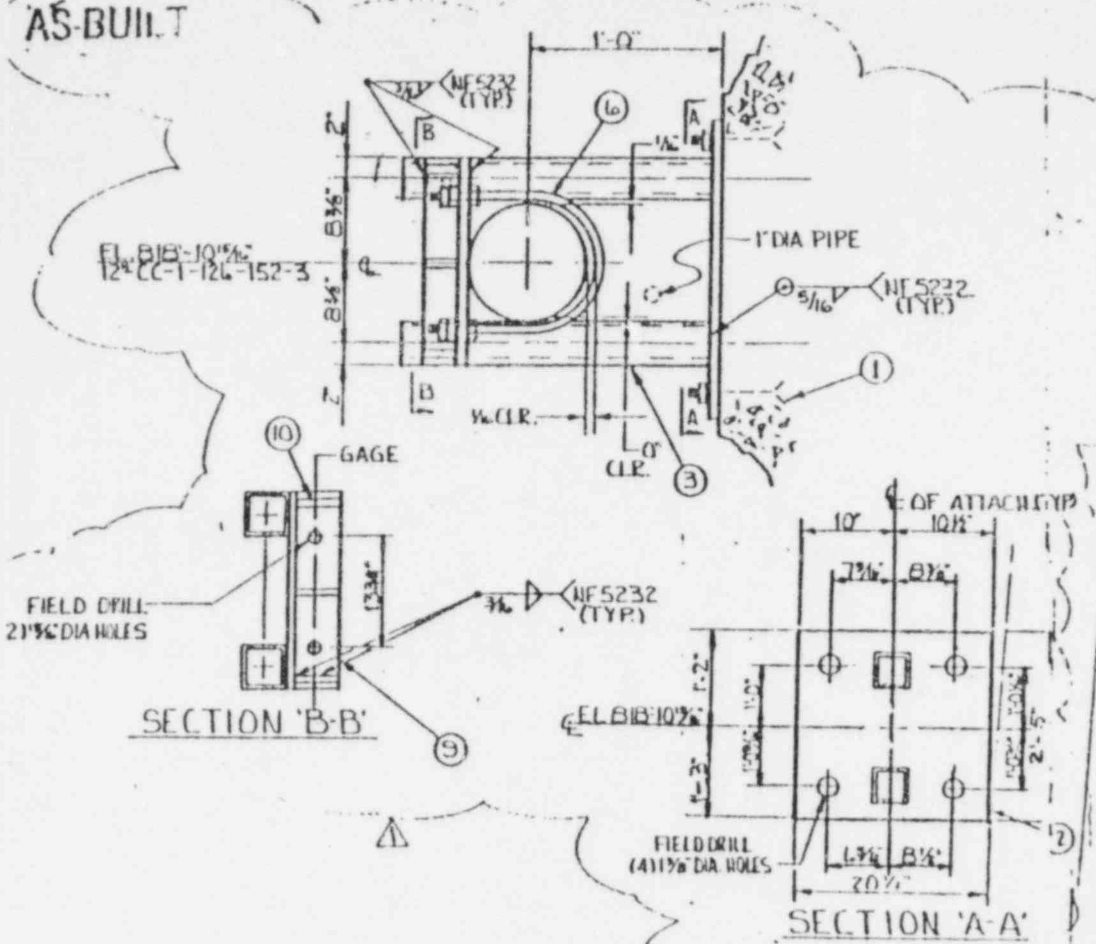
$K_x = F_x/\Delta_x$ = 22053/0.00603 = 3.66×10^6
$K_y = F_y/\Delta_y$ = 7324/0.00136 = 5.39×10^6
$K_z = F_z/\Delta_z$ = 2891/0.00151 = 1.92×10^6
} TRANSLATIONAL

$K\theta_x = M_x/\theta^{(rad)}$ = 37464/(0.00167π)÷180 = 12.85×10^8
$K\theta_y = M_y/\theta^{(rad)}$ = 230484/(0.02109π)÷180 = 6.26×10^8
$K\theta_z = M_z/\theta^{(rad)}$ = 446904/(0.05268π)÷180 = 4.86×10^8
} ROTATIONAL

FRAME IS STIFF IE SATISFIES PIPING CRITERIA
TRANSLATIONAL = 1×10^6 ROTATIONAL = 1×10^8

REF. SPEC. M-5200

AS-BUILT



ITEM NO.	MATERIALS & OPERATIONS	QUAN	SHIP	PBS	L	CSS	PRIM	SEC
	SEISMIC PIPE RESTRAINT CONSISTING OF:	ONE						
1	1 1/4"x12" Hilti Kwik Concrete Anchors (1144)	4				x		
2	1"x1'-7" Carbon Steel (SA-515 GR 65 or SA 36) Plate 2'-0" Long, TW-129#	1		x			x	
3	6"x4"x3/8" Structural Tubing (A-500 GR B) 1'-10" Long, TW-80#	2			x		x	
4	6"x4"x3/8" Structural Tubing (A-500 GR B) 1'-0 13/16" Long, TW-47#	2			x		x	
6	PDS 120 W/ 4 NUTS	1						
9	L 3"x3"x1/2"x1'-1 3/4" (SA-36)	1			X		X	
	SEISMIC ASSEMBLY SKETCH AND ENGINEERING BUNDLE AND TAG	1						
	MARK # CC-1-126-019-F43R							
10	C.S. P 1/4"x2"x2" (SA-36)	3		X			X	
12	C.S. P 1/4" THICK (SA-36 or SA515 GR 65) PER SECT. 'AA'	1						

Apply one coat of Carbo Zinc #11 to above mat'l except th'ds which shall be coated w/a rust preventative.

FOR ENGINEERING USE ONLY

FOR COPY [illegible] USE ONLY

THIS DOCUMENT IS [illegible] CURRENT STATUS AND REVISION.

No Nut's By Grinnell

Approved By: CFC
Date: 5-8-79

FOR MATERIALS AND OPERATIONS SEE SKETCH NO. SHEET OF

BRHL FO CC-1-FB-03 R-4
I.P.D. Iso. CC-1-FB-03 REV. 3
Data Point 1224 (PROB# AB1-65D R-0) SEE BRHL FOR HGR LOCATION
Pipe Mat'l. SB-106 GR B
Insul. 1/2" Bldg. FB

NOTES

4) Locking devices for high strength bolts are not required per DCA 7607

VENDOR CERTIFIED
DRAWING REV. NO. 1
BY GA DATE 10/1/81

1/0" 1101

THIRD PARTY INSPECTION
CODE CLASS: ASME III-3

Brown & Root, Inc.

REF. DRAWING NUMBERS
PIPE: ML-0801 REV. 3 ELECT: EL-0840 REV 4
STEEL: S-0800 REV. 5 HV.A.C.: ML-0830 REV 4

REV	DATE	DWN	CHK	APP	DESCRIPTION
0	[illegible]	JW	[illegible]	[illegible]	ISSUE FOR CONST. P.W. "B 1-6" FIELD FAB. PER CPPA-2295
1	10-6	TP	[illegible]	KD	Rev. As Noted, Ref. CMC 30802-51 [illegible], See Note 4, "As Built" VENDOR CERTIFICATION, REF; [illegible] 5193
2	2	2	2	2	

CONDITIONS	Fx	Fy	Fz	Mx	My	Mz
DESIGN						
NORMAL & UPSET		-3614	1/193			
EMERGENCY		-3757	1/203			
FAULTED						

CUSTOMER Texas Utilities Service, Inc
ORDER OR CONT. NO. CP-0046
JOB NAME Comanche Peak 1 & 2
MARK NO. CC-1-126-019-F43R
SKETCH NO. ~ ~
SHEET 1 OF 1 REV. 1

cb

.005

TEXAS UTILITIES SERVICES INC.
COMANCHE PEAK S.E.S.
Agent For
DALLAS POWER & LIGHT COMPANY
TEXAS ELECTRIC SERVICE COMPANY
TEXAS POWER & LIGHT COMPANY

Date 7-31-84
Calc By GMC
Chk'd/Apprd. By
Subject CC-1-1216-019-F43R

Filing Code
Sheet No. Of
G & H Job. No.
Ref. Dwg./Spec. No.

$$0.31\left(\frac{38.3}{32.8}\right) = .36$$

FORM DHE-5

TEXAS UTILITIES SERVICES INC.
COMANCHE PEAK S.E.S.
Agent For
DALLAS POWER & LIGHT COMPANY
TEXAS ELECTRIC SERVICE COMPANY
TEXAS POWER & LIGHT COMPANY

Date 8/26/85 | Filing Code
Calc By AB | Sheet No. 4 of 13
Chk'd/Apprd. By BG 9/16/85 | G & H Job. No.
Subject CC-1-126-019-F43R | Ref. Dwg./Spec. No.

REF.

Y Shear $= \frac{1542}{2(4)(.375)} = 514$ psi

SA 650

Z Shear $= \frac{3275}{2(6)(.375)} = 728$ psi

Combined shear = 2183 psi $< .4 S_y \Rightarrow 15320$ psi
∴ ok

③ Slenderness ratio:

$\frac{KL}{r} = \frac{(2.1)(19.5)}{1.53} = 26.76 \approx 27 < 200$ (conservative)

Per SA 610 $F_A = 21330$ psi

=A610

⑤ From Min Max Normal Stress.

Max Normal stress = 7116 psi

or 7116 psi < 21330 psi

$f_a/F_A = 1925/2.45/21330 = .0067 < .15$ ∴ ok

(6) $\frac{\text{Axial}}{F_A} + \frac{f_{bz}}{F_{Bz}} + \frac{f_{by}}{F_{By}} < 1$

or $.007 + \frac{3414/7.53}{22980} + \frac{23619/9.54}{22980} = 0.31$

$.6S_y = .6 \times 38$ ksi
$= 22980$ psi

or $0.31 < 1$ ∴ ok

TS is ok to use

Stem = 6 PUS-120 w/6 NUT check

Allowable load

@ Level A/B 7540# > 1400#

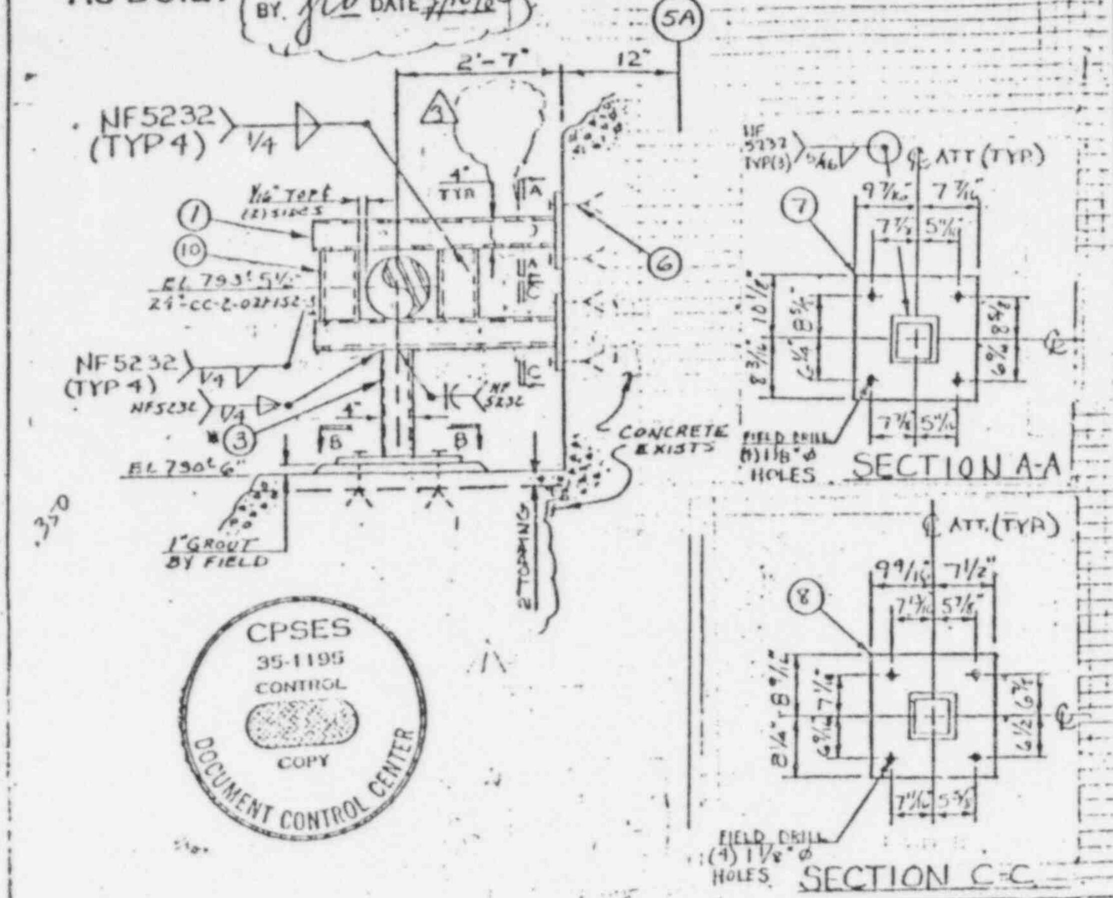
@ Level C 10030# > 1820#

CORS (UPS)
No. PUS,
Rev. 0 Pg 1.

FOR OFFICE AND ENGINEERING USE ONLY

FOR OFFICE AND ENGINEERING USE ONLY

AS-BUILT (VENDOR CERTIFIED DRAWING REV. NO. 3 BY. JLO DATE 8/16/83)



CPSES 35-1195 CONTROL COPY DOCUMENT CONTROL CENTER

NOTES CONT:

4) Locking devices for high strength bolts are not required per DCA 7607.

ITEM NO.	MATERIALS & OPERATIONS	QUAN	SHIP		PBS	L	CSS
	SEISMIC PIPE RESTRAINT CONSISTING OF:	ONE					
1	3/8"x4"x6" Structural Tubing (A-500-GR B) 4'-1" Long.	2				x	
	/Section A-A						
2	W6x12 (SA-36) 3'-0-1/16" Long, TW-404	2				x	
3	3/8"x4"x6" Structural Tubing (A-500-GR B) 1'-5 3/4" Long.	1				x	
4	Carbon Steel (SA-515 GR 65 or SA-36) Plate /Section A-A, TW-2740	2			x		
5	Carbon Steel (SA-515 GR 65 or SA-36) Plate /Section B-B, TW-3400	1				x	
6	1"x12" Hilti Kwik Concrete Anchors, TW-003	12			X		x
7	1" THK C.S. PL PER SECTION A-A (SA36)	1					
	SEISMIC ASSEMBLY SKETCH AND ENGINEERING	1					
	BUNDLE AND TAG	1					
	MARK # CC-2-021-010-A33R						

REV	DATE	DWN	CHK	APP	DESCRIPTION
3	9-16-83	VM	RG	RK	REV'D VENDOR CERT.

ITEM NO.	MATERIALS & OPERATIONS	QUAN	SHIP		PBS	L	CSS
	ALL MATERIAL BY FIELD						
8	1" THK C.S. PL PER SECTION "CC" (SA36)	1			X		
9	1 1/4" THK C.S. PL PER SECTION BB (SA36)	1			X		
10	TS 1/2"x4"x4"x2'-0 1/4" LG (A500 GR B)	2				X	
	PAINT: CARBO ZINC #11						
	Approved By: DEP Date: 11/1/78	QUAN	SHIP		PBS	L	CSS

FOR MATERIALS AND OPERATIONS SEE SKETCH NO. SHEET OF

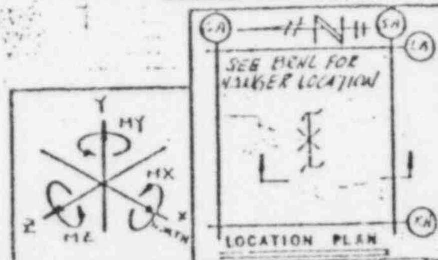
Brown & Root, Inc.

CONDITIONS	Fx	Fy	Fz	Mx	My
DESIGN					
NORMAL & UPSET	+1124 -1374	1108			
EMERGENCY	+1161 -1041	1004			
FAULTED					

REF. DRAWING NUMBERS

PIPE: M1-0704-01 REV.6 ELECT: E1-0700-01 REV. 4

STEEL: S-0700 REV.11 H.V.A.C.: M1-0715



THIRD PARTY INSPECTION YES ☐ NO ☐

CODE CLASS: ASME III-3

REV	DATE	DWN	CHK	APP	DESCRIPTION
0				RM	ISSUE FOR CONST FW 1-8 FIELD FAB
1		M			REVD AS NTD REF CMC 62043 R4 DCA 7607 (SEE NT 4)
D	~	~	~	~	DELTD FWS 1-8) (ADDED SHEET 2) ASBUILT
2					VENDOR CERTIFICATION, REF. 27741

CUSTOMER	Texas Utilities Servi
ORDER OR CONT. NO.	CP-0046
JOB NAME	CC. S.E.S. 1 & 2
MARK NO.	CC-2-021-010-A33
SKETCH NO.	
SHEET 1 OF 2	REV.

BRHL ! Iso. CC-2-AB-13 REV.1

I.P.D. Iso. CC-2-AB-13 REV.8

Data Point 487/# AB-1 C/D REV0

Pipe Mat'l. SA106 GR.B

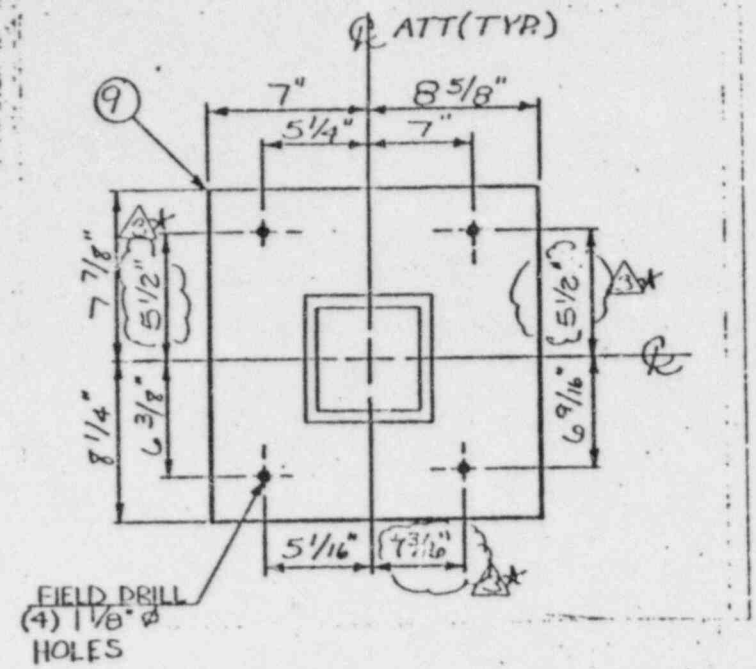
Insul. 1/2" Sht. A

*FIELD TRIM TO SUIT TO #21101

AS-BUILT

VENDOR CERTIFIED
DRAWING REV. NO. 3
BY JLD DATE 9/16/82

☆ CHANGE NOT MADE BY CB&C



SECTION "B-B"

FOR OFFICE AND
ENGINEERING USE ONLY.

BROWN & ROOT, INC.
ENGINEERS & CONSTRUCTORS

REF. DRAWING NUMBERS
PIPE: MI-0704-01 REV E ELECT: E-0700-01 REV 4
STEEL: S-0700 REV 11 H.V.A.C.: MI-0752 REV K

REV	DATE	DWN	CHK	APP	DESCRIPTION
3	9/16/82	JLD	[illegible]	[illegible]	ISSUED FOR AS BUILT REF: CMC 62043 R4 DCA 7607 (NTS) DELTD FWS 1-8
2	[illegible]	[illegible]	[illegible]	[illegible]	REVISE CERTIFICATION, REJECTED (2741
1	7/16/82	VRA	[illegible]	[illegible]	REV'D VENDOR CERT.

THIRD PARTY INSPECTION YES ☒ NO ☐
CODE CLASS: ASME III/3

CUSTOMER Texas Utilities Service, Inc.
ORDER OR CONT. NO. CP-0046
JOB NAME Comanche Peak 1 & 2
MARK NO. CC-2-081-010-A33R
SKETCH NO. -
SHEET 2 OF 2 REV. 3

TO# 21101

FORM DHE-5

TEXAS UTILITIES SERVICES INC.
COMANCHE PEAK S.E.S.
Agent For
DALLAS POWER & LIGHT COMPANY
TEXAS ELECTRIC SERVICE COMPANY
TEXAS POWER & LIGHT COMPANY

Date 7/31/84
Calc By C. CLARK
Chk'd/Apprd By
Filing Code
Sheet No. 1 Of 1
G & H Job. No. 2323
Subje. MK# CC-2-021-010-A33R
Ref. Dwg./Spec. No.

$f_a = 2278^{\#}$ } Ref. V.C. Calcs
MAX NORM STRESS $= 5706\ ^{\#}/_{in^2}$ } STRUDL CODE CHECK

$$\text{MAX NORM STRESS} = \frac{P}{A} + \frac{M_x}{S_x} + \frac{M_y}{S_y}$$

$$5706 = 2278 + (f_b)$$

$$(f_b) = 3428\ ^{\#}/_{in^2}$$

F_A @ $KL/r = 67$ & TEMP $= 200^\circ$ (SA36) $\Rightarrow F_A = 15{,}390\ ^{\#}/_{in^2}$ (PSE G.LINE SEC III PG 10 of 17 (A)

$F_B = .60(32{,}800) = 19680\ ^{\#}/_{in^2}$

$$f_a/F_A + f_b/F_B < 1.00$$

$$\frac{2278}{15390} + \frac{3428}{19680} < 1.00$$

$$.322 < 1.00$$

CHKD. BY .... DATE ..-..-.. CUSTOMER .... SUPPORT I.D. ....

PROJECT .... OTHER I.D. ....

REF. PAGE

SAG50 REV0

CODE CHECK

Input — O.K.

Deflection < 1/16" — O.K. ✓

Shear Stress

Torsion = 5745 "# ✓

Torsional Stress (6x4x3/8) = $\frac{5745}{2(5.625)(3.625)(.375)}$ ✓

= 375.67 ✓

Torsional Stress using prop. (4x4x1/2) = $\frac{5745}{2(3.5)(3.5)(.5)}$ = 469 #/IN² ✓ (Conservative)

Y Shear (max) = 733 #/IN² ✓

Z Shear (max) = 900 #/IN² ✓

Total Shear = 469 + 733 + 900 = 2102 #/IN²
(Conservative)

< .4 Sy ✓

= 15320 #/IN²

O.K.

Slenderness Ratio

$\frac{kl}{r}$ = $\frac{2.1(44.0625)}{1.39}$ ✓

= 67 ✓ < 200 O.K.

k = 2.1

l = 44.0625

r = 1.39 (4x4x1/2) or Conservative

= 1.54 (6x4x3/8)

FA @ 200 °F ✓ = 17.40 KSI ✓

Normal Stress.

Max Stress = 5.706 ksi < 17.40 ksi O.K. ✓

Axial & Bending

$\frac{f_a}{F_A}$ = $\frac{2278}{17400}$ = .1309 < .15 ✓

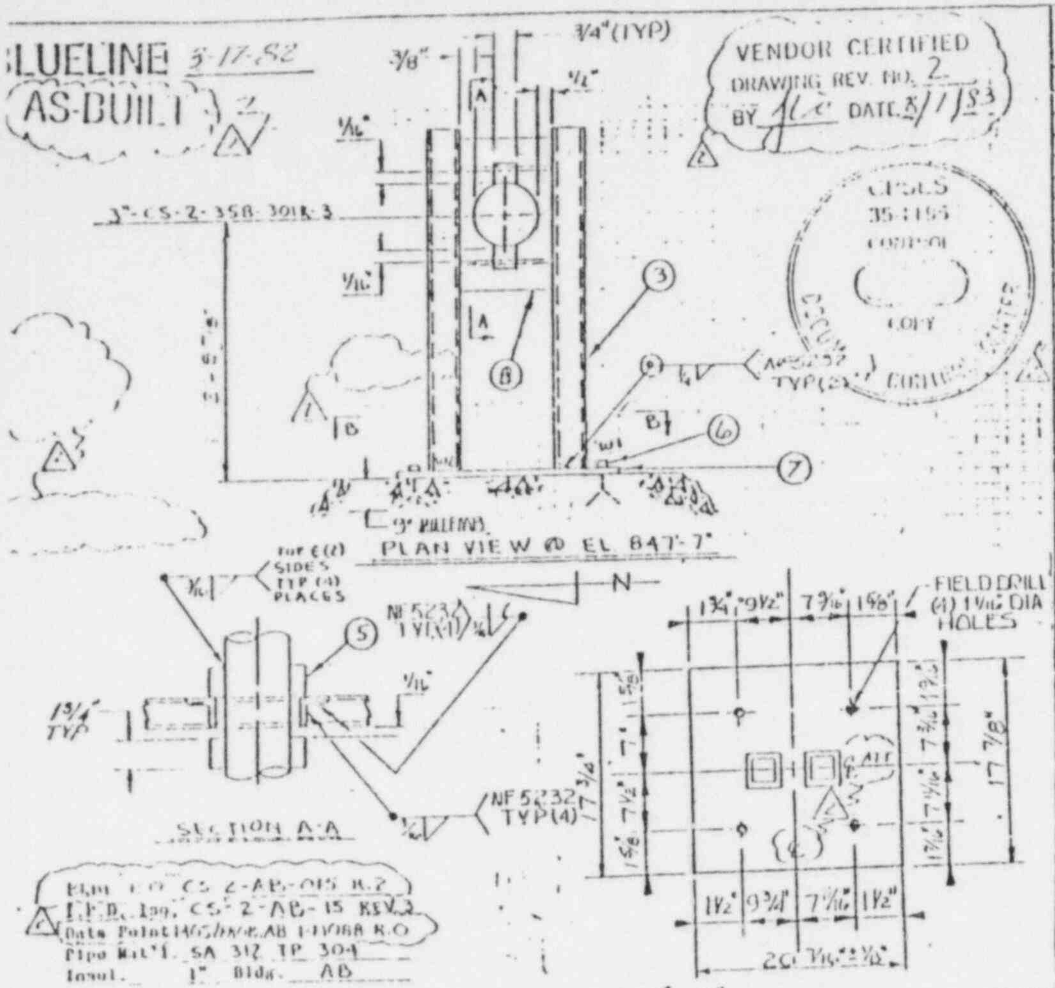
O.K. ✓

ALL STEEL MEMBERS ... FOUND ADEQUATE

BLUELINE 3-17-82

AS-BUILT 2

VENDOR CERTIFIED
DRAWING REV. NO. 2
BY [illegible] DATE 8/11/83



CPSES
CONTROL COPY

Elev. CS-2-AB-015 R.2
Isom. CS-2-AB-15 REV.2
Data Point 1465/... AB 1-1706A R.O
Pipe Mat'l. SA 312 TP 304
Insul. 1" Bldg. AB

Notes:
1) By issue of rev. 1 of this Drawing, the following Documents are voided:
CMC 38262
PHBP 1493
5) Locking devices for high strength bolts are not required per DCA 7607

FIELD STRIP INSULATION 1/4" EACH SIDE OF STEEL

T/O 24901

ITEM NO.	MATERIALS & OPERATIONS	QUAN	SHIP		PBS	L	CSS	PRIM	SEC	AISC
	SEISMIC PIPE RESTRAINT CONSISTING OF:	ONE								
1	~~1" X 12" Hilti Kwik Bolts TW-58~~	4					X			
2	~~1" Carbon Steel (SA-515 GR-65 or SA-36) Plate /Section B-B.~~	1			X			X		
3	1/4"x4"x4" Structural Tubing (A-500 GR B) 1'-2 1/2" TW-7781 Section B-B.	2				X		X		
4	1/4"x4"x4" Angle (SA-36) 1'-0" 4 3/8" long. TW-58	2				X		X		
(5)	3/4" X 1 1/4" X 1 3/4" STAINLESS STEEL LUGS (SA-479 TP 304)	4					X			
6	1" X 12" HILTI KWIK BOLT	4					X			
7	1" C.S. PL. PER SECT. B-B (SA36/SA515GR65)	1			X			X		
	SEISMIC ASSEMBLY SKETCH AND ENGINEERING BUNDLE AND TAG MARK # CS-2-358-013-A53R	1								
8	4" X 4" X 1/4" ANGLE 4 3/8" LG (SA36)	2				X		X		

Apply one coat of Carbo Zinc #11 to above mat'l except th'ds which shall be coated w/a rust preventative

FOR OFFICE AND ENGINEERING USE ONLY

Approved By: S.E.C.
Date: 7/6/78

FOR MATERIALS AND OPERATIONS SEE SKETCH NO. ____ SHEET ____ OF ____

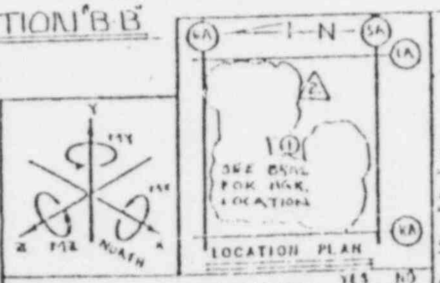
Brown & Root, Inc.

REF. DRAWING NUMBERS
PIPE: M1-0709 REV 5 ELECT: E1-0706 REV 5
STEEL: S-0120 REV. 2 H.V.A.C.: M1-0761 REV 7

CONDITIONS	Fx	Fy	Fz	Mx	My	Mz
DESIGN 2						
NORMAL & UPSET		+56 -316	+256 -81			
EMERGENCY		+91 -331	+279 -124			
FAULTED						

REV	DATE	DWN	CHK	APP	DESCRIPTION
0	[illegible]	[illegible]	[illegible]	[illegible]	ISSUE FOR CONST [illegible] CPP-A-119
1	[illegible]	[illegible]	[illegible]	[illegible]	REVD AS NTD: REF E.M.H.S.; SEE NT 1
2	8/11/83	[illegible]	[illegible]	[illegible]	REVD AS-BUILT REF CMC [illegible]
					[illegible] 27854 & 30520

CUSTOMER Texas Utilities Service, Inc.
ORDER OR CONT. NO. CP-0046
JOB NAME Comanche Peak 1 & 2
MARK NO. CS-2-358-013-A53R
SKETCH NO.
SHEET 1 OF 1 REV. 2



THIRD PARTY INSPECTION YES NO
CODE CLASS: ASME III-3

FORM DHE-5

TEXAS UTILITIES SERVICES INC.
COMANCHE PEAK S.E.S.
Agent For
DALLAS POWER & LIGHT COMPANY
TEXAS ELECTRIC SERVICE COMPANY
TEXAS POWER & LIGHT COMPANY

Date 7/31/04
Calc By P. CLARK
Chk'd/Apprd. By
Subject CS-2-358-013-A53R

Filing Code
Sheet No. 1 Of 1
G & H Job No. 2323
Ref. Dwg./Spec. No.

1/4 x 4 x 4 T. ST'L

$f_a/F_a = .009$ #/in²

MAX/MIN Norm = 6463 #/in²

Ref V.C. Cale's STRUDL Code Check

$F_b = .6(32,800) = 19,680$ #/in² (SA36 @ 200°)

$$\frac{f_a}{F_a} + \frac{f_b}{F_b} < 1.00$$

$$.009 + 6463/.6(32,800) < 1.00$$

$$.337 < 1.00$$

$$.34 \checkmark$$

CHKD. BY ..... DATE 1/21/83 CUSTOMER ..... TUSI ..... SUPPORT I.D. CS-2-358-013-A53R

PROJECT ..... CM ..... OTHER I.D. ..... REV 2 .....

REF. PAGE

"STRUDL CODE CHECK"

INPUT - OK

DEFLECTIONS - JTS 5 AND 9 $\Delta y = .044" < .0625"$ ✓

SHEAR STRESS - $Y_{SHEAR} = 480\ \#/in^2$

$Z_{SHEAR} = 654\ \#/in^2$

$T = \frac{622(.25)}{.0403} = 3859\ \#/in^2$ cons. ✓

$f_{v\,COMBINED} = 480 + 654 + 3859 = 4993\ \#/in^2$

$F_v = .4(F_y) = .4(34{,}720\ \#/in^2) = 13{,}888\ \#/in^2 > 4993\ \#/in^2$

SLENDERNESS RATIO - $KL/r = 2.1(34.77)/.795 = 92 < 200 < 240$

FROM SA 610 @ 150°F $F_A = 13{,}360\ \#/in^2$ ✓

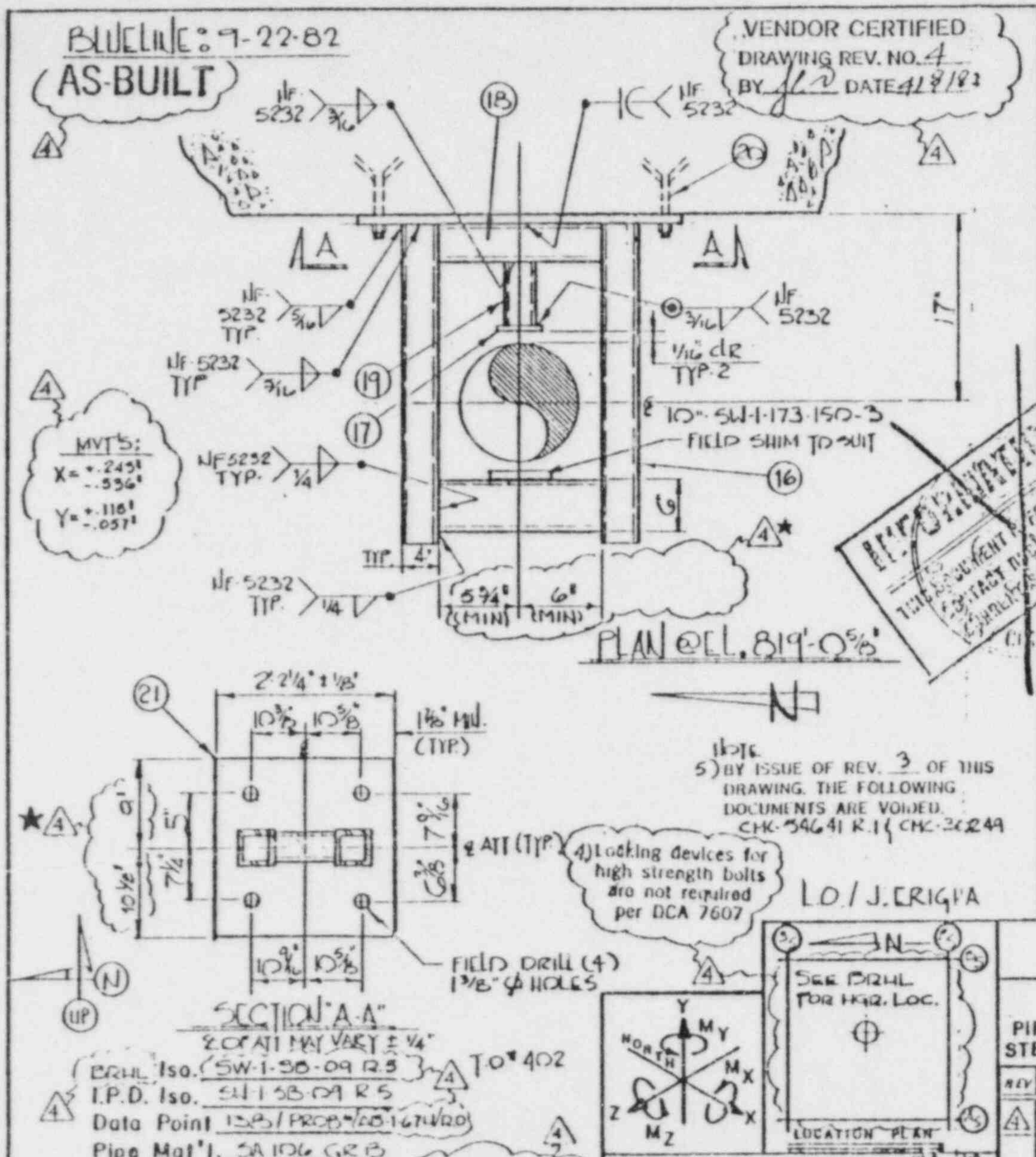
BENDING STRESS - $\frac{AXIAL}{F_A} \leq .15$ $\frac{127}{13{,}360} = .009 < .15$ ✓

$\frac{MAX - MIN\ NORM}{F_A} \leq 1.0$

$\frac{6463}{13360} = .48 < 1.0 \therefore$ OK IN COMPRESSION + BENDING ✓

END STRUDL CODE CHECK

All steel ok



BRHL Iso. SW-1-SB-09 R.5
I.P.D. Iso. SW-1-SB-09 R.5
Data Point 138/PROB 4/SB-1674/20
Pipe Mat'l. SA 106 GR B
Insul. — Bldg. SB

THIRD PARTY INSPECTION
CODE CLASS: ASME III-3

FOR OFFICE AND ENGINEERING USE ONLY

ITEM NO.	MATERIALS & OPERATIONS	QUAN.	SHIP		PBS	L	CSS
15	TS 4"x6"x1/2" 11 3/4" LONG A-500 GR B	1				X	
16	TS 4"x6"x1/2" 2'-7" LONG A-500 GR B	2				X	
17	1/2" CS PL 4"x4" (SA-36 / SA 515 GR 65)	1			3		
18	TS 4"x4"x1/2" 11 3/4" LONG A-500 GR B	1				X	
19	TS 3"x3"x1/4" 0' LONG A-500 GR B	1				X	
20	1 1/4" x 16 1/2" SUPER HILTI KWIK BOLTS (13 1/2" MIN EMB)	4					X
21	1 1/4" CS PL PER SECTION "A-A" (SA 515 GR 65 / SA-36)	1			X		

REV	DATE	DWN	CHK	APP	DESCRIPTION
0	6-8-79	JW	[illegible]	[illegible]	ISSUE FOR CONST. FW 1-14
1	[illegible]	JW	RK	[illegible]	REV. AS NOTED, REF. CMC 30249
2	[illegible]	JEB	[illegible]	[illegible]	REV'D AS NTD; REF CMC 54641 R1 DCA 7607 SEE NT. 4 AS BUILT
3	9-22-82	[illegible]	[illegible]	[illegible]	REV'D AND REDRAWN REF FMH 3 (SEE NOTE 5) (GTN # 58920)

MARK # SW-1-173-064-S42R
PAINT: CARBO ZINC # 11

FOR MATERIALS AND OPERATIONS SEE SKETCH NO. ______ SHEET ___ OF ___

BROWN & ROOT, INC.
ENGINEERS & CONSTRUCTORS

REF. DRAWING NUMBERS
PIPE: M1-0603 R12 ELECT: E1-0716 R9
STEEL: S1-0605 R9 H.V.A.C.: M1-0652 R4

CONDITIONS	Fx	Fy	Fz	Mx	My
DESIGN					
~~NORMAL &~~ UPSET			+2032 -5982		
EMERGENCY			+3781 -3726		
FAULTED					

REV	DATE	DWN	CHK	APP	DESCRIPTION
4	4/4/83	MAM	GBH	Q	VENDOR CERTIFICATION PER GTN #68950.

CUSTOMER Texas Utilities Service,
ORDER OR CONT. NO. CP-0046
JOB NAME Comanche Peak 1 & 2
MARK NO. SW-1-173-064-S42R
SKETCH NO.
SHEET 1 OF 1 REV

FORM DHE-5

TEXAS UTILITIES SERVICES INC.
COMANCHE PEAK S.E.S.
Agent For
DALLAS POWER & LIGHT COMPANY
TEXAS ELECTRIC SERVICE COMPANY
TEXAS POWER & LIGHT COMPANY

Date 7/31/84
Calc By P. CLARK
Chk'd/Apprd. By
Subject SW·1·173·064·S43R

Filing Code
Sheet No. Of
G & H Job. No.
Ref. Dwg. Spec. No.

Ref. V.C. Calc's pg 4

$F_a = 18630^{\#/in^2}$ (@ 200° · SA36) ($Kl/r = 23$)

$f_a = 3,004^{\#/in^2}$

Min Norm = $3,404^{\#/in^2}$

$F_B = .6(32,800) = 19,680^{\#/in^2}$

$$\frac{3004}{18630} + \frac{3404}{19,680} < 1.00$$

✓

$.33 < 1.00$

CHK'D ..... DATE ..... CUSTOMER ..... SUPPORT I.D. .....

PROJECT ..... CM. ..... OTHER I.D. .....

REF. PAGE

ALL DISPLACEMENTS LESS THAN .0625 ∴ OK. ✓

CHECK OF NORMAL STRESS.

MAX. AXIAL STRESS = 3.004 ✓

MAX. $\frac{KL}{r} = \frac{2.1 \times 20.1875}{1.47} = 28.839 < 200 \div < 240$ ∴ OK ✓

$Fa = 22.14$ @ $\frac{KL}{r} = 23 \rightarrow T = 150°F$ FOR STR. TUBE SAG10/R.O. ✓

$\frac{fa}{Fa} = \frac{3.004}{22.14} = .134 < .15$ ∴ O.K. ✓

TORSION VERY SMALL WILL NOT EFFECT ON STRESS ✓

MAX NORMAL = 2.290 (2.294) k

MIN NORMAL = 3.404 k } < Fa ∴ OK ✓

CRITICAL MEMBER (MEM # 9, 10)

$\frac{Kl}{r} = \frac{2.1 \times 6.3125}{1.1} = 12.05 < 200$ ∴ OK

NEED NOT CALC. SEE bellow..

(3) NEW LOADING & STR.

CHECK OF SHEAR STRESS.

MAX. Y SHEAR STRESS = ~~.651~~ (.658) k ✓

MAX. Z SHEAR STRESS = ~~.088~~ (.086) k ✓

$f_V = Y_{SHEAR} + 2(Z_{SHEAR}) + \tau_t$ $\tau_t = \frac{T}{2hdt} = \frac{26}{2(2.75)(2.75)(.25)} = 7$ NEC

$f_V = .651 + .088 + .007 = .746 < .4(S_y) = .4(35.04) = 14.016^k$ ✓

∴ OK.

BLUELINE 1-26-83

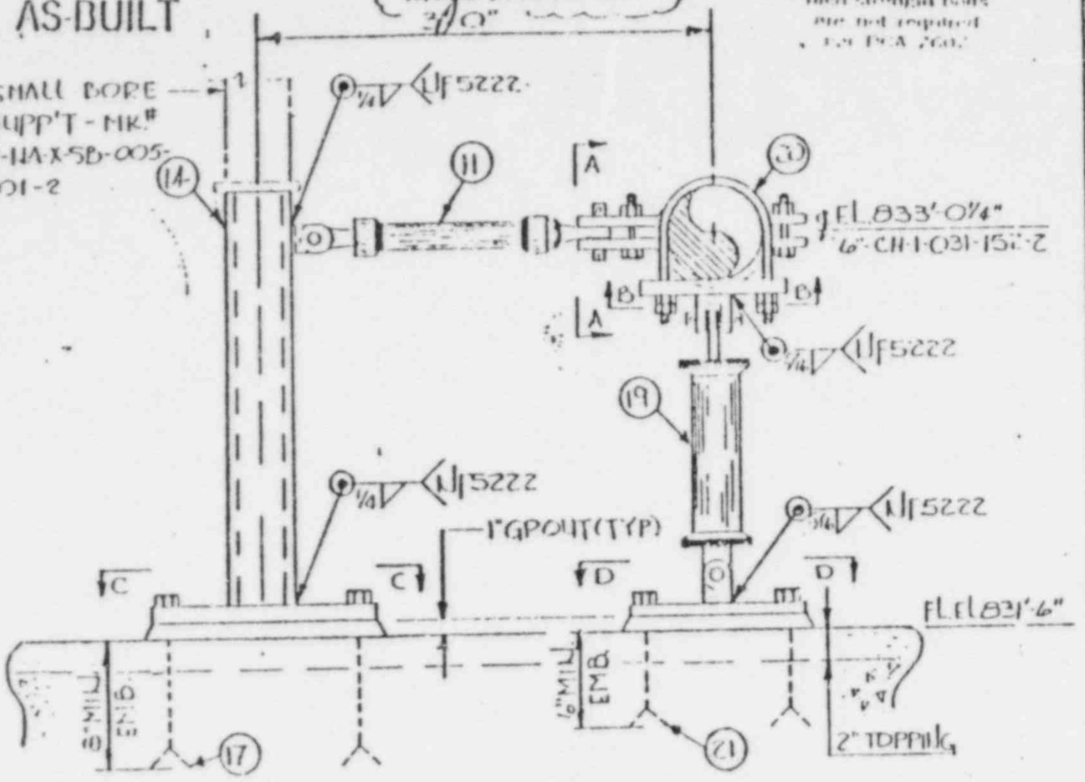
AS-BUILT

VENDOR CERTIFIED DRAWING REV. NO. 4 BY [illegible] DATE 1/3/83

NOTES CONT

8) Locking devices for high strength bolts are not required per PCA 7602

SMALL BORE SUPP'T - MK# H-HA-X-SB-005-001-2



NOTES:

1) BY ISSUE OF REV. 1 OF THIS DRAWING, THE FOLLOWING DOCUMENTS ARE VOIDED. CMC 37471

2) BY ISSUE OF REV. 2 OF THIS DRAWING, THE FOLLOWING DOCUMENTS ARE VOIDED. CMC 46054, REV. 3

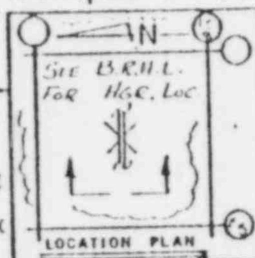
7) BY ISSUE OF REV. 3 OF THIS DRAWING, THE FOLLOWING DOCUMENTS ARE VOIDED. CMC 79224 REV. 2

LAYOUT BY CASAQUITE

B&R Iso. CH-1-SB-002 R.1
I.P.D. Iso. CH-1-SB-02, REV. 4
Data Point 97/PROB AB HEDRO
Pipe Mat'l. SA106 GR. B
Insul. 1" Bldg. SB

TO# 2102

MVT
Z=10.009
-0.0



THIRD PARTY INSPECTION
CODE CLASS: ASME III-2

ITEM NO.	MATERIALS & OPERATIONS	QUAN	SHIP
10	[illegible] SWAY STRUT	1	
11	[illegible] SWAY STRUT	1	
12	[illegible] PIPE CLAMP (SA36)	1	
[illegible]	[illegible]	1	
13	[illegible] (SA36)	1	
14	[illegible]	1	
15	1" CSTL PER SECTION C-C [illegible]	1	
16	[illegible]	1	
17	1"X12" HILTI KWIK BOLT		
18	[illegible] HILTI KWIK BOLT		
19	[illegible] SWAY STRUT		
20	[illegible] U-BOLT [illegible] (SA36)	1	
21	1"X12" HILTI KWIK BOLTS		
22	1 1/4" CSTL PER SECTION B-B (SA36) [illegible]	1	
23	1" CSTL PER SECTION D-D [illegible]	1	

FOR OFFICE AND ENGINEERING USE ONLY

REV	DATE	DWN	CHK	APP	DESCRIPTION
1	[illegible]	[illegible]	[illegible]	[illegible]	ISSUED FOR CONST'D.
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
					ADDED NOTES 7,8

MARK # CH-1-031-005-S52R
PAINT: CARBO ZINC # 11

FOR MATERIALS AND OPERATIONS SEE SKETCH NO. SHEET

BROWN & ROOT, INC.
ENGINEERS & CONSTRUCTORS

REF. DRAWING NUMBERS
PIPE: [illegible] ELECT: [illegible]
STEEL: [illegible] H.V.A.C. [illegible]

CONDITIONS	Fx	Fy	Fz	Mx
[illegible]	[illegible]	[illegible]		
NORMAL/UPSET	[illegible]	[illegible]		
EMERGENCY	[illegible]	[illegible]		
FAULTED				

REV	DATE	DWN	CHK	APP	DESCRIPTION
1	[illegible]	[illegible]	[illegible]	[illegible]	REV'D: REDRAWN, REF [illegible] ADDED NOTE 6; ADDED SHT 2
2	[illegible]	M	[illegible]	[illegible]	REV'D AS NOTED [illegible] ADDED NOTE 7
3	83	Q	D	[illegible]	REV'D AS NT'D REF CMC # [illegible] REV. 2, DCA 7607 (SEE NOTE A)
4	~	~	~	~	AS BUILT VENDOR CERTIFICATION, ISN # G1505

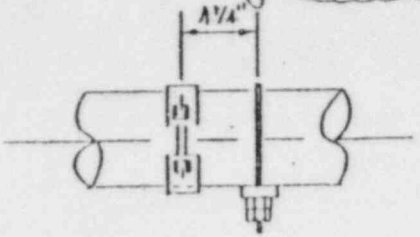
CUSTOMER Texas Utilities Servi[illegible]
ORDER OR CONT. NO. CP-004[illegible]
JOB NAME Comanche Peak [illegible]
MARK NO. CH-1-031-005-[illegible]
SKETCH NO.
SHEET 1 OF 2 RE[illegible]

BLUELINE 1-26-83

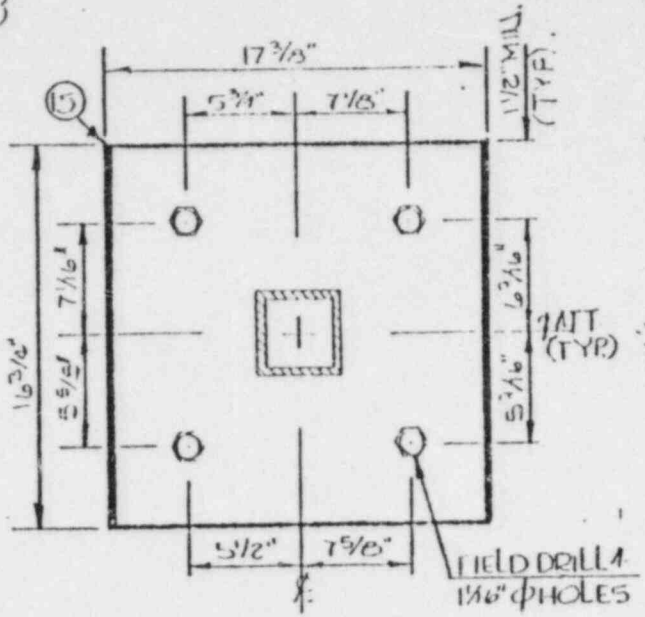
AS-BUILT

VENDOR CERTIFIED
DRAWING REV. NO. 1
BY [illegible] DATE 10/3/83

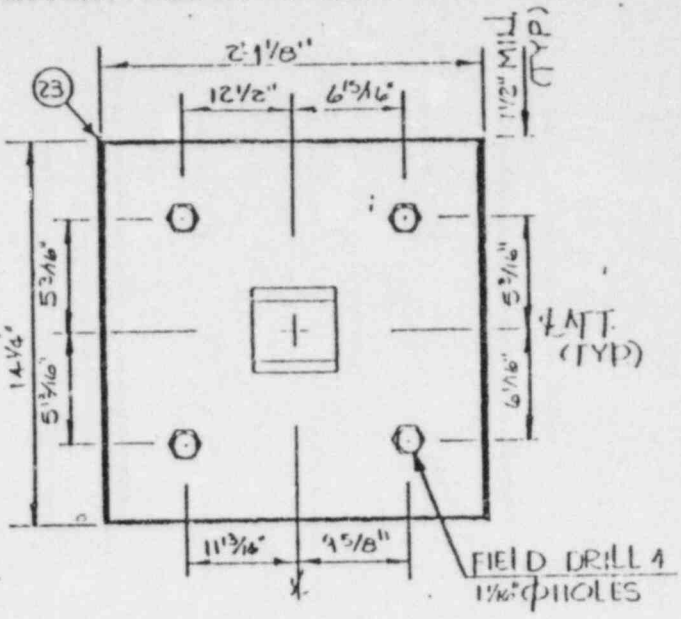
FOR OFFICE AND ENGINEERING USE ONLY



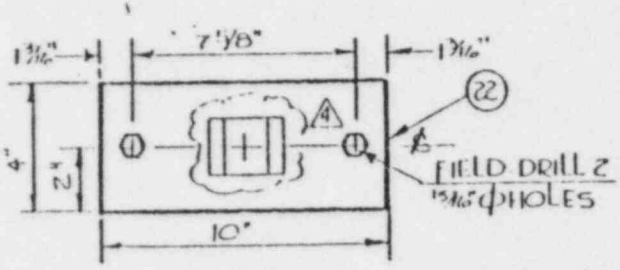
SECTION "A-A"



SECTION "C-C"



SECTION "D-D"



SECTION "BB"

℄ ATT. MAY VARY ± 1/4" (TYP. BOTH R'S)

FOR OFFICE AND ENGINEERING USE ONLY

BROWN & ROOT, ENGINEERS & CONSTRUCTORS

REF. DRAWING NUMBERS
PIPE: ELECT:
STEEL: H.V.A.C.:

REV	DATE	DWN	CHK	APP	DESCRIPTION
1	11/82	M			ISSUED FOR CONST. REF. DWG. R-1 SEE NOTE 6
2	12/82	M			REVISED AS NOTED. REF. DWG. DEV 2 SEE NOTE 7
3	8/83	Q	"D"		REVISED AS NOTED. REF. CHG # 80856. R-2. DCA 16 D 7 SEE NOTE 8 AS BUILT VENDOR CERTIFICATION. DTN# G1305
4					

CUSTOMER Texas Utilities Service
ORDER OR CONT. NO. CP-0046
JOB NAME Comanche Peak 1&2
MARK NO. CH-1-001-CVS-S1
SKETCH NO.
SHEET 2 OF 2 REV.

THIRD PARTY INSPECTION YES ☐ NO ☐
CODE CLASS: ASME III-2

TO# 2102

FORM DHE-5

TEXAS UTILITIES SERVICES INC.
COMANCHE PEAK S.E.S.
Agent For
DALLAS POWER & LIGHT COMPANY
TEXAS ELECTRIC SERVICE COMPANY
TEXAS POWER & LIGHT COMPANY

Date 7/31/84
Calc By G. CLARK
Chk'd/Apprd By
Filing Code
Sheet No. 1 Of 1
G & H Job No 2323

Subject MK# CH·1·031·005·S52K Ref. Dwg./Spec. No.

4X4X¼ T. ST'L

$f_a/F_a + f_b/F_b < 1.00$

$f_a/F_a = .01$

$f_b = 6248\ \#/in^2$ (MAX Norm)

} Ref. V.C. CALC's pg 5 of 12

$F_b = .6(32,800) = 19,680\ \#/in^2$ (@ 200° SA·36)

$f_a/F_a + f_b/F_b < 1.00$

$.01 + \frac{6648}{19,680} < 1.00$

$.327 < 1.00$ (CONSERV. ⇒ AXIAL ADDED IN TWICE)

FORM DHE-1

TEXAS UTILITIES SERVICES INC.
COMANCHE PEAK S.E.S.
Agent For
DALLAS POWER & LIGHT COMPANY
TEXAS ELECTRIC SERVICE COMPANY
TEXAS POWER & LIGHT COMPANY

Date 9/26/93
Calc By DRP
Chk'd/Apprd. By [illegible] 9/29/93
Subject PH-1-031-005-552R

Filing Code
Sheet No. 5 Of 12
G & H Job. No.
Ref. Dwg./Spec. No.

As built load per GTN 61305.

Main steel supporting X support is also ganged with small supports.

Both supports will be analysed separately.

X support

Item # 8 - SRS-08-PC / SPC 08-060

CC: 23"

N/H all = 5000# < 1964#

OK

STRUDL has been run adding all small support lot to main steel

STRUDL input OK

Members 1, 2, 3 are part of main steel

Δ: All less than 1/16" - OK

Shear stresses

$|Y| = 893$ psi

$|Z| = 29$ psi

$\sigma' = 170^{\#/"}$ (Very small, Negligible)

Total shear: $893 + .2 \times 29 = 951$ psi

$F_v = 0.15y = .6 \times 38300 = 15320$ psi. OK

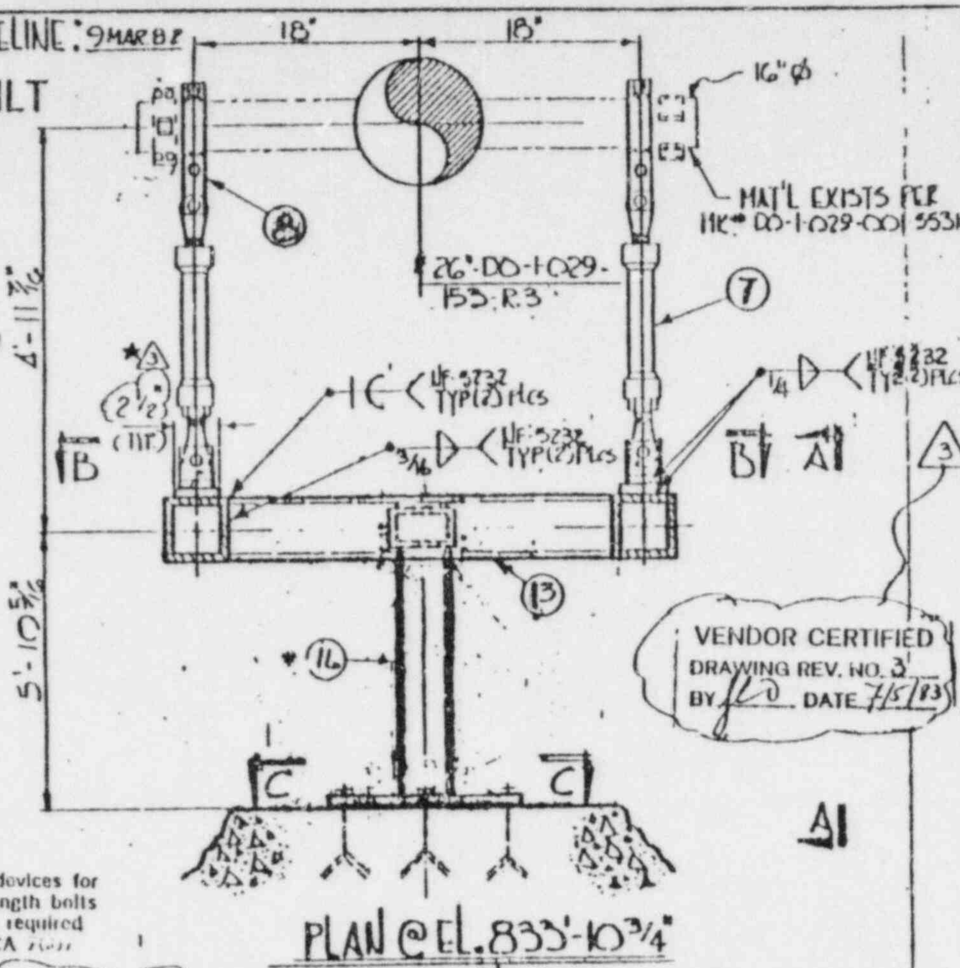
Max/Min Bending axial = 6248 psi

$K'l/r = \frac{2.1 \times 72.5}{1.5} = 102$ $F_a = 12750$ psi > 6248 psi OK

$f_a/F_a = \frac{129}{12750} = 0.01 < 0.15$ OK All steel OK

BLUELINE: 9MAR83

AS-BUILT



VENDOR CERTIFIED
DRAWING REV. NO. 3
BY ___ DATE 7/5/83

PLAN @ EL. 833'-10 3/4"

NOTE:

1.) Locking devices for high strength bolts are not required per DCA ____

★ CHANGE NOT PER CMC

*FIELD CUT TO SUIT

ITEM NO.	MATERIALS & OPERATIONS	QUAN	SHIP		PBS	L	C33	PRIM
6	1 1/4" C.S. PL PER SECTION "E-E" (SA-515 GR.65/ SA-36)	1			X			X
7	3PS-OB-RD SWAY STRUT	2					X	
8	3R-OB-160 PIPE CLAMP (SA-36)	2					X	
9	5/16" C.S. PL 2 1/2" X 4 1/4" (SA-515 GR.65/ SA-36)	2			X			X
10	7/8" C.S. PL PER SECTION "L-L" (SA-36/ SA-515 GR 65)	1			X			X
11	3/4" C.S. PL PER SECTION "F-F" (SA-515 GR 65/ SA-36)	1			X			X
12	1" X 12" SUPER HILTI KWIK BOLT (4" MIN EMB.)	1					X	
13	TS 6"X6"X1/2" 2'-6" LONG (A500 GR.B)					X		X
14	TS 6"X6"X1/2" 8 7/8" LONG (A500 GR.B)	2				X		X
15	TS 4"X6"X1/4" 17" LONG (A500 GR.B)					X		X
16	TS 4"X6"X1/4" 5'-7 1/16" LONG (A500 GR.B)					X		X
17	1"ϕ x 12" LG. HILTI KWIK BOLT						X	
18	1 1/4" C.S. PL PER SECTION "C-C" (SA-36/ SA-515 GR 65)	1			X			

FOR ENGINEERING & OFFICE USE ONLY

INFORMATION COPY

THIS DOCUMENT IS FOR INFORMATION ONLY. CONTACT DOCUMENT CONTROL FOR CURRENT STATUS AND REVISION.

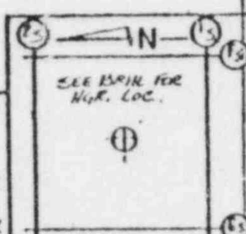
REV	DATE	DRWN	CHK	APP	DESCRIPTION
3	7/5/83				REV VENDOR CERTIFIED NCR M7985

MARK # DO-1-029-002-S43R
PAINT: CARBO ZINC # 11

FOR MATERIALS AND OPERATIONS SEE SKETCH NO. ____ SHEET __ OF __

BRUIL Iso. DO-1-DG-025 R.0
I.P.D. Iso. DO-1-DG-25 R.4
Data Point 2232/PRDB. AB-1-167C, R.1
Pipe Mat'l. SA-357 GR.22
Insul. 5" Bldg. 5

TO# 2904



LOCATION PLAN

THIRD PARTY INSPECTION CODE CLASS: ASME III-3

BROWN & ROOT, INC.
ENGINEERS & CONSTRUCTORS

REF. DRAWING NUMBERS

PIPE: M1-0630 R.4 ELECT: 1-0727 R.5
STEEL: 2-0605 R.9 H.V.A.C.: M1-0650 R.3

CONDITIONS	Fx	Fy	Fz	Mx	My
DESIGN	—	—	—	—	—
NORMAL & UPSET	—	—	+1676 -7475	—	—
EMERGENCY	—	—	[illegible]	—	—
FAULTED	—	—	—	—	—

REV	DATE	DWN	CHK	APP	DESCRIPTION
0	1-4-82	KR			ISSUE FOR CONSTRUCTION – REF. FHHS RIII-R.0
1					REVD & REDRAWN REF. FHHS R1; ADD SHEETS 2-3
2	6-19-83				REVD AS NOTED; REF. CMC-69115, R.5; CPPA M415; DCA 7607 (N.T.I.) AS BUILT
3	-	-	-	-	VENDOR CERTIFIED, REF. G,TUI 64828

CUSTOMER Texas Utilities Service, I...
ORDER OR CONT. NO. CP-0046
JOB NAME Comanche Peak 1 & 2
MARK NO. DO-1-029-002-S43R
SKETCH NO. ___
SHEET 1 OF 3 REV. 3

FOR OFFICE AND ENGINEERING USE ONLY

BLUELINE: 9MAR82

AS-BUILT

FOR OFFICE AND ENGINEERING USE ONLY

INFORMATION COPY

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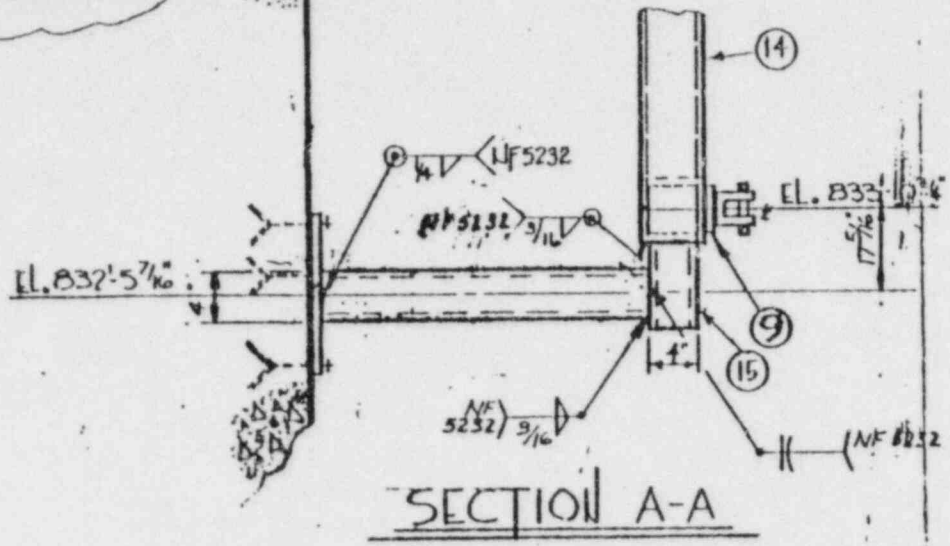
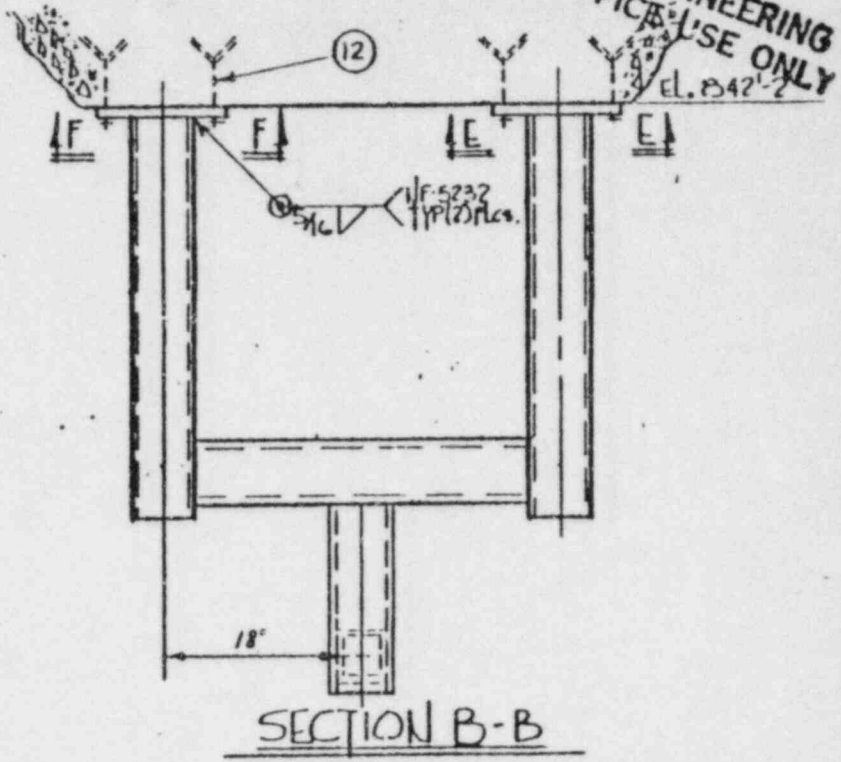
FOR ENGINEERING & OFFICE USE ONLY

3

VENDOR CERTIFIED
DRAWING REV. NO. 3
BY JLO DATE 7/5/83





BROWN & ROOT, INC
ENGINEERS & CONSTRUCTORS

REF. DRAWING NUMBERS

PIPE:
ELECT:
STEEL:
H.V.A.C.:

REV	DATE	DWN	CNR	APP	DESCRIPTION
1	3/31/82	[illegible]	[illegible]	[illegible]	ISSUE FOR CONST. REF. TH 45.01
2	6/23/82	[illegible]	RD	[illegible]	REVD AS NTD; REF: CMC-69773 R 3, SPA-19915; DCA-760 (NTL) AS BUILT VENDOR CERTIFIED; REF. 6TH 6406B
3	7/5/83	FH	RD	7/11/83	REV. VENDOR CERT; REF. LCR 17185

CUSTOMER Texas Utilities Service, Inc.
ORDER OR CONT. NO. CP-0046
JOB NAME Comanche Peak 1&2
MARK NO. DS-1092-022-543R
SKETCH NO.
SHEET 2 OF 3 REV. 3

I.D.# 2904

THIRD PARTY INSPECTION
CODE CLASS: ASME III 3

BLUELINE 9 MAR. 82

AS BUILT

VENDOR CERTIFIED
DRAWING REV. NO. 3
BY _____ DATE 11/5/83

INFORMATION COPY
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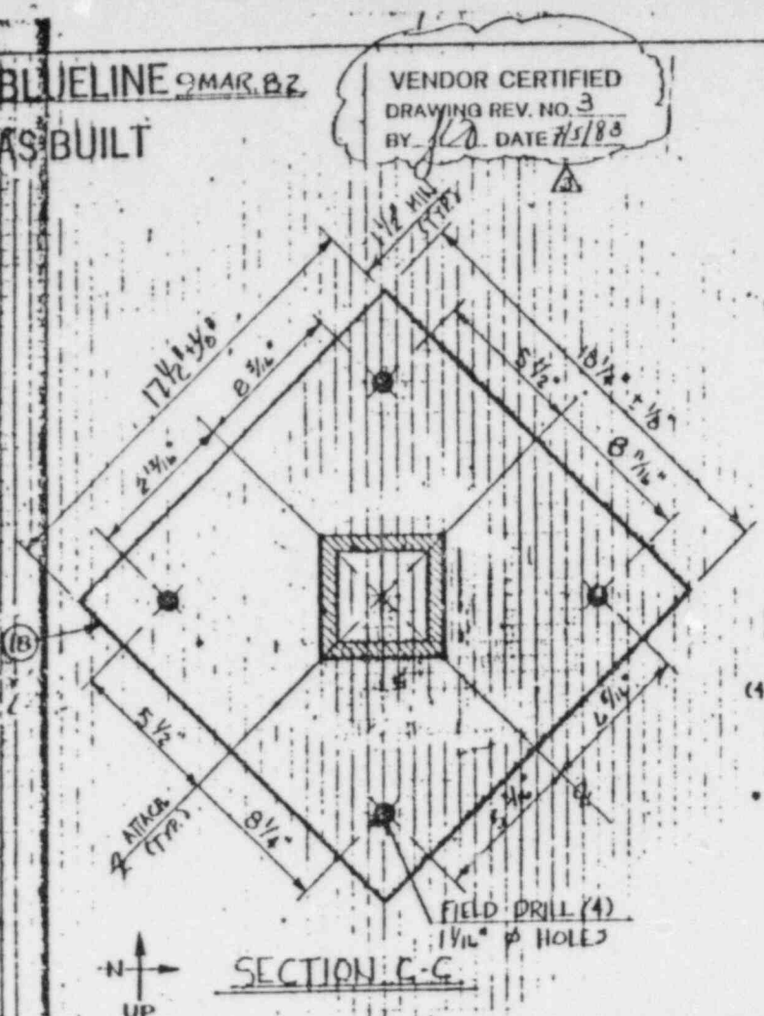
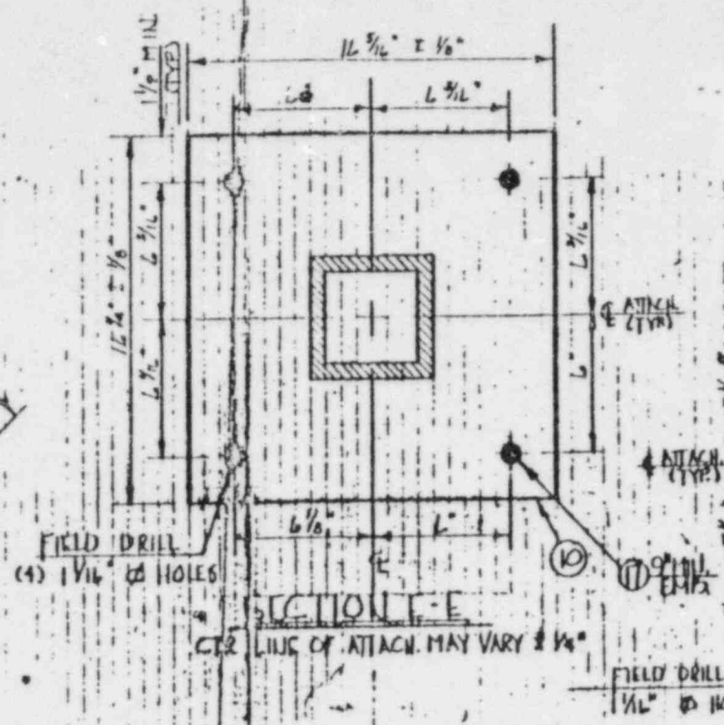
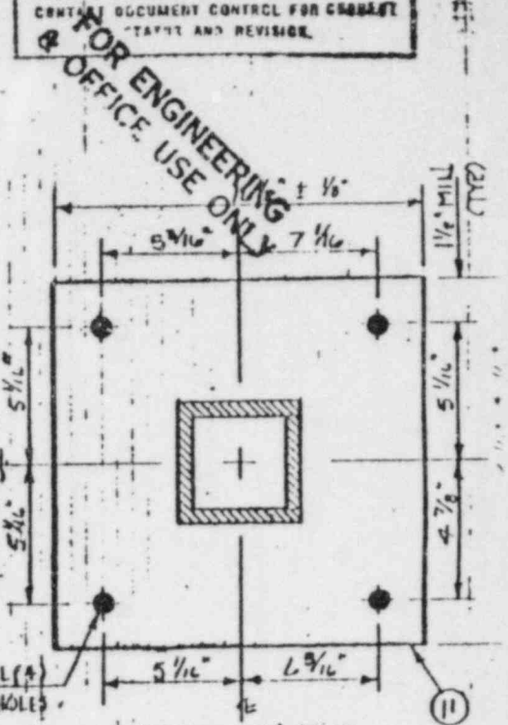
FOR ENGINEERING & OFFICE USE ONLY







FOR OFFICE AND ENGINEERING USE ONLY

THIRD PARTY INSPECTION YES NO
CODE CLASS: ASME III-3

REV	DATE	DWN	CHK	APP	DESCRIPTION
1	1/26	CR	[illegible]	[illegible]	ISSUE FOR CONST. ~ REF: F-M-11-3-R-1
2	5/83	[illegible]	[illegible]	[illegible]	REVD AS NTED; REF: CMC-60775 R3 CPA-79815 DCA 76022 REV. AS BUILT VENDOR CERTIFIED, REF. GTN # 60078
3	11/83	KH	RD	RH	REV. VENDOR CERT; REF NCR M-7905

BROWN & ROOT, INC
ENGINEERS & CONSTRUCTORS

REF. DRAWING NUMBERS
PIPE: _____ ELECT: _____
STEEL: _____ H.V.A.C.: _____

CUSTOMER Texas Utilities Service, Inc
ORDER OR CONT. NO. CP-0046
JOB NAME Comanche Peak 1&2
MARK NO. DO-1-029-002-3 SR
SKETCH NO. _____
SHEET 3 OF 3 REV. 3

D #2904

FORM DHE-5

TEXAS UTILITIES SERVICES INC.
COMANCHE PEAK S.E.S.
Agent For
DALLAS POWER & LIGHT COMPANY
TEXAS ELECTRIC SERVICE COMPANY
TEXAS POWER & LIGHT COMPANY

Date 7/31/84
Calc By P. CLARK
Chk'd/Apprd. By
Filing Code
Sheet No. 1 Of 1
G & H Job. No. 2323

Subject DO.1.029.002.S43R
Ref. Dwg /Spec No.

Ref V.C Calc's pg 5 of 18

$f_a/F_A = .04$

MAX/MIN STRESS = 5672

$F_B = .6(32,800) = 19,680\ \#/in^2$ (SA36 - 200°)

$.045 + 5672/19680 < 1.00$

$.33 < 1.00$

FORM DHE-5

TEXAS UTILITIES SERVICES INC.
COMANCHE PEAK S.E.S.
Agent For
DALLAS POWER & LIGHT COMPANY
TEXAS ELECTRIC SERVICE COMPANY
TEXAS POWER & LIGHT COMPANY

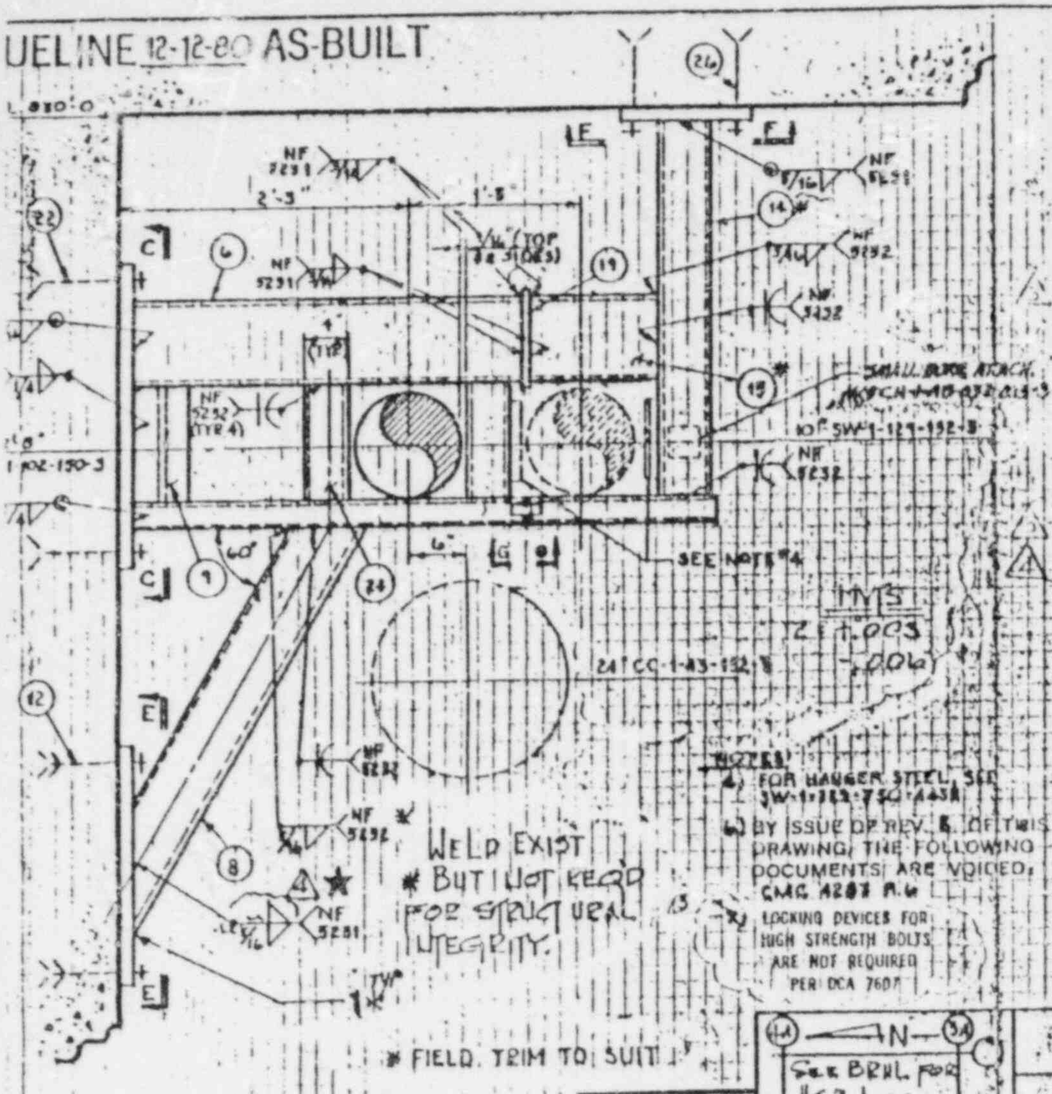
Date 6/11/93
Calc By DFH
Chk'd/Apprd. By AB ✓
Filing Code
Sheet No. 5 of 18
G & H Job. No.

Subject DO-1-029-002-543R Ref. Dwg./Spec. No.

	REF	PG
STRUDL CODE CHECK		
INPUT - OK		
DEFLECTIONS < .0625 ∴ OK		
FL/r 6x6 x 1/2 $\frac{(2.1)(99.25)}{2.19} = 95.17$ ∴ OK		
6x4x 1/4 $\frac{(2.1)(69.06)}{1.59} = 91.21$ ∴ OK		
ALLOWABLE STRESS @ 350° F		
S_y = 36.55 Ksi ✓	ES	
F_A = 13.19 KSi	17	
$F_B = (.6)(36.55) = 21.93$		
$F_V = (.4)(36.55) = 14.62$		
AXIAL & BENDING		
WORSE CASE ASSUMED		
LARGEST AXIAL FORCE = 2695# ✓		
SMALLEST AREA = 4.54 ✓ $P/A = 593.6$ ✓		
$f_a/F_a = 593.6/13190 = .045 < .15$ ∴ use eq 1		
SINCE MAX STRESS = 5672 < 13170 ✓ pass axial & bending		
Shear & Torsion (worse case taken)		
$T = 16176/(2)(4)(6)(.25) = 1348$ psi ✓		
$Z_{shear} = 2695.3/(.25)(4)(2) = 1348$ psi ✓		
$V_{shear} = 179.5/2 = 90$ psi ✓		
$1348 + 2(1342) + 90 = 4122 < 14620$ ∴ OK ✓		

FOR OFFICE AND ENGINEERING USE ONLY

UELINE 12-12-80 AS-BUILT



ITEM NO.	MATERIALS & OPERATIONS		QUAN	SHIP		PBS	L	CSS	PRIM.	SEC.	AISC.
6	T.S. 6"x6"x1/2"x2'-11 3/4"	A500 GR.B	1				X		X		
7	T.S. 2"x4"x1/4"x2'-11 3/4"	A500 GR.B	1				X		X		
8	T.S. 6"x6"x3/8"x3'-8 1/4"	A500 GR.B	1				X		X		
9	M4 x 13 x 0'-10 13/16"	SA-36	1				X		X		
10	1 1/4" C.S.R. PER SECTION "C-C"	SA-36	1			X			X		
11	1" C.S.R. PER SECTION "E-E"	SA-36	1			X			X		
12	1"x9" SUPER HILTI-KWIK CONC. ANCHOR		4					X			
14	T.S. 6"x6"x1/2"x7'-8 3/8"	A500 GR.B	1				X		X		
15	T.S. 6"x6"x1/2"x1'-1 1/4"	A500 GR.B	1				X		X		
17	T.S. 4"x2"x1/4"x1'-10 3/4"	A500 GR.B	1				X		X		
19	1/2"x7"x7" C.S.R.	SA-36/SA515 GR.65	1			X			X		
20	1/2"x1 1/2"x4" C.S.R.	SA-36/SA515 GR.65	2			X			X		
22	1"x9" HILTI-KWIK CONC. ANCHOR		4					X			
23	T.S. 2"x2"x1/4"x2'-11 3/4"	A500 GR.B	1				X		X		
24	T.S. 6"x4"x3/8"x0'-10 13/16"	A500 GR.B	2				X		X		
25	1" C.S.R. PER SECTION F-F	SA-36/SA515 GR.65	1			X			X		
26	1 1/4"x12" SUPER HILTI-KWIK CONC. ANCHOR		4					X			
27	T.S. 2"x2"x1/4"x3'-10 3/4"	A500 GR.B	1			X			X		

VENDOR CERTIFIED
DRAWING REV. NO. 4
BY [illegible] DATE 5-23-83

★ CHANGE NOT MADE BY CMC

REV	DATE	DWN	CHK		DESCRIPTION
3	4/21/83	[illegible]	[illegible]	[illegible]	REV. AS NOTED REF. CMC 46823 R7 DCA-7607 (SEE NT 7) "AS-BUILT" VENDOR CERTIFICATION PER CPP BE 23
4	5-23-83	[illegible]	[illegible]	[illegible]	REV. VENDOR CERT. REF. LER-M-6180

INFORMATION COPY
THIS DOCUMENT IS FOR INFORMATION ONLY. CONTACT [illegible]

MARK # SW-1-102-065-A43R
PAINT: CARBO ZINC # 11

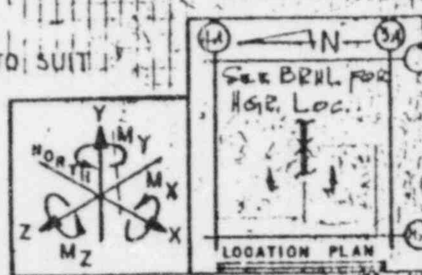
FOR ENGINEERING & OFFICE USE ONLY

FOR MATERIALS AND OPERATIONS SEE SKETCH NO. ______ SHEET ___ OF ___

BROWN & ROOT, INC.
ENGINEERS & CONSTRUCTORS

REF. DRAWING NUMBERS
PIPE: M1-0705 REV 11 — ELECT: E1-0701-01 R1
STEEL: S1-0718 REV 3 — H.V.A.C.: M1-0785 R.6

CONDITIONS	Fx	Fy	Fz	Mx	My	Mz
DESIGN	-43 +112	-1781 +110	—	—	—	—
NORMAL & UPSET	-1860 +1530	-4019 +520	—	—	—	—
EMERGENCY	-1896 +1963	-4019 +1800	—	—	—	—
FAULTED	—	—	—	—	—	—



TD # 402
DUAL Iso. SW-1-AB-011 Rev. 2
I.P.D. Iso. SW-1-AB-11-Rev 7
Data Point 2595/AB-1-067 X R.O
Pipe Mat'l. A106 GR.B
Insul. ______ Bldg. A

THIRD PARTY INSPECTION
CODE CLASS: ASME III-3

REV	DATE	DWN	CHK	APP	DESCRIPTION
0	[illegible]	KLM	[illegible]	PM	ISSUE FOR CONST FIELD FAB. FW 1-6
1	9/15/[illegible]	KC	CG	[illegible]	REV'D AS NOTED & PER CPPA 5900 (SEE NOTE 5) ADDED SHT. 2
2	12-12-80	RH	[illegible]	[illegible]	REV'D AS NOTED - REF. FIELD MODIFIED HANGER SKETCH (w/ [illegible]) DELETED NOTES 1-3 & 5 & FW 5-6

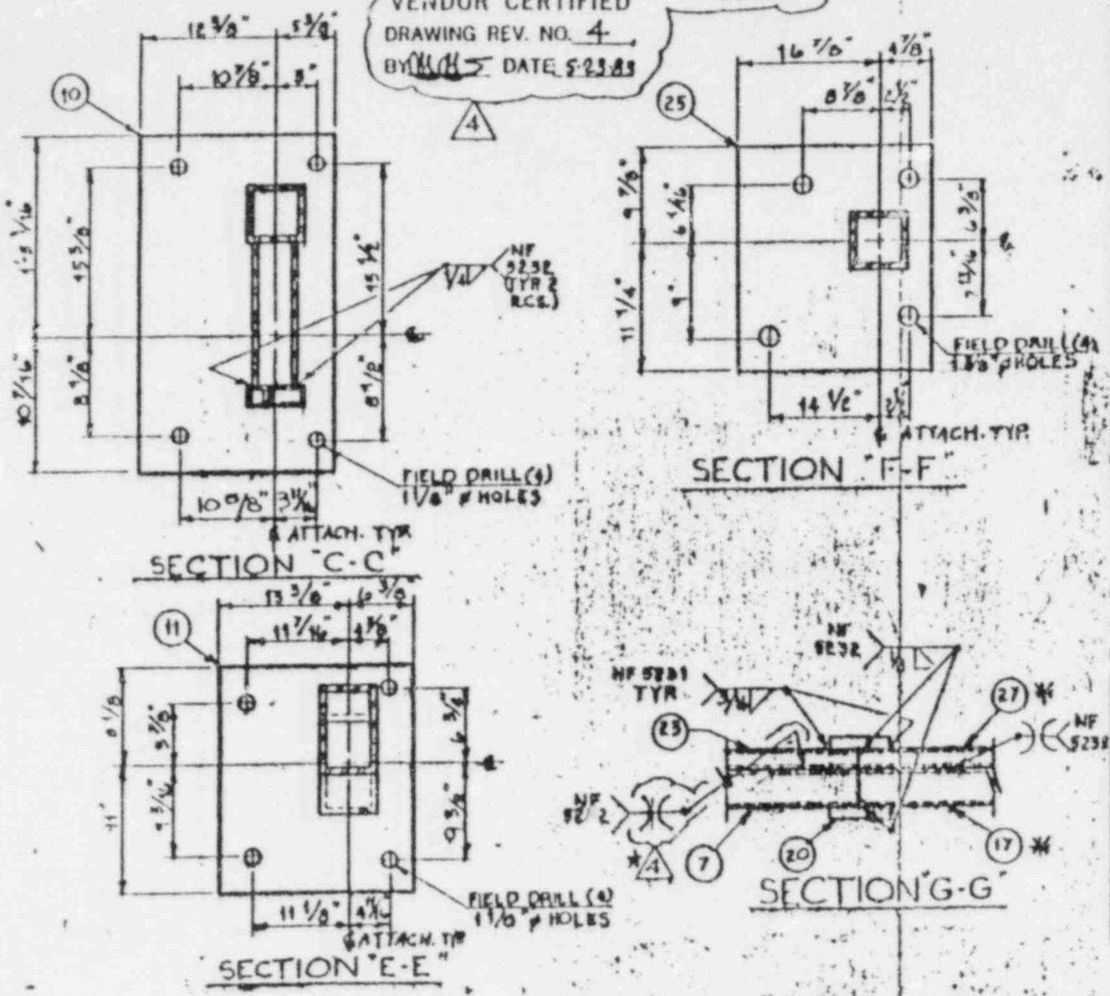
CUSTOMER Texas Utilities Service, Inc.
ORDER OR CONT. NO. CP-0046
JOB NAME Comanche Peak 1 & 2
MARK NO. SW-1-102-065-A43R
SKETCH NO. ______
SHEET 1 OF 2 REV. 4

FOR OFFICE AND ENGINEERING USE ONLY

BLUELINE 12-12-80 (AS-BUILT)

★ CHANGE NOT MADE BY CMC

VENDOR CERTIFIED
DRAWING REV. NO. 4
BY MHS DATE 5-23-83



ITEM NO	QTY REQ'D	MATERIAL DESCRIPTION	PBS	L	SS	PRIM	SEC.	AISC

REV	DESCRIPTION	DATE	DWN.	CHKD.	APPVD.
3	REV AS NT'D, REF CMC 46823 R.7; DCA ... (SEE NT. 7); "AS-BUILT" VENDOR CERTIFICATION, REF. CCP 8523	[illegible]	JC	[illegible]	[illegible]

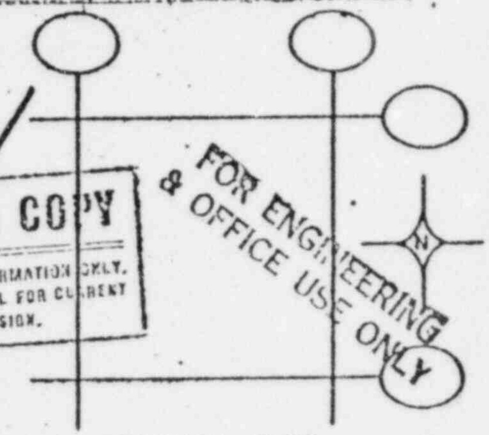
REV	DESCRIPTION	DATE	DWN.	CHKD.	APPVD.
4	REV. VENDOR CERT. REF. NCR-M-64345	5-23-83	CBH	JC	RCH

ASME CODE EDITION: ______
ADDENDA: ______
DESIGN SPEC: ______

RE. CERTIFICATION

INFORMATION COPY
THIS DOCUMENT IS FOR INFORMATION ONLY. CONTACT DOCUMENT CONTROL FOR CURRENT STATUS AND REVISION.

FOR ENGINEERING & OFFICE USE ONLY



LOCATION PLAN

DATA PT	SUPPORT LOADS (LBS) DESIGN	SERVICE LEVEL LIMITS A	B	C	D	PIPE MVTS (INCHES)
VERT.						
N-S						
E-W						

NOTE +N,E,UP / -S,W,DN

AUTHORIZED NUCL. INSP. YES ☒ NO ☐
ASME CODE CLASS ASME III-3

REF. DWGS	BRHL ISO.	REV	MECHANICAL	REV	ELECTRICAL	REV
	SW-1-AB-011	2				
	FAB. ISO.	REV	STRUCTURAL	REV	H.V.A.C.	REV

REV	DESCRIPTION	DATE	DWN.	CHKD.	APPVD.
2	REV'D AS NT'D PER FIELD AS-BUILT HANGER SKETCH (SEE NT. 6) DEL NTS. 1-3 (5) (FW)	12-12-80	R.H.	[illegible]	[illegible]
1	REV'D AS NOTED (PER CMM 5900 SEE NT 5)	9-25-80	RC.	OG	[illegible]

Brown & Root, Inc.
ENGINEERS AND CONSTRUCTORS
HOUSTON, TEXAS

CLIENT TUSI
PLANT COMANCHE PEAK
JOB NO. 8323

SUPPORT NO. SW-1-102-065-A43R
SHEET 2 OF 2 REV. 4

FORM DHE-5

TEXAS UTILITIES SERVICES INC.
COMANCHE PEAK S.E.S.
Agent For
DALLAS POWER & LIGHT COMPANY
TEXAS ELECTRIC SERVICE COMPANY
TEXAS POWER & LIGHT COMPANY

Date 7-31-84
Calc By GMC
Chk'd/Apprd. By
Filing Code
Sheet No. 1 Of
G & H Job. No.

Subject SW-1-102-065-A43R
A500 REVIEW
Ref. Dwg /Spec. No.

1.) $5020 = \frac{11445}{2.306} + \frac{257}{4.56}$

2) 840 SEE CALCS

3) 21600 D.G. SECTION III, PAGE 60F17

4) 18460 $Kl/r = 26$ ∴ Fa @ 200° FOR A-36

FORM DHE-5

TEXAS UTILITIES SERVICES INC.
COMANCHE PEAK S.E.S.
Agent For
DALLAS POWER & LIGHT COMPANY
TEXAS ELECTRIC SERVICE COMPANY
TEXAS POWER & LIGHT COMPANY

Date 9.2.82. Filing Code
Calc By S. Mazumdar Sheet No. 3 Of 20
Chk'd/Apprd. By AK 9-22-82 G & H Job. No.
Subject SW-1-102-065-A43R REV 3 Ref. Dwg./Spec. No.

As Built load review.

Ref: PSE Guideline.

Note: This hanger is gang with S. ppt MK# SW-1-129-730-A43R, H-CH-1-AB-032-003-3, H-CH-1-AB-006-3

Ref: Strudl Job # J1190A DT. 9.1.82.

Deflection Check.

Deflection at any joint < .063" ok. see II

Stress Check.

Maximum Stress (Member 1) = 5522 psi < 22,900 psi ok. see III

Check for Member 1. (TS 4x2x.25 + TS 2x2x.25)

$A_x = 4.18 in^2$ $A_y = 3 in^2$ $A_z = 2 in^2$
$I_x = 5.26 in^4$ $I_y = 2.306 in^4$ $I_z = 14.32 in^4$
$S_y = 2.306 in^3$ $S_z = 4.56 in^3$. $r_y = 0.74$ in $r_z = 1.85$ in

Axial Stress = $\frac{3513}{4.18} = 840$ psi = f_a (Maximum of 1,2,3,4)

Consider as if the member is unbraced.

$\frac{kl}{r} = \frac{1.0 \times 19.3}{0.74} = 26$. (Ref: Aisc 5-138)

$F_a = 21,400$ psi

$\frac{f_a}{F_a} = \frac{840}{21400} = .04 < .15$.

$\frac{f_a}{F_a} + \frac{f_{by}}{F_{by}} + \frac{f_{bz}}{F_{bz}} = 0.04 + \frac{11445}{2.306 \times 22,900} + \frac{257}{4.56 \times 22900}$

$= 0.26 < 1.0$ (ok)

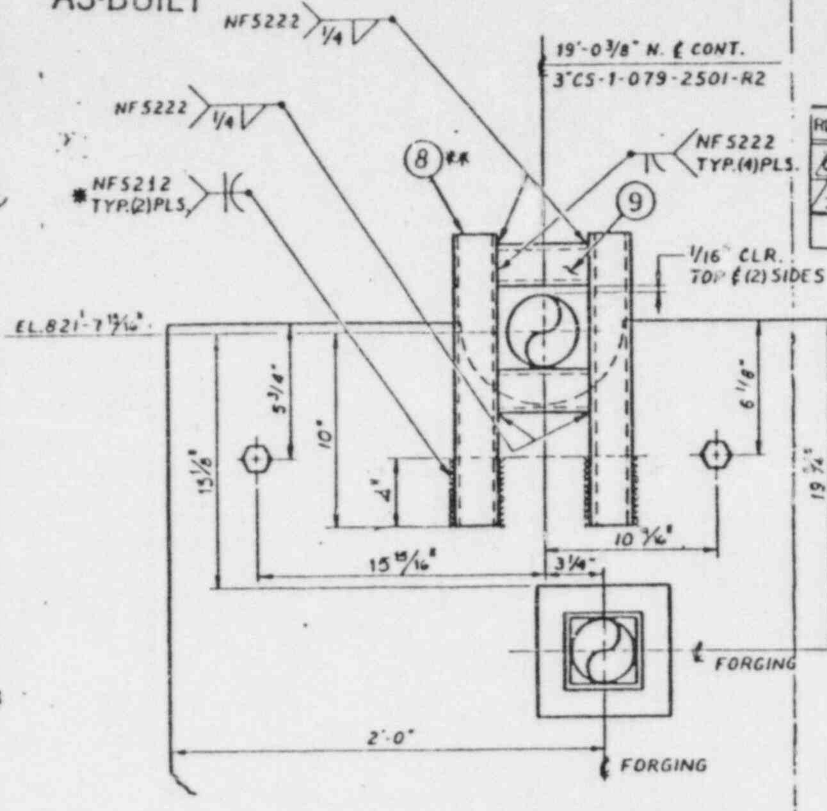
BLUELINE 4-6-82

AS-BUILT

* WELD ONLY FROM ℄ OF BOLTS DOWN
** FIELD TRIM TO SUIT

ITEM NO	NO REQ'D	DESCRIPTION	WT.	ASME OR ASTM	P R I M	MIC
8	2	1/4" x 3" x 3" x 17" LG., T.S.		A500 GR.B	L	
9	2	1/4" x 3" x 3" x 3 5/8" LG., T.S.		A500 GR.B	L	

REV	DATE	DR.	CHK	APR	DESCRIPTION
6	2-7-84				REV'D VENDOR CERT. REF: NCR-H-4155
7		TC			REV'D VENDOR CERT. REF: WPT# 2339



ELEV. LOOKING EAST

T.O.# 4901 ⚠7

MOMENT RESTRAINT PLATE, EXISTING, 2" THK. (A588 GR.B) DRG. # SI-0538-04

NOTE:

2.) Locking devices for high strength bolts are not required per DCA 7607

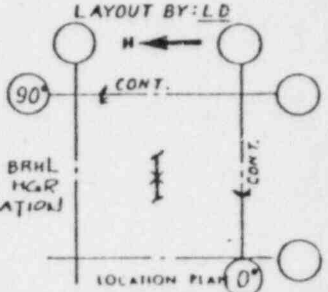
NOTE:

1) BY ISSUE OF REV. 1 OF THIS DRAWING, THE FOLLOWING DOCUMENTS ARE VOIDED: CMC # 33233 R-2

CPSES DOCUMENT CONTROL CENTER

VENDOR CERTIFIED
DRAWING REV. NO. 7
BY ... DATE ... 84

LAYOUT BY: LD



SEE BRHL FOR HGR LOCATION

LOCATION PLAN

REV	DATE	DWN	CHK	APR	DESCRIPTION
0					ISSUE FOR CONST.
1					REV'D AND REDRAWN, REF: R.M.H.S. NO. 51-R.1 (SEE NT.1)
2					REV'D AS NTD. REF. CMC 87... DCA
3					*NOT (SEE NOTES 1 "AS BUILT")
4					REV'D VENDOR CERTIFICATION REF: CMP# 22572
5					REVISED VENDOR CERTIFICATION REF: CMP# 26275
6					REV'D VENDOR CERTIFICATION REF WPT # 4728

LOAD (LBS)	GRAV	THER	HYDRO	OBE	SSE	DESIGN LOADS	MVTS (IN)	
UP						75	VERT	0
DN						958 / 1525 / 1533	H-S	0
N								
S								
E								
W								

CALC: AB-1-432 R 2; 278; SUPP CASE: SC-11-43A6B

REFERENCE DRAWINGS		REV		REV		REV
BRHL ISOMETRIC	CS-1-RB-023	2	PIPING 2323-MI-0511	10	ELECTRICAL 2323-E1-0500-04	14
FAB ISOMETRIC	CS-1-RB-23	5	STRUCTURAL 2323-SI-0519	4	HVAC 2323-MI-0550	5

CODE/CLASS: III/2
PAINT: CARBO ZINC #11
ZONE —

OWNER: TEXAS UTILITIES SERVICES INC.
PROJECT: COMANCHE PEAK UNITS NO. 1 & 2
ENGINEER: GIBBS & HILL INC.

Brown & Root, Inc.
HOUSTON, TEXAS

DRAWN	DATE	CHK'D	DATE	APPV'D	DATE
AB	10-16-78	TB	10-27-78		11-13-78

P.O. NO. CP-0046 A-1 | MFG. REL. TC-153

PRODUCTION ORDER | SERIAL NUMBER | SHEET 1 of 1

1386 | MK. NO. CS-1-079-028-C42R | REV. 7

TUSI CPSES

JOB NO. 3010-10-005C
SHEET ____ OF ____
CLIENT/PROJECT ____
ENGR. ll DATE 7/30/86
SUBJECT MK# CS-1.079-028-C42R
CHK'D. MAH DATE 7-31-86

THE COMPUTER RUN BASED ON HIGHER LOADS THAN THE LATEST LOADS [CONSERVATIVE]

THE MAX STRESSES AT MEM (7) FROM STRUDL RUN LOAD (1)

$$f_b = \frac{My + Mz}{S} = \frac{3348 + 6370}{2.1} = 4628 \text{ psi}$$

$$f_a = \frac{Fx}{A} = \frac{1241}{2.59} = 479 \text{ psi}$$

$$Kl/r = \frac{2.1 \times 6.625}{1.1} = 12.65$$

SA-36 ALLOWABLES USED CONSERVATIVLY
N/U ALLOWABLES CONSERVATIVE

$$Fa = 21000 \times \frac{31.9}{36} = 18608 \text{ psi}$$

$$F_b = 0.6 \times S_y = 0.6 \times 31.9 = 19140 \text{ psi}$$

Interaction Eq.

$$\frac{f_a}{Fa} + \frac{f_b}{F_b} = \frac{479}{18608} + \frac{4628}{19140}$$

$$= 0.026 + 0.242 = 0.268 < 1$$

O.K.

NPS FORM CB 100

REF

FRICTION LOAD : $(F_z)_x = (.3)(750) = 225^{\#}$

$(F_z)_y = (.3)(1570) = 471^{\#}$

(A) MEMBER DESIGN:

FROM STRUDL 'STR 5' 5

MAX. NORMAL STRESS = 5108 PSI (MEM. 7, LOAD 1)

STRESS VERY LOW BY INSPECTION - O.K.

SHEAR STRESS OK. BY STRUDL STR-5 OUTPUT OBSERVATION.

(B) DEFLECTION

MAX DEFLECTION AT NORMAL/UPSET CONDITION:

AT JT. 7, $\Delta_x = .001" < .062"$ OK

AT JT 5, $\Delta_y = .001" < .062"$ O.K.

(C) STIFFNESS

Δ_x (AT JT. 7, LOAD 3) = .00105"

$\therefore K_x = 1000/.00105 = 9.524 \times 10^5$ #/IN

Δ_y (AT JT. 5, LOAD 4) = .00099"

$\therefore K_y = 1000/.00099 = 1.01 \times 10^6$ #/IN.

THE ABOVE VALUES ARE MORE THAN 100% OF OLD VALUES.

2	784.378	0.000	FR	1	-530.465	0.000	FR 2
3	1053.299	1.000	FR	1	-1380.459	1.000	FR 2
4	1387.038	0.000	FR	1	-1052.042	0.000	FR 2
5	1343.581	1.000	FR	1	-1564.722	1.000	FR 2
6	2455.581	1.000	FR	1	-1497.139	1.000	FR 2
7	5107.067	1.000	FR	1	-4148.625	1.000	FR 2
8	3803.160	1.000	FR	1	-3350.891	1.000	FR 2
9	2744.877	0.000	FR	1	-2032.520	0.000	FR 2
10	1345.148	0.000	FR	1	-632.792	0.000	FR 2
11	5.195	1.000	FR	1	-6.020	1.000	FR 2
12	5.035	1.000	FR	1	-5.602	1.000	FR 2

SHT. 12 OF 16

0

LOADING LIST 3 4
OUT DEC 5
LIST DISP ALL

0

****
RESULTS OF LATEST ANALYSES
****

PROBLEM - JOB TITLE - NPSH 1366 & NPSH 3221

ACTIVE UNITS INCH LB DEG DEGF SEC

RESULTANT JOINT DISPLACEMENTS SUPPORTS

JOINT	LOADING	DISPLACEMENT			ROTATION		
		X DISP.	Y DISP.	Z DISP.	X ROT.	Y ROT.	Z ROT.
11	GLOBAL						
	3	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
	4	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
12	GLOBAL						
	3	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
	4	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000

SHT. 9 OF 16

	2	2		-243.435	-222.881	-36.832	-123.299	370.437	-679.730
		3		243.435	222.881	36.832	123.299	-248.413	-58.673
3									
	1	3		423.672	-103.126	-51.689	-195.254	-324.281	86.080
		4		-423.672	103.126	51.689	195.254	1040.469	-1514.977
	2	3		322.531	-70.075	-36.832	-131.635	-244.098	58.673
		4		-322.531	70.075	36.832	131.635	754.435	-1029.615
4									
	1	4		-433.820	43.970	51.689	-162.674	-1046.057	-1514.977
		5		433.820	-43.970	-51.689	162.674	329.870	2124.220
	2	4		-327.446	41.424	36.832	-127.327	-755.174	-1029.615
		5		327.446	-41.424	-36.832	127.327	244.837	1603.578
5									
	1	5		286.377	1241.182	419.311	-175.408	-323.278	2124.220
		6		-286.377	-1241.182	-419.311	175.408	-1065.901	1987.817
	2	5		222.881	936.565	317.168	-126.389	-245.323	1603.578
		6		-222.881	-936.565	-317.168	126.389	-805.455	1499.260
6									
	1	6		-1241.182	286.377	419.311	-1065.901	-175.408	-1987.817
		7		1241.182	-286.377	-419.311	1065.901	-1213.771	2936.584
	2	6		-936.565	222.881	317.168	-805.455	-126.389	-1499.260
		7		936.565	-222.881	-317.168	805.455	-924.389	2237.663
7									
	1	7		-1241.182	1036.377	644.311	-1065.901	1213.771	-2936.584
		8		1241.182	-1036.377	-644.311	1065.901	-3348.374	6370.102

1 OFFSITE TUS' GTICES V2 M4 82/08/03. 12.32.30. PAGE

0								
	2	7		-936.565	612.881	434.168	-805.455	924.389	-2237.663
		8		936.565	-612.881	-434.168	805.455	-2362.788	4268.136
8									
	1	8		-585.688	113.875	412.564	17.513	2607.082	-2437.249
		9		585.688	-113.875	-412.564	-17.513	-4540.770	2970.982
	2	8		-526.319	13.732	268.847	-22.146	1854.401	-1707.807
		9		526.319	-13.732	-268.847	22.146	-3114.489	1772.169
9									
	1	8		-922.502	655.494	-231.747	-741.293	1083.413	3932.853
		10		922.502	-655.494	231.747	741.293	-315.635	-1761.202
	2	8		-599.149	410.246	-165.321	-508.387	783.309	2560.329
		10		599.149	-410.246	165.321	508.387	-235.602	-1201.185
10									
	1	10		-922.502	655.494	-231.747	-741.293	315.635	1761.202
		2		922.502	-655.494	231.747	741.293	452.143	410.449
	2	10		-599.149	410.246	-165.321	-508.387	235.602	1201.185
		2		599.149	-410.246	165.321	508.387	312.106	157.959
11									
	1	9		412.564	585.688	-113.875	-2970.982	-17.513	-4540.770
		11		-412.564	-585.688	113.875	2970.982	188.326	5419.303
	2	9		268.847	526.319	-13.732	-1772.169	22.146	-3114.489
		11		-268.847	-526.319	13.732	1772.169	-1.548	3903.967
12									

TUSI CPSES

JOB NO. 5010-10-0050
SHEET ____ OF ____
CLIENT/PROJECT ____
ENGR. [illegible] DATE 7/31/34
SUBJECT MK# RC-1-075-044-CS1K
CHK'D. [illegible] DATE 7-31-84

THE COMPUTER RUN BASED ON HIGHER LOADS THAN THE LATEST LOADS [CONSERVATIVLY]

THE MAX STRESSES FOR MEM (5) LOAD 8

TS 6X6X1/4

$$f_b = \frac{M_y + M_z}{S} = \frac{5967 + 832}{16.19} = 3739 \text{ psi}$$

$$f_a = \frac{F_x}{A} = \frac{352}{10.09} = 35 \text{ psi}$$

$$KL/r = \frac{2.1 \times 13.56}{2.19} = 13$$

$$Fa = 21000 \times \frac{31.9}{36} = 18608 \text{ psi}$$

$$F_b = 0.6 \times 31900 = 19140 \text{ psi}$$

SA-36 ALLOWABLES USED CONSERVATIVLY
N/U ALLOWABLE CONSERVITIVE

INTERACTION EQ

$$\frac{fa}{Fa} - \frac{fb}{F_b} = \frac{35}{18608} + \frac{3739}{19140}$$

$$= 0.002 + 0.1954 = 0.1974 < 1$$

O.K

TUSI CPSES

JOB NO. 3010-12-005C
SHEET ____ OF ____
CLIENT/PROJECT ____
ENGR. [illegible] DATE 7/21/
SUBJECT MK # RC-1-075-044-C51K
CHK'D. MAH DATE 7-21-8-

THE LOADS AT THE INTERMEDIATE INSERTS ARE VERY SMALL AS WELL AS TUBE STELL 6"X6"X 1/2" USED HENCE TS AT INTERMEDIATE INSERT HAS VERY SMALL STRESSES.

Sheet 34

****
RESULTS OF LATEST ANALYSES
****

PROBLEM - NONE TITLE - NONE GIVEN

ACTIVE UNITS INCH LB RAD DEGF SEC

MEMBER FORCES

MEMBER	LOADING	JOINT	FORCES			MOMENTS		
			AXIAL	SHEAR Y	SHEAR Z	TORSION	MOMENT Y	MOMENT Z
1	5	1	-1472.9	-27.0	-9903.2	-34136.5	-1470.5	-.0
		2	1472.9	27.0	9903.2	34136.5	17378.2	-45.0
	6	1	1520.1	39.1	-2850.8	-30633.8	-1578.1	.0
		2	-1520.1	-39.1	2850.8	30633.8	6214.9	63.6
	7	1	-1520.1	-39.1	2850.8	30633.8	1578.1	-.0
		2	1520.1	39.1	-2850.8	-30633.8	-6214.9	-63.6
	5	1	1472.9	27.0	9903.2	34136.5	1470.5	.0
		2	-1472.9	-27.0	-9903.2	-34136.5	-17378.2	45.0
	8	1	-1.8	16.5	-.1	-525.4	-22.6	.0
		2	1.8	-13.8	.1	525.4	22.8	20.2
2	5	2	-1472.9	-20.8	-2903.2	4316.8	-15924.3	45.0
		3	1472.9	20.8	2903.2	-4316.8	55848.2	-409.5
	6	2	1520.2	38.8	4149.2	1827.3	-4359.3	-63.6
		3	-1520.2	-38.8	-4149.2	-1827.3	-52264.8	584.4
	7	2	-1520.2	-38.8	-4149.2	-1827.3	4359.3	63.5
		3	1520.2	38.8	4149.2	1827.3	52264.8	-584.4
	5	2	1472.9	20.8	2903.2	-4316.8	15924.3	-45.8
		3	-1472.9	-20.8	-2903.2	4316.8	-55848.2	409.5
	8	2	-1.8	13.8	-.1	-525.4	-22.4	-20.2
		3	-.0	23.3	.1	525.4	23.8	-52.4
3	5	3	2074.7	49.5	3824.2	1888.4	-29351.2	491.4
		4	-2074.7	-49.5	-3824.2	-1888.4	-2985.1	348.7
	6	3	-2188.8	-12.8	-2188.1	2811.2	24756.8	326.3
		4	2188.8	12.8	2188.1	-2811.2	-1484.4	-434.2
	7	3	2188.8	12.8	2188.1	-2811.2	-24756.8	-326.3
		4	-2188.8	-12.8	-2188.1	2811.2	1484.4	434.2
	5	3	-2074.7	-49.5	-3824.2	-1888.4	29351.2	-491.4
		4	2074.7	49.5	3824.2	1888.4	2985.1	-348.7
INTERMEDIATE	9	3	4.9	-116.1	3.9	954.1	8.8	-522.2
INSERT		4	-5.9	134.6	-3.9	-954.1	-48.7	-508.8

TUSI NPS 3043 W 3044 SC FAX-SAA ENGR AUS CHKD

UTICES V2 M2 81/02/06. 08.34.25. PAGE 5

Sheet 3

	4								
		5	4	-497.5	9.6	2661.6	-923.1	2676.0	247.
			5	497.5	-9.6	-2661.6	923.1	-29183.4	-152
		6	4	411.8	54.2	-3073.4	-217.6	1787.0	-162.
			5	-411.8	-54.2	3073.4	217.6	28584.8	697.
		7	4	-411.8	-54.2	3073.4	217.6	-1787.0	162
			5	411.8	54.2	-3073.4	-217.6	-26589.8	-697
INTERMEDIATE INSERT		8	4	497.5	-9.6	-2661.6	923.1	-2876.0	-247
			5	-497.5	9.6	2661.6	-923.1	29183.4	152
		9	4	-4.9	112.3	4.1	-1006.9	-41.7	509
			5	3.7	-84.1	-4.1	1006.9	1.5	46?
	5								
		5	5	351.9	-60.2	-4319.8	-531.9	59697.2	-831
			6	-351.9	60.2	4319.8	531.9	22.3	-.
		6	5	-295.4	48.7	4031.0	1234.4	-55674.7	673
			6	295.4	-48.7	-4031.0	-1234.4	-51.8	
		7	5	295.4	-48.7	-4031.0	-1234.4	55674.7	-673
			6	-295.4	48.7	4031.0	1234.4	51.8	-.
		8	5	-351.9	60.2	4319.8	531.9	-59697.2	831.
			6	351.9	-60.2	-4319.8	-531.9	-22.3	.
		9	5	-.7	-14.3	.1	719.4	28.8	-538
			6	-1.0	58.7	-.1	-719.4	-30.2	-.
	6								
		5	3	-6732.4	47.4	4154.3	-81.8	-26435.1	-1486.
			7	6732.4	-47.4	-4154.3	81.8	13972.3	1628.
		6	3	6655.3	-126.6	-4293.2	-910.7	27532.5	-404.
			7	-6655.3	126.6	4293.2	910.7	-14653.0	18.
		7	3	-6655.3	126.5	4293.2	910.7	-27532.5	404.
			7	6655.3	-126.6	-4293.2	-910.7	14653.0	-18.
		8	3	6732.4	-47.4	-4154.3	81.8	26435.1	1486.
			7	-6732.4	47.4	4154.3	-81.8	-13972.3	-1628.
		9	3	-4.0	64.9	1.4	575.1	30.1	1479.
			7	4.0	-64.9	-1.4	-575.1	-34.1	-1224.
	7								
		5	7	-7404.8	-120.5	64.6	1075.0	-13874.9	-2018.
			8	7404.8	120.5	-64.6	-1075.0	11964.6	-1723.
		6	7	8088.6	51.0	-123.0	-1066.5	14640.5	126.
			8	-8088.6	-51.0	123.0	1066.5	-11001.6	1394.
		7	7	-8088.6	-51.0	123.0	1066.5	-14640.5	-126.
			8	8088.6	51.0	-123.0	-1066.5	11001.6	-1393.
		8	7	7404.8	120.5	-64.6	-1075.0	13874.9	2018.
			8	-7404.8	-120.5	64.6	1075.0	-11964.6	1723.
		9	7	-5.9	64.6	2.7	-142.6	-25.3	1345.
			8	4.1	-.4	.9	142.6	-.9	-86.
	8								
		5	8	-4152.4	-132.5	-6732.4	-962.4	-11960.2	1850.
			9	4152.4	132.5	6732.4	962.4	32176.4	-2248.
		6	8	4294.7	57.4	6655.3	675.3	10994.0	-1689.
			9	-4294.7	-57.4	-6655.3	-675.3	-31579.2	1661.
		7	8	-4294.7	-57.4	-6655.3	-675.3	-10994.0	1689.
			9	4294.7	57.4	6655.3	675.3	31579.2	-1661.
		8	8	4152.4	132.5	6732.4	962.4	11960.2	-1850.
			9	-4152.4	-132.5	-6732.4	-962.4	-32176.4	2248.
		9	8	-1.4	.4	-4.0	-147.4	1.2	-77.
			9	1.4	-.3	4.0	147.4	10.7	78.
	9								
		5	5	5541.6	70.1	449.4	984.3	-30513.2	377.

Sheet 39

****
RESULTS OF LATEST ANALYSES
****

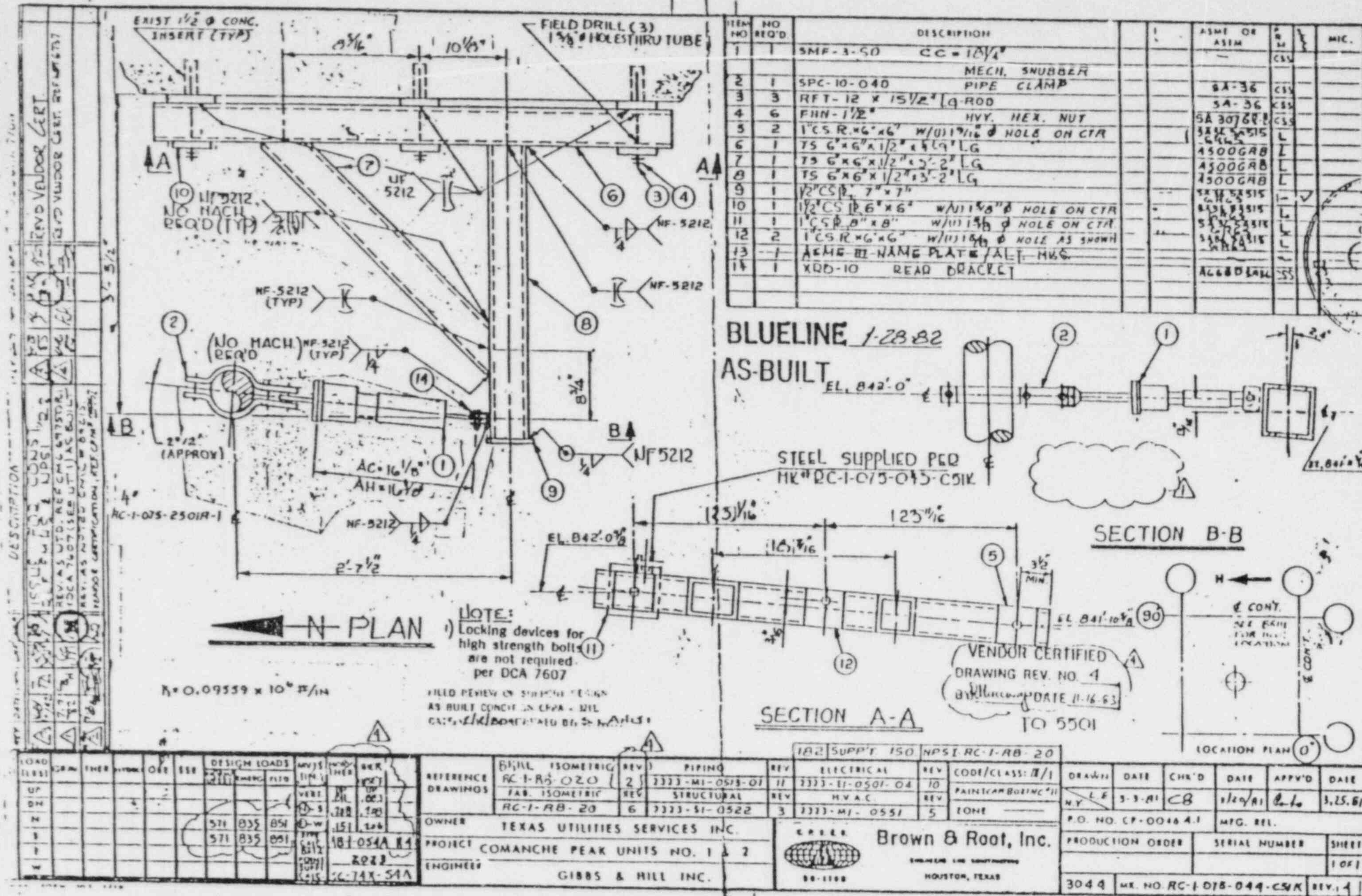
PROBLEM - NONE TITLE - NONE GIVEN

ACTIVE UNITS INCH LB RAD DEGF SEC

INTERNAL MEMBER RESULTS

MEMBER MAXIMUM STRESS

MEMBER	MAX NORMAL	AT SECTION	LOAD	MIN NORMAL	AT SECTION	LOAD
1	1234.5	1.000 FR	5	-1234.5	1.000 FR	8
2	3611.6	1.000 FR	5	-3611.6	1.000 FR	6
3	2108.9	0.000 FR	8	-2108.9	0.000 FR	5
4	1861.3	1.000 FR	5	-1861.3	1.000 FR	6
5	3773.5	0.000 FR	8	-3773.5	0.000 FR	5
6	124.4	0.000 FR	7	-124.4	0.000 FR	8
7	1765.9	0.000 FR	5	-1765.9	0.000 FR	6
8	110.4	1.000 FR	5	-110.4	1.000 FR	8
9	2594.9	0.000 FR	8	-2594.9	0.000 FR	7
10	2448.2	0.000 FR	6	-2448.2	0.000 FR	7
11	6.4	0.000 FR	6	-6.4	0.000 FR	5
12	54.4	0.000 FR	6	-54.4	0.000 FR	7
13	77.0	0.000 FR	5	-77.0	0.000 FR	5



ITEM NO	NO REQ'D	DESCRIPTION	ASME OR ASTM
1	1	SMF-3-50 CC=10¼" MECH. SNUBBER	—
2	1	SPC-10-040 PIPE CLAMP	SA-36
3	3	RFT-12 × 15½" LG ROD	SA-36
4	6	FHN-1½" HVY. HEX. NUT	SA 307 GR.B
5	2	1" CS PL×6"×6" W/(1) 1 9/16" Φ HOLE ON CTR	SA515
6	1	TS 6"×6"×1/2"×4'-9" LG	A500GRB
7	1	TS 6"×6"×1/2"×5'-2" LG	A500GRB
8	1	TS 6"×6"×1/2"×3'-2" LG	A500GRB
9	1	1/2" CS PL 7"×7"	SA515
10	1	1½" CS PL 6"×6" W/(1) 1⅝" Φ HOLE ON CTR	SA515
11	1	1" CS PL 8"×8" W/(1) 1⅝" Φ HOLE ON CTR	SA515
12	2	1" CS PL×6"×6" W/(1) 1 5/16" Φ HOLE AS SHOWN	SA515
13	1	ASME III NAME PLATE/ALT. MKG.	
14	1	XRD-10 REAR BRACKET	A668 D

REFERENCE DRAWINGS	REV	PIPING	REV	ELECTRICAL	REV
B&R ISOMETRIC RC-1-RB-020	2	2323-MI-0513-01	11	2323-EI-0501-04	10
FAB. ISOMETRIC RC-1-RB-20	6	STRUCTURAL 2323-SI-0522	3	H.V.A.C. 2323-MI-0551	5

CODE/CLASS: III/1

OWNER: TEXAS UTILITIES SERVICES INC.

PROJECT: COMANCHE PEAK UNITS NO. 1 & 2

ENGINEER: GIBBS & HILL INC.

Brown & Root, Inc. HOUSTON, TEXAS

DRAWN N.Y. DATE 3-3-81 CHK'D CB DATE 3/20/81 DATE 3.25.81

P.O. NO. CP-0046 A.1

SHEET 1 OF 1

3044 MK. NO. RC-1-078-044-C51K REV. 4

FOR OFFICE AND ENGINEERING USE ONLY

$$f_b = \frac{M_y + M_z}{S}$$

$$= \frac{114 \times 20 + 114 \times 0.3 \times 20 + 358 \times 0.3 \times 21.75}{5.1} = 1039 \text{ psi}$$

$$f_a = \frac{358}{4.95} = 72 \text{ psi}$$

$$Kl/r = \frac{2.1 \times 13}{1.44} = 19$$

$$F_a = 20660 \times \frac{31.9}{36} = 18307 \text{ psi}$$

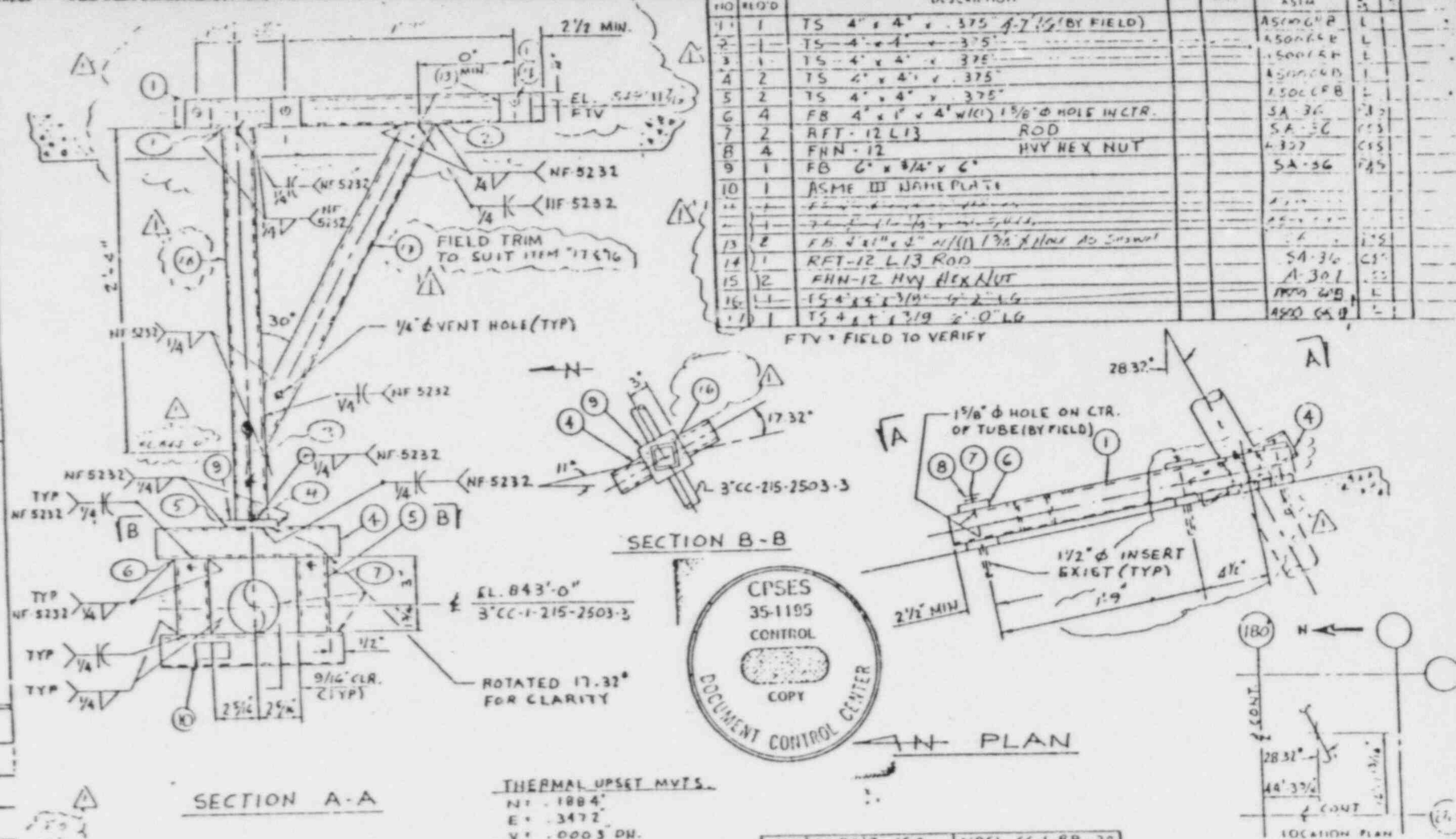
$$F_b = 0.6 \times 31900 = 19140 \text{ psi}$$

SA-36 ALLOWABLE USED CONSERVATIVELY

INTERACTION EQ

$$\frac{f_a}{F_a} + \frac{f_b}{F_b} = \frac{72}{18307} + \frac{1039}{19140} = 0.06 < 1$$

TS@INTERMEDIATE INSERT IS O.K SINCE LOADS ARE VERY SMALL



ITEM NO	NO. REQ'D	DESCRIPTION	WT.	ASTM	
1	1	TS 4" x 4" x .375" 4'-7 1/2" (BY FIELD)		A500 GR B	L
~~2~~	~~1~~	~~TS 4" x 4" x .375"~~		A500 GR B	L
~~3~~	~~1~~	~~TS 4" x 4" x .375"~~		A500 GR B	L
4	2	TS 4" x 4" x .375"		A500 GR B	L
5	2	TS 4" x 4" x .375"		A500 GR B	L
6	4	FB 4" x 1" x 4" W/(1) 1 3/8" φ HOLE IN CTR.		SA-36	[illegible]
7	2	RFT-12 L13 ROD		SA-36	CS
8	4	FHN-12 HVY HEX NUT		A-307	CS
9	1	FB 6" x 3/4" x 6"		SA-36	[illegible]
10	1	ASME III NAMEPLATE			
~~11~~	~~1~~	[illegible]		[illegible]	
~~12~~	~~1~~	[illegible]		[illegible]	
13	2	FB 4" x 1" x 4" W/(1) 1 3/8" φ HOLE AS SHOWN		[illegible]	[illegible]
14	1	RFT-12 L13 ROD		SA-36	CS
15	12	FHN-12 HVY HEX NUT		A-307	[illegible]
~~16~~	~~1~~	~~TS 4" x 4" x 3/16" [illegible]~~		A500 GR B	L
17	1	TS 4" x 4" x 3/16" 2'-0" LG		A500 GR B	L

FTV = FIELD TO VERIFY

THERMAL UPSET MVTS.
N = .1884"
E = .3472"
V = .0003" DN.

LOAD (LBS)	GRAV	THER		OBE	SSE	DESIGN LOADS		
UP		3		39	78	0	0	
DN	262	57		39	78	358	397	
N								
S								
E								
W								

PIPE CALC: 598 *1 · 105 · SC-41-65

197	SUPP'T ISO NPSI-CC-1-RB-32
REFERENCE DRAWINGS	G & H ISOMETRIC 2323-MI-3225-63, REV C; PIPING 2323-MI-0507; ELECTRICAL 2323-EI-0601-01, REV 5
	FAB. ISOMETRIC CC-1-RB-32, REV 10; STRUCTURAL 2323-SI-0622, REV 3; H.V.A.C. 2323-MI-0551, REV 3
CODE/CLASS	III/3
PAINT	CARBOZINC [illegible]
ZONE	
OWNER	TEXAS UTILITIES SERVICES INC.
PROJECT	COMANCHE PEAK UNITS NO. 1 & 2
ENGINEER	GIBBS & HILL INC.

CPSES 35-1195

Brown & Root, Inc.
ENGINEERS AND CONSTRUCTORS
HOUSTON, TEXAS

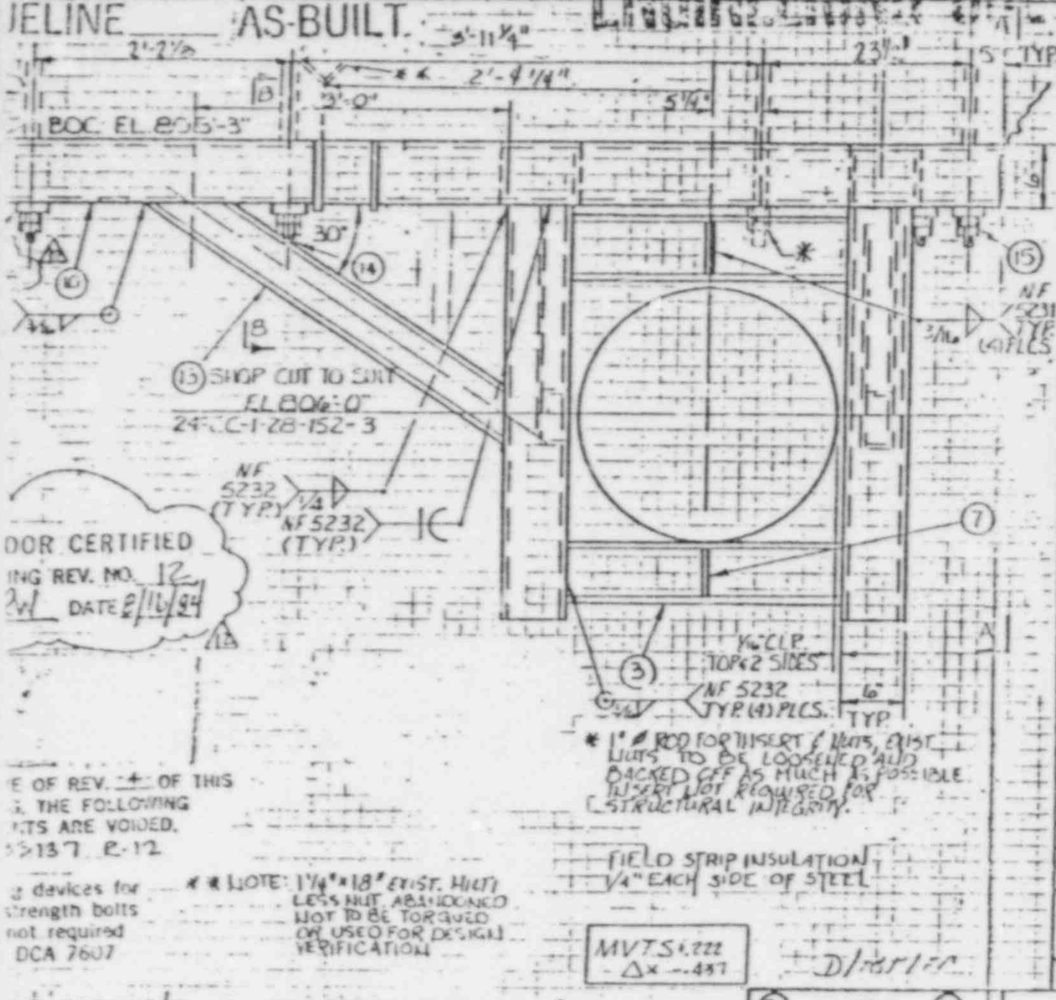
DRAWN	DATE	CHK'D	DATE	APP'D
RG / PK	6-1-79	WP / EW	6/4/79	[illegible]

P.O. NO. CP-0040A.1 · MFG. REL. TC-1[illegible]

PRODUCTION ORDER · SERIAL NUMBER

2290 · MK. NO. CC-1-215-013-C53R · REV. 1

FOR OFFICE AND ENGINEERING USE ONLY



VENDOR CERTIFIED
DRAWING REV. NO. 12
DATE 2/16/84

...E OF REV. 4 OF THIS ..., THE FOLLOWING ...TS ARE VOIDED. ...5137 R-12

...g devices for ...strength bolts not required DCA 7607

MVTS 4.222 Δx = .437

...AES/FA

ITEM NO.	MATERIALS & OPERATIONS	QUAN	SHIP	PBS	L	CSS	PRIM.	SEC.	AISC.
5	W6x15.5 x 2'-0 1/8" LG (SA36) TW 62#	2			X		X		
7	3/8" C.S. STIFFENER 2 1/2" x 5 1/2" LG (SA36/SA515 GR65) TW 6#	4		X			X		
10	1/2" T.S. ... x 2'-8 1/8" LG (A500 GR B)	1				X			
11	1/2" T.S. ... x 5'-... LG (A500 GR B)	1			X	X	X		
11	1/2" T.S. ... x 3'-6" LG (A500 GR B)	2			X	X	X		
12	W4x13 x ...'-6" LG (SA-36)	1				X			
14	1" ROD TL=11" (SA-36)	7							
15	1" DIA. HEX NUT (A307 GR B)	6							
16	...								
17	1/2" T.S. 8"x6"x1 1/4" LG. (A500 GR. B)	2			X		X		
...	1" DIA ... LG (SA36) THRD ROD	3				X			
21	1" DIA. HEX NUT (A307 GR B)	6							
22	1/2" T.S. 8"x6"x6'-0" LG (A500 GR B)	1							
23	1/2" T.S. 3"x3"x4'-0" LG. (A500 GR B)	2			XX				
24	WASHER PLATE RWP-... FIELD TRIM TO SUIT	1							
25	WASHER PLATE RWP-08 FIELD TRIM TO SUIT	6							
26	T.S. ...x8"x6" x 12" LG. A500 GR B	1			X		X		
27	1/2" ... 8"x9 1/2" (E70, E45 ... GR65)	4		X			X		

FOR OFFICE AND ENGINEERING USE ONLY

REV	DATE	DWN	CHK	APP	DESCRIPTION
1	...				REV. AS NTD. REF. FMMS ... (FE-11-5)
2	6-... 83				REV'D AS NTD. REF; CMC 82394 R2 AS BUILT
3	~	~	~		VENDOR CERTIFICATION, REF. STN # 62995 ...
4	9-26-83				REV'D VENDOR CERT.
5	...-83				REV'D VENDOR CERT.
6	...				REV. VENDOR CERT.
7	...-84				REV'D VENDOR CERTIFICATION ... 35135

DESCRIPTION: REV'D VENDOR CERT. / REV'D VENDOR CERT. / REV'D VENDOR CERT. D/C UCR # M1474...

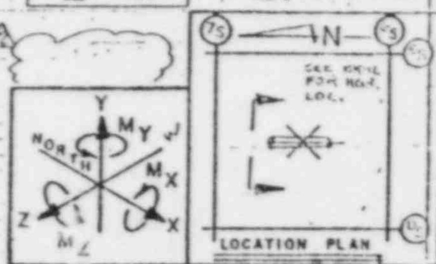
FOR MATERIALS AND OPERATIONS SEE SKETCH NO. ____ SHEET ___ OF ___

BROWN & ROOT, INC.
ENGINEERS & CONSTRUCTORS

REF. DRAWING NUMBERS
PIPE: MI-0604 R-11 ELECT: E1-0601-01 R5
STEEL: SI-0605 R-9 H.V.A.C.: MI-0651 R5

CONDITIONS	Fx	Fy	Fz	Mx	My	Mz
NORMAL						
UPSET						
EMERGENCY						
FAULTED						

REV	DATE	DWN	CHK	APP	DESCRIPTION
0					ISSUED FOR CONST. FW 1-5
1					REVISED PER ... REV 1 ... FW 6 & 12
2					...
3					...



THIRD PARTY INSPECTION YES / NO
CODE CLASS: ASME III-3

... Iso. CC-1-SB-003 R-4
I.P.D. Iso. CC-1-SB-023 R5
Data Point ...
Pipe Mat'l. SA106 GR.B
Insul. 1/2" Bldg. SB

CUSTOMER Texas Utilities Service, Inc.
ORDER OR CONT. NO. CP-0046
JOB NAME Comanche Peak 1 & 2
MARK NO. CC-1-020-024-S33R
SKETCH NO. —
SHEET 1 OF 2 REV. 12

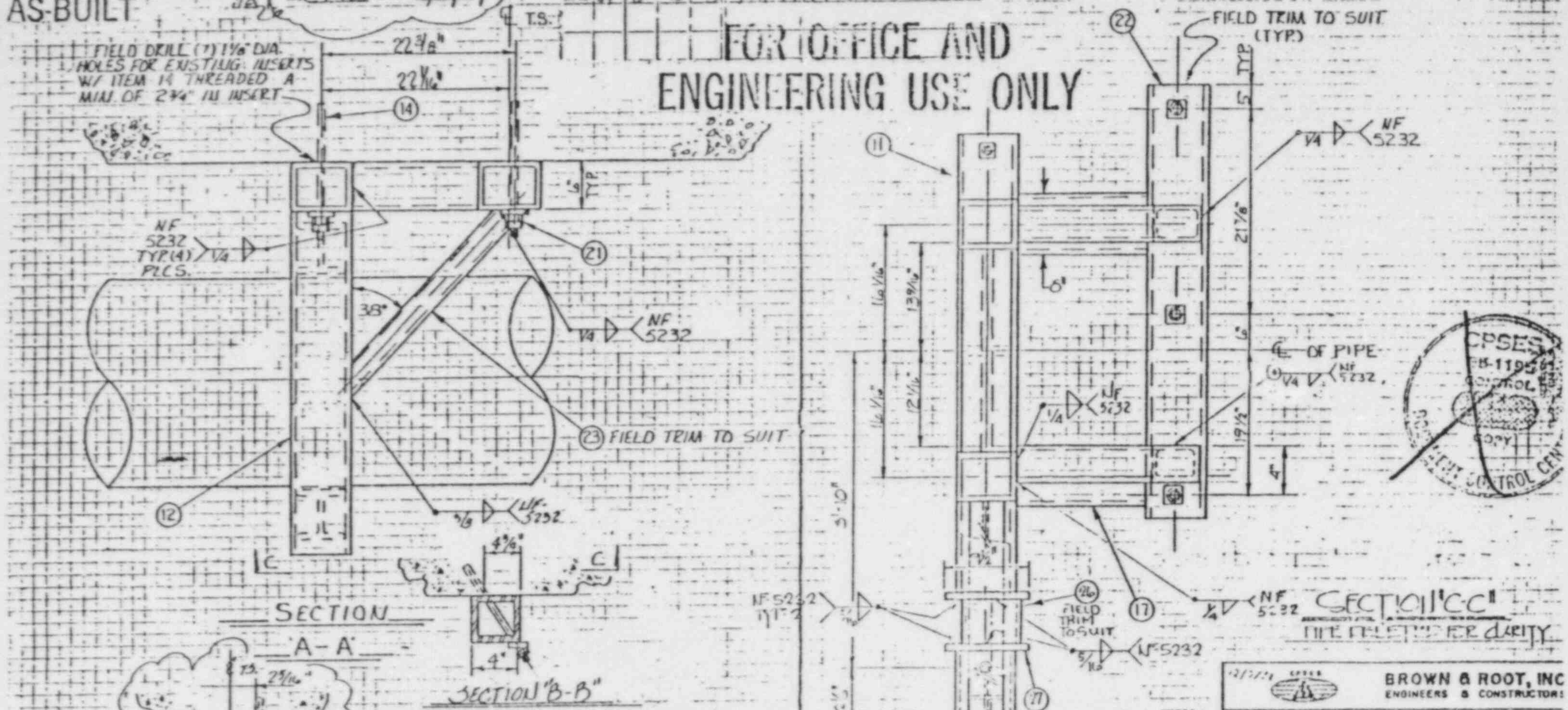
BLUELINE:

AS-BUILT

VENDOR CERTIFIED
DRAWING REV. NO. 12
BY RW DATE 8/16/84

FOR OFFICE AND ENGINEERING USE ONLY

☆ CHANGE NOT MADE BY CMC



REV	DATE	DWN	CHK	APP	DESCRIPTION
9	2-14-84	E			REV'D VENDOR CERT.
12	8-16-84				REV'D VENDOR CERT., REF.

REV	DATE	DWN	CHK	APP	DESCRIPTION
4	11-10-83	E			REV'D VENDOR CERT.
5	11-28-83	H			REV. VENDOR CERT.
7	7-25-84				REV'D VENDOR CERTIFICATION REF CFPA 35935
10	2-6-84				REV'D VENDOR CERT.

THIRD PARTY INSPECTION YES ☑ NO ☐

CODE CLASS: ASME III-3

REV	DATE	DWN	CHK	APP	DESCRIPTION
					ISSUED FOR CONST.
					REV'D AS NTD REF; CMC 82394 R-2
					REV'D VENDOR CERT.

BROWN & ROOT, INC
ENGINEERS & CONSTRUCTORS

REF. DRAWING NUMBERS

PIPE: — ELECT: —
STEEL: — H.V.A.C.: —

CUSTOMER Texas Utilities Service, Inc
ORDER OR CONT. NO. CP-0046
JOB NAME Comanche Peak 1 & 2
MARK NO. CC-1-0?8-?24-S33R
SKETCH NO.
SHEET 2 OF 2 REV. 12

FORM DHE-5

TEXAS UTILITIES SERVICES INC.
COMANCHE PEAK S.E.S.
Agent For
DALLAS POWER & LIGHT COMPANY
TEXAS ELECTRIC SERVICE COMPANY
TEXAS POWER & LIGHT COMPANY

Date 10-13-83
Calc By EJN
Chk'd/Apprd. By [illegible] 10-13-83
Subject QC-1-028-024.S33R

Filing Code
Sheet No. 1 Of 1
G & H Job. No.
Ref. Dwg./Spec. No.

REF: STRUDL OUTPUT J-381A 4-28-83

MAX. NORMAL STRESS OCCURS @ MEM. 15 (FOR TUBE STL only)

MAX. STRESS = 2451 psi (TS 8x6x1/2)

MEMBER FORCES (use max., conserv.)

AXIAL FORCE = 6271 Lbs. , TORSION = 4204 IN-Lbs.

Y Shear = 824 Lbs
Z Shear = 2952 Lbs.

} Envelope force used

$\frac{KL}{r} = \frac{2.1(42)}{2.31} = 38.18$ Say 39

Fa = 17620 psi, SECT. III page 6 (Rev 4 PGE Guideline)

2451 psi < 17620 psi, OK (conserv.)

SHEAR STRESSES:

DUE TO TORSION:

$f_{vt} = \frac{\text{TORSION}}{2At} = \frac{4204}{2(8-0.5)(6-0.5)(0.5)} = 102$ psi

$f_{vy} = \frac{824}{2(8)(0.5)} = 103$ psi

$f_{vz} = \frac{2952}{2(6)(0.5)} = 492$ psi

$f_v = \left[(103+102)^2 + (492+102)^2\right]^{1/2}$

$f_v = 628$ psi < 13,100 psi, OK

$f_a = \frac{6271}{12.4} = 506$ psi < 17620 psi

ATTACHMENT D

CASE Exhibit 5P 42 Page 1 of 1

Marcus N. Bressler, P E, Inc.
CONSULTING ENGINEER

829 CHATEAUGAY ROAD
KNOXVILLE, TN 37923
(615) 693-0822

July 15, 1981

Mr. R. J. Vurpillat, Jr., Manager
Power Group Quality Assurance
P. O. Box 3
Houston, Texas 77001

Dear Mr. Vurpillat:

First let me apologize for the unseemly delay in completing and submitting the Survey Report for the Pre-ASME Survey Training Program. Had I been aware at the time of the unforeseen demands on my time during the last three months, I would have remained at each site one extra day and written the final report. The report could have been prepared in your word processor system, submitted to me for proof reading, and returned to you, signed and sealed in less time than it actually took.

As you know, I have spent a great deal of time recently very involved in Brown & Root, Inc., training programs. In fact, all things being equal, I expect to be in the South Texas Project on July 27 - 30, to teach an expanded introduction to Section III, General Requirements, Fabrication, Examination, and Testing to approximately 70 STP and HLP personnel.

I have not yet received ASME clearance to participate in your ASME Survey as your consultant, without potential conflict of interest. The Survey team leader, Mr. Robert Tilton, has indicated that he would not feel any undue pressure from my presence. If I can reach Mr. Mel Green, Managing Director, Codes and Standards, in the next two weeks (he is on vacation), I will notify you immediately to determine to what extent, if any, you would want me to participate. If there is a desire from Brown & Root for my presence at the three sites, we may need to extend the contract with my company to cover the added fees and expenses, or else open up a new contract.

I again wish to thank you for the opportunity to serve your company, and trust that in the near future we may be able to discuss a long term consulting contract in the various areas of my expertise.

Sincerely yours,

Marcus N Bressler

M. N. Bressler, President
M. N. BRESSLER, PE, INC.

MNB/

TENN REGN. NO. 9411

ATTACHMENT E

CASE EXHIBIT 581 Page 1 of 1

Marcus N. Bressler, P.E., Inc.
CONSULTING ENGINEER

829 CHATEAUGAY ROAD
KNOXVILLE, TN 37922
(615) 693-0822

July 15, 1981

Mr. J. P. Clarke, III
Staff Engineer
Brown & Root, Inc.
Comanche Peak Steam Electric Plant
P. O. Box 1001
Glen Rose, Texas 76043

Dear Mr. Clarke:

I need not tell you how sorry I am that it has taken so long to complete my assignment and write and submit the final report on the Pre-ASME Survey Training Program.

I completely overestimated my capability to do four jobs (maybe five) simultaneously. Working for TVA, The ASME Code, ASME Professional Development Department, Brown & Root Training Department and others did not leave much time for writing the survey reports.

However, here it is, and I hope that the exit interview provide you with enough details to correct the few findings and also consider the recommendations of the team listed in the report as observations.

I will be at STP probably on July 27 - 30 to give an extended course on introduction to Section III, General Requirements, Fabrication, Examination and Testing to approximately 70 STP and HLP personnel. Al Fernandez is handling the training session.

I again want to thank you for your confidence in my capabilities and your recommendation, which made it all possible. If I can be of service again in the near future, I still have an open Purchase Order with TUSI.

Sincerely yours,

Marcus N. Bressler

M. N. Bressler, President
M. N. BRESSLER, PE, INC.

MNB/

cc:
R. J. Vurpillat, Jr.

ATTACHMENT F

George	Burgess
Merritt	Norman
Ham	Johnson
McBay	Popplewell
Calder	Creamer
Deem	Kissinger
Strange	Finneran
Stobaugh	Murray
Davis	
Hicks	
Gentry	R. Baker
	File

TEXAS UTILITIES SERVICES INC.
P. O. BOX 1002 · GLEN ROSE, TEXAS 76043

October 25, 1983

The American Society of Mechanical Engineers
United Engineering Center
345 East 47th Street
New York, New York 10017

Attention: Mr. John Millman

COMANCHE PEAK STEAM ELECTRIC STATION

Gentlemen:

The following inquiries are submitted concerning the use of Code Case N-71 as it pertains to the use of A500 tubular shapes. These inquiries are submitted in response to questions being raised by an intervenor, and the background for the concern is provided.

Inquiry 1:

An Owner has contracted for construction of component supports under the provisions of Case N-71-9. Must component supports constructed from ASTM A500 tubular shapes under the provisions of Case N-71-9 be redesigned or reanalyzed using the lower yield strength values published in a later revision of the Case (e.g., N-71-10) for the same material?

Suggested Reply:

No, the provisions of later revisions to Code Cases are neither mandatory nor retroactive.

Inquiry 2:

Did the Committee determine that use of the yield strength values for A500 tubular shapes published in Case 1644-3 through N-71-9 would result in unsafe construction?

Suggested Reply:

No, the Committee recognized that the yield strength of A500 in the cold-wrought condition may be slightly reduced in the heat affected zone of weldments. The values for A501 and A36 material were selected as conservative values for A500 tubular shapes in the welded condition. However, the Committee does not feel that this reduction in yield strength poses a safety concern.

When there is a safety concern resulting from a decrease in required properties, ASME policy is to notify organizations and individuals who may be affected by such changes through Mechanical Engineering and letters to holders of Certificates

of Authorization and jurisdictional and regulatory authorities. These measures were not determined to be necessary in the case of the yield strength values for A500 tubular shapes in Case 1644-3 through N-71-9.

Inquiry 3:

If a component support is ordered under a Design Specification which requires compliance with an Edition and Addenda of the Code which was issued prior to ASME Council approval of Case N-71-10, and the contract date for the support is after the date of Council approval of Case N-71-10, does the Code allow the construction of the support under the provisions of Case N-71-9?

Suggested Reply:

Yes.

Background:

Revision 3 to Case N-71 (1644-3) added yield strength values for A500 tubular shapes for two different strength levels of cold-wrought carbon steel. The yield strength values were higher than the values given for A501 hot-finished tubing in the Case, which are the same as the values given in Appendix I for SA-36 structural shapes. (Since A500 material is often welded when used in conjunction with Case N-71, and the strength level in the heat affected zone may be slightly decreased, the yield strength values for A500 were reduced in Case N-71-10 to be identical to the established values for A501 tubing and A36 structural shapes).

An intervenor has questioned the adequacy of the higher yield strength values given in N-71-9 and questions whether or not the reduced values in N-71-10 must be applied retroactively to construction meeting the requirements of earlier published versions of Case N-71. In ASLB licensing hearings, a federal judge has issued an opinion that the A500 yield strength values in Case N-71-9 are in error, and that component supports designed in accordance with Case N-71-9 should be reevaluated using the values in Case N-71-10.

To impose the A500 yield strength values in Case N-71-10 on construction to prior revisions of Case N-71 would have an impact on the design of component supports which have already been designed and installed all over the country.

Your efforts in getting this inquiry included in the November Code Week agenda are appreciated.

Very truly yours,

TEXAS UTILITIES SERVICES INC.

John C. Finneran Jr.

for M. R. McBay
Manager of Engineering

cc: J. S. Marshall
J. P. Clarke

C A S E

(CITIZENS ASSN. FOR SOUND ENERGY)

1426 S. Polk
Dallas, Texas 75224

214/946-9446

September 26, 1984

Docketing and Service Section
Office of the Secretary
U. S. Nuclear Regulatory Commission
Washington, D. C. 20555

Dear Sir:

Subject: In the Matter of
Application of Texas Utilities Electric Company, et al. for An Operating License for Comanche Peak Steam Electric Station Units #1 and #2 (CPSES)
Docket Nos. 50-445 and 50-446

Affidavit of CASE Witness Mark Walsh, CASE's Answer to Applicants' Response to Board's Partial Initial Decision Regarding A500 Steel

We are attaching the original signed and notarized Affidavit of CASE Witness Mark Walsh, which was attached to subject Answer.

Thank you.

Respectfully submitted,

CASE (Citizens Association for Sound Energy)

Juanita Ellis

(Mrs.) Juanita Ellis
President

cc: Service List

Attachment

UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION

BEFORE THE ATOMIC SAFETY AND LICENSING BOARD

In the Matter of	}{	
	}{	
TEXAS UTILITIES ELECTRIC	}{	Docket Nos. 50-445-1
COMPANY, et al.	}{	and 50-446-1
(Comanche Peak Steam Electric	}{	
Station, Units 1 and 2)	}{	

CERTIFICATE OF SERVICE

By my signature below, I hereby certify that true and correct copies of

CASE's Answer to Applicants' Response to Board's Partial Initial Decision Regarding A500 Steel

have been sent to the names listed below this 26th day of September, 1984, by: Express Mail where indicated by * and First Class Mail elsewhere.

* Administrative Judge Peter B. Bloch
U. S. Nuclear Regulatory Commission
4350 East/West Highway, 4th Floor
Bethesda, Maryland 20814

* Ms. Ellen Ginsberg, Law Clerk
U. S. Nuclear Regulatory Commission
4350 East/West Highway, 4th Floor
Bethesda, Maryland 20814

* Dr. Kenneth A. McCollom, Dean
Division of Engineering,
Architecture and Technology
Oklahoma State University
Stillwater, Oklahoma 74074

* Dr. Walter H. Jordan
881 W. Outer Drive
Oak Ridge, Tennessee 37830

* Nicholas S. Reynolds, Esq.
Bishop, Liberman, Cook, Purcell
& Reynolds
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Washington, D.C. 20036

* Geary S. Mizuno, Esq.
Office of Executive Legal
Director
U. S. Nuclear Regulatory
Commission
Maryland National Bank Bldg.
- Room 10105
7735 Old Georgetown Road
Bethesda, Maryland 20814

Chairman, Atomic Safety and Licensing
Board Panel
U. S. Nuclear Regulatory Commission
Washington, D. C. 20555

Chairman
Atomic Safety and Licensing Appeal
Board Panel
U. S. Nuclear Regulatory Commission
Washington, D. C. 20555

John Collins
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U. S. Nuclear Regulatory Commission
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Dr. David H. Boltz
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Dallas, Texas 75224

Michael D. Spence, President
Texas Utilities Generating Company
Skyway Tower
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Dallas, Texas 75201

Docketing and Service Section
(3 copies)
Office of the Secretary
U. S. Nuclear Regulatory Commission
Washington, D. C. 20555

Renea Hicks, Esq.
Assistant Attorney General
Environmental Protection Division
Supreme Court Building
Austin, Texas 78711

Juanita Ellis

(Mrs.) Juanita Ellis, President
CASE (Citizens Association for Sound Energy)
1426 S. Polk
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