

# Hope Creek HPCI Exhaust Piping Supports Analysis of Reported Damage in RF12

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## 1 Revision Summary

Revision	Date	Description and Reason for Change
0	12/10/04	Original Issue

## 2 Purpose

On November 1, 2004, with the plant in Mode 5 for RF12, tandem snubbers on the HPCI turbine exhaust piping failed during dynamic testing. Subsequent inspections of the HPCI system resulted in several observations. These observations were thought to confirm a damaging water hammer in HPCI exhaust piping. The tandem snubber condition was documented in Notification 20209622.

This evaluation was prepared to assess if the observed conditions were caused by a water hammer in the HPCI exhaust piping system.

## 3 Scope

The scope of this evaluation is the tandem snubber failure documented in notification 20209622 and the observations from the concomitant inspections on the HPCI exhaust line from the HPCI turbine to the torus penetration number P-201 (1-FD-006-HBB-20) and the vacuum breaker line from its attachment to the HPCI exhaust line to torus penetration P-204 (1-FD-006-HBB-3, 1-FD-008-HBB-3, and 1-FD-008-HBB-8).

## 4 Discussion

### 4.1 Background

The HPCI System is designed to pump water through the 'A' Core Spray spargers and the 'A' Feedwater header. The primary purpose of HPCI is to maintain Reactor Pressure Vessel (RPV) inventory for small breaks that do not de-pressurize the RPV. The HPCI System may also be used for RPV pressure control. Finally the System may be used for RPV inventory control following reactor isolation and a coincident failure of the non-ECCS RCIC system.

Exhaust steam from the HPCI turbine is discharged below the surface of the suppression pool. A drain pot at the low point in the exhaust line collects moisture present in the steam. Collected moisture is discharged through an orifice to the HPCI barometric condenser.

A system of vacuum relief valves and isolation valves is installed as a vacuum breaker line, which connects the free space in the suppression chamber with the HPCI turbine exhaust line. This

mitigates the effects of water from the suppression pool being drawn into the HPCI turbine exhaust line. Table 4-1 lists the major components in the HPCI turbine exhaust line.

The pipe lines are ASME Code Section III, Class 2. Piping struts, hydraulic snubbers, frames, and spring hangers support the piping. Table 4-2 lists the pipe supports of the lines in this evaluation. The isometric drawings for these lines are References 7.3 and 7.4.

Per the ISI snubber inspection program the inspection scope was expanded to other snubbers in the area. The scope was further expanded at the request of Design Engineering. In the end all snubbers and hangers were inspected on both the HPCI and RCIC turbine steam lines. Non-destructive NDE was also conducted on numerous welds as requested by Design Engineering (See Section 4.3).

**Table 4-1 Major Components in the HPCI Steam Exhaust Line**

<u>Component</u>	<u>Description</u>
HPCI Turbine Exhaust Drain Pot	Collects condensate from turbine exhaust and turbine draining to barometric condenser
Exhaust Line Rupture Disks	Prevents overpressure protection of turbine casing and exhaust line
Exhaust Line Check Valve (V004)	Provide backflow isolation of the exhaust line from the suppression pool
HPCI Turbine Exhaust Line Isolation Valve (HV-F071)	Isolates turbine exhaust line from the suppression pool
HPCI Turbine Exhaust Outboard Vacuum Breaker Isolation Valve (HV-F075)	Isolates the torus atmosphere from the HPCI turbine exhaust line following a breach of the HPCI steam piping concurrent with high drywell pressure.
HPCI Turbine Exhaust Vacuum Breaker Valves (PSV-F076, PSV-F077)	Prevent the condensing action of the steam in the turbine exhaust lines from creating a vacuum and drawing torus water into the exhaust line
HPCI Turbine Exhaust Inboard Vacuum Breaker Isolation Valve (HV-F079)	Isolates the torus atmosphere from the HPCI turbine exhaust line following a breach of the HPCI steam piping concurrent with high drywell pressure.

**Table 4-2 Pipe Supports on the HPCI Steam Exhaust Line**

<u>Isometric Hanger No.</u>	<u>Hanger Drawing Number</u>	<u>Hanger Description</u>
Piping Isometric 1-P-FD-01		
H01	1-P-FD-006-H01	Variable Support
H04	1-P-FD-006-H04	Sway Strut
H06	1-P-FD-006-H06	Sway Strut
H08	1-P-FD-006-H08	Variable support

H11	1-P-FD-006-H11	Sway strut
H12	1-P-FD-006-H12	Sway strut
H13	1-P-FD-006-H13	Sway strut
H14	1-P-FD-006-H14	Sway strut
H15	1-P-FD-006-H15	Tandem hydraulic snubbers
H17	1-P-FD-006-H17	Sway strut
H18	1-P-FD-006-H18	Hydraulic snubber
H19	1-P-FD-006-H19	Tandem variable support
H22	1-P-FD-006-H22	Hydraulic snubber on valve operator
Piping Isometric 1-P-BC-06		
H03	1-P-FD-008-H03	Frame (box support)
H04	1-P-FD-008-H04	Rigid Strut
H05	1-P-FD-008-H05	Hydraulic Snubber
H06	1-P-FD-008-H06	Variable Support
H07	1-P-FD-008-H07	Rigid Strut
H08	1-P-FD-008-H08	Rigid Strut
H09	1-P-FD-008-H09	Rigid Strut
H13	1-P-FD-008-H13	Frame
H14	1-P-FD-008-H14	Rigid strut
H15	1-P-FD-008-H15	Tandem Hydraulic snubbers
H20	1-P-FD-006-H20	Hydraulic snubber
H21	1-P-FD-006-H21	Sway strut

#### 4.2 Support Observations

The observations listed in table 4-3 were made by the ISI group during a systematic walk down of the HPCI exhaust piping. Each observation other than simple "no degradation observed" will be addressed in Section 5, Support Observation Analysis. Those supports with no comments were not inspected by ISI.

**Table 4-3 Observations Made During Pipe Support Inspections**

Hanger Drawing Number	Observation
Piping Isometric 1-P-FD-01	
1-P-FD-006-H01	20210445 - No degradation observed. Cold and Hot settings obscured by paint. Scraping of indicator against can shows 0.25 to 0.375" movement, hanger drawing shows 1/8"
1-P-FD-006-H04	20210440 - No loose parts. Strut misaligned 15 to 20 degrees, shifted toward wall penetration.
1-P-FD-006-H06	No degradation observed.
1-P-FD-006-H08	No degradation observed.
1-P-FD-006-H11	No degradation observed.
1-P-FD-006-H12	No degradation observed.
1-P-FD-006-H13	No degradation observed.
1-P-FD-006-H14	No degradation observed.
1-P-FD-006-H15	20209438, 20209622- Snubber test failure

1-P-FD-006-H17	No degradation observed.
1-P-FD-006-H18	No
1-P-FD-006-H19	No degradation observed.
1-P-FD-006-H22	20210035 – Snubber as found setting not per design
Piping Isometric 1-P-BC-06	
1-P-FD-008-H03	
1-P-FD-008-H04	
1-P-FD-008-H05	
1-P-FD-008-H06	
1-P-FD-008-H07	
1-P-FD-008-H08	
1-P-FD-008-H09	
1-P-FD-008-H13	
1-P-FD-008-H14	
1-P-FD-008-H15	
1-P-FD-006-H20	20210034 - Snubber Extension Tube Bent
1-P-FD-006-H21	

#### 4.3 Piping Weld Inspections

All field welds on the 20" HPCI exhaust lines shown on construction fabrication drawing (Ref. 7.5 and 7.6) were magnetic particle tested. All welds were found satisfactory.

## 5 Support Observation Analysis

### 5.1 Tandem snubber test failure (1-P-FD-006-H15A and B)

The snubbers on the HPCI steam side piping systems are manufactured by Lisega. The snubbers are Lisega Part Number 3072. The tandem pair of HPCI snubbers (H1FD -1-P-FD-006-H015(A)&(B)) were being testing in compliance with the IST Snubber program per procedures SH.RA-ST.ZZ-0105(Q) and NC.DE-TS.ZZ-3067(Q) to verify Technical Specification 3/4.7.5 requirements.

For the A snubber, initial testing for running drag was successful with 1/2" per minute rate. The tension lock up and bleed test was then performed. The snubber locked at 107% of rated load. The compression lock up and bleed test reached 60.8 %, and then the load dropped. Upon opening the snubber the distance tube and circlip were both deformed. The B snubber failed similarly with tension reaching 106% and compression 10.3%. The same components were damaged. An outline drawing and parts list for this snubber is in Attachment C.

These snubbers are on their fifth refueling cycle and this snubber pair has not been tested since the design change from PSA mechanical type snubber to Lisega type snubbers in RF07. Past IST visual examinations (completed every 36 months and last performed in RF10) have not revealed any degradation at this location. No visual degradation was noted during this inspection until physically tested.

An apparent cause evaluation is being performed in Condition Report 70042341. This apparent cause will address possible water hammer modes and snubber failure assessment.

The failed snubbers were returned to Lisega for evaluation and testing. Based on Lisega's examination it appears that the reservoir poppet valve was stuck open. This allows the reservoir to fill solid, fully compressing the reservoir spring and loading the distance ring and circlip. This is a compression loading of the snubber. Lisega has postulated that the snubbers would have been able to perform in a Seismic event and that the testing method on the snubber test machine exaggerated the poppet problem to damage the reservoir snap ring. Lisega is continuing their analysis and have not yet provided a written report.

5.2 Snubber as found setting not per design (1-P-FD-006-H22)

Design detail drawing (Ref. 7.7) calls for the snubber setting to be 2 1/2", the as found setting for this outage was 5 3/8". This would be a significant change in the position of the snubber. Additional research of inspection notes by the snubber program manager show the condition has existed since the Lisega snubber was installed. This will be documented in his disposition of the NUCR associated with 20210035. Confirming this are the engineering walkdowns that carefully examined the verticality of the valve this snubber supports. Also the pipe clamps on either side of the valve were examined. There is no misalignment of the struts on these clamps and no scratch marks on the pipe at the clamps. The clear conclusion is that the pipe and valve did not rotate. The engineering walkdown observations are included in Attachment A.

5.3 Strut misaligned 15 to 20 degrees (1-P-FD-006-H04)

Walkdown by engineering indicated less than 4 degree from vertical. This offset is within construction tolerance. Originator of notification has been requested to complete Condition Report confirming he agrees with engineering assessment.

5.4 Snubber Extension Tube Bent (1-P-FD-006-H20)

Although a bowed support is a possible indicator of overload due to an axial load. A lateral load causing the deformation appears more likely since adjacent supports and components show no evidence of high load, the snubber tested satisfactory in RF12 expanded inspection, and the extension tube is 7/8" diameter – a susceptible to damage size if climbed on or hung from. This is a congested area with frequent valve work

5.5 Spring Can Movement larger than design (1-P-FD-006-H01)

Scraping between the indicator and can indicates that movement from 1/4 inch to 3/8 inch may have occurred. The design movement on the hanger drawing is 1/8 inch per the hanger drawing. Paint scrapes between the indicator and can are not a reliable indicator of piping movement. This hanger is adjacent to the HPCI turbine. The indication could be a result of normal operational loads from the turbine operation, disassembly of pipe support during maintenance, original installation of hanger, or disconnecting the HPCI piping from the turbine exhaust. This observation cannot be used to support or refute the possibility of water hammer in the system.

## 6 Conclusions and Recommendations

Evaluation of the snubber failures and inspection observations reveals there is no conclusive evidence that a waterhammer event has occurred in the HPCI Turbine Exhaust line to the Torus. All inspections point to a structurally sound piping system that has not experienced loads that would displace the line, rotate pipe clamps, damage component, or overstress the piping.

The following recommendations should be implemented to complete the validation of the conclusion of this evaluation

1. Lisega Inc.'s final failure analysis report must be received and confirmed as matching their preliminary input.
2. Completion of NUCR associated with 20210035, Snubber as- found setting not per design.
3. Completion of NUCR associated with 20210440, Strut misaligned
4. Confirm that the rupture disks tested satisfactory
5. Complete inspection of wall penetration bellows, 20213732
6. Complete assessment of snubber extension tube lateral capacity
7. Evaluate extended HPCI run entering R12 and assess impact on snubbers
8. Confirm maintenance on 1-P-FD-006-H01 since last spring can painting

## 7 References

- 7.1 SH.RA-ST.ZZ-0105(Q)
- 7.2 NC.DE-TS.ZZ-3067(Q)
- 7.3 1-P-FD-01, Revision 24, System Isometric/ Reactor Building HPCI Turb. Supply and Exhaust
- 7.4 1-P-BC-06, Revision 12, System Isometric/ Reactor Building RHR Cross Connect Vacuum Breakers from Torus
- 7.5 1-P-FD-004, Revision 9, Fab. Iso HPCI Turb Supply & Exhaust Reactor Bldg,
- 7.6 1-P-FD-005, Revision 10, Fab Iso HPCI Turb Supply & Exhaust Reactor Bldg
- 7.7 1-P-FD-006-H22, Revision 1, & change from 4EO-3507, pkg 3, rev 0

## 8 Effects of Other Technical Documents

None

## 9 Attachments

- A. Engineering Walkdown Report, Pages A1 to A2
- B. Pipe Support Drawings, Cover Page and Pages B1 to B50
- C. Lisega Outline Drawings, C1 to C12
- D. Causal Factor Evaluation for Pipe Support Observations, Pages D1 to D2



10 Signatures

Preparer Alan Johnson Date: 12/11/04

Peer Reviewer [Signature] Date: 12-11-04

Independent Review Bob Keck Date: 12-12-2004

Approved [Signature] Date: 12-12-04

## Attachment A - Engineering Walkdown Report

Inspection Date: December 4, 2004

Engineers: Alan Johnson, Civil Design Supervisor  
John Barkhamer, Civil Design Staff Engineer

Inspection Purpose: Inspect the HPCI Turbine Exhaust Line from HPCI turbine to the suppression pool for evidence that would support or refute the reported damage attributed to waterhammer.

Approach: Using the piping isometrics, detail pipe support drawings, and ISI observations as a guide, a hand over hand inspection of the piping was performed. Attributes that were carefully observed were pipe alignment, valve alignment, clamp alignment, scratches on piping that would indicate clamp and frame rotation or axial movement, position of insulation, crimping on metal insulation at tight clearance locations, attachment point wear mark, and attached cables and small piping.

Results: Observations are in order of inspection from turbine to torus  
HPCI Turbine Room

Hangers in the HPCI turbine room showed no evidence of large deflection. Hanger 1-P-FD-006-H01 had less than 4 degree angle to vertical. Scaffolding was available at wall penetration. The adjacent support, 1-P-FD-006-H08 is a box frame that showed no scratches or other evidence of large deflections. The pipe as it penetrated the concrete wall was not concentric with the pipe sleeve. It was slightly north of center. All supports were satisfactory.

### Torus Room

Torus support lower and upper pins near the HPCI exhaust torus penetration were inspected for signs of rotation. There was no evidence of pin extension, light surface corrosion at pin/support interface was unbroken, and dust on pins was undisturbed.

The torus room concrete wall to HPCI piping bellows cover was slightly askew, only the outer convolution of the bellows could be seen, The pipe appears to have been installed a bit north of wall penetration sleeve center. Inspection of the bellows was not possible with cover plate in place.

The first horizontal from wall penetration and vertical runs showed no evidence of movement. Two struts, 1-P-FD-006-H11 and H12 that provide lateral restraint on the vertical riser were aligned and showed no evidence of rotation.

The next horizontal HPCI exhaust line run includes the exhaust line check valve and the isolation valve. There are 5 supports on this horizontal run. Most insulation was blanket and it allowed for pull back and close pipe inspection. Scaffold provided very good access for this length of pipe. Strut H13 adjacent to angle was straight and aligned. The H15 with tandem struts was reinstalled

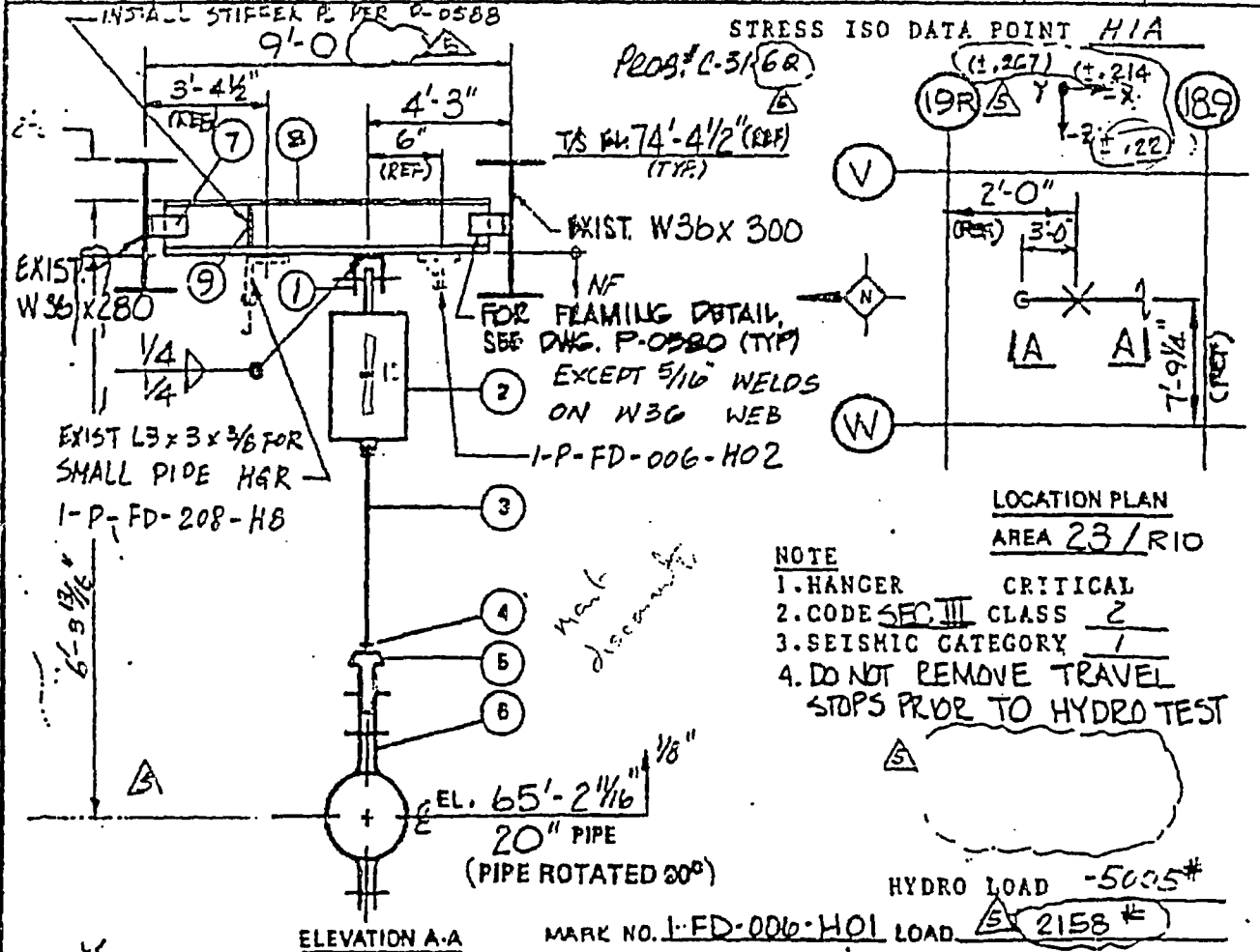
with new snubbers. The frame, lugs, and pipe were examined for evidence of movement or loading. The support frame and lugs had no paint scratches, wear marks, dents, or other signs of loading that would indicate high load. The piping had no scrape or paint marks at the interface with the pipe. The struts on either side of the exhaust isolation valve were aligned correctly. Close examination of the clamp/pipe interface confirmed no rotation of the clamps. These clamps are very close to the isolation valve. The attachment cables to the valve operator were taut but showed no signs of stress. The valve orientation was vertical. Snubber H22, attached to the operator, was aligned. There was no evidence that this valve rotated due to piping movement that could account for the change in cold setting. Additionally the insulation on the pipe was in contact with an adjacent structure and showed no damage or evidence of large deflection

The last pipe segments of the exhaust pipe to torus penetration were all satisfactory.

The vacuum breaker line is a 3" line that includes two check valves, two motor operated valves, and a manual valve. The strut reported as bowed was not installed. The location of the strut was observed to be in a location that could be used for climbing.

Attachment B: Pipe Support Drawings

ITEM NO.	NO. REC'D	PART NO.	SIZE	DESCRIPTION	MAT'L
1	1	66	1"	Welded Beam Attachment w/ PILE COLLAR FLU	
2	1	82	1/2"	Variable support, Type B (RL-215B) MOUNT: 1/8" UP EXCEL-2270 w/ Travel Stops	
3	1	140N	1" x 3'-10" LG	Rod w/ 6" TBE	
4	2		1"	Hex Nut	
5	1	290	1"	Weldless Eye Nut	
6	1	295	20"	Three Bolt Pipe Clamp Provide Lock Nut	
7	4		1 1/2" x 2 1/2" x 1/4"	ANGLE CLIP = 3/8" LONG	
8	1		W10 x 49 x 8'-9 1/8" LG.		
9	2		3/8" x 4 1/8" x 8 1/8" STIFFENER PLATE PER P-0588		
NOTE: ALL MAT'L TO BE SA-36 U.N.O.					

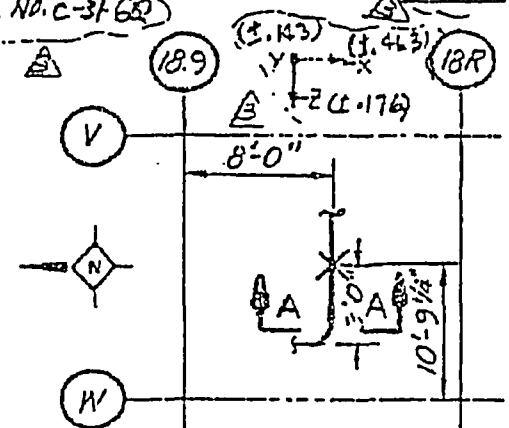


ISSUED FOR FINAL STRESS CALC. AND INCOMP. FOR P-0588	DESIGNED BY	CHECKED BY	DATE	REV.
REVISED PER FOR P-5002 REVISIONS	DESIGNED BY	CHECKED BY	DATE	REV.
PUBLIC SERVICE ELECTRIC AND GAS COMPANY HOPE CREEK GENERATING STATION NO. 1 & 2 UNITS		SAN FRANCISCO		REF. DWGS. IRO 1-P-FD-01 REV (19) PIPE C-0801-REV (16) STEEL
PIPE SUPPORT REACTOR BLDG.	JOB NO. 10255	DRAWING NO. 1-P-FD-006-H01(Q)	REV. 5	
IPC I SYSTEM TURBINE STEAM				

49-00-606 M-413-P

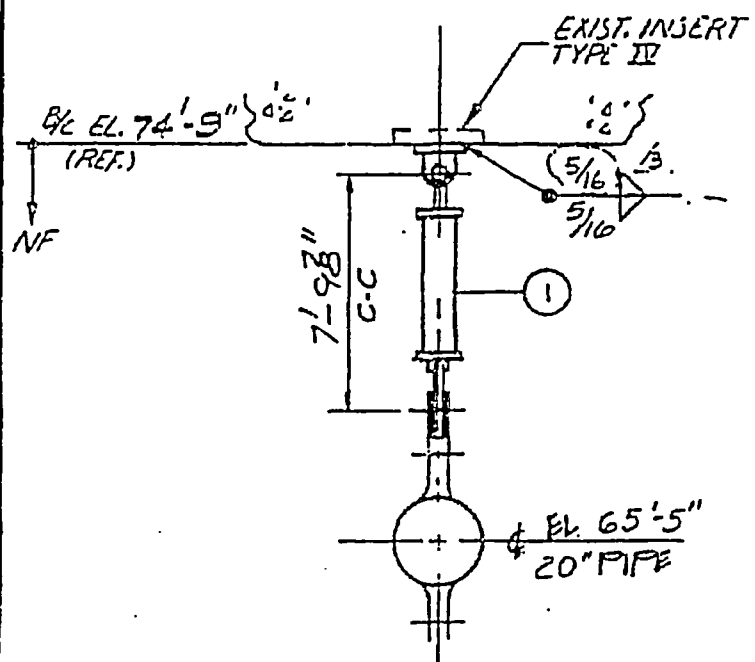
ITEM NO	NO REQ'D	FIG. NO.	SIZE	DESCRIPTION	NAT'L
1	1	211	# 1	Sway Strut Assy. 2" O.D. Pipe. W = 6'-11 5/8" Sv. Load (SEE TABLE BELOW) (B)	
ALL MAT'L TO BE SA-36 U.N.O.					

STRESS ISO DATA POINT (STRESS PRO. NO. C-31-65) H4A



LOCATION PLAN  
 AREA 23/R10

- NOTES:
- HANGER CRITICAL
  - CODE SEC III CLASS 2
  - SEISMIC CATEGORY 1



ELEVATION A-A  
 (VERT. BSM)

\* MIN DESIGN LOAD SERVICE TYPE I

	N/U	EMERG.	FAULTED
F.Y.	± 8000	± 8000	± 8000

MARK NO 1-FD-006-H04

FOR SUPPORT

M-413-P

49-00-606

ISSUED FOR HWK STRESS CALL. AND INCORP. FIELD REVL F 2

PUBLIC SERVICE ELECTRIC AND GAS COMPANY HOPE CREEK GENERATING STATION NO. 1 & 2 UNITS		SAN FRANCISCO	
PIPE SUPPORT. - REACTOR BLDG HPCI TURBINE SUPPLY & EXHAUST		JOB NO. 10855	DRAWING NO. 1-P-FD-006-H04(Q) 3

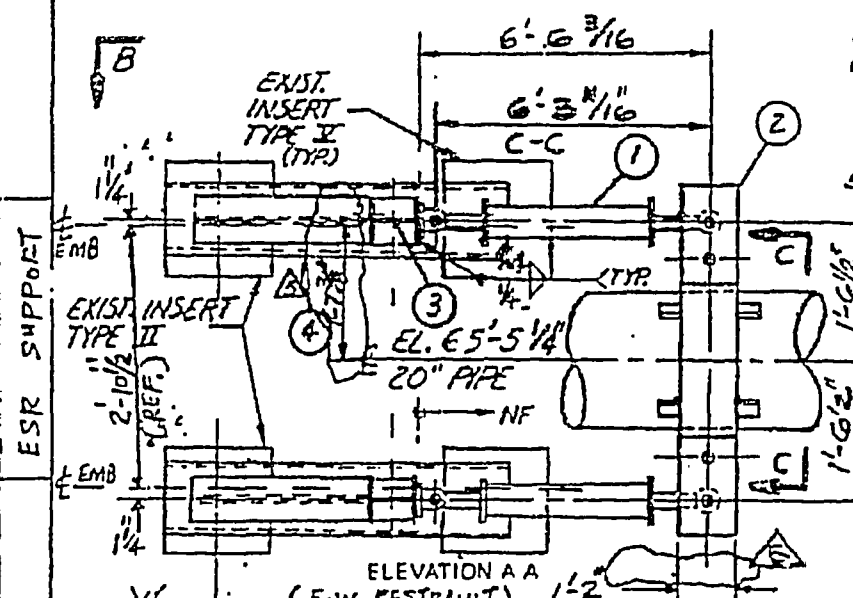
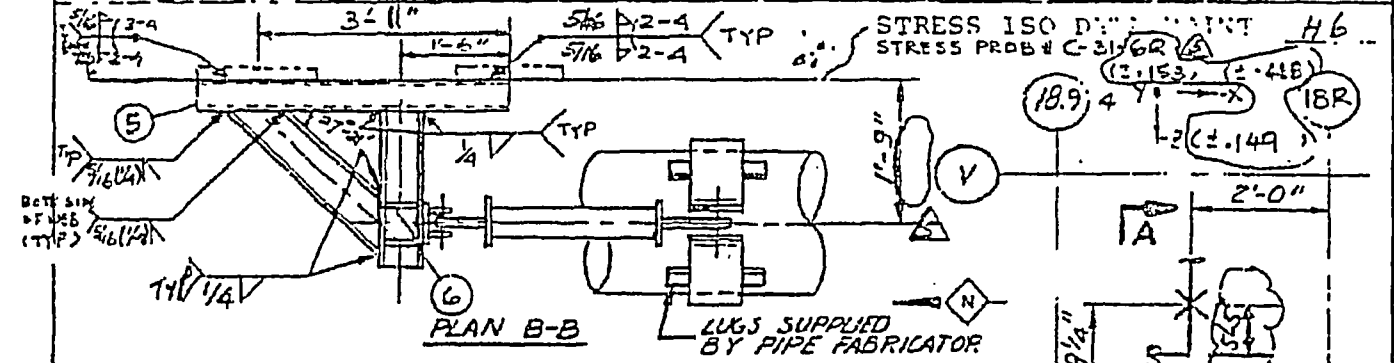
REV. DATE REVISIONS

CIVIL BY CHUK DESIGNED BY PV ENG STRS PROJ

REF. DWGS. ISO 1-P-FD-01 REV. 19 (B)  
 PIPE P-2301-1  
 STEEL C-0511-1 REV. 1

OK B2

ITEM NO	NO. REQ'D	PART NO	SIZE	DESCRIPTION	MAT'L
1	2	211	# 2	SNAY STRUT ASSY. H/OPTION 1 W = 5'-6" . . . . . LOAD = SEE TABLE BELOW	
2	1	40 N	20"	RISE CLAMP TYPE "A" C-C = 3'-11" S=1.38 F=1.000/1.002 A=1.00 FOR USE WITH FIG. 211 SIZE 2; W/LOAD STUDS/WASHERS	
3	2	-	-	WG x 20 x 2'-1" LG. FIELD CUT TO SUIT	
4	2	-	-	WG x 20 x 2'-11 13/16" C-C LG (SEE PLAN B-B)	
5	2	-	-	TS 8 X 8 X 1/2 X 4'-9" LG	A 501-76 OR EQUIV
6	8	-	-	2 3/8 x 2 3/8 x 5 3/8" LG. REC DRG. P-0588	



LOCATION PLAN  
AREA 23/R10

NOTE  
 1. HANGER CRITICAL.  
 2. CODE SEC. III CLASS 2  
 3. SEISMIC CATEGORY 1

\* MIN. DES. LOAD SERVICE TYPE I

WEIGHT	NORMAL/UPSET	EMERG.	FAULTED
F2	# 10893	# 8000	# 13346

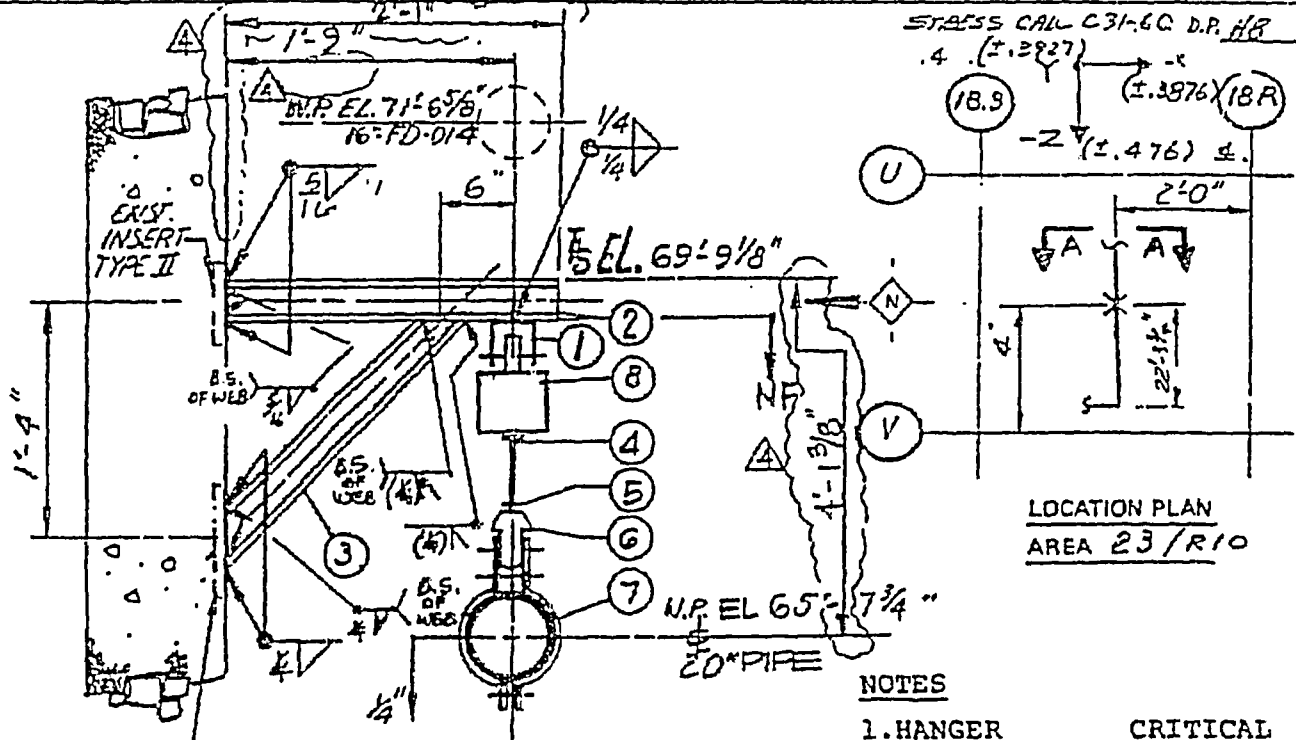
SECTION C-C

REV	DATE	DESCRIPTION	BY	CHKD	DESIGN	ENGR	STRS	PROJ
1		ISSUED FOR FINAL STRESS CALC. IN COMP. FCN-NF-783, FCN-101.						
2		REVISED PER FCN # P-8290 FCN # P-8881 AND PUA						

PUBLIC SERVICE ELECTRIC AND GAS COMPANY HOPE CREEK GENERATING STATION NOS. 1 & 2 UNITS	SAN FRANCISCO	ISO 1-P-FD-01 REV. 15
		REF. DWGS. PIPE C-0753-1 SHT. 1 REV. 10
PIPE SUPPORT- REACTOR BLDG HPCI TURBINE SUPPLY & EXHAUST	JOB NO. 10855	DRAWING NO. 1-P-FD-006-H06(Q)
		REV. 5

RI 5.24.94

ITEM NO	NO REQ'D	PART NO	SIZE	DESCRIPTION	MAT'L
1	1	LG	1 1/2"	Welded Beam Attachment <i>W/ PINECOTTER DR</i>	
2	1	-	WG x 20 x 2 1/2" LG.		
3	1	-	W4 x 13 x 2' 0" LG. (SEE ELEVATION A-A)		
4	1	1A0N11/8" x 1' 0" LG.	ROD W/ R.H. CONTINUOUS THREAD		
5	2	-	1 1/8"	Hex Nut	
6	1	280	1 1/8"	Weldless Eye Nut	
7	1	235	20"	Three Bolt Pipe Clamp Provide Lock Nut	
8	1	-B2	#13	VARIABLE SUPPORT, TYPE "B" HL = 2850# MGMT. = 1/2" DNCL. 2560#. W/ TRAVEL STOPS	
NOTE: BOLT & NUT MAT'L FOR CLAMP = SA-307 GR. B ALL MAT'L TO BE SA-36 U.N.O.					



ELEVATION A-A

- NOTES**
- HANGER CRITICAL
  - CODE SEC. III CLASS 2
  - SEISMIC CATEGORY 1
  - DO NOT REMOVE TRAVEL STOPS PRIOR TO HYDRO TEST.
  - FIELD TO PROVIDE TEMPORARY SUPPORT DURING HYDRO TEST
- HYDRO LOAD 4800#  
 LOAD 7422#

ESR SUPPORT

REV	DATE	REVISIONS	BY	CHK'D	DESIGN	SUPV	ENGR	STRS	PROJ
1	6/1/04	REV PER REV FOR GUIDANCE & AS SHOWN	TC	WPH	TC	TC	TC	TC	TC
2	11/3/06	ISSUED FOR FINAL STRESS CALL & INCORPORATED F&I FOR H-2315	SP	WPH	SP	SP	SP	SP	SP

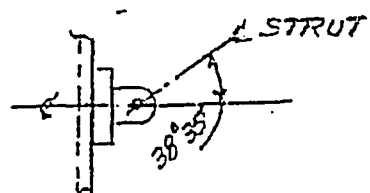
PUBLIC SERVICE ELECTRIC AND GAS COMPANY HOPE CREEK GENERATING STATION NO. 1 & 2 UNITS	 SAN FRANCISCO	ISO	1-P-FD-01 REV 19
		REF. DWGS.	PIPE - STEEL C-0461-1 REV. 7
PIPE SUPPORT REACTOR BLDG HPCI SYSTEM TURBINE STEAM	JOB NO.	DRAWING NO.	REV.
	10855	1-P-FD-006-H081Q	4

36-01-02

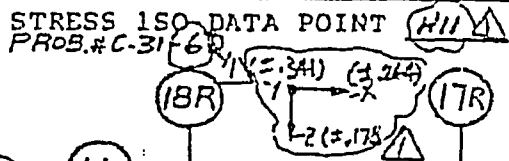
FTR-69 BY



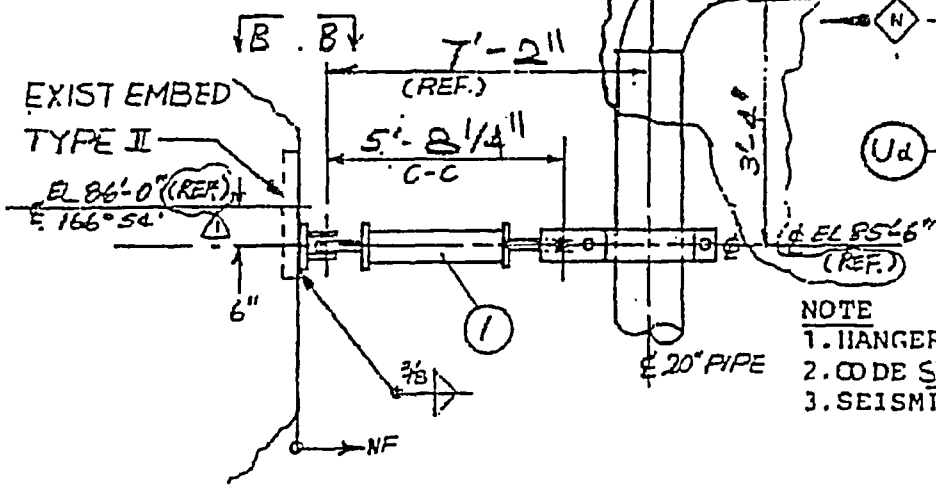
ITEM NO	NO REQ'D	PART NO	SIZE	DESCRIPTION	MAT'L
1	1	211	5" S	SWAY STRUT ASSY, O.D. PIPE 20" W=4'-4 3/4" LOAD (SEE TABLE BELOW)	
NOTE: ALL MAT'L TO BE SA-36 U.N.D.					



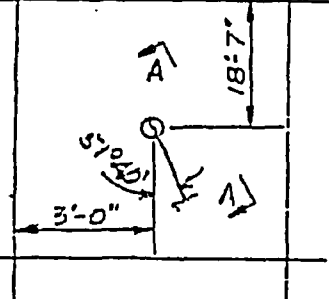
SECTION B-B



STRESS ISO DATA POINT  
 PROB.# C-31-6R



ELEVATION A-A  
 (LATERAL RESTRAINT)



LOCATION PLAN  
 AREA 20/B11

- NOTE
- HANGER CRITICAL
  - CODE SECT III CLASS 2
  - SEISMIC CATEGORY 1

ESR SUPPORT

FORCE	N/U #	EMER #	FAULT #
FUT	12661	18992	14367

MARK NO 1-FD-006-H11

ISSUED FOR FINAL STRESS CALC. AND INCRP F <sub>0</sub>	BY	CHK'D	DES'D	ENGR	STRS	PROJ
REV. DATE	REVISIONS					

PUBLIC SERVICE ELECTRIC AND GAS COMPANY  
 HOPE CREEK GENERATING STATION  
 NOS. 1 & 2 UNIT



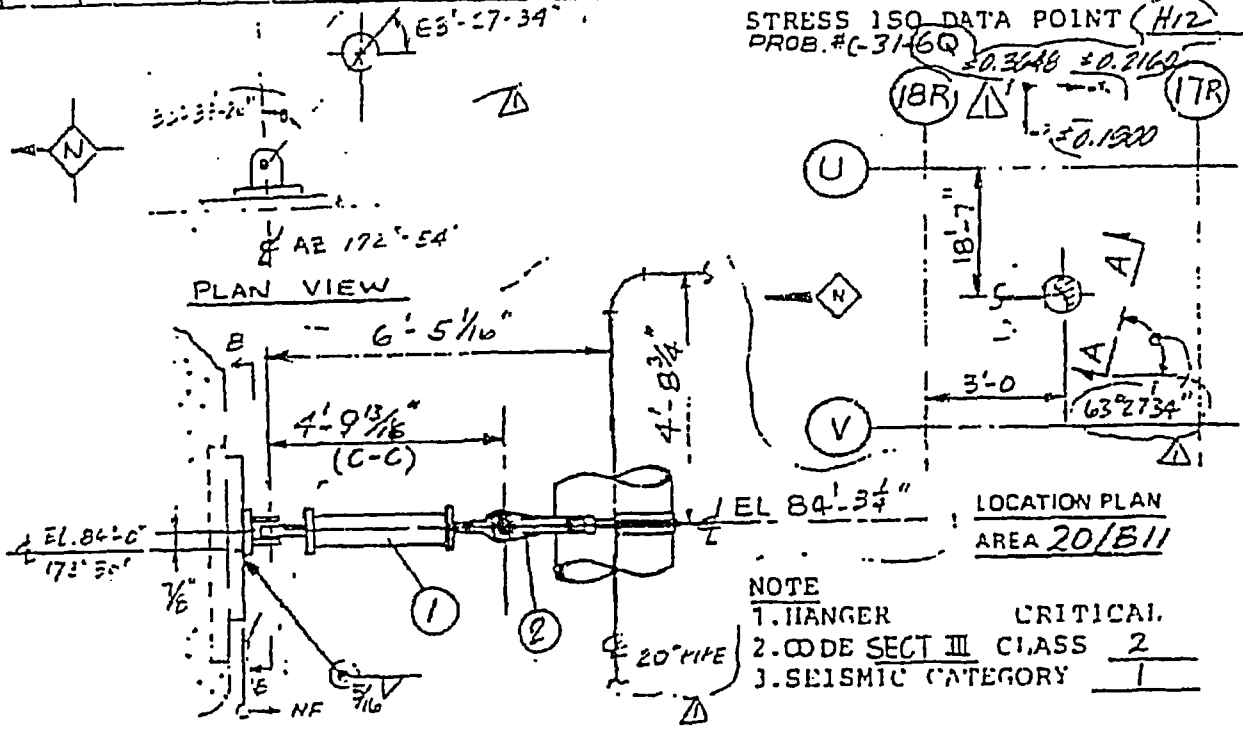
ISO 1-P-FD-01 REV. 19  
 REF. DWGS. PIPE STEEL C-0702-1 SHT. 1 REV. 8

PIPE SUPPORT REACTOR BLDG. HPCI TURB SUPPLY & EXHAUST	JOB NO. 10855	DRAWING NO. 1-P-FD-006-H11 (Q) 1	REV. 1
--	------------------	-------------------------------------	-----------

B5

1 PUA

ITEM NO	NO. REQ'D	PART NO	SIZE	DESCRIPTION	MAT'L
1	1	211	#6	SWAY STRUT ASSY, O.D. PIPE 20"	
				W=3L 11 3/8" LOAD=(SEE LOAD TABLE II)	
2	1	315N	#33B	20" O.D. STIFF CLAMP WITH U-BOLT	



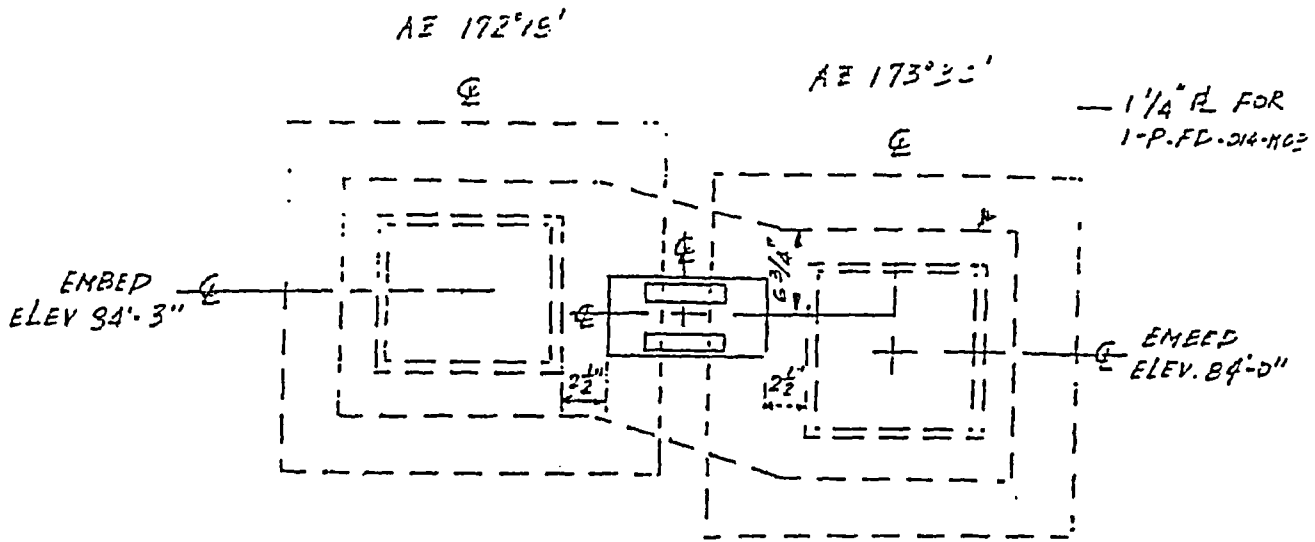
771

ELEVATION A A  
(LATERAL RESTRAINT)

MARK NO 1-P-FD-006-H12



1. SCALE FOR FINAL STRESS CALC & INCORPORATED FOR N-1665. NF-SBE2, N-11200 AND FIELD REV FOR S & F01		EBY GWW EBY I RPH
REV. DATE	REVISIONS	BY CH'K DESG. PV ENG STRS PROJ
PUBLIC SERVICE ELECTRIC AND GAS COMPANY HOPE CREEK GENERATING STATION NOS. 1 & 2 UNITS		ISO 1-P-FD-01 (REV. 19) REF. DWGS. PIPE P-2002-1 STEEL C-0702-1 SHT. 1 REV. 2
PIPE SUPPORT REACTOR BLDG. HPCI TURB SUPPLY & EXHAUST		JOB NO 10855 DRAWING NO 1-P-FD-006-H12(Q) 1 SHT 1/2

TAP B6



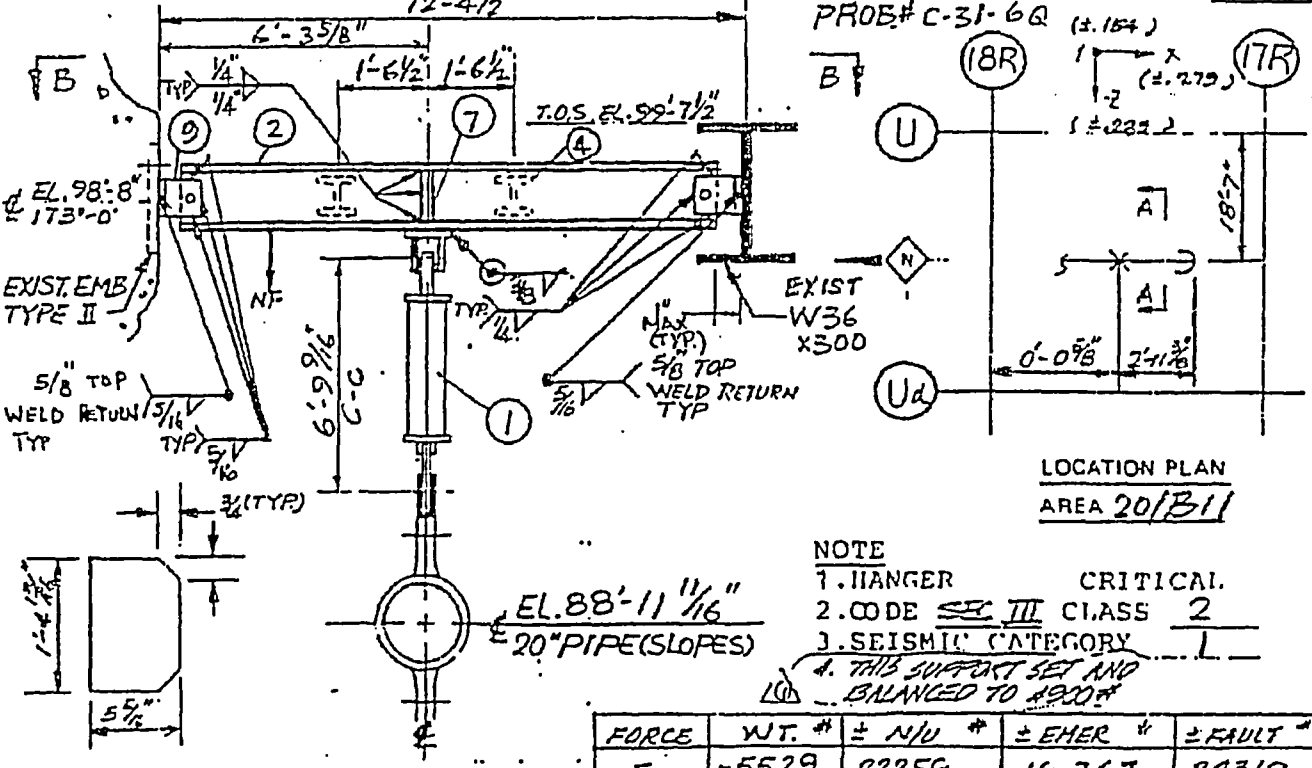
SECTION B-B

MARK NO. 1-FD-006-H12

 SEE SHT 1		EPH 9/11/12 EPH 1/12 C R/B	
REVISIONS		BY CH'K DESD PV ENGR STR PRO	
PUBLIC SERVICE ELECTRIC AND GAS COMPANY HOPE CREEK GENERATING STATION NOS. 1 & 2 UNITS		 SAN FRANCISCO	
PIPE SUPPORT REACTOR BLDG. HPCI TURBINE SUPPLY & EXHAUST		REF. DWGS.	ISO 1-P-FD-01 (REV. 19) PIPE STEEL C-0702-1 SHT 1 REV 12
JOB NO.		DRAWING NO	
10855		1-P-FD-006-H12(Q) L: SHT 2/2	
		REV.	
		/	

ITEM NO	NO REQ'D	PART NO	SIZE	DESCRIPTION	MAT'L
1	1	211	#6	SWAY STRUT ASSY, O.D. PIPE 20" W=5'-4 5/8", LOAD=SEE TABLE BELOW	
2	1	-	W 18X119X12'-4 1/2"	(FIELD TRIM TO SUIT)	
3	6	-	5" X 5" X 3/8"	ANGLE CLIPS X 1'-2 1/2" LG	
4	2	-	W12X72X7'-10 1/2" LG.		
5	1	-	W18X119X12'-9" LG.		
6	2	-	W12X72X (FIELD CUT TO SUIT)		
7	2	-	1/2" X 5 5/8" X 1'-4 13/16"	STIFF PLATE (SEE DETAIL 1)	
8	8	-	3 1/2" X 2 1/2" X 3/8"	ANGLE CLIPS X 9 1/4"	
9	4	-	PL 3/8" X 5" X 1'-2 1/2"		

NOTE: ALL MAT'L TO BE SA-36 U.N.O. STRESS 1SC DATA POINT H13  
 PROB# C-31-6Q (±.154)



- NOTE
- HANGER CRITICAL.
  - CODE SEC III CLASS 2
  - SEISMIC CATEGORY L
  - THIS SUPPORT SET AND BALANCED TO 4900#

ESR SUPPORT

DETAIL 1

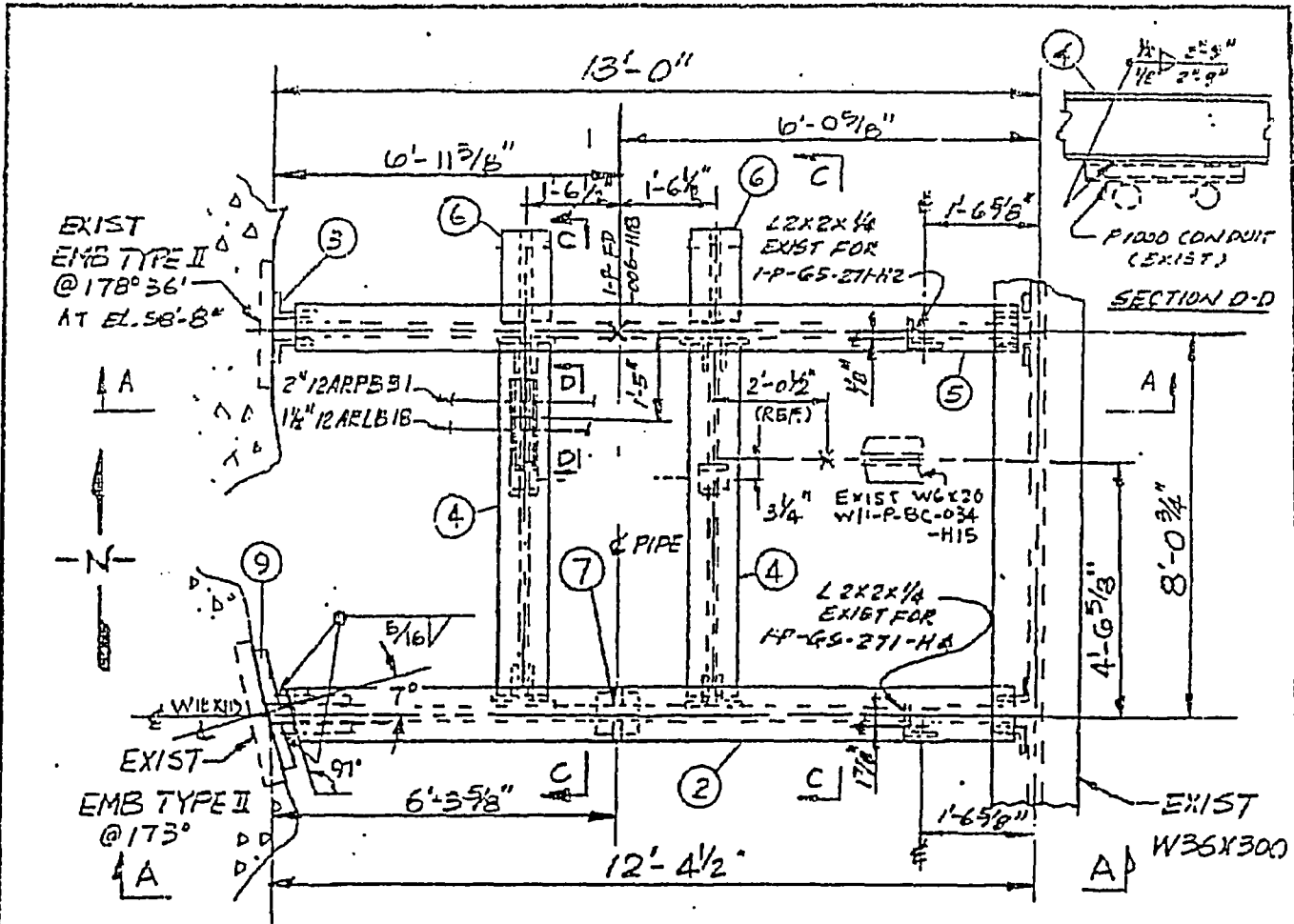
HYDRO LOAD .-7362 #

ELEVATION A A (VERTICAL RESTRAINT) MARK NO. 1-FD-006-H13

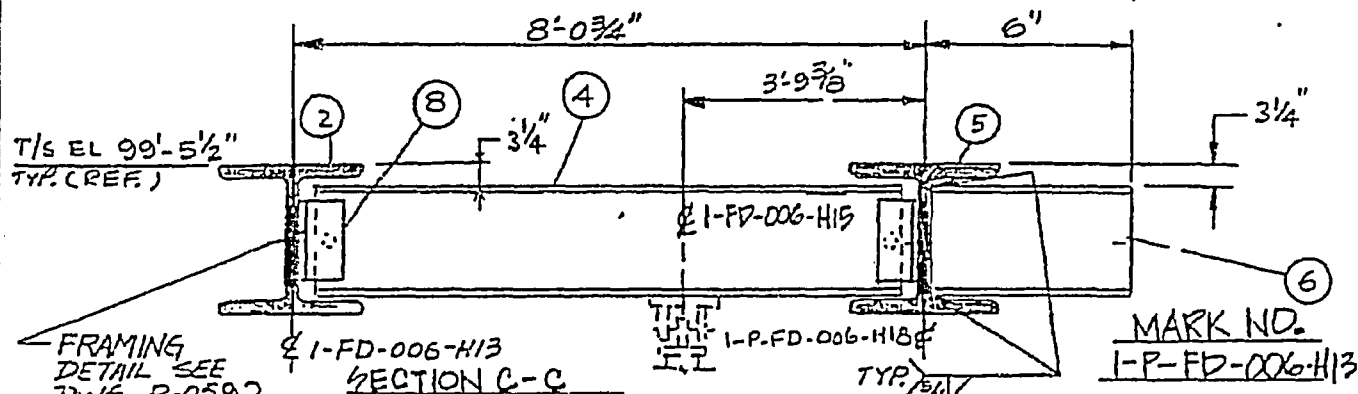
ISSUED FOR FINAL STRESS CALC. & INCORP. FOR H10355 & FIELD REV. F2 & F3 AND RECONCILED FOR P. 8136		Gmc W4 Gmc	L RMA
REVISED PER FOR. HF-15341		EAH DM EAH	L RMA
REVISIONS		BY CH'K DESIG SUPV ENG STRS PROJ	
PUBLIC SERVICE ELECTRIC AND GAS COMPANY HOPE CREEK GENERATING STATION NO. 1 & 2 UNITS		ISO 1-P-FD-01 REV. 19 REF. DWGS. PIPE C-0702-15HT1 REV. 16 STEEL C-0803-1 REV. 18	
PIPE SUPPORT REACTOR BLDG. WPCI TURB SUPPLY & EXHAUST		JOB NO. 10855	DRAWING NO. 1-P-FD-006-H13(Q) SH. 1 OF 2

7/11

B8



PLAN B-B



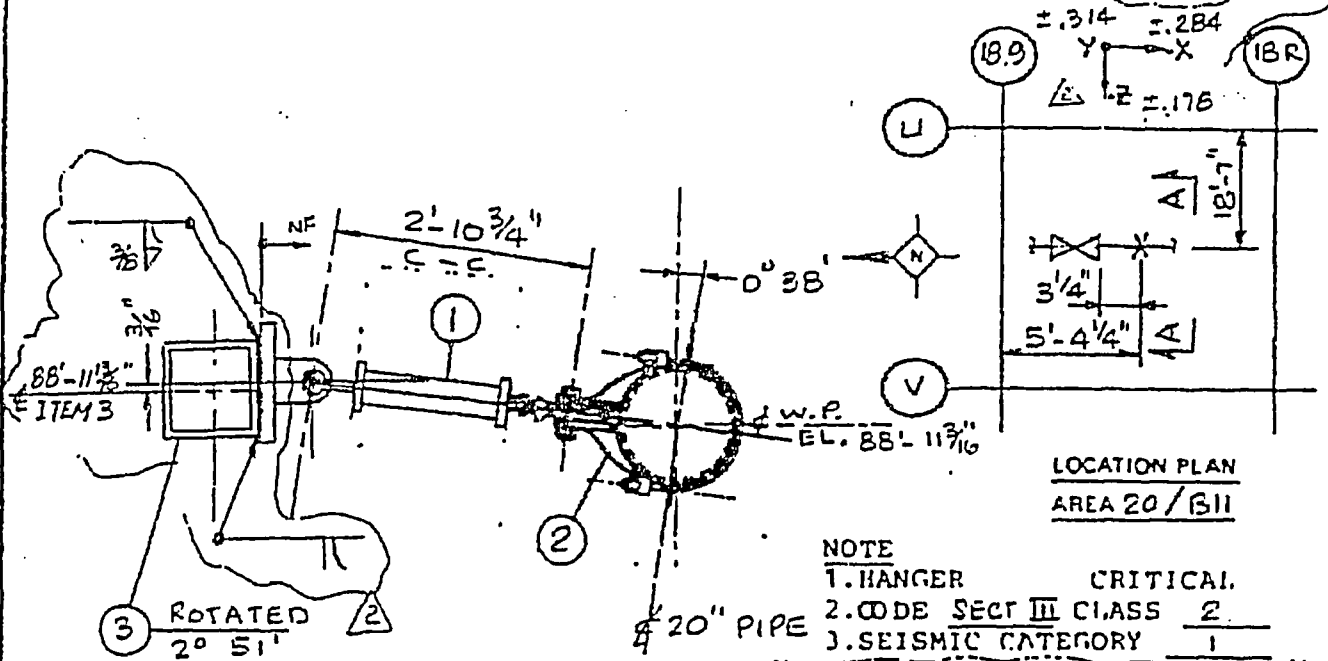
SECTION C-C

REV. DATE	SEE SHEET 1 OF 2	BY	CHK'D	DES'D	APP'D	ENG	STRS	PROJ
	SEE SHEET 1 OF 2	SW	DM	SW	DM	I	RM	
	REVISIONS	BY CH'K'DES'D APP'D ENGR STRS PROJ						

PUBLIC SERVICE ELECTRIC AND GAS COMPANY HOPE CREEK GENERATING STATION NOS. 1 & 2 UNITS	SAN FRANCISCO	REF. DWGS.	180	—
		PIPE	—	—
PIPE SUPPORT REACTOR BLDG.	JOB NO.	DRAWING NO.	REV.	
HPCI TURB. SUPPLY & EXHAUST	10855	1-P-FD-006-H13(0)	6	
		SHT. 2 OF 2		

ITEM NO	NO REQ'D	FIG. NO.	SIZE	DESCRIPTION	MAT'L
1	1	211	# 7 SWAY STRUT ASSY. OPTION # 1	$W = 1'-2\frac{3}{4}"$ . LOAD = (SEE TABLE BELOW)	
2	1	315N	50B 20" O.D. STIFF CLAMP WITH U-BOLT		
3	1	-	TS 8x8x 1/2 x 9'-9" LG.		SA-36
4	1	-	TS 10x6x 1/2 x 1'-2 1/2" LG (SHOP MITRE, FIELD TRIM TO SUIT)		
5	1	-	TS 10x6x 1/2 x 1'-2" LG		
6	1	-	TS 10x6x 1/2 x 10" LG		
7	1	-	TS 8x6x 1/2 x 1'-5" LG (FIELD TRIM TO SUIT)		
8	1	-	TS 10x10x 1/2 x 1'-8 1/2" LG (FIELD TRIM TO SUIT, SHOP MITRE)		
9	2	-	R 1/4 x 8 1/2 x 8 1/2 LG		SA-36
10	1	-	R 1/4 x 10 1/2 x 10 1/2 LG		SA-36

STRESS PROB. NO. C-31-(64Q) & D.P. H1514



FORCE	WT. #	± NORMAL/UPSET #	± EMER. #	± FAULT #
F <sub>Z</sub>	-	15726	18655	19880

ELEVATION A-A  
 (EAST-WEST RESTRAINT)

MARK NO 1-FD-006-H14

ISSUED FOR FINAL STRESS CALC., INCORP. FOR P-10884  
 F.12 & REVISED AS SHOWN

REV	DATE	REVISIONS	BY	CHK'D	APP'D	STR	TR
2	11/78		CIVIL	BY CH'K DESO	BY MENG	STR	TR

FEDERAL SERVICE ELECTRIC AND GAS COMPANY  
 HOME CREEK GENERATING STATION  
 BOX 182 UACB

BECHTEL  
 SAN FRANCISCO

REF. DWGS  
 SYS ISO 1-P-FD-01, REV. 19  
 PIPE -  
 STEEL C-0702-1, SHT 1, REV 12

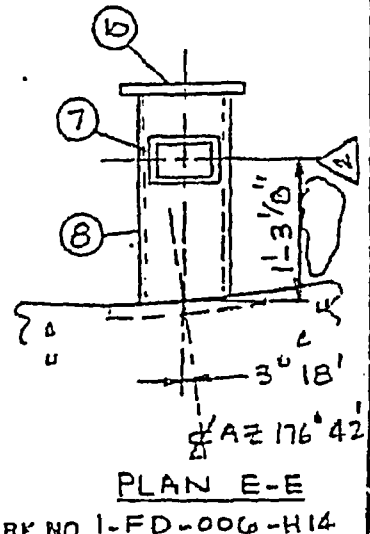
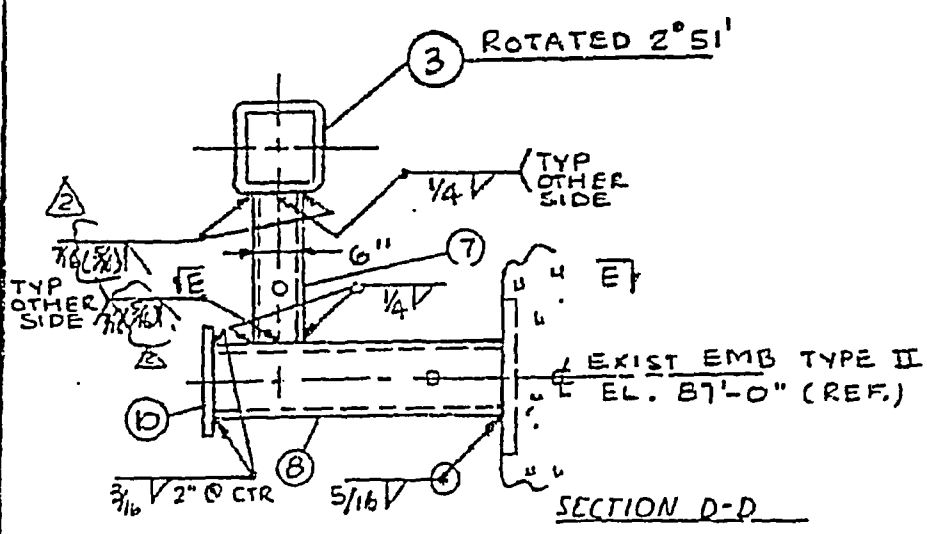
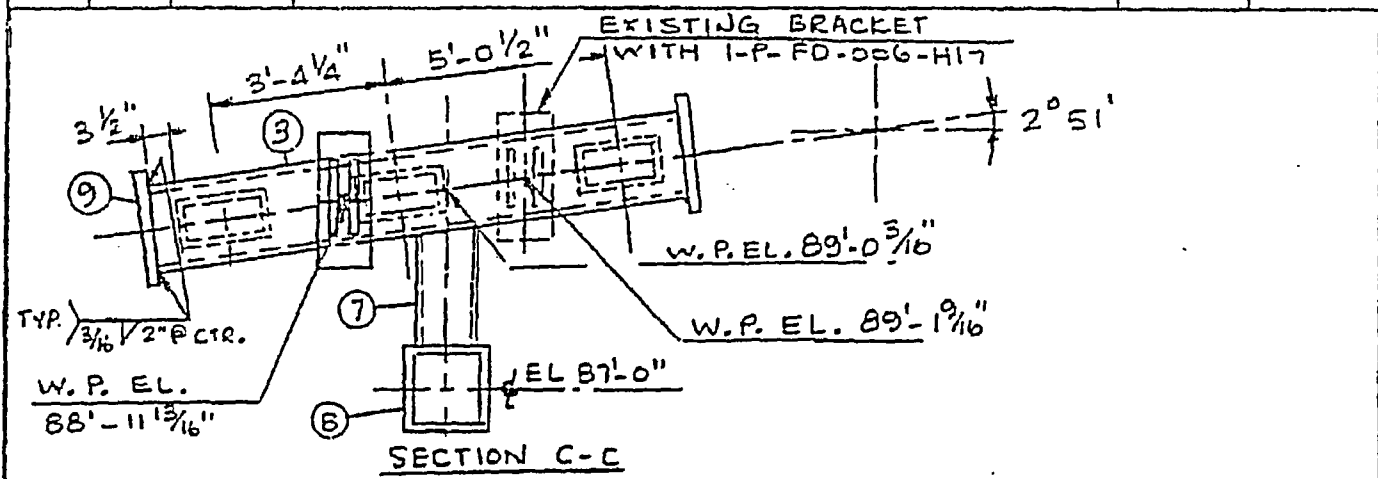
PIPE SUPPORT REACTOR BLDG.	JOB NO	DRAWING NO	REV
HPCI TURB SUPPLY & EXHAUST	10855	SHT. 1 OF 3 1-P-FD-006-H14 (W)	2

TAP BID

PUA

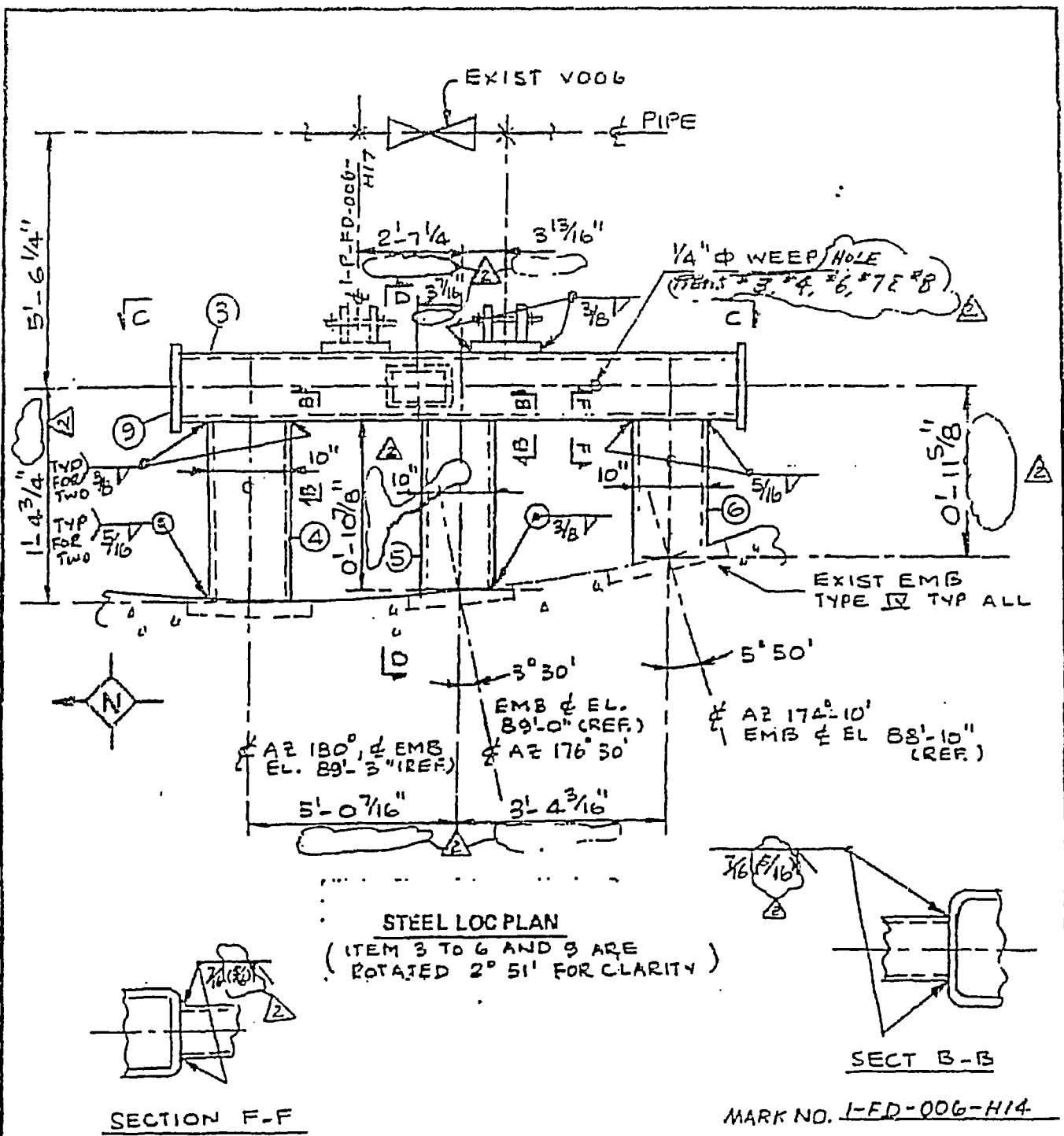
PIPE SUPPORT

REV.	NO.	DATE	DESCRIPTION
(FOR BILL OF MATL SEE SHT 1 OF 3)			



MARK NO. 1-P-FD-006-H14

SEE SH. 1 OF 3	REVISIONS	CIVIL	BY	CHKD	DESIGN	SUPV	ENGR	STRS	PROJ
PUBLIC SERVICE ELECTRIC AND GAS COMPANY HOPE CREEK GENERATING STATION NOS. 1 & 2 UNITS		SAN FRANCISCO		SYS ISO _____ REF. DWGS. PIPE _____ STEEL _____					
PIPE SUPPORT REACTOR BLDG.		JOB NO.		DRAWING NO.				REV.	
HPCI TURB. SUPPLY & EXHAUST		10855		SHT. 2 OF 3 1-P-FD-006-H14 (W)				2.	



	SEE SH. 1 OF 3	
	REVISIONS	CIVIL BY CH'K DESG. PV ENG STRS. PRO.
PUBLIC SERVICE ELECTRIC AND GAS COMPANY HOPE CREEK GENERATING STATION NOS 1 & 2 UNITS		SYS ISO _____ REF. DWGS. PIPE _____ STEEL _____
PIPE SUPPORT REACTOR BLDG. HPCI TURB SUPPLY & EXHAUST	JOB NO. 10855	DRAWING NO. SH. 3 OF 3 1-P-FD-006-H14 (G)
		REV. 2

B12

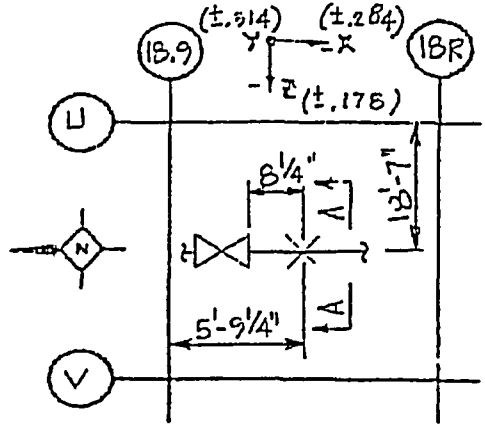


ITEM NO	NO REC'D	FIG. NO.	SIZE / DESCRIPTION	MAT'L
1	** 2	307	SIZE 35 MECH. SHOCK-ARRESTOR, STROKE = 6", LOAD = 4000 C.S. = 27/8", H.S. = 2 3/4", MVMT. = 1/8" (RETRACT), W = 41-0 1/16", ACCELERATION = .02g, MAT'L. PER B&PV CODE SECT. III, W/ADDITIONAL REAR PKT.	
2	1	-	T.S. 6 x 4 x 1/2 x 41-0" LG.	A-501-76 2F EQUAL
3	1	-	T.S. 8 x 4 x 1/2 x 31-6" LG.	" "
4	4	-	WA x 13 x 11-8 1/8" LG. (CUT TO SUIT)	
5	2	-	R 1/4" x 4 1/2" x 01-6 1/2" LG.	
6	2	-	R 1/4" x 4 1/2" x 01-8 1/2" LG.	

NOTE: ALL MAT'L. TO BE SA-36 U.N.O.

\*\* MATCH PERFORMANCE  
 SNUBBERS

STRESS PROB. NO. C-31-6(Q) & D.P. H1514



LOCATION PLAN  
 AREA 20/B11

- NOTE
1. HANGER CRITICAL.
  2. CODE SECT. III CLASS 2
  3. SEISMIC CATEGORY I
  4. INSTALLED ORIENTATION FOR ITEM #1 SHALL NOT EXCEED ± 1° FROM VERTICAL IN COLD POSITION.

FORCE	IN/U #	EMER. #	FAULTED #
F <sub>y</sub>	8,000*	8,000*	8,000*

\* MIN. DESIGN LOAD, SERVICE TYPE I

ESR SUPPORT

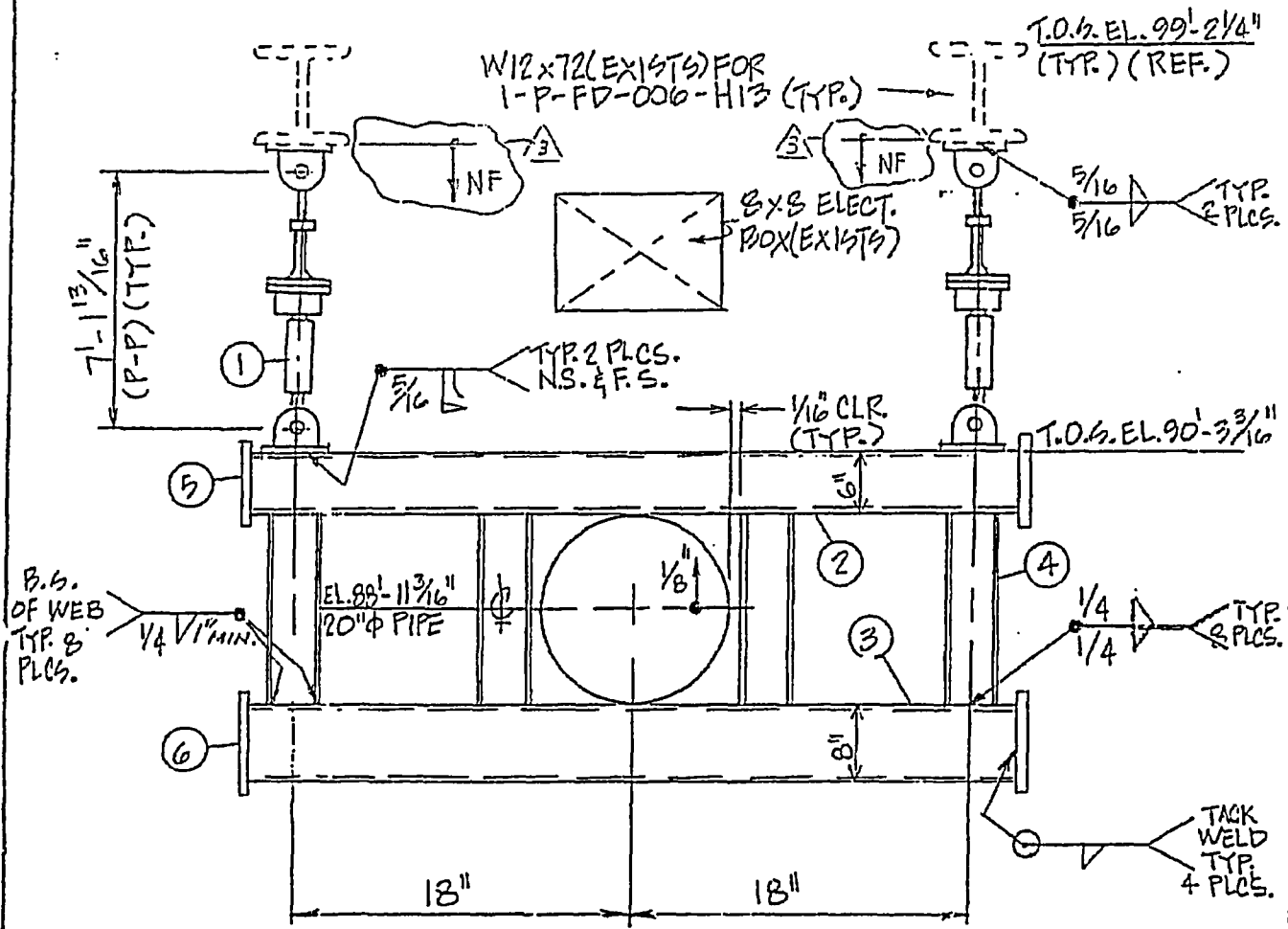
ELEVATION A A

MARK NO. 1-P-FD-006-H15

2	1/26	ISSUED FOR FINAL STRESS CALC., HGR. RE-DESIGNED	-	SFT	WJ	6FT	1/2	RM
3	1/23	THIS REVISION SUPERSEDES & INCORPORATES "NO IMPACT TO N-5"	-	TR	WM	TR	1/4"	SP
REV DATE		REVISIONS	CIVIL	BY CH'K DESO SUPV ENGR STRS PROJ				
PUBLIC SERVICE ELECTRIC AND GAS COMPANY MOORE CREEK GENERATING STAT. DM BOX 1 & 2 WHITE			SYS ISO 1-P-FD-01-REV. 10		REF DWGS PIPE C-0803-1 REV 15 STEEL C-0702-1, SHT. 1, REV. 16			
PIPE SUPPORT REACTOR BLDG.			JOB NO	DRAWING NO		REV		
HPCI TURB. SUPPLY & EXHAUST			10855	1-P-FD-006-H15(Q) SHT. 1 OF 2		3		


PWA

NOTE: "O" CLEARANCE IS TO BE MAINTAINED BETWEEN ITEM # 2 & PIPE AND ITEM # 3 & PIPE.



ELEVATION A-A (LKG. NORTH)

MARK NO. 1-FD-006-H15

P.A. 12387 REV. DATE	SEE SH. 1 OF 2	REVISIONS						PRK CIVIL	W/M BY	PRK CH'K'D	J.M. DES'D	SE SUPV	W/A ENGR	SPS STRS PROJ
	PUBLIC SERVICE ELECTRIC AND GAS COMPANY HOPE CREEK GENERATING STATION NOS 1 & 2 UNITS	 SAN FRANCISCO	ISO _____ REF. DWGS. PIPE _____ STEEL _____	JOB NO. 10855	DRAWING NO. 1-P-FD-006-H15 (R) SH. 2 OF 2	REV. 3								

B14

PART 2 - MODIFICATION AND TESTING, SECTION 5.0  
 FORM NC.DE-WB.EZ-0003-7  
 MODIFICATION DOCUMENT COVER SHEET

MD NO.: H 35  
 CHANGE NO.: 4EC-3507  
 PACKAGE NO.: 03  
 CP REV. NO.: 0

PAGE NO. 1  
 REV. NO. 0

DOCUMENT CHANGED: DWG# 1-P-FD-006-H015 Rev. 3 SHT/VOL NO.: 001  
 (PROVIDE TYPE, NUMBER AND REV. THAT CHANGE IS BASED ON)

ACTUAL CHANGE TO BE MADE: Replace existing snubber with LISEGA Hydraulic Snubber as detailed below :

Hanger No.	Existing Snubber	Replaced by New LISEGA Part no.		
		Snubber	Pin	Stud / Pin
1-P-FD-006-H015A	PSA0035	307256RE1	30-1003-150	30-1003-150

New Cold Set (CS) (in.)	New Hot Set (HS) (in.)	New Stroke (in.)	Flip (Y/N)	Shroud Removed (Y/N)
N/A	N/A	5.88	Y	N

Construction / DOC. Updater Note:

- "Flip" refers to whether or not the new snubber body is to be reversed from its original position.
- "Shroud Removed" refers to whether or not the new snubber housing is to be removed due to interference concerns.
- "Flip" and "Shroud Removed" condition may be changed, from what is specified, as long as it is properly documented (as-built) on this MD.
- Remove any design load information that appears on the drawing.

0	ORIGINAL ISSUE	<i>MK</i> M. C. Chang 8-1-97	<i>JA</i> T. Nickerson 8-12-97		
REV. NO.	REVISION SUMMARY	PREPARED BY & DATE	PEER REVIEW & DATE	INSTALLED MCRs	INSTALLER & DATE

PART 2 - MODIFICATION AND TESTING, SECTION 5.0  
 FORM NC.DE-WB.ZZ-0003-7  
 MODIFICATION DOCUMENT COVER SHEET

MD NO.: H 36  
 CHANGE NO.: 4EO-3507  
 PACKAGE NO.: 03  
 CP REV. NO.: 0

PAGE NO. 1  
 REV. NO. 0

DOCUMENT CHANGED: DWG# 1-P-FD-006-H015 Rev. 3 SHT/VOL NO.: 001  
 (PROVIDE TYPE, NUMBER AND REV. THAT CHANGE IS BASED ON)

ACTUAL CHANGE TO BE MADE: Replace existing snubber with LISEGA  
Hydraulic Snubber as detailed below :

Hanger No.	Existing Snubber	Replaced by New LISEGA Part no.		
		Snubber	Pin	Stud / Pin
1-P-FD-006-H015B	PSA0035	307256RE1	30-1003-150	30-1003-150

New Cold Set (CS) (in.)	New Hot Set (HS) (in.)	New Stroke (in.)	Flip (Y/N)	Shroud Removed (Y/N)
N/A	N/A	5.88	Y	N

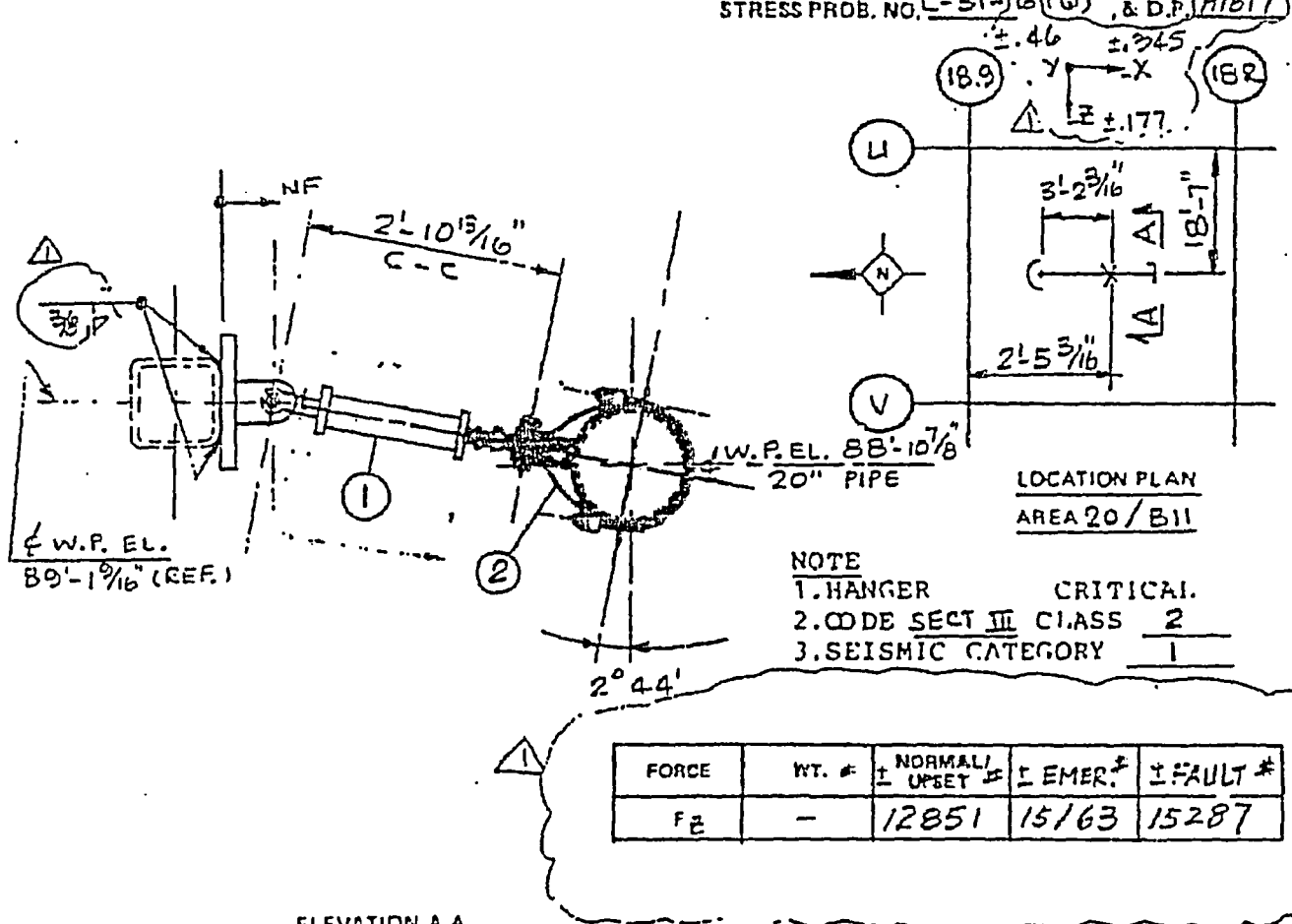
Construction / DOC. Updater Note:

- "Flip" refers to whether or not the new snubber body is to be reversed from its original position.
- "Shroud Removed" refers to whether or not the new snubber housing is to be removed due to interference concerns.
- "Flip" and "Shroud Removed" condition may be changed, from what is specified, as long as it is properly documented (as-built) on this MD.
- Remove any design load information that appears on the drawing.

0	ORIGINAL ISSUE	<i>MC</i> M. C. Chang 8-1-97	<i>TN</i> T. Nickerson 8-12-97		
REV. NO.	REVISION SUMMARY	PREPARED BY & DATE	PEER REVIEW & DATE	INSTALLED MCRs	INSTALLER & DATE

ITEM NO	QTY REQ'D	FIG. NO.	SIZE	DESCRIPTION	MAT'L
1	1	211	# 7 SWAY STRUT ASSY, OPTION # 1	$W = 1'-2\frac{13}{16}"$ . LOAD = <u>SEE TABLE BELOW</u>	
2	1	315 N	# 508 20" O.D. STIFF CLAMP WITH H-BOLT		

STRESS PROB. NO. C-31-(6)(Q) & D.P. (H1817)



ESR SUPPORT

PUA

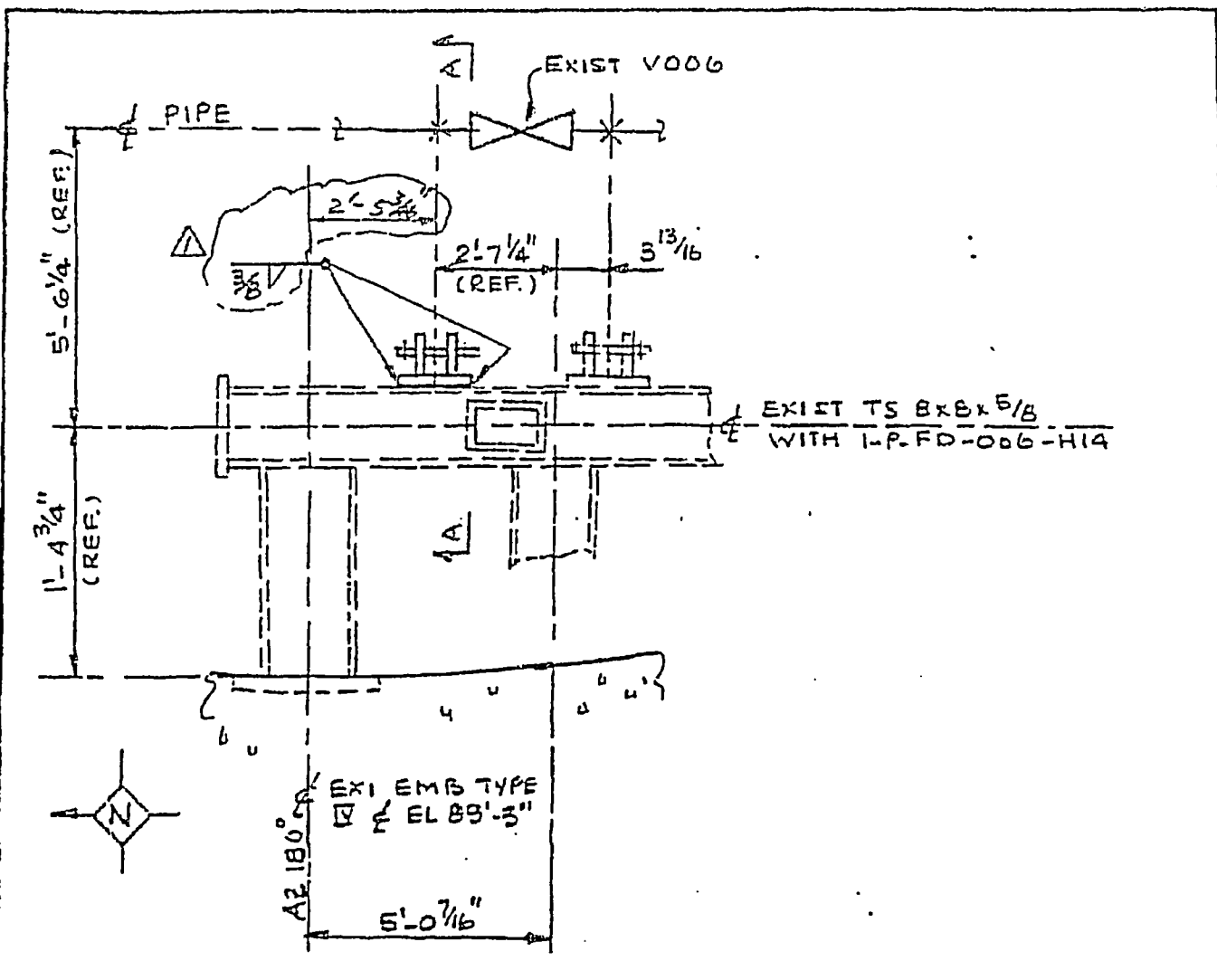
ELEVATION A A

(EAST-WEST RESTRAINT)

MARK NO 1-PD-006-H17

ISSUED FOR FINAL STRESS CALC. AND INCORP. F <sub>0</sub>					
REV DATE	REVISIONS	CIVIL	BY CH'K DESD	PM ENGR STRS PROJ	
PUBLIC SERVICE ELECTRIC AND GAS COMPANY HOPE CREEK GENERATING STATION VOL 1 & 2 UGITE		SYS ISO 1-P-FD-01, REV. (19) REF. PIPE [REDACTED] STEEL C-0702-1, SHT, REV 12		SAN FRANCISCO	
PIPE SUPPORT REACTOR BLDG.		JOB NO	DRAWING NO	REV	
HPCI TURB. SUPPLY & EXHAUST		10855	SHT 10 OF 2 1-P-FD-006-H17 (Q)	/	

TAP BIT



**STEEL LOC PLAN**  
 (EXISTING STEEL ROTATED)  
 (2° 51' FOR CLARITY)

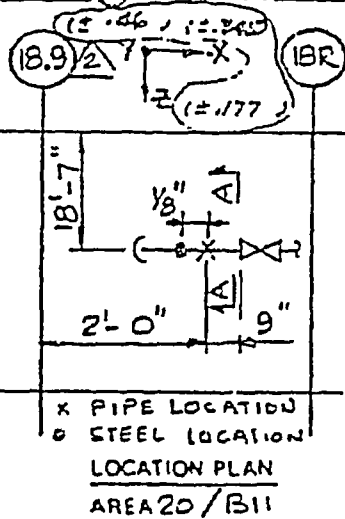
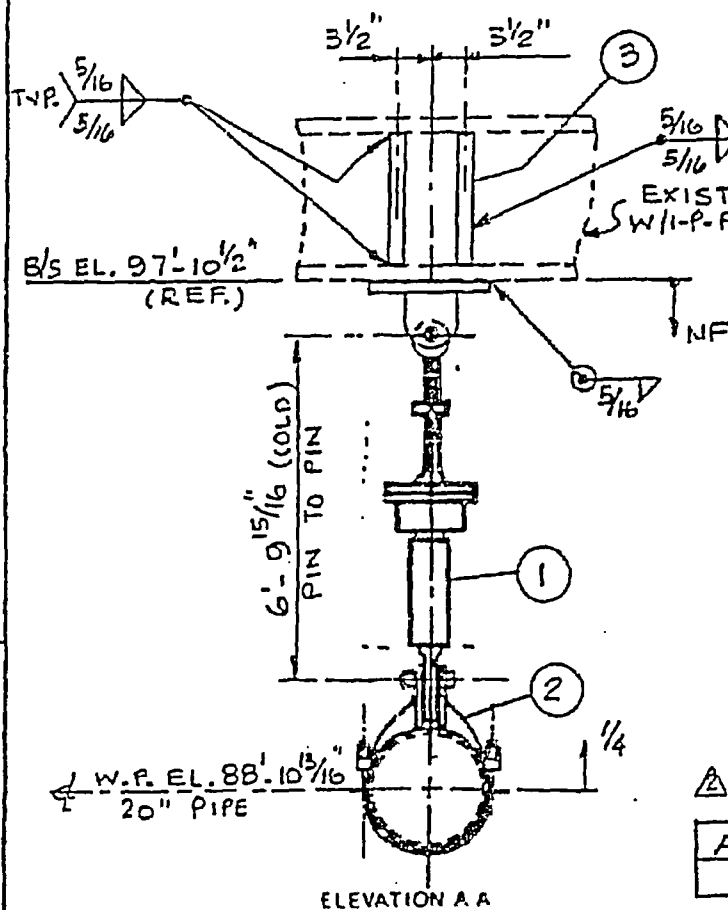
MARK NO. 1-P-FD-006-H17

	SEE SH. 1 OF 2 REVISIONS	CIVIL BY CHIK DESOJA PV ENG STRS PROJ
	PUBLIC SERVICE ELECTRIC AND GAS COMPANY HOPE CREEK GENERATING STATION NOS. 1 & 2 UNITS	
PIPE SUPPORT REACTOR BLDG. HPCI TURB. SUPPLY & EXHAUST	JOB NO. 10855	DRAWING NO. SH. 2 OF 2 1-P-FD-006-H17 (Q) /

ITEM NO	NO REC'D	FIG. NO.	SIZE	DESCRIPTION	MAT'L
1	1	307	#35	MECHANICAL SHOCK ARRESTOR, WITH OUT CLAMP STROKE = 6" CS = 3 1/2" HS = 5" MVT. = 1/4" RETRACT) LOAD = <del>2000</del> W = 3'-8 1/16" ACCELERATION = .02g, MAT'L PER B & PV. CODE SECT. III. SEE NOTE # 4	
2	1	315 N	#33A	20" O.D. STIFF CLAMP WITH U-BOLT	
3	4	-	R 1/2" x 5 1/4" x 16 15/16"	L4 SEE DETAIL-1	

NOTE: ALL MAT'L TO BE SA-35 U.N.O.

STRESS PROB. NO. C-31-(6) (Q1) & D.P. H1817



- NOTE
- HANGER CRITICAL.
  - CODE SECT III CLASS 2
  - SEISMIC CATEGORY I
  - INSTALLED ORIENTATION FOR ITEM # 1 SHALL NOT EXCEED ± 1° FROM VERTICAL IN COLD POSITION

FORCE	± N/4 #	± EMER #	± FAULTED #
FY	10265	8000 #	10864

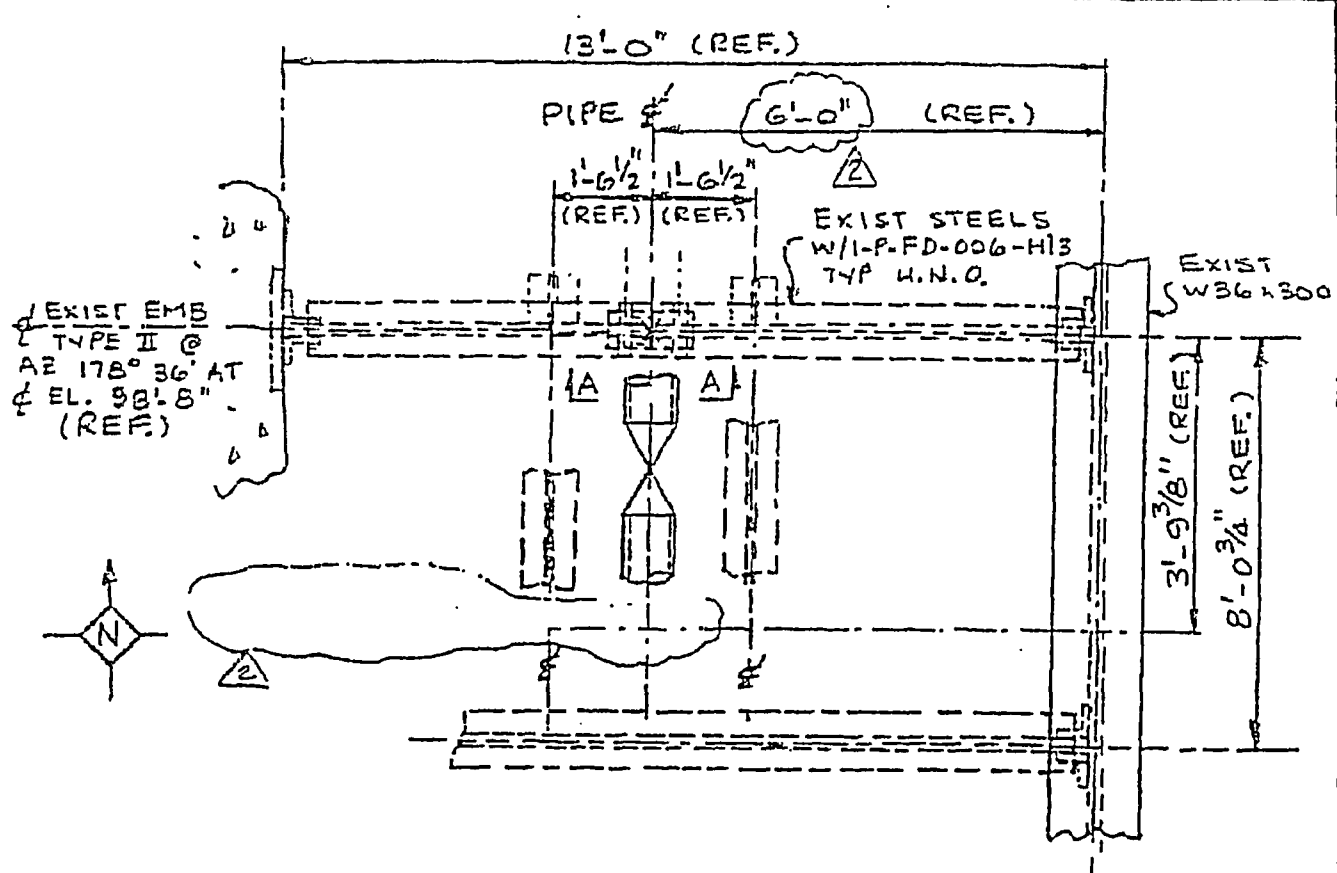
# MIN. DESIGN LOAD  
 MARK NO 1-FD-006-H18

ESR SUPPORT

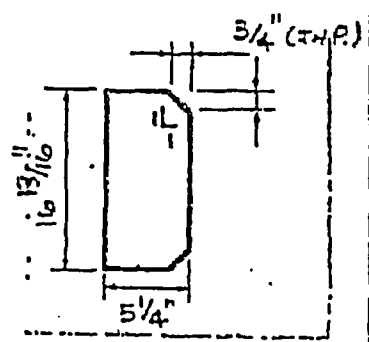
(VERTICAL SNUBBER)

ISSUED FOR FINAL STRESS CALC. & INCORP. FOR H484	CIVIL	BY CHIK DESAI / PV ENGS	STR	STR
PUBLIC SERVICE ELECTRIC AND GAS COMPANY HOPE CREEK GENERATING STATION	SAN FRANCISCO	SYS ISO 1-P-FD-01, REV 19	REF DWGS PIPE C-0803-1 REV 78	STEEL C-0102-1 SHT. 1 REV 16
PIPE SUPPORT, REACTOR BLDG.	JOB NO 10855	DRAWING NO 1-P-FD-006-H18 (Q)	REV 2	2
HPCI TURB SUPPLY & EXHAUST		SHT 1 OF 2		

PVA



STEEL LOG PLAN



DETAIL - 1

MARK NO. 1-FD-006-H18

SEE SHEET 1 OF 2		REVISIONS				BY CH'K DESOZ PVIENG STRSPROJ			
PUBLIC SERVICE ELECTRIC AND GAS COMPANY HOPE CREEK GENERATING STATION NOS. 1 & 2 UNITS		SAN FRANCISCO		REF. DWGS.		SYS ISO _____ PIPE _____ STEEL _____			
PIPE SUPPORT REACTOR BLDG.		JOB NO. 10855		DRAWING NO. SHT. 2 OF 2 1-P-FD-006-H18 (0)		REV. 2			

B2D



PART 2 - MODIFICATION AND TESTING, SECTION 5.0  
 FORM NC.DE-WB.ZZ-0003-7  
 MODIFICATION DOCUMENT COVER SHEET

MD NO.: H 37  
 CHANGE NO.: 4EO-3507  
 PACKAGE NO.: 03  
 CP REV. NO.: 0

PAGE NO. : 1  
 REV. NO. : 0

DOCUMENT CHANGED: DWG# 1-P-FD-006-H018 Rev. 2 SHT/VOL NO.: 001  
 (PROVIDE TYPE, NUMBER AND REV. THAT CHANGE IS BASED ON)

ACTUAL CHANGE TO BE MADE: Replace existing snubber with LISEGA Hydraulic Snubber as detailed below :

Hanger No.	Existing Snubber	Replaced by New LISEGA Part no.		
		Snubber	Pin	Stud / Pin
1-P-FD-006-H018	PSA0035	307256RE1	30-1003-150	30-1025-150, L=12

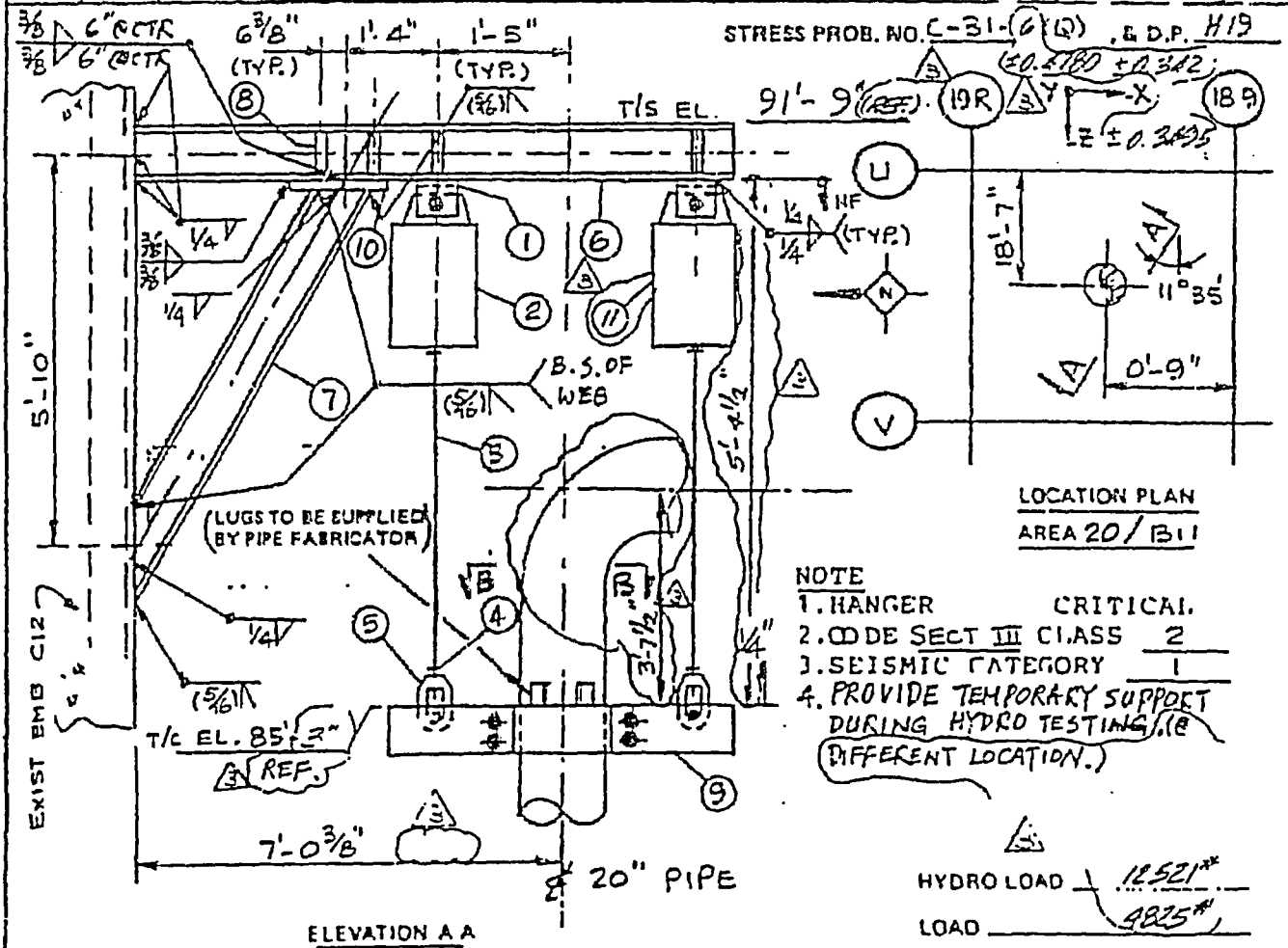
New Cold Set (CS) (in.)	New Hot Set (HS) (in.)	New Stroke (in.)	Flip (Y/N)	Shroud Removed (Y/N)
N/A	N/A	5.88	N	N

Construction / DOC. Updater Note:

- "Flip" refers to whether or not the new snubber body is to be reversed from its original position.
- "Shroud Removed" refers to whether or not the new snubber housing is to be removed due to interference concerns.
- "Flip" and "Shroud Removed" condition may be changed, from what is specified, as long as it is properly documented (as-built) on this MD.
- Remove any design load information that appears on the drawing.

0	ORIGINAL ISSUE	<i>MC</i> M. C. Chang 8-1-97	<i>TN</i> T. Nickerson 8-12-97		
REV. NO.	REVISION SUMMARY	PREPARED BY & DATE	PEER REVIEW & DATE	INSTALLED MCRS	INSTALLER & DATE

NO.	NO. REQ'D	FIG. NO.	SIZE	DESCRIPTION	MAT'L
1	2	66	1"	WELDED BEAM ATTACHMENT WITH PIN & COTTER PIN	
2	1	B-26B		<del>FOR VEHICLE SUPPORT TYPE B. CL = 2670" CL = 2670" AVAT = 1/4" UP. W/ TRAVEL STOP</del>	
11	1	B-26B		<del>FOR VEHICLE SUPPORT TYPE B. CL = 2670" CL = 2670" AVAT = 1/4" UP. W/ TRAVEL STOP</del>	
3	2	140N	1" x 1/4" x 8"	LG ROD WITH 9" TBE (CUT TO SUIT IN FIELD)	A
4	4	-	1"	HEX NUT	
5	2	290	1"	WELDLESS EYENUT	
6	1	-	W10x49x8'-9"	C-C LG. SEE STL. LOC. PLAN (CUT TO SUIT);	
7	1	-	W10x49x(7'-9")	LG. (CUT TO SUIT)	
				AND ELEVATION, A-A	
8	8	-	R 3/8" x 4 1/16" x 8 1/16"	STIFFENER PLATE, PROVIDE AND INSTALL PER DETAIL P-05BB	
				(BILL OF MAT'L CONT. ON SHIT 2 OF 2)	



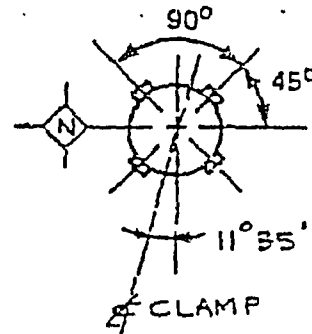
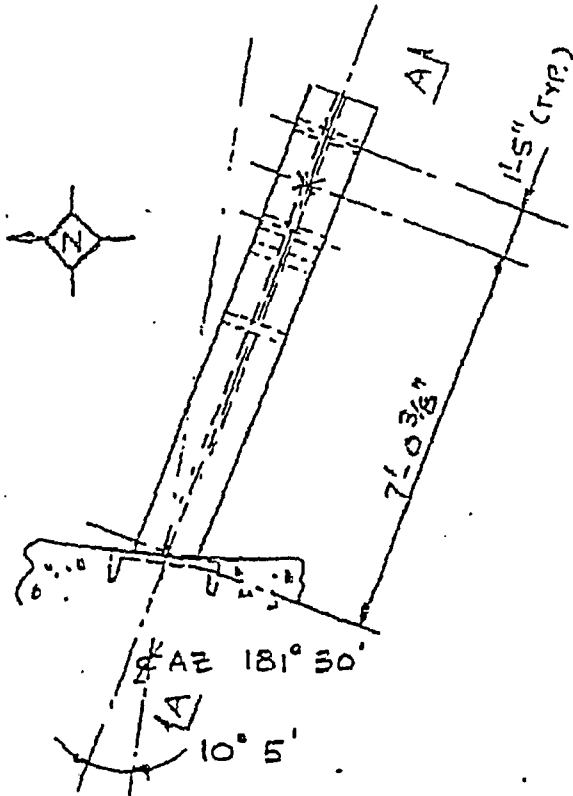
ESR SUPPORT

S/2

2/21/16	ISSUED FOR FINAL STRESS CALL & INCORP. FOR H-231A & P-2				
REV DATE	REVISIONS	CIVIL	BY CH'K DESIGNED BY ENG STRS PROJ		
PUBLIC SERVICE ELECTRIC AND GAS COMPANY HOPE CREEK GENERATING STATION NO. 1 & 2 UNITS		SAN FRANCISCO		SYS ISO 1-P-FD-01, REV 19	
PIPE SUPPORT, REACTOR BLDG.		JOB NO 10855	DRAWING NO	REV	
HPCI TURB SUPPLY & EXHAUST			SHT. 1 OF 2 1-P-FD-006-H19 (10)	3	

P-22

ITEM NO.	NO. RECD	FIG. NO.	DESCRIPTION	MAT'L
9	1	-	20" O.D. SPECIAL RISER CLAMP, C TO C = 34"	
			PER ITT-GRINNELL STRESS REPORT SA-4126-1 & BECHTEL DOCUMENT NO. 10855-P401(W)-172-1	
10	1	-	R 1" x 16" x 16"	
NOTE: ALL MAT'L TO BE SA-36 U.N.O.				



PLAN B-B  
(LUG ORIENTATION)

STEEL LOC PLAN

MARK NO. 1-FD-006-H19

REV. DATE	SEE SH. 1 OF 2	CIVIL	BY CH'K DESD R/PV	ENG	STRS	PROJ
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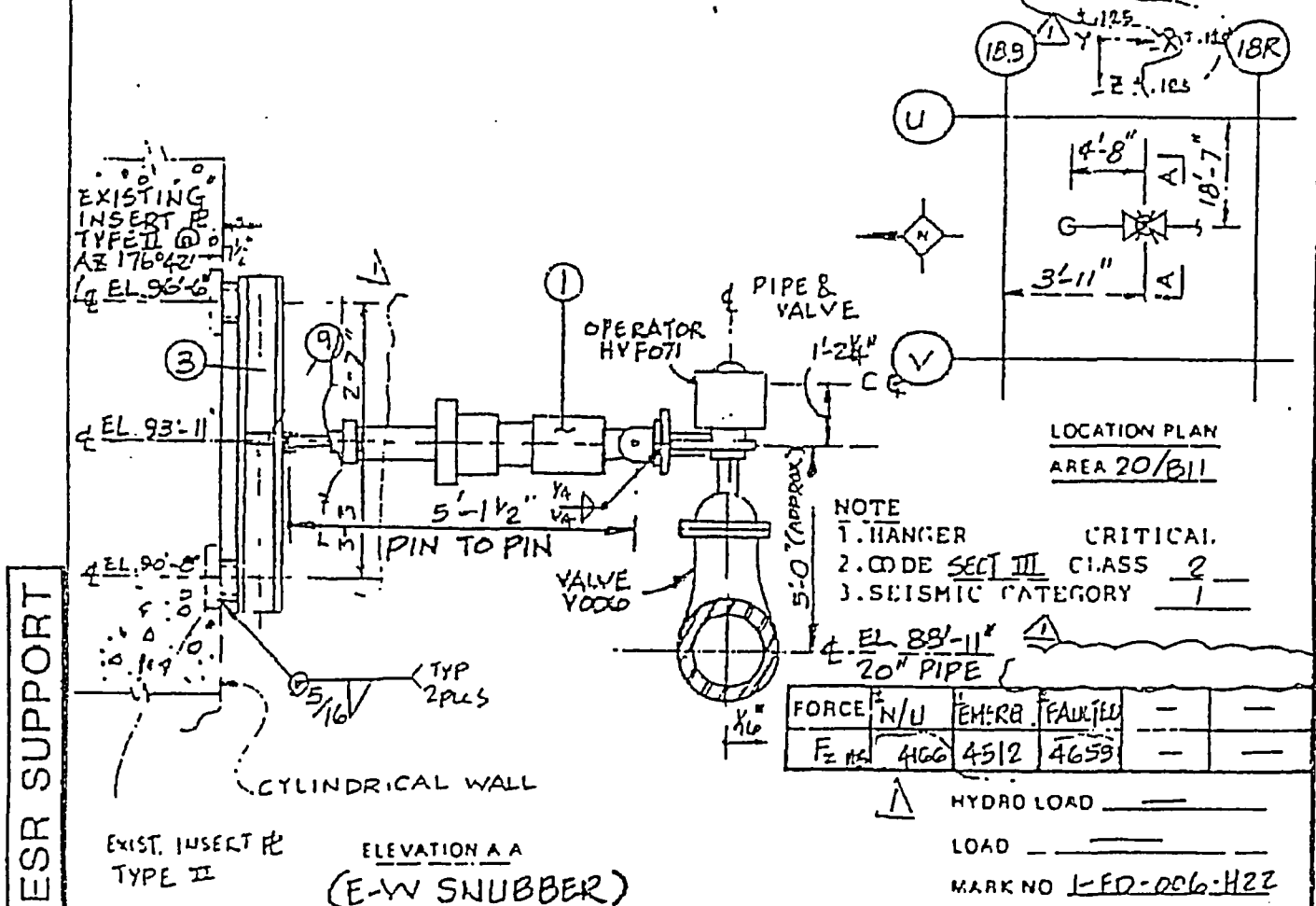
PUBLIC SERVICE ELECTRIC AND GAS COMPANY HOPE CREEK GENERATING STATION NOS. 1 & 2 UNITS	 SAN FRANCISCO	BY 150 _____
		REF. DWGS. PIPE _____ STEEL _____

PIPE SUPPORT REACTOR BLDG. HPCI TURB SUPPLY & EXHAUST	JOB NO. 10855	DRAWING NO. SHT 2 OF 2 1-P-FD-006-H19 (W)	REV. 3
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B23

ITEM NO	NO. REQ'D	FIG. NO.	SIZE / TYPE	DESCRIPTION	MAT'L
1	1	307	#3 MECHANICAL SHOCK SUPPRESSOR	5" STROKE W/ADDITIONAL REAR BRACKET, LOAD = $\frac{3}{4}$ WT = $X_{10}$ WT $CS = \frac{1}{2}$ , $HS = \frac{1}{4}$ , $W = 3 \cdot 2 \frac{1}{8}$ ACCELERATION = .02G, MAT'L PER BSIPV, CODE SECT. III	
2	2	-	TS 4 x 4 x 3/8 X 0'-8" LG (FIELD CUT TO SUIT)		A361-70
3	1	-	W 6 X 20 X 7'-0" LG (FIELD CUT IF NECESSARY)		CP BR 111
4	-	-	# 1 1/2" THICK PLATE (SEE DET. 3. FIELD CUT TO SUIT TO MATCH THE DIAMETER OF THE YOKE.)		
(BILL OF MATERIAL CONT. ON SHT. 2 OF 2)					
NOTE ALL MAT'L TO BE <del>A-36</del> OR SA-36 U.V.O.					

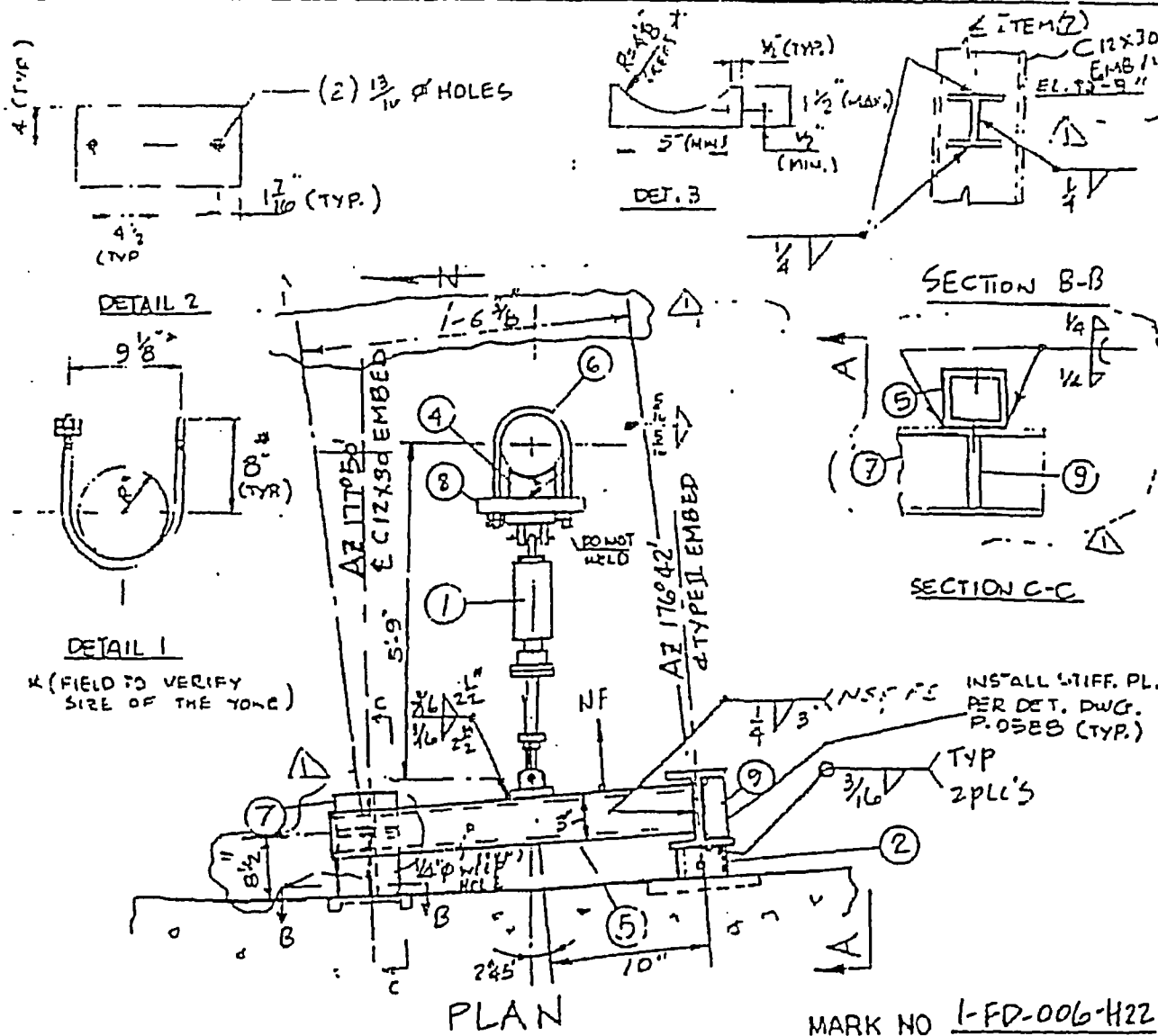
STRESS PROB. NO. C3160 & D.P. 45CG5




ISSUED FOR FINAL STRESS CALC. AND INCORP.		DATE	BY	CHK'D	REV
FCR P-13046 F02 REVISIONS		PIPE	BY CH'K DESG	ENG	STR
PUBLIC SERVICE ELECTRIC AND GAS COMPANY HOPE CREEK GENERATING STATION NO. 1 & 2 UNITS		SYS ISO 1-P-FD-01 REV (19)			
SAN FRANCISCO		REF DWGS STEEL C-0702-1, REV. 15			
PIPE SUPPORT REACTOR BLDG.		JOB NO	DRAWING NO	REV	
HPCI TURB. SUPPLY & EXHAUST		10855	1-P-FD-006-H22(Q)	1	
			SHT. 1 OF 2		

B24

ITEM NO	NO REVD	FIG NO	SIZE	DESCRIPTION	MAT'L
5	1	—	7.5" x 3" x 1/2" x 2'-0" LG (CUT TO SUIT)		A361-TE RES B
6	1	1375	1/2" B SPECIAL U-BOLT THREADED BOTH ENDS W/ 4 HEX NUTS (SEE DET. 1)		
7	1	—	W6 x 20 x 2'-0" LG (FIELD CUT IF NECESSARY)		
8	1	—	R 3/4" x 8" x 12" LG (SEE DETAIL 2)		
9	2	—	R 3/8" x 2 3/8" x 5 3/8" (STIFFENER PL. PER DET. P.05BB)		
10	1	—	DELETED		



SEE SH. 1	REVISIONS	PIPE	BY CH'K DESG	ENGR	STRS	PROJ
PUBLIC SERVICE ELECTRIC AND GAS COMPANY HOPE CREEK GENERATING STATION NOS 1 & 2 UNITS	 SAN FRANCISCO	ISO	REF DWGS	PIPE	STEEL	
PIPE SUPPORT REACTOR BLDG. HPCI TURB. SUPPLY & EXHAUST	JOB NO 10855	DRAWING NO 1-P-FD-006-H22 (Q) SH. 2 OF 2	REV 1			

B25

PART 2 - MODIFICATION AND TESTING, SECTION 5.0  
 FORM NC.DE-WB.ZZ-0003-7  
 MODIFICATION DOCUMENT COVER SHEET

MD NO.: H 38  
 CHANGE NO.: 4EO-3507  
 PACKAGE NO.: 03  
 CP. REV. NO.: 0

PAGE NO. 1  
 REV. NO. 0

DOCUMENT CHANGED: DWG# 1-P-FD-006-H022 Rev. 1 SHT/VOL NO.: 001  
 (PROVIDE TYPE, NUMBER AND REV. THAT CHANGE IS BASED ON)

ACTUAL CHANGE TO BE MADE: Replace existing snubber with LISEGA Hydraulic Snubber as detailed below :

Hanger No.	Existing Snubber	Replaced by New LISEGA Part no.		
		Snubber	Pin	Stud / Pin
1-P-FD-006-H022	PSA0003	305256RE1	30-1003-075	30-1003-075

New Cold Set (CS) (in.)	New Hot Set (HS) (in.)	New Stroke (in.)	Flip (Y/N)	Shroud Removed (Y/N)
N/A	N/A	5.88	N	N

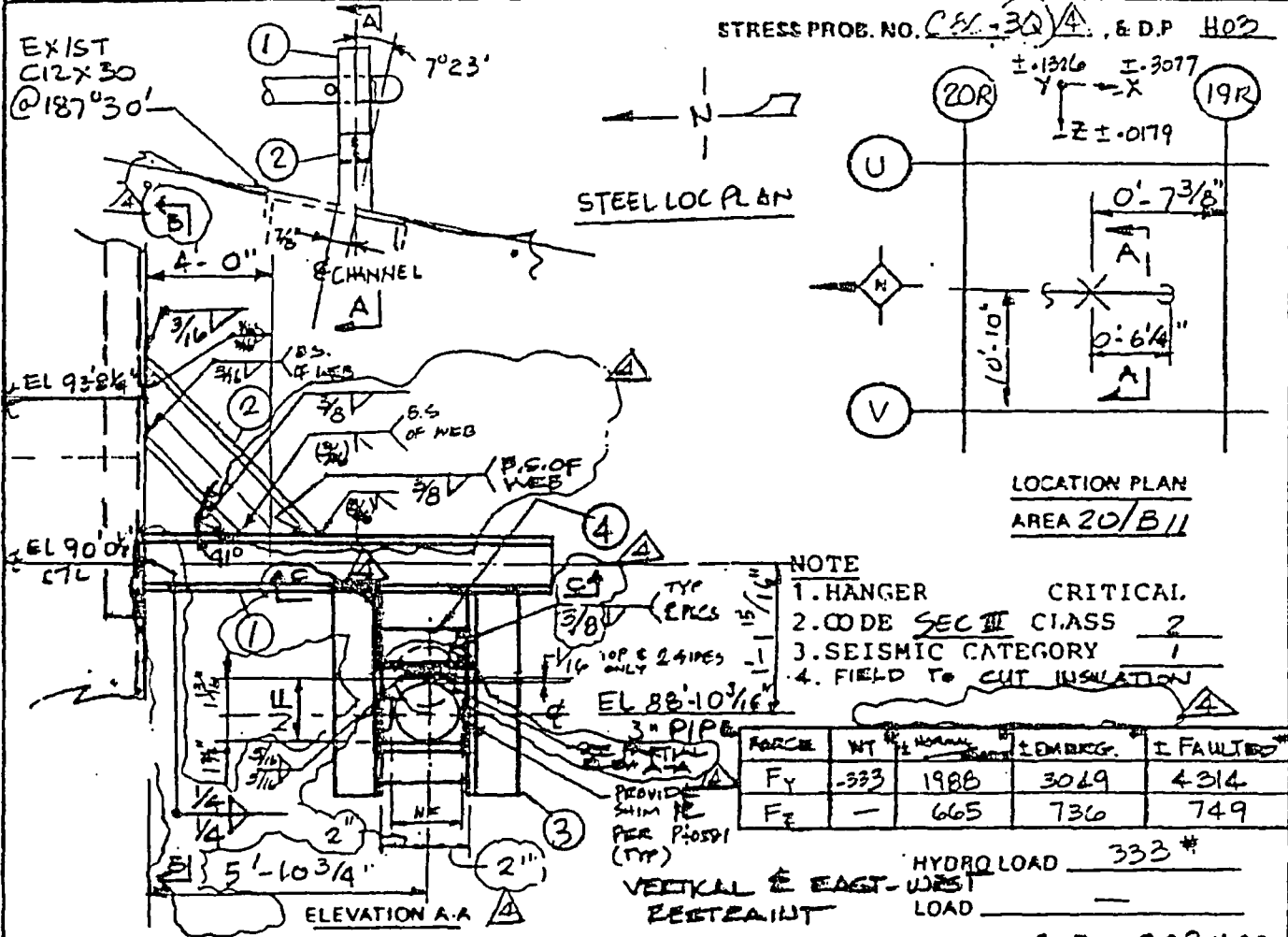
Construction / DOC. Updater Note:

- "Flip" refers to whether or not the new snubber body is to be reversed from its original position.
- "Shroud Removed" refers to whether or not the new snubber housing is to be removed due to interference concerns.
- "Flip" and "Shroud Removed" condition may be changed, from what is specified, as long as it is properly documented (as-built) on this MD.
- Remove any design load information that appears on the drawing.

0	ORIGINAL ISSUE	<i>MCC</i> M. C. Chang 8-1-97	<i>SN</i> T. Nickerson 8-12-97		
REV. NO.	REVISION SUMMARY	PREPARED BY & DATE	PEER REVIEW & DATE	INSTALLED MCRs	INSTALLER & DATE

CODE CASE N-413 APPROVED

ITEM NO	NO RECD	FIG. NO.	SIZE	DESCRIPTION	MAT'L
1	1	-	W4X13X6'-7" LG		
2	1	-	W4X13X5'-(8) [C-C LENGTH (SEE ELV. A-A)]		
3	2	-	L2 1/2 X 2 1/2 X 3/8 X 11'-7" LG.		
4	2	-	L2 1/2 X 2 1/2 X 3/8 X 5 1/2' LG		
NOTE: ALL MAT'L TO BESA-36 UNO					



REV	DATE	DESCRIPTION	BY	CHKD	DESIGN	ENGR	STR	PROJ
1	ADD'D SHT. 2 OF 2.	ADDED "ISSUED FOR FINAL STRESS ONLY" TO THIS DRAWING. REVISED PER AS REQ'D. ADDED FIELD TO ITEM 4. CHECKED FOR H-1776, H-1782, HF-10248, HF-10249, HF-10250.						

PUBLIC SERVICE ELECTRIC AND GAS COMPANY  
 MOPE CREEK GENERATING STATION  
 SHEET 18 OF 20 SHEETS

SAN FRANCISCO

SYS ISO 1-P-RC-06 REV 9

REF. DWGS. PIPE STEEL C-0703-1 SHT 1 REV 0

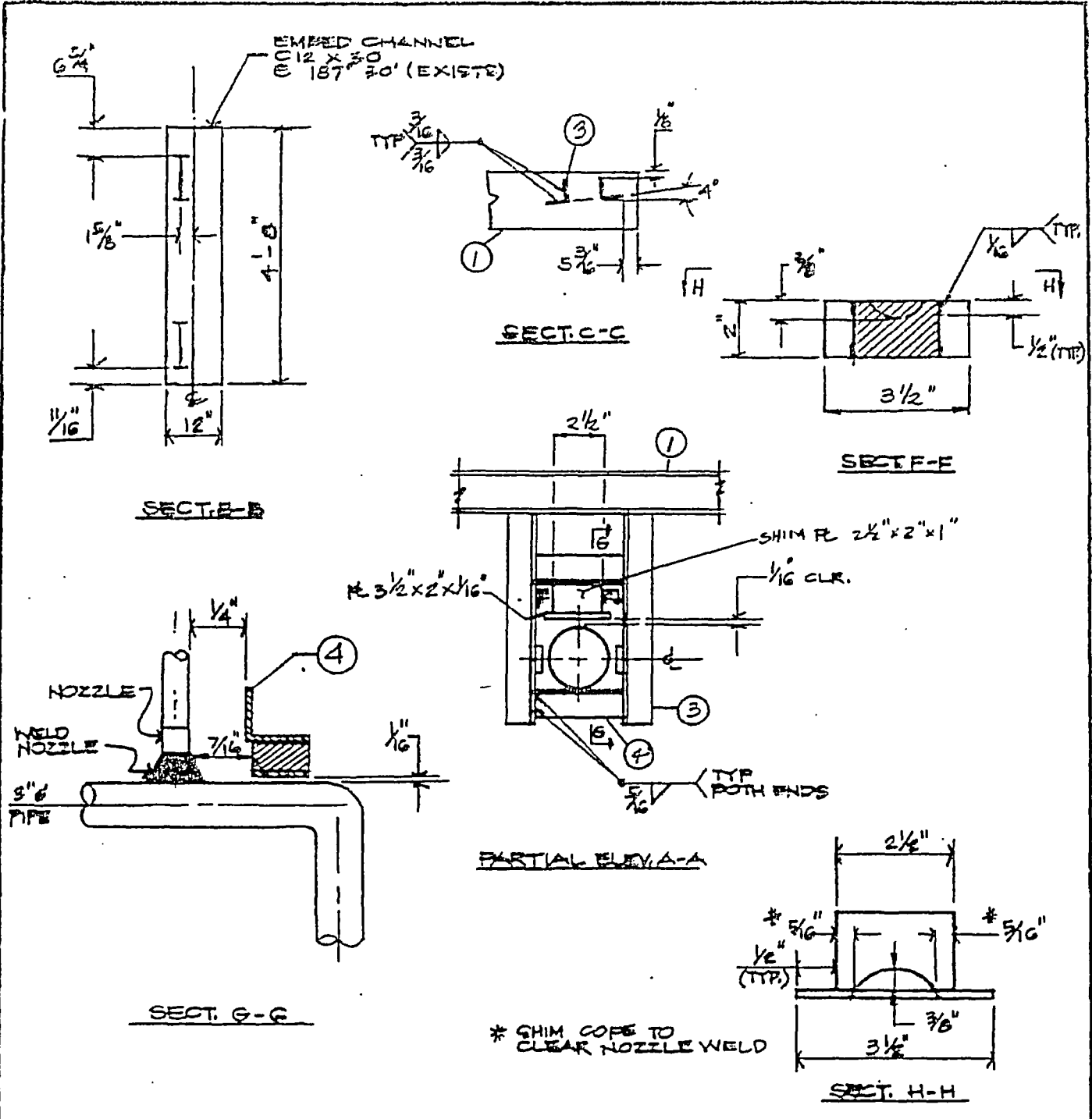
PIPE SUPPORT - REACTOR BLDG.

JOB NO. 10855

DRAWING NO. 1-P-FD-008-H03 (A)

REV. 5

RHR CROSS-CONNECT VACUUM BREAKERS FROM TURBINE



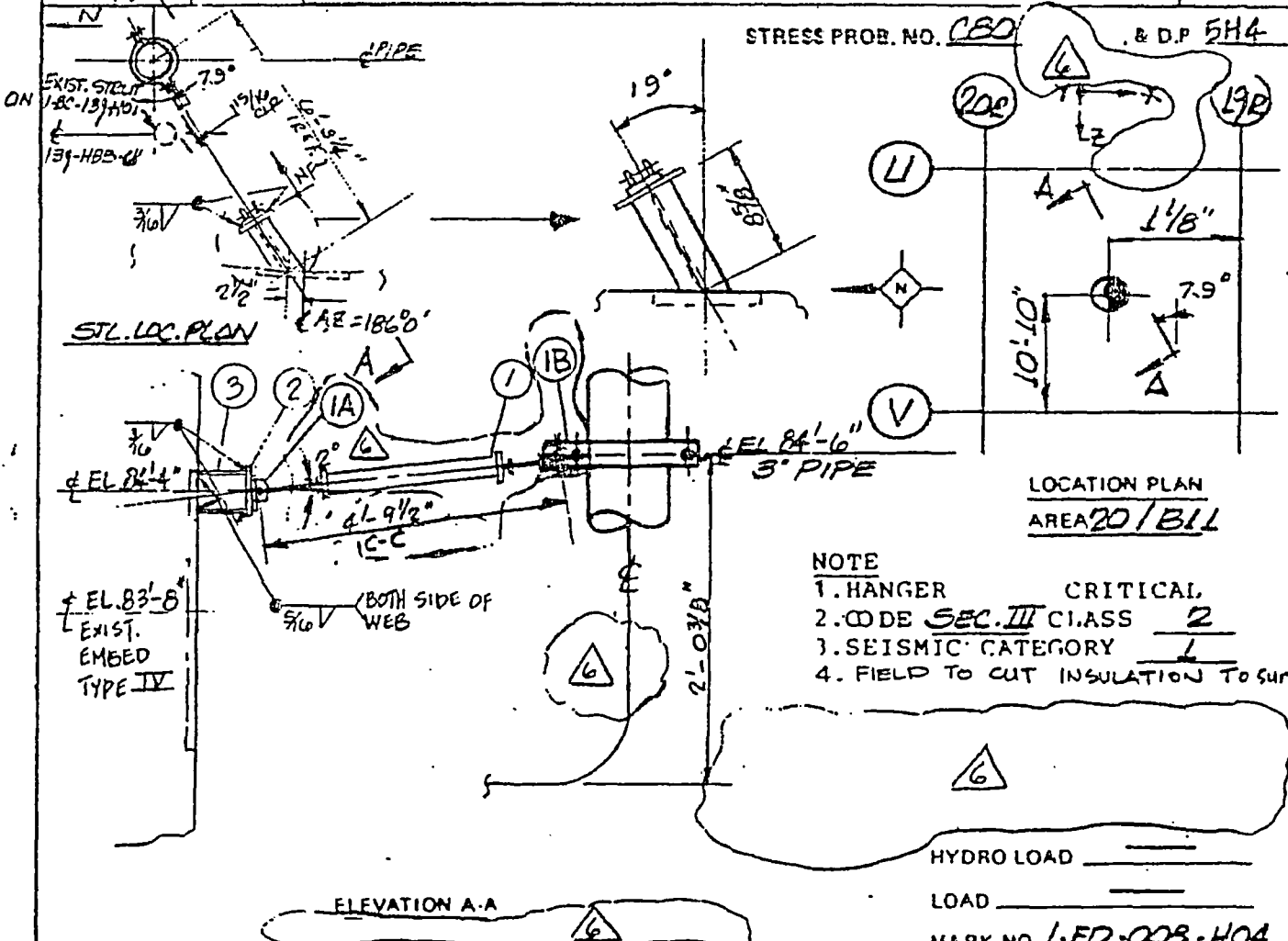
MARK NO. LER-008-H03

A 3/27/77 REV. DATE		SEE SHIT 1 OF 2 REVISIONS		SEE SHIT 1 OF 2 BY CH'K DESD SUPV ENGR STRS PROJ	
PUBLIC SERVICE ELECTRIC AND GAS COMPANY HOPE CREEK GENERATING STATION NOS. 1 & 2 UNITS			SAN FRANCISCO	180 1-P-BC-06 REV. 7 REF. DWGS. PIPE _____ STEEL C-0703-1 SHIT 1 REV. 20	
PIPE SUPPORT REACTOR BLDG. RHR CROSS-CONNECT VACUUM BREAKERS FROM TORUS			JOB NO. 10855	DRAWING NO. 1-P-FD-008-H03 (Q)	REV. SHIT 2/2 PUA



ITEM NO	NO REQ'D	FIG. NO.	SIZE	DESCRIPTION	MAT'L
1	1	-	L1 SEGA RIGID STRUT W/LOAD STUD & PIN		
				TYPE 3932 RR1 (E = 57 1/2")	
1A	1	-	REAR BRACKET SIZE 1 AS SUPPLIED W/FIG		
				307 MECHANICAL SHOCK ARRESTOR	
1B	1	6	3" PIPE CLAMP AS SUPPLIED W/FIG 307 SIZE 1		
				MECHANICAL SHOCK ARRESTOR	
2	1	-	PL 1/2" x 5" x 5"		
3	1	-	W 4 x 13 x 140" LG. (FIELD CUT TO SUIT) SEE ST'L LOC PLAN		

NOTE: ALL MAT'L TO BE SA-36 U.N.O.



- NOTE
1. HANGER CRITICAL
  2. CODE SEC. III CLASS 2
  3. SEISMIC CATEGORY 1
  4. FIELD TO CUT INSULATION TO SUIT

HYDRO LOAD \_\_\_\_\_  
 LOAD \_\_\_\_\_

MARK NO. 1-P-FD-008-H04

6	APPROVED TO SUPERSEDE INCORP DCP 45C1021, PKG 8, MDH08/0	SS	RNV	SS	SR	RNV	SR
5	ISSUED FOR FINAL STRESS CALC. INCORP. PCR. NO. N-976 AND AS BUILT 'E' REV. F2	RA	KE	RA	KE	RA	KE
REV DATE	REVISIONS	BY CH'K DESG ENGR STRS PROJ					

PUBLIC SERVICE ELECTRIC AND GAS COMPANY  
 HOPE CREEK GENERATING STATION  
 VOL. 1 & 2 SHEETS



REF. DWGS. PIPE \_\_\_\_\_  
 STEEL C-0703-LSHT. 1 REV. 19

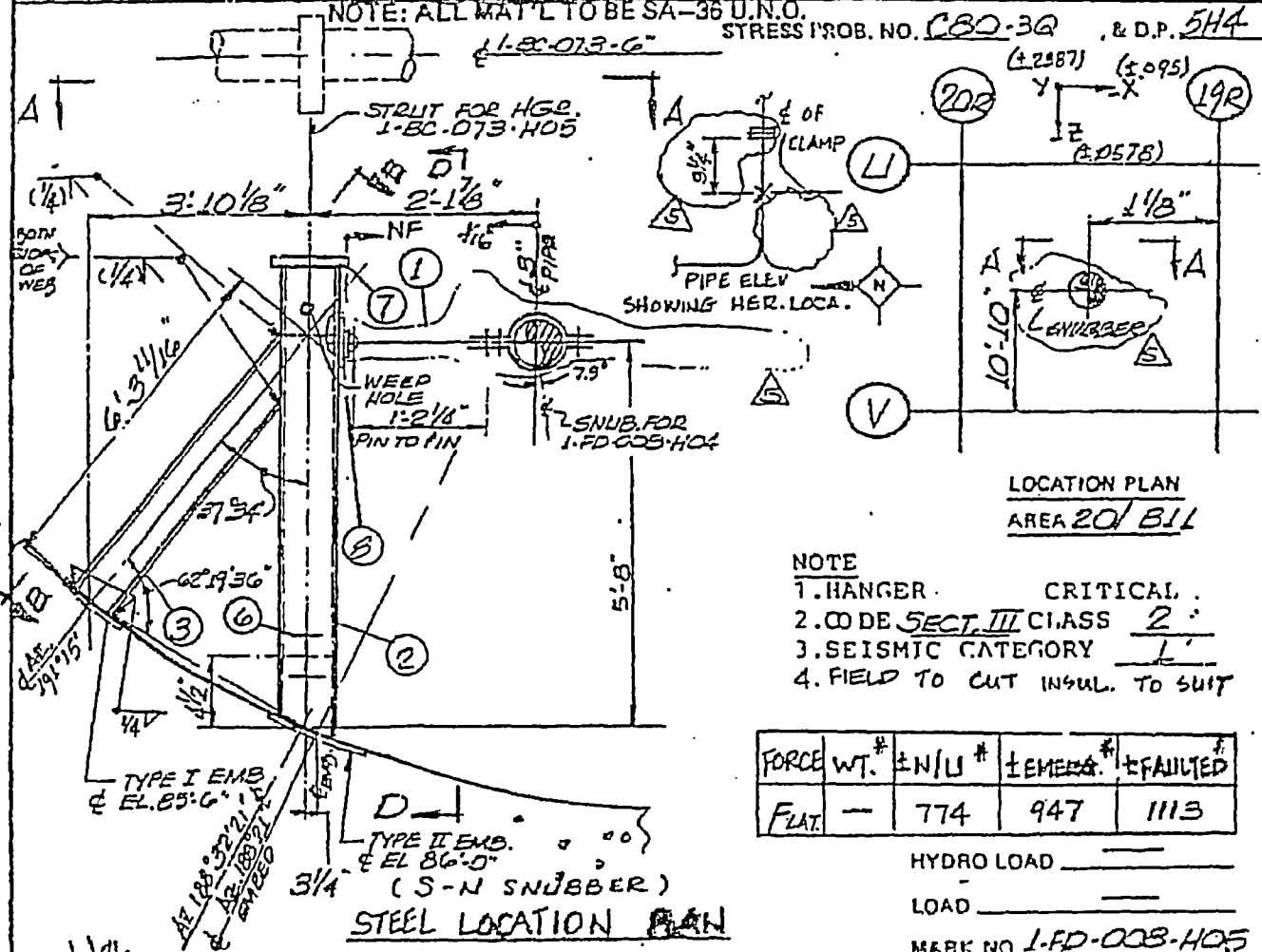
PIPE SUPPORT REACTOR BLDG. R.H.R. CROSS-CONNECT VACUUM BREAKERS FROM TORUS	JOB NO. 10855	DRAWING NO. 1-P-FD-008-H04 (Q)	REV. 6
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B29

CODE CASE N-413 APPLIED

ITEM NO	NO. REQ'D	FIG. NO.	SIZE	DESCRIPTION	MAT'L
1	1	306	#1	MECHANICAL SHOCK SUPPRESSOR, 1" STROKE, 3/16" OD PIPE, LOAD = SETTABLE, CS = 2 1/16 HS = 2" MVT = 1/2" ACCELERATION = .02g (RETRACT) MATL PER B&PV. CODE SECT. III	
2	1	-	TS 6x6x3/8 x 6'-1"	C-C LENGTH (SEE STL. LOC. PLAN)	
3	1	-	W4x13 x 5'-11 3/8"	C-C LENGTH (SEE STL. LOC. PLAN)	
6	1	-	W4x13 x 0'-7"	LG.	
7	1	-	7x7x3/8 R		
8	1	-	R 3/4 x 4 x 0'-6"		

NOTE: ALL MAT'L TO BE SA-36 U.N.O. STRESS PROB. NO. C80-3Q & D.P. 5H4  
 1-BC-073-6 (2287) (2095) (20578) (19R)



REV. DATE	DESCRIPTION	BY	CHK'D	DES'D	APP'D	ENG	STR	PROJ
	REVISED TO INCORP. AS-BUILT REV. F4							
	ISSUED FOR FINAL STRESS CALC. INCORP. PER NO. P-13160 AND AS-BUILT FI. REV. E1							

PUBLIC SERVICE ELECTRIC AND GAS COMPANY  
 HOME CREEK GENERATING STATION  
 REG. 1 & 2 UNITS

SAFETY

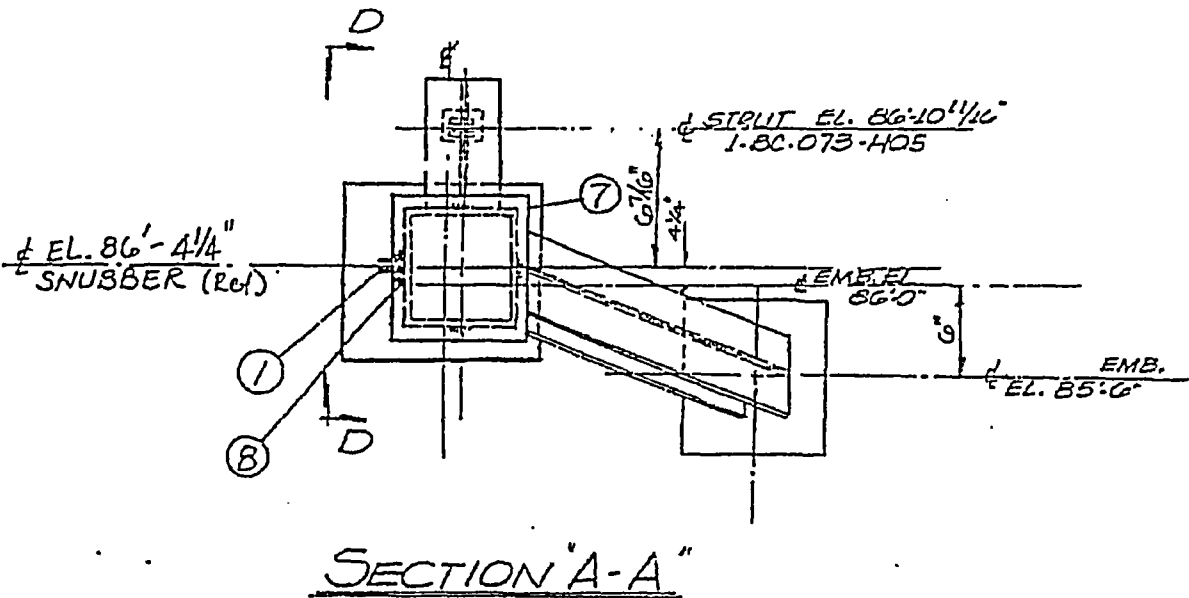
SAN FRANCISCO


SYS ISO 1-P-BC-06 REV. 9  
 REF. DWGS. PIPE \_\_\_\_\_  
 STEEL C-0703-1, SHT. 1 REV. 9

PIPE SUPPORT REACTOR BLDG. R.H.R. CROSS-CONNECT VACUUM BREAKERS FROM TORUS	JOB NO. 10855	DRAWING NO. 1-P-FD-003-H05(Q) SHT. 1 OF 3	REV. 5
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B30

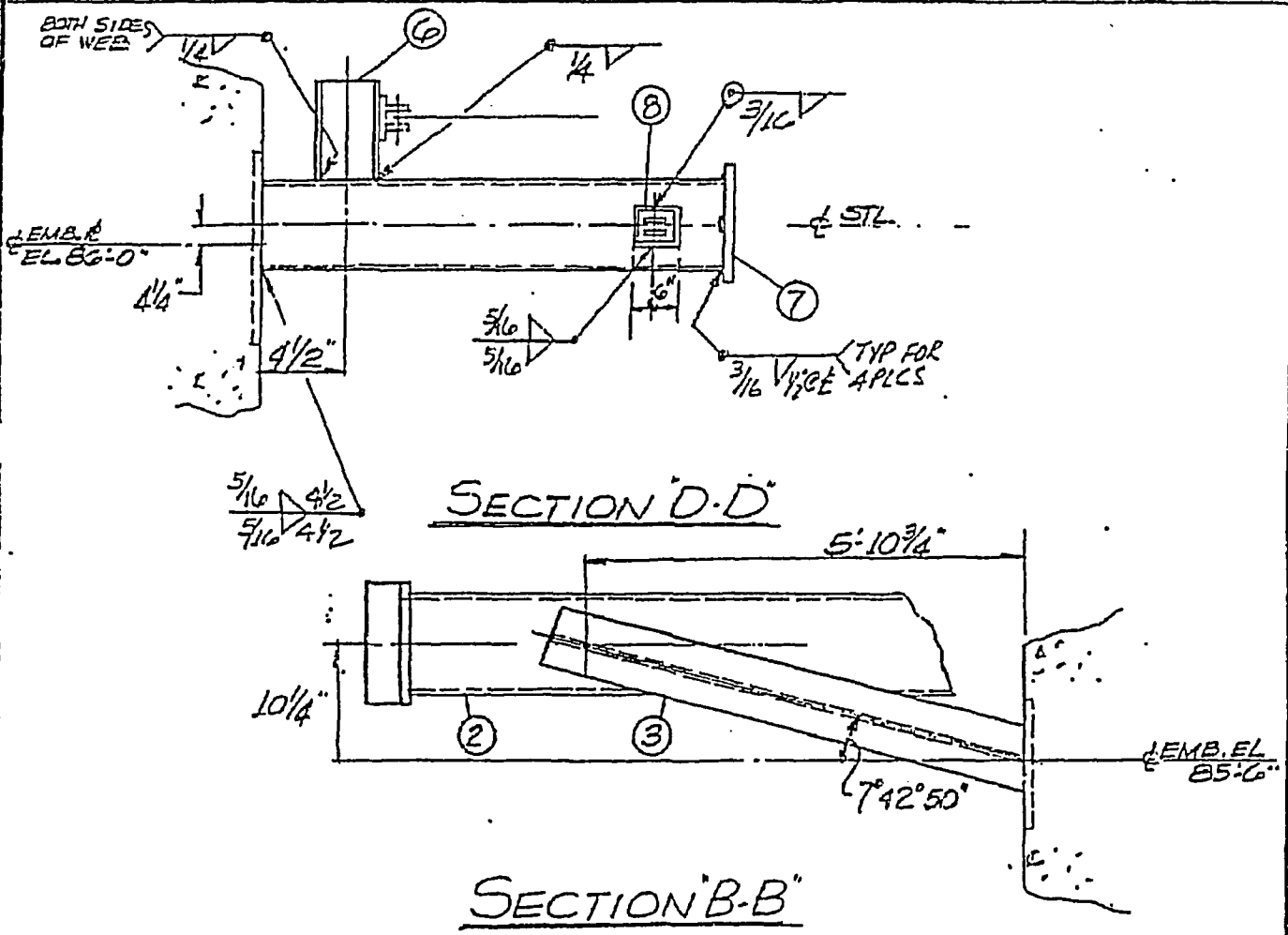
ITEM NO.	NO. REC'D	FIG. NO.	SIZE	DESCRIPTION



<p>SEE SHT. 1 OF 3</p>		<p>MARK NO. 1-FD-008-H05</p>			
<p>SEE SHT. #1 OF 3</p>		<p>BY <i>EPH</i></p>	<p><i>MAN</i></p>	<p><i>REV</i></p>	<p><i>2</i></p>
<p>REVISIONS</p>		<p>BY <i>CHK</i></p>	<p><i>DES</i></p>	<p><i>ENG</i></p>	<p><i>STRS</i></p>
<p>PUBLIC SERVICE ELECTRIC AND GAS COMPANY          HOPE CREEK GENERATING STATION          NOS. 1 &amp; 2 UNITS</p>		 SAN FRANCISCO		<p>SYS ISO _____</p> <p>REF. DWGS. PIPE _____</p> <p>STEEL _____</p>	
<p>PIPE SUPPORT REACTOR BLDG.          R.H.R CROSS-CONNECT VACUUM          BREAKERS FROM TORUS</p>		<p>JOB NO.          10855</p>		<p>DRAWING NO.          1-P-FD-008-H05 (Q)          SHT. 2 OF 3</p>	
<p> </p>		<p> </p>		<p>REV.          5</p>	


B31

ITEM NO.	NO. REQ'D	FIG. NO.	SIZE	DESCRIPTION



SEE SH. 1 OF 3	MARK NO. 1-FD-008-H05
SEE SH. 1 OF 3	BY CH'K'DESG. SUPV'ENGR STRS. PROJ.
REVISIONS	

**PUBLIC SERVICE ELECTRIC AND GAS COMPANY**  
**HOPE CREEK GENERATING STATION**  
 NOS. 1 & 2 UNITS



SAN FRANCISCO

REF. DWGS.	SYB ISO _____
	PIPE _____
	STEEL _____

PIPE SUPPORT REACTOR BLDG.	JOB NO.	DRAWING NO.	REV.
R.H.E. CROSS-CONNECT VACUUM BREAKERS FROM TORUS	10855	1-P-FD-008-H05(Q) SH. 3 OF 3	5

B32

PART 2 - MODIFICATION AND TESTING, SECTION 5.0  
 FORM NC.DE-WB.ZZ-0003-7  
 MODIFICATION DOCUMENT COVER SHEET

MD NO.: H 85  
 CHANGE NO.: 4EO-3507  
 PACKAGE NO.: 03  
 CP REV. NO.: 0

PAGE NO. 1  
 REV. NO. 0

DOCUMENT CHANGED: DWG# 1-P-FD-008-H005 Rev. 5 SHT/VOL NO.: 001  
 (PROVIDE TYPE, NUMBER AND REV. THAT CHANGE IS BASED ON)

ACTUAL CHANGE TO BE MADE: Replace existing snubber with LISEGA Hydraulic Snubber as detailed below :

Hanger No.	Existing Snubber	Replaced by New LISEGA Part no.		
		Snubber	Pin	Stud / Pin
1-P-FD-008-H005	PSA0001	303856RC1	30-1003-050	30-1025-050, L=5.5

New Cold Set (CS) (in.)	New Hot Set (HS) (in.)	New Stroke (in.)	Flip (Y/N)	Shroud Removed (Y/N)
1.8	1.74	4	N	N

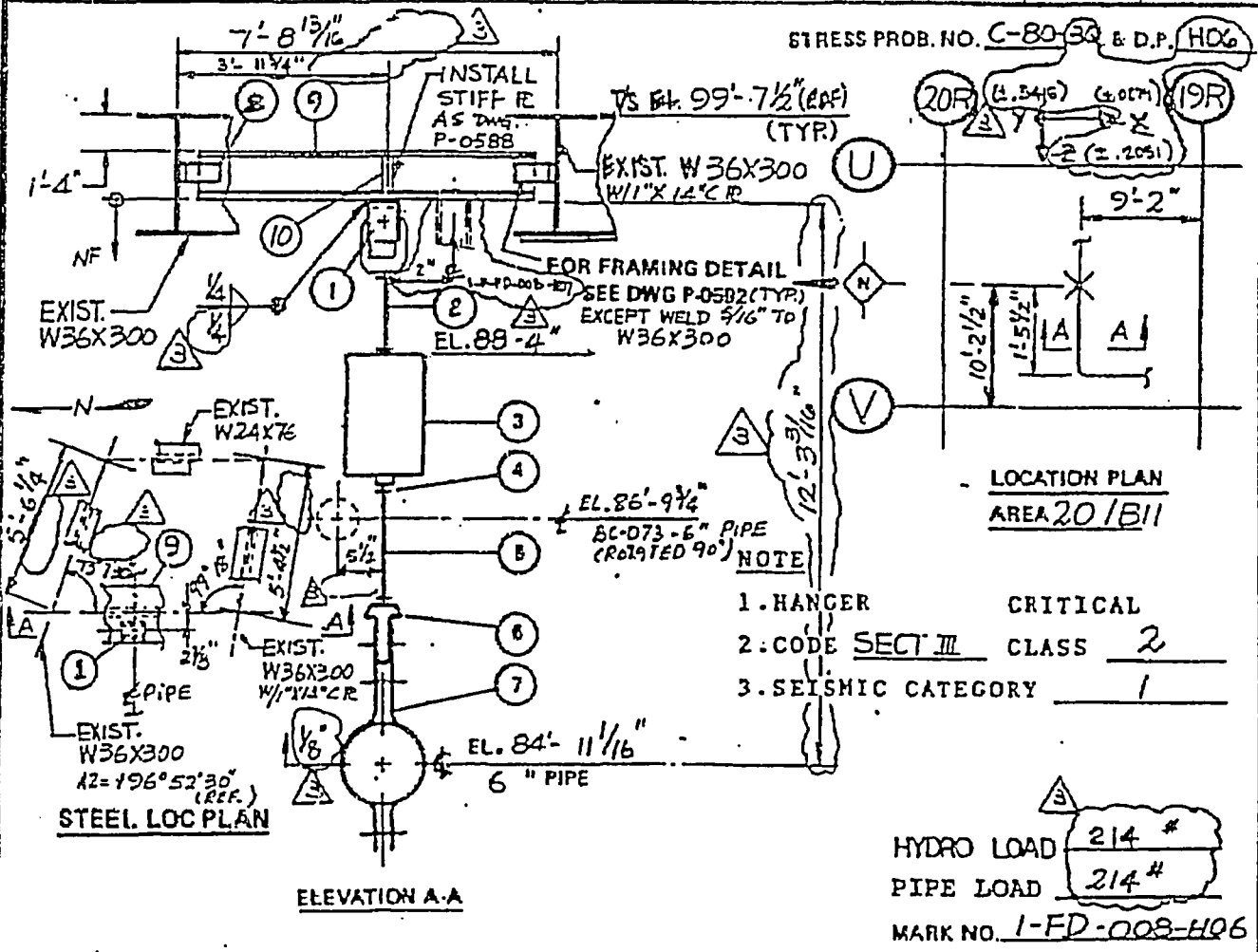
Construction / DOC. Updater Note:

- "Flip" refers to whether or not the new snubber body is to be reversed from its original position.
- "Shroud Removed" refers to whether or not the new snubber housing is to be removed due to interference concerns.
- "Flip" and "Shroud Removed" condition may be changed, from what is specified, as long as it is properly documented (as-built) on this MD.
- Remove any design load information that appears on the drawing.

0	ORIGINAL ISSUE	<i>MCC</i> M. C. Chang 8-1-97	<i>TN</i> T. Nickerson 8-12-97		
REV. NO.	REVISION SUMMARY	PREPARED BY & DATE	PEER REVIEW & DATE	INSTALLED MCRs	INSTALLER & DATE

ITEM NO.	NO. RECD	FIG. NO.	SIZE	DESCRIPTION	MAT'L
1	1	66	1/2"	Welded Beam Attachment W/ PIN & CONN. PIN	
2	1	180N	1/2" X 8'-9"	Rod w/ 5" TBE	
3	1	56B C.L.L.	# 4	Variable Support Type A, HL- (214 #), MVMT = 1/2" (UP) CL- (220 #), w/ Travel Stops	
4	4	-73	1/2"	Hex Nut	
5	1	180N	1/2" X 2'-0"	Rod w/ 5" TBE	
6	2	290	1/2"	Weldless Eye Nut	
7	1	297	6"	DOUBLE Bolt Pipe Clamp PROVIDE LOCK NUT	
8	-	-	4" X 9 1/2" X 3/8"	PLATE PER P-0592 SHT. 2	
9	31	-	W 12 X 72 X 7'-9 1/4"	C-C.L.G. (SEE ELEVATION A-A)	
10	2	-	R. 3/8" X 5 1/4" X 10 1/8"	STIFF R. AS PER DWG. P-0588	

NOTE: ALL MAT'L TO BE SA-36 U.N.O.



PUA

SR-SPG-113

ISSUED FOR FINAL STRESS CALC & INCORPORATED FIELD REV. F.3		BY CH'K DESIGNED ENGRS PROJ	
REV. DATE	REVISIONS	SYG ISO	1-P-BC-06 REV. 2
PUBLIC SERVICE ELECTRIC AND GAS COMPANY HOPE CREEK GENERATING STATION BKS. 1 & 2 UNITS		REF. DWGS.	PIPE P- STEEL C-0803-1 REV. 1
PIPE SUPPORT REACTOR BLDG. R.H.R. CROSS-CONNECT VACUUM BREAKERS FROM TORUS		JOB NO.	DRAWING NO.
		10855	1-P-FD-008-H06(R)
			REV. 3

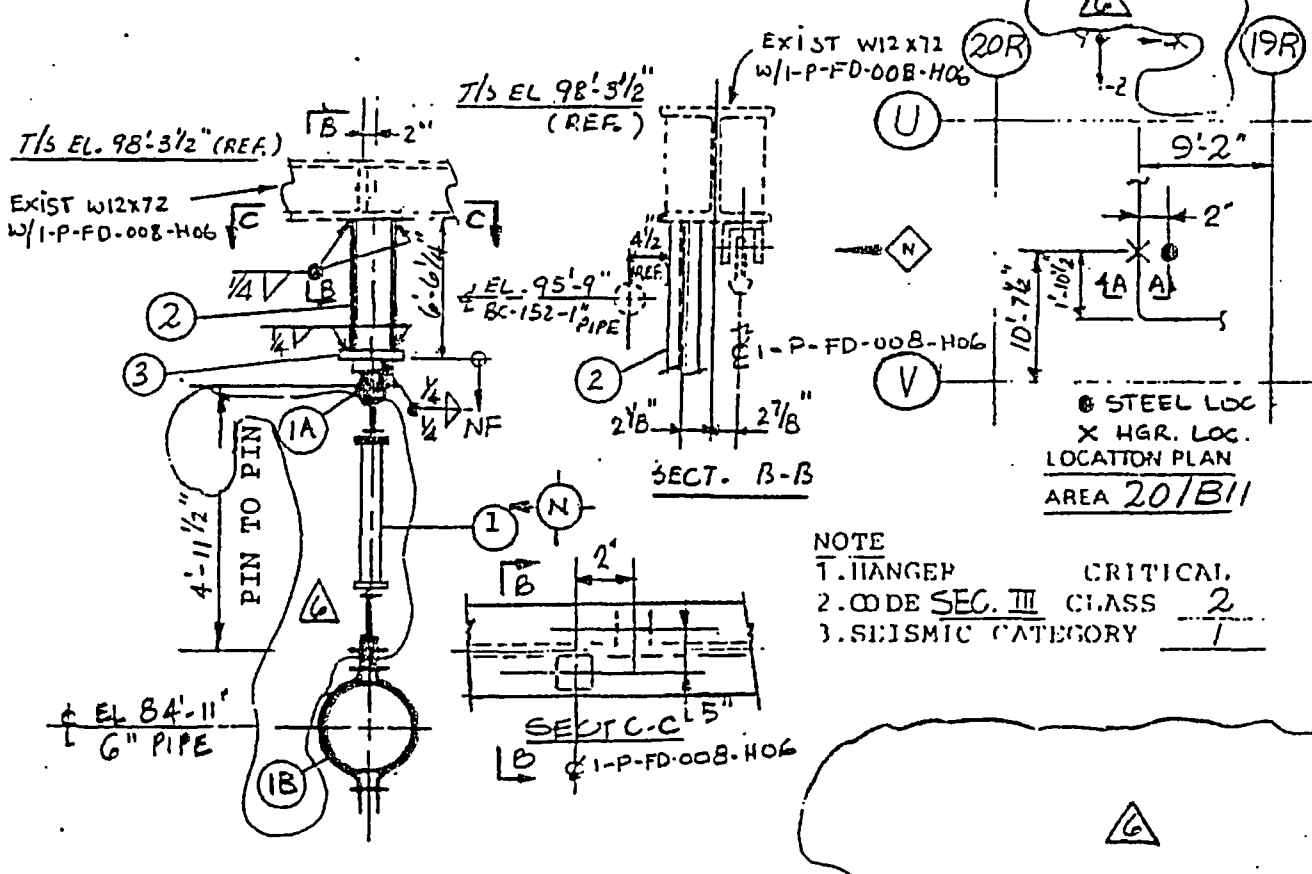
RT-675

B34

ITEM NO	NO REQ'D	FIG. NO	SIZE	DESCRIPTION	MAT'L
1	1	-	LISEGA RIGID STRUT W/LOAD STUD		
			TYPE 3952 RR 1 (E=59 1/2")		
1A	1	-	SIZE 3 REAR BRACKET & PIN AS SUPPLIED W/FIG		
			307 MECHANICAL SHOCK ARRESTOR		
1B	1	-	6" Ø PIPE CLAMP AS SUPPLIED W/FIG 307		
			SIZE 3 MECHANICAL SHOCK ARRESTOR		
2	1	-	WLX20X 6'-5 1/2"		
3	1	-	R 3/4" x 7" x 7"		

NOTE: ALL MAT'L TO BE SA-36 U.N.O.

STRESS PROE. NO. C-80 E.D.P. H07



- NOTE
1. HANGER CRITICAL.
  2. CODE SEC. III CLASS 2
  3. SEISMIC CATEGORY 1

STEEL LOC X HGR. LOC.  
 LOCATION PLAN  
 AREA 20/B11

PUA

MARK NO 1-FD-008-H07

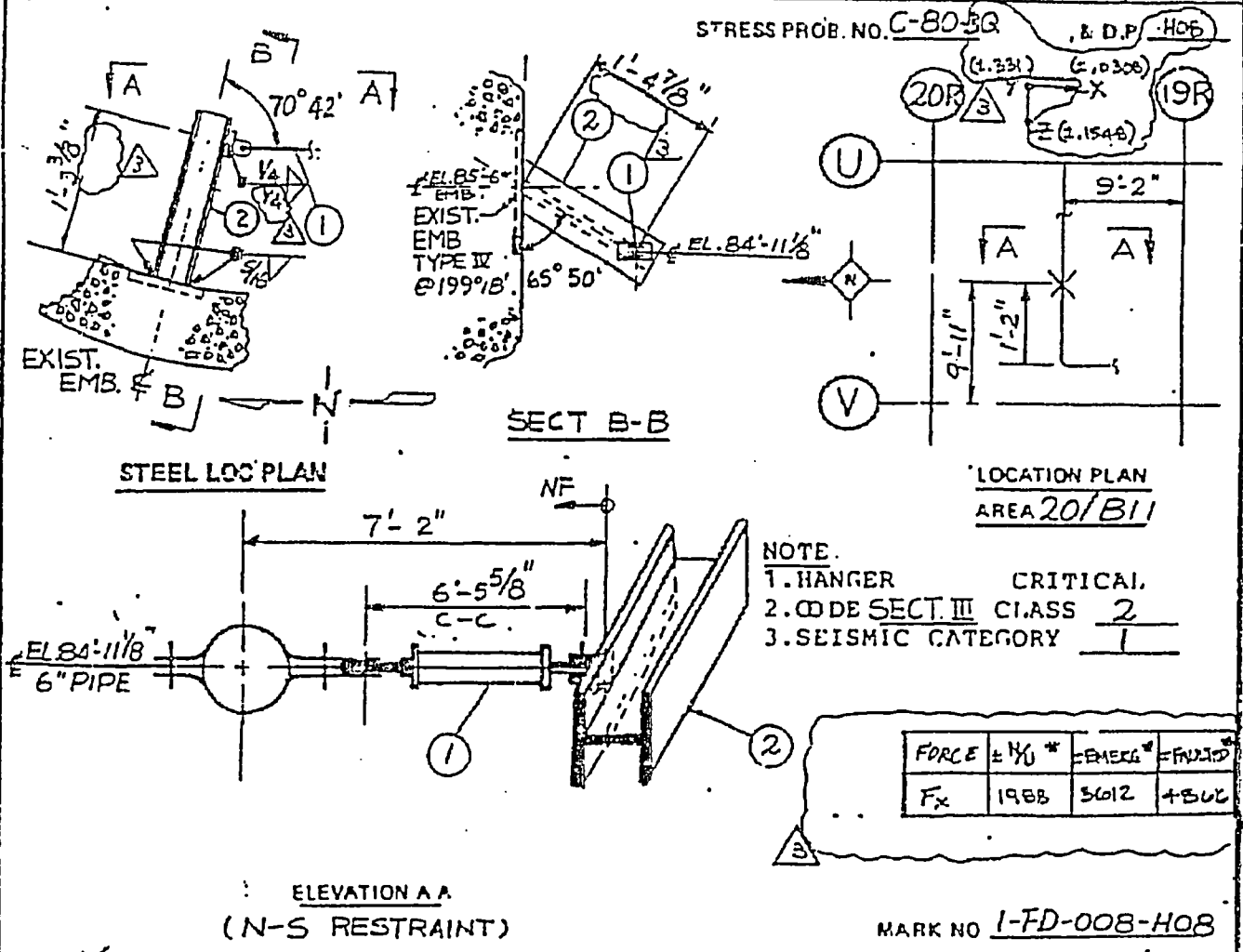
4.13 98 REVD TO SUPERSEDE & INCORP DEC REC 1021 P&G & MD H09/1	JSS RNV JSS SR RNV JNV SR
REV DATE REVISIONS	BY CH'K DESO SUPV ENG STRS PRO
PUBLIC SERVICE ELECTRIC AND GAS COMPANY HOPE CREEK GENERATING STATION BOG. 1 & 2 UGTS	SAN FRANCISCO
PIPE SUPPORT REACTOR BLDG. R.H.R. CROSS-CONNECT VACUUM BREAKERS FROM TORUS	JOB NO. 10855 DRAWING NO. 1-P-FD-008-H07(Q) REV. 6

V-SNUB-402

B35

ITEM NO	NO RECD	FIG. NO.	SIZE	DESCRIPTION	MAT'L.
1	1	(63)	# 7	BRAY STRUT ASSY. O.D. PIPE 6 5/8" L=6'-5 5/8" LOAD = / SEE LOAD TABLE BELOW	
2	1	-	W 8 X 31 X 1'-10 1/16	C-C (SEE SECT. B-B)	

NOTE: ALL MAT'L TO BE SA-36 U.N.J.



PUA

MARK NO 1-FD-008-H08

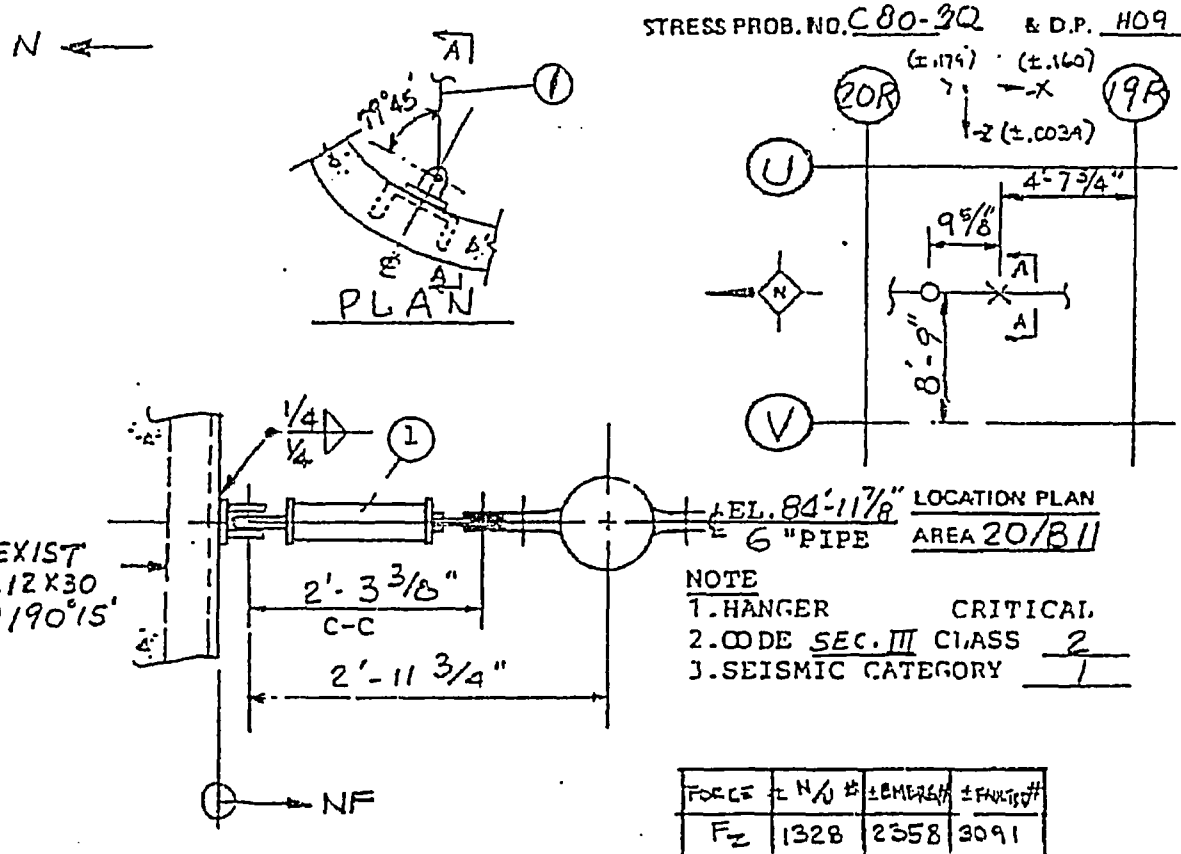
PUBLIC SERVICE ELECTRIC AND GAS COMPANY HOME CREEK GENERATING STATION BOX 1 & 2 UNITS	SAN FRANCISCO	SYS ISO 1-P-BC-06 REV. 9 REF. DWGS. PIPE C-0703-1/SHT. 1 REV. 21
PIPE SUPPORT REACTOR BLDG. R.H.R. CROSS-CONNECT VACUUM BREAKER FROM TORUS	JOB NO. 10855	DRAWING NO. 1-P-FD-008-H08(Q) 3

RT# 675

B3/2



ITEM NO.	NO. REC'D	FIG. NO.	SIZE	DESCRIPTION	MAT'L
1	1	211(*)	#1	SWAY STRUT ASSY, O.D. PIPE 6 7/8" W=1 5/8", LOAD = SEE LOAD TABLE BELOW #C&L FB. 031 #A SWAY STRUT USED PER F30, REF. F-0234	A



PUA

H-REST-326

ELEVATION A-A  
 (EAST-WEST RESTRAINT) MARK NO 1-FD-008-H09

REV. DATE		REVISED TO INCORP. AS-BUILT REV. F30	BY CH/KDES/SUP/ENG/STRS/FOU
REVISIONS			

PUBLIC SERVICE ELECTRIC AND GAS COMPANY  
 HOPE CREEK GENERATING STATION  
 DOC. 1 & 2 UNITS

SAN FRANCISCO

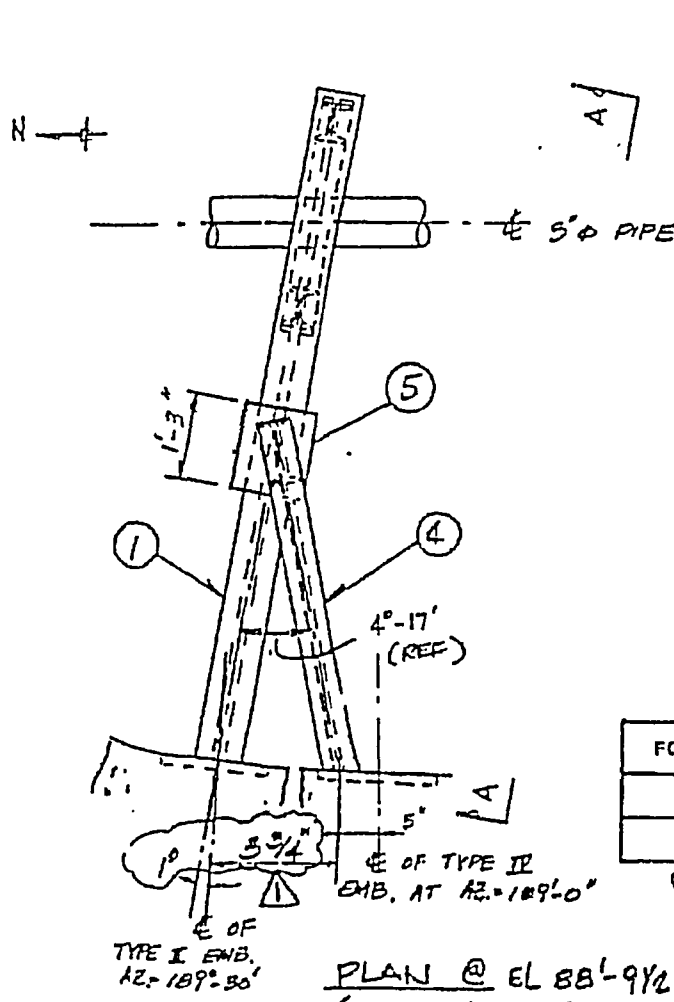
REF. DWGS. PIPE \_\_\_\_\_ STEEL C-0703-1SH/REV.21

SYS ISO 1-P-BC-06 REV.9

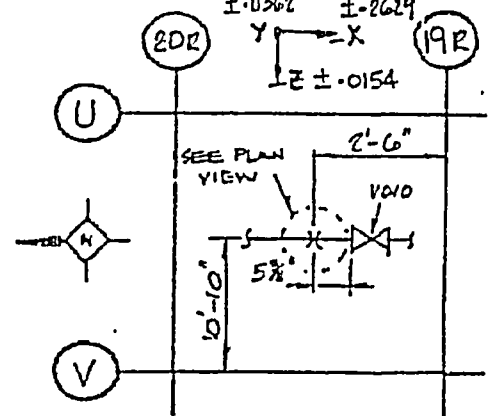
PIPE SUPPORT REACTOR BLDG.	JOB NO.	DRAWING NO.	REV.
RHR CROSS-CONNECT VACUUM BREAKERS FROM TORUS	10855	1-P-FD-008-H09(Q)	4

ITEM NO	NO REQ'D	FIG. NO.	SIZE	DESCRIPTION	MAT'L
1	1	--	W 6 x 20 x 10'-3" LG		
2	2	--	W 4 x 13 x 0'-5 1/2" LG		
3	1	--	W 4 x 13 x 1'-4" LG		
4	1	--	W 6 x 20 x (4'-8 1/2" LG. (FIELD TRIM TO SUIT))		
5	1	--	H. 3/4 x 10 x 1'-3" LG		

NOTE: ALL MAT'L TO BE SA-36 U.S.A.



STRESS PROB. NO. C 80-3R & D.P. HXX  
 $\pm 0.362$   $\pm 2629$   
 $\pm Z \pm 0.154$



- NOTE  
 1. HANGER CRITICAL.  
 2. CODE SECT II CLASS 2  
 3. SEISMIC CATEGORY 1  
 4. FIELD TO CUT INSNL. TO SUIT

FORCE	WT. *	NORMAL/UPSET *	EMERG. *	FAULTED *
F <sub>y</sub>	-350	1106	2155	2729

HYDRO LOAD -350  
 LOAD ---  
 MARK NO 1-FD-008-H13

ISSUED FOR FINAL STRESS CALC. & INCORP. ORATED FCN. H=968, FCN. H=4568  
 REV DATE FIELD REV. FD REVISIONS

PUBLIC SERVICE ELECTRIC AND GAS COMPANY  
 HOPE CREEK GENERATING STATION  
 BOIL. 1 & 2 UNITS

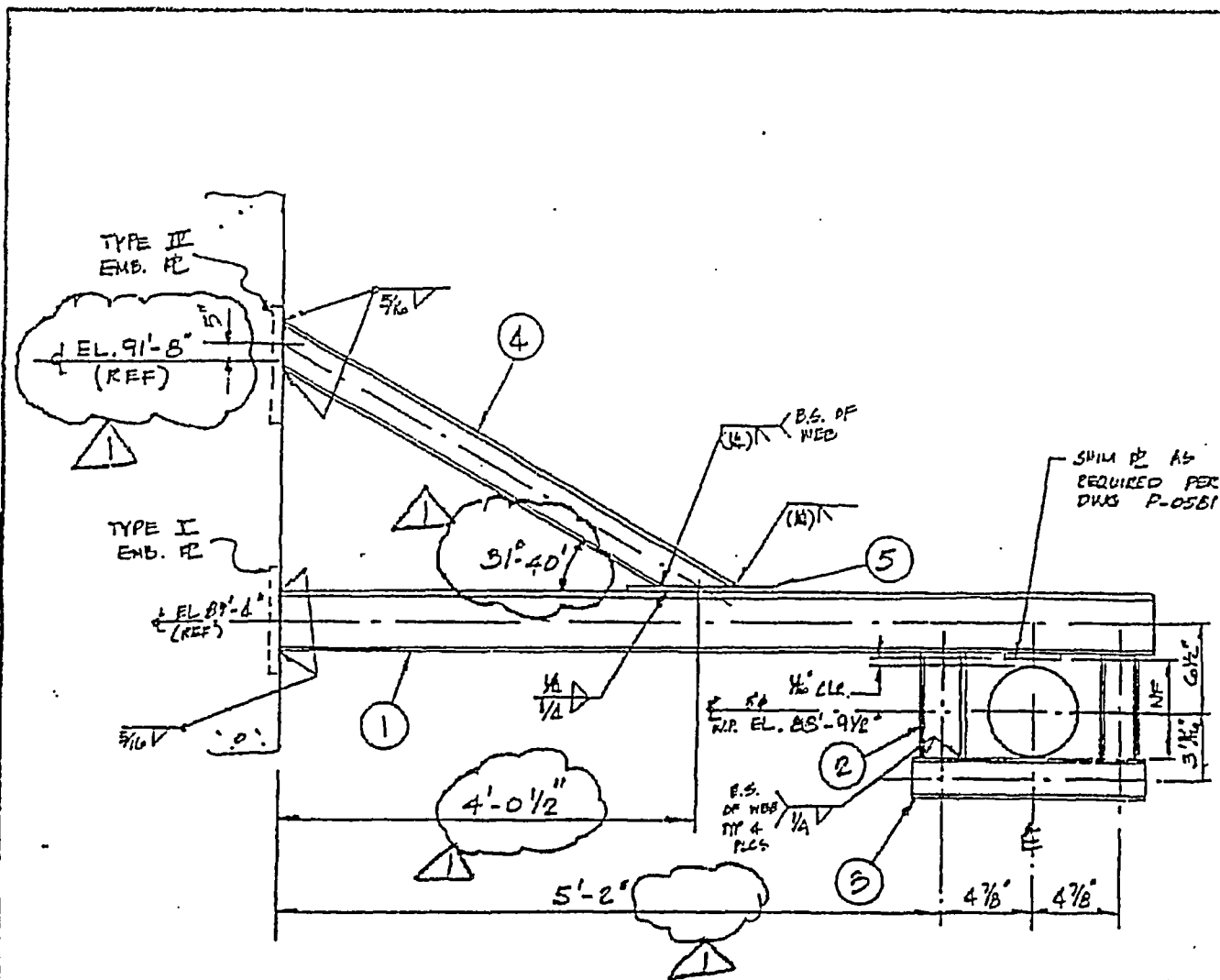


SYS ISO 1-P-BC-016 Rev 9  
 REF. DWGS PIPE ---  
 STEEL C-703-1 SH.1 Rev 19

PIPE SUPPORT REACTOR BLDG.  
 RHR. CROSS-CONNECT VACUUM  
 BREAKERS FROM TORUS

JOB NO	DRAWING NO	REV
10855	1-P-FD-008-H13 (R) SHT 1/2	1

B-38



SECTION A-A

MARK NO. 1-PD-008-H13

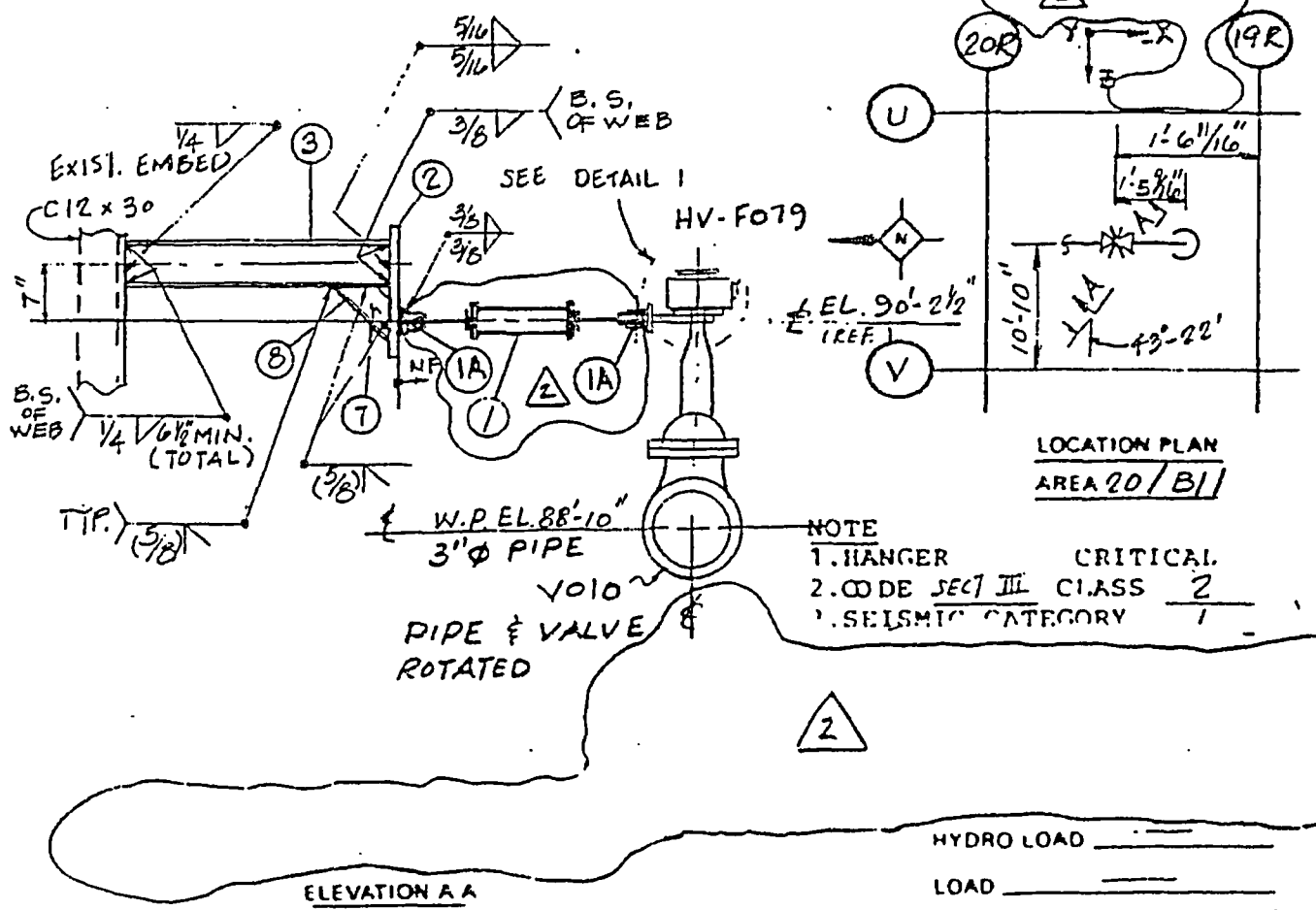
SEE SHIT	OF 2	FE	BP	FE	OV	UZ	SP
REVISIONS		BY CH'K DESG' ENGRS STRS PROJ					

PUBLIC SERVICE ELECTRIC AND GAS COMPANY HOPE CREEK GENERATING STATION NOS 1 & 2 UNITS	 SAN FRANCISCO	IFO _____ REF. DWGS. PIPE _____ STEEL _____
		JOB NO. 10855 DRAWING NO. 1-P-FD-008-H13 (2) SHIT. 2/2
PIPE SUPPORT REACTOR BLDG. RHR CROSS-CONNECT VACUUM BREAKER FROM TORUS	REV. 1	

B39

ITEM NO.	NO. REQ'D	FIG. NO.	SIZE	DESCRIPTION	MAT'L
1	1	-		LISEGA RIGID STRUT W/(2) LOAD PINS TYPE 3952 RRI (E=19/16")	
1A	2	-		REAR BRACKET SIZE 3 AS SUPPLIED W/ FIG 306 MECHANICAL SHOCK ARRESTOR	
2	1	-	PL. 2" X 9" X 1-5" LG.		
3	1	-	WB X 31 X 4-1 7/8" LG. (FIELD CUT TO SUIT)		
4	1	-	PL. 1 1/2" X 5" X 0-11" LG.		
5	1	-	PL. 1" X 4 1/16" X 0-5" LG. (SEE DETAIL 2)		
6	1	1375	SPECIAL U-BOLT 7/8" X 7" LG. A=7/8" B=7 1/8" C=8" D=9 1/2" E=5"		
7	2	-	PL. 2" X 4 1/2" X 0-4 1/2" LG. (SEE DETAIL 3)		
8	1	-	PL. 2" X 8" X 0-10 1/2" LG. (FIELD CUT TO SUIT PER DETAIL 3)		

NOTE: ALL MATERIAL TO BE SA-36 U.N.I.O. STRESS PROB. NO. C80



2	2/16/94	REV'D TO SUPERSEDE & INCORP DCP & EC 1021, PAG 8, MD H1010	JS	RNV	JS	SR	RNV	SR
REV DATE	REVISIONS		BY CH'K DESO SUPV ENG STRS PROJ					

PUBLIC SERVICE ELECTRIC AND GAS COMPANY  
 HOPE CREEK GENERATING STATION  
 ELEC. 1 & 2 UNITS

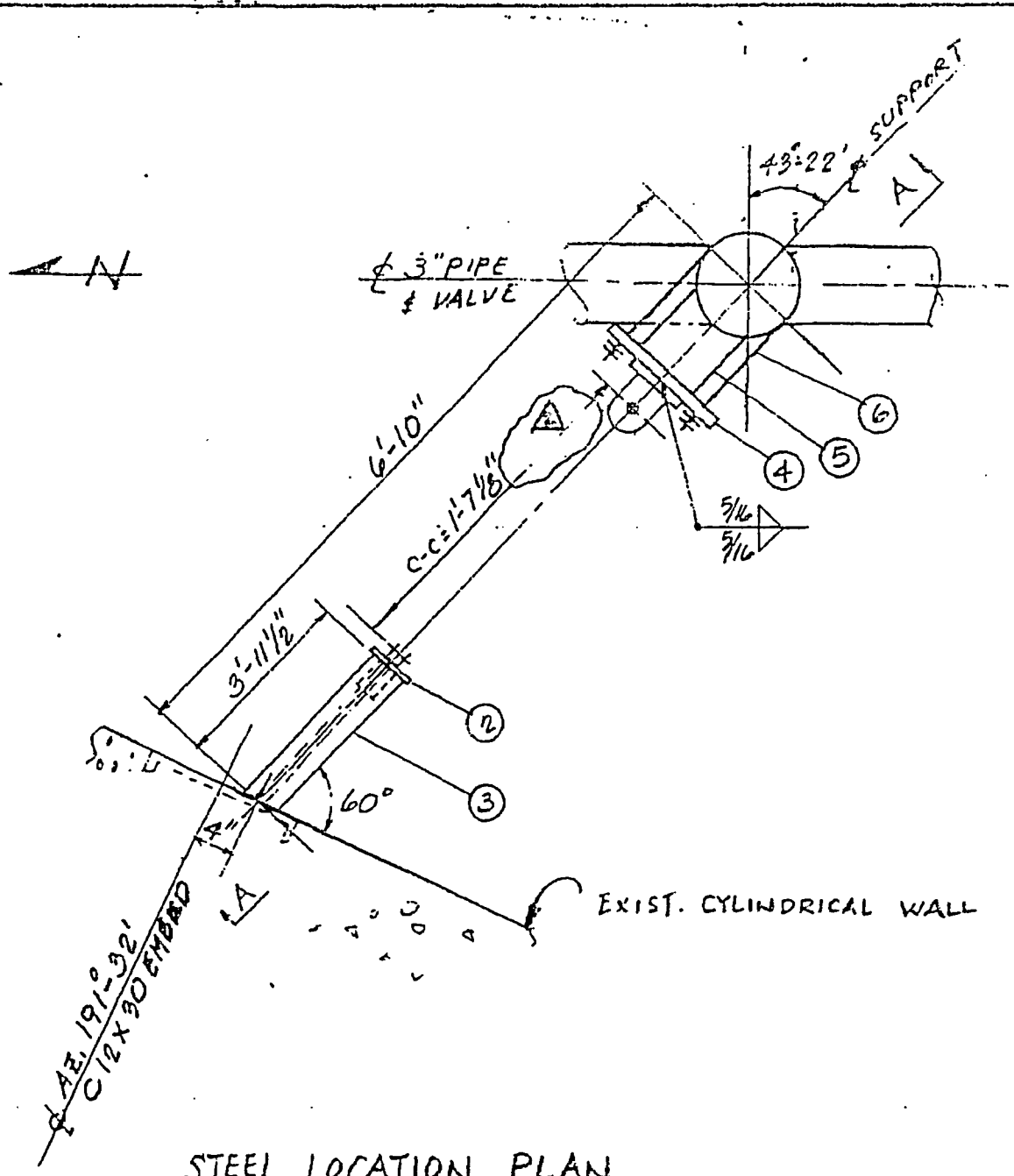
SAN FRANCISCO

REF. DWGS. STEEL C-0703-1 REV. 19

SYS ISO 1-P-BC-06 REV. 9

PIPE SUPPORT REACTOR BLDG.	JOB NO.	DRAWING NO.	REV
RHR CROSS-CONNECT VACUUM BREAKERS FROM TORUS	10855	1-P-FD-008-H14 SHT. 1 OF 3	Q 2

B10

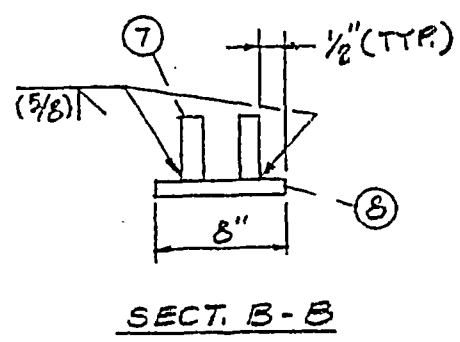
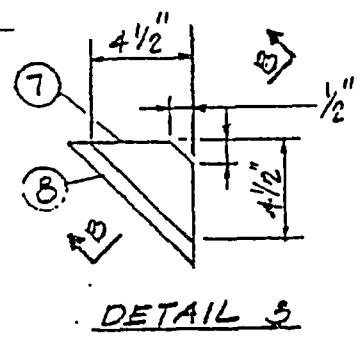
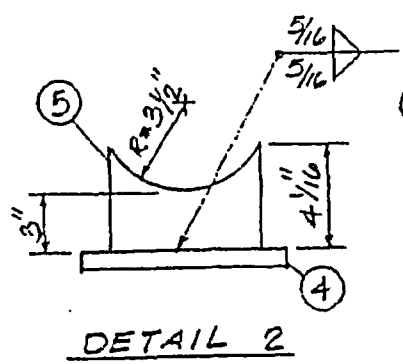
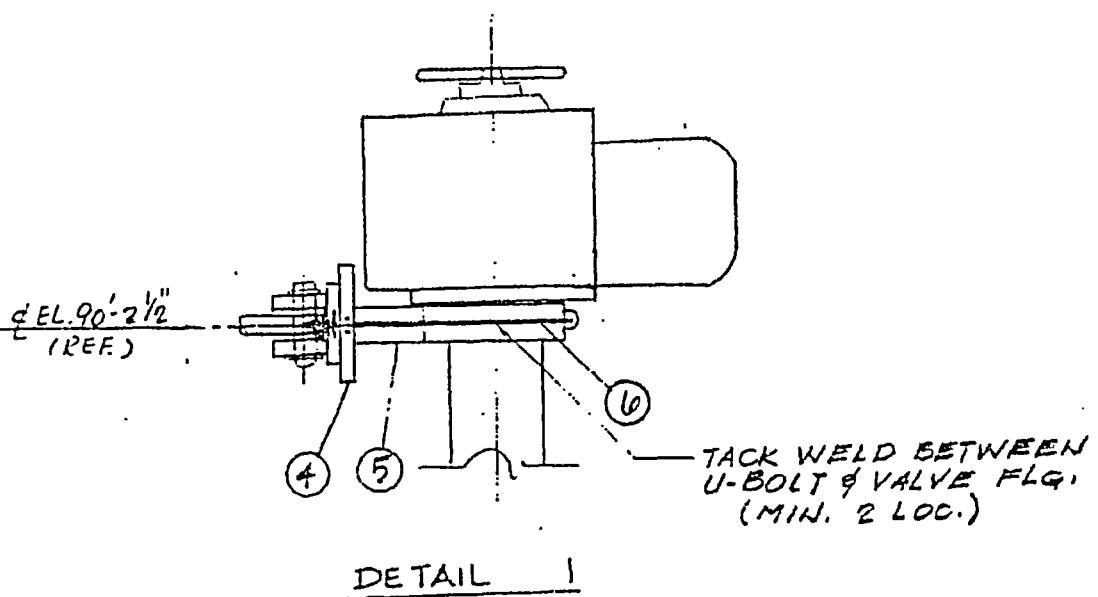


STEEL LOCATION PLAN

MARK NO. 1-FD-008-H14

SEE SHT. 1 OF 3 REVISIONS	JS RNV SS SR RNV END SR
	BY CH'K DESD SUPV ENG STRS PROJ
PUBLIC SERVICE ELECTRIC AND GAS COMPANY HOPE CREEK GENERATING STATION NOS. 1 & 2 UNITS	REF. DWGS. ISO _____ PIPE _____ STEEL _____
PIPE SUPPORT REACTOR BLDG. RHR CROSS-CONNECT VACUUM BREAKERS FROM TORUS	JOB NO. 10855 DRAWING NO. 1-P-FD-008-H14 SHT 2 OF 3 REV. 2

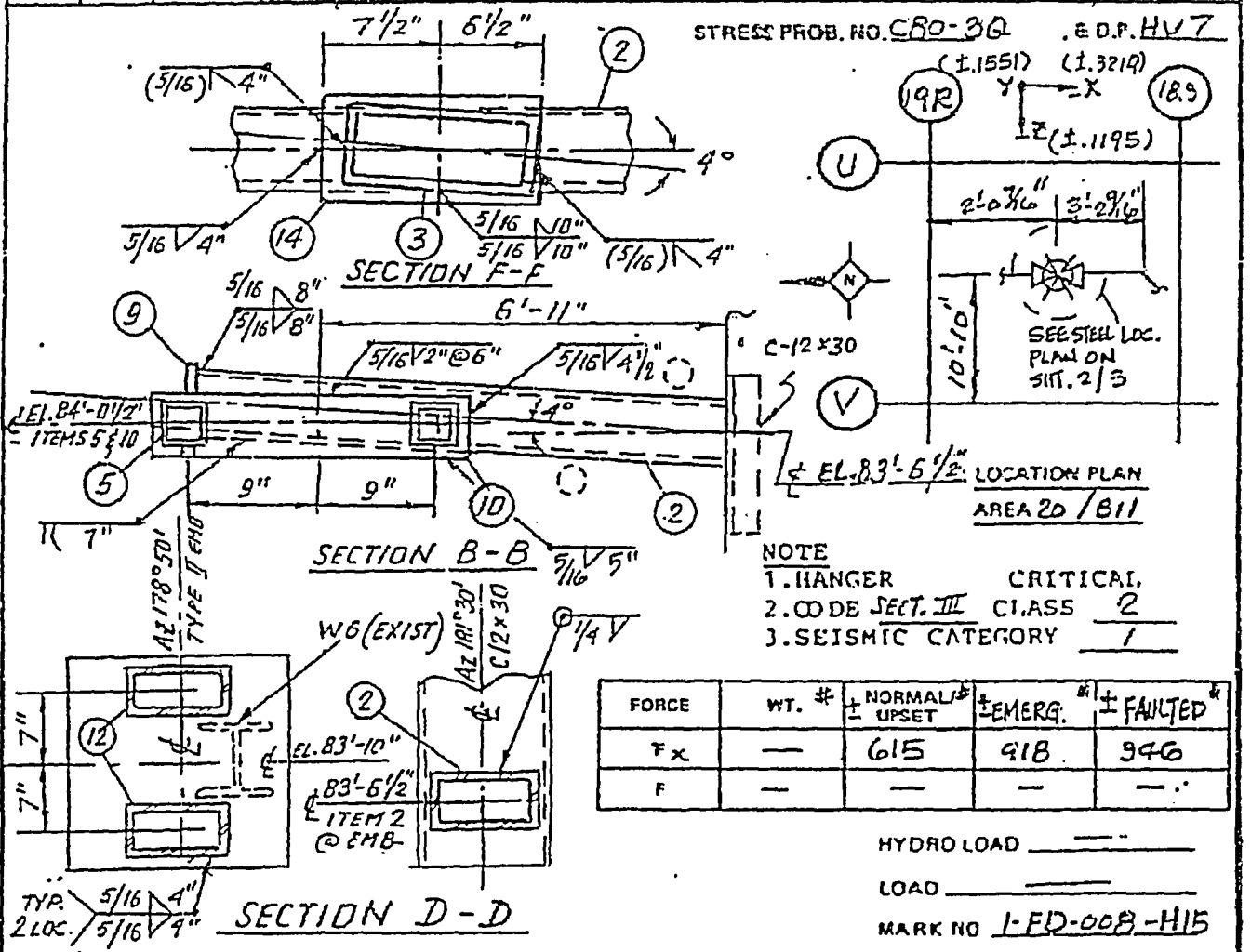
B41



2	4-14-94	SEE SHEET 1 OF 3	✓SS	RNV	✓SS	SR	RNV	2	SR
REV.	DATE	REVISIONS	BY CH'K DESO SUP ENG STRS POLF						
PUBLIC SERVICE ELECTRIC AND GAS COMPANY HOPE CREEK GENERATING STATION PAGE 1 & 2 UNITE			 SAN FRANCISCO		REF. IDO _____ DWG. PIPE _____ STEEL _____				
PIPE SUPPORT REACTOR BLDG. RHR CROSS-CONNECT VACUUM BREAKERS FROM TORUS			JOB NO. 10855		DRAWING NO. 1-P-FD-008-H14 SHT. 3 OF 3			REV. 2	

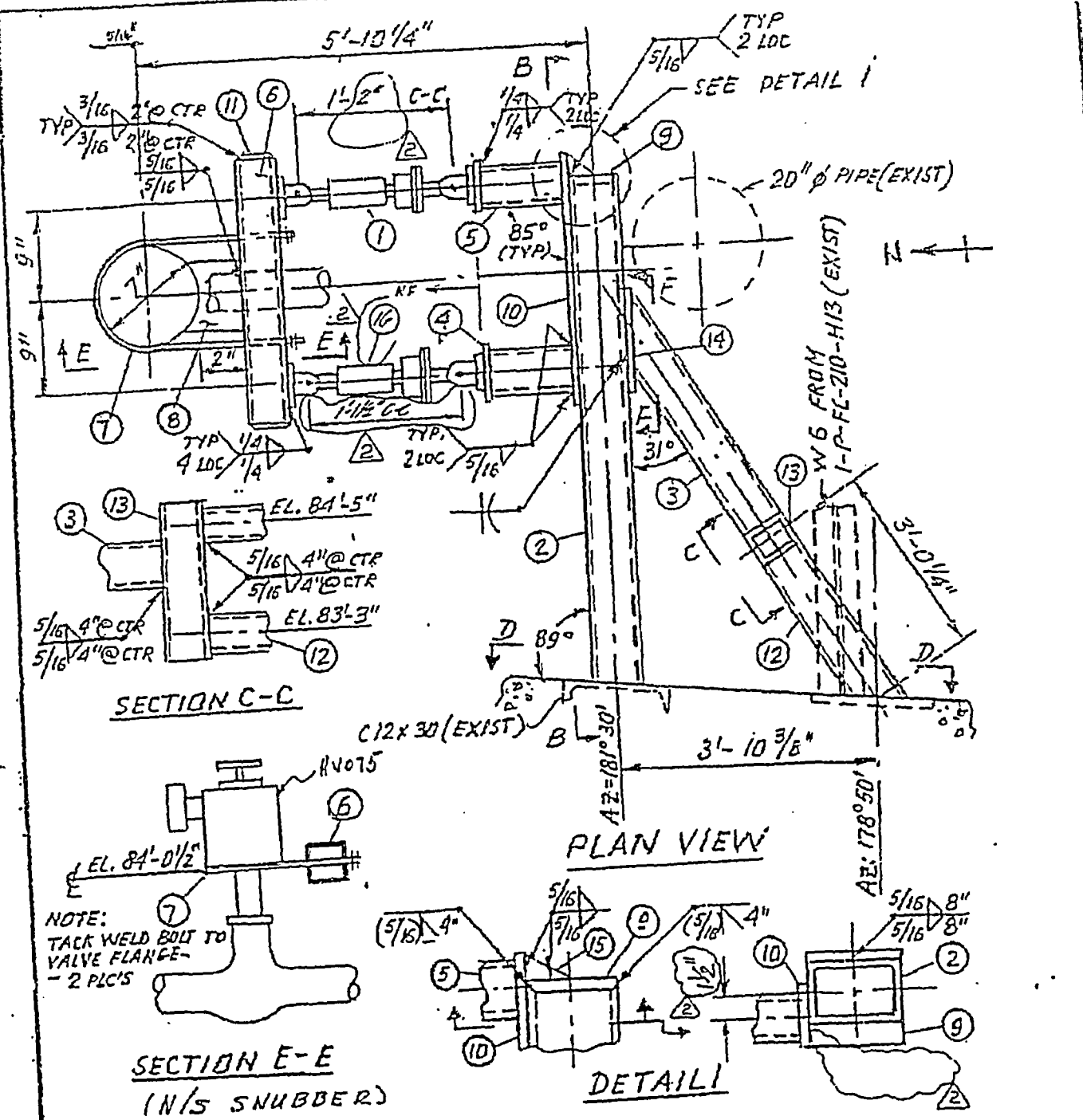
B42-

ITEM NO	NO RECD	FIG. NO.	SIZE /	DESCRIPTION	MAT'L
1	(1)	300	"1	MECHANICAL-SHOCK-SUPPRESSOR 4" STROKE W/ADDITIONAL REAR BRACKET, LOAD = SEE TABLE MVT = 5/16 (21), CS = 1/4" x 1/2", HS = 19 (1/2) ACCELERATION = .02g, M.T.L PER B&PV, CODE SECT. III	
2	1	---	TS 10x6x1/2x 7'-8" LG		A501-70 OR EQUAL
3	1	---	TS 6x6x1/2x 5'-4" LG	FIELD CUT TO SUIT	"
4	2	---	12 1/2" x 5" x 0'-5" LG		
5	2	---	TS 4" x 4" x 1/2" x 3'-4" LG (FIELD CUT TO SUIT)		A501-70 OR EQUAL
6	1	---	TS 4" x 4" x 1/2" x 2'-0" LG		"
(FOR CONTINUATION SEE SH. 3 OF 3 - ITEMS 7 TO 15)					



REV DATE	2/19/88	REVISED PER FCR. H-2241 & RECONCILED FCR. H-2354	PIPE	BY	CHK	DES	EN	STR	TR
PUBLIC SERVICE ELECTRIC AND GAS COMPANY HOPE CREEK GENERATING STATION FOOT 1 & 2 UNITS			SYS ISO 1-P-BC-06 REV. 9		REF. OWGS. PIPE C-0703-1, REV. 19				
PIPE SUPPORT REACTOR BLDG.			JOB NO. 10855		DRAWING NO. 1-P-FD-008-H15(Q)		REV. 2		
R.H.R. CROSS-CONNECT VACUUM BREAKERS FROM TORUS					SHT. 1 OF 3				

RJ/B



NOTE:  
 TACK WELD BOLT TO  
 VALVE FLANGE -  
 2 PLCS

SEE SH. 1 OF 3		REV. DATE		REVISIONS		APR 88 BY JPK DESIGNED BY ENG STRS TO	
PUBLIC SERVICE ELECTRIC AND GAS COMPANY HOPE CREEK GENERATING STATION PAGE 1 & 2 OF 2				SAN FRANCISCO		REF. DES. STEEL	
PIPE SUPPORT REACTOR BLDG. RHR CROSS-CONNECT VACUUM BREAKERS FROM TORUS				JOB NO. 10855		DRAWING NO. 1-P-FD-008-H15 SH. 2 OF 3	
						REV. 2	


B44



ITEM NO.	NO. REQ'D	FIG. NO.	SIZE	DESCRIPTION	MAT'L
7	1	1375	3/4" x 7"	SPECIAL U-BOLT; A=3/4" B=7/16" C=7 <sup>13</sup> / <sub>16</sub> "; D=12 <sup>1</sup> / <sub>4</sub> "; E=7 <sup>1</sup> / <sub>2</sub> " W/HEX NUTS	
8	1	-	Ø 1" x 3 <sup>1</sup> / <sub>16</sub> " x 0'-5" LG		
9	1	-	Ø 1" x 8" x 0'-10" LG		
10	1	-	Ø 1" x 5" x 2'-0" LG		
11	2	-	Ø 1/4" x 3 <sup>1</sup> / <sub>4</sub> " x 0-3 <sup>1</sup> / <sub>4</sub> " LG		
12	2	-	TS 6" x 4" x 1/2" x 3'-0" LG (FIELD CUT TO SUIT)		A-501-76 O2 ERVAL
13	1	-	TS 6" x 4" x 1/2" x 1'-8" LG		"
14	1	-	Ø 3/4" x 8" x 1'-2" LG		
15	1	-	Ø 1" x 3" x 0'-5" LG (FIELD TRIM TO SUIT)		
16	1	300	#1 MECHANICAL SHOCK SUPPRESSOR, 4" STROKE w/ ADDITIONAL REAR BRACKET, SEE TABLE ON SH. 1 FOR LOAD, MVRT = 7/16" (EXT.), CS = 3/4" HS = 1 <sup>1</sup> / <sub>16</sub> " ACCELERATION = 0.2g, MAT'L PER BAFY CODE SECT. III		
NOTE: ALL MAT'L TO BE SA-36, U.N.O. MATCHED PERFORMANCE OF ITEMS 1 & 16 REQUIRED					



MARK NO. 1-FD-008-H15

SEE SH. 1 OF 3		REV. DATE	REVISIONS	PIPE BY CH'K'DESIGN ENGRS	STRS. PROJ.
PUBLIC SERVICE ELECTRIC AND GAS COMPANY HOPE CREEK GENERATING STATION NO. 1 & 2 UNITS		 SAN FRANCISCO		ISO _____	REF. DWGS. _____
PIPE SUPPORT REACTOR BLDG. R. M. R CROSS-CONNECT		JOB NO. 10855	DRAWING NO. 1-P-FD-008-H15 SH. 3 OF 3	STEEL _____	REV. 2

BH5

PART 2 - MODIFICATION AND TESTING, SECTION 5.0  
 FORM NC.DE-WB.ZZ-0003-7  
 MODIFICATION DOCUMENT COVER SHEET

MD NO.: H 86  
 CHANGE NO.: 4EO-3507  
 PACKAGE NO.: 03  
 CP REV. NO.: 0

PAGE NO. 1  
 REV. NO. 0

DOCUMENT CHANGED: DWG# 1-P-FD-008-H015 Rev. 2 SHT/VOL NO.: 001  
 (PROVIDE TYPE, NUMBER AND REV. THAT CHANGE IS BASED ON)

ACTUAL CHANGE TO BE MADE: Replace existing snubber with LISEGA Hydraulic Snubber as detailed below :

Hanger No.	Existing Snubber	Replaced by New LISEGA Part no.		
		Snubber	Pin	Stud / Pin
1-P-FD-008-H015A	PSA0001	303856RC1	30-1003-050	30-1003-050

New Cold Set (CS) (in.)	New Hot Set (HS) (in.)	New Stroke (in.)	Flip (Y/N)	Shroud Removed (Y/N)
1.6	1.91	4	N	N

Construction / DOC. Updater Note:

- "Flip" refers to whether or not the new snubber body is to be reversed from its original position.
- "Shroud Removed" refers to whether or not the new snubber housing is to be removed due to interference concerns.
- "Flip" and "Shroud Removed" condition may be changed, from what is specified, as long as it is properly documented (as-built) on this MD.
- Remove any design load information that appears on the drawing.

0	ORIGINAL ISSUE	<i>MCC</i> M. C. Chang 8-1-97	<i>TA</i> T. Nickerson 8-12-97		
REV. NO.	REVISION SUMMARY	PREPARED BY & DATE	PEER REVIEW & DATE	INSTALLED MCRs	INSTALLER & DATE

*BH*

PART 2 - MODIFICATION AND TESTING, SECTION 5.0  
 FORM NC.DE-WB.ZZ-0003-7  
 MODIFICATION DOCUMENT COVER SHEET

MD NO.: H 87  
 CHANGE NO.: 4EO-3507  
 PACKAGE NO.: 03  
 CP REV. NO.: 0

PAGE NO. 1  
 REV. NO. 0

DOCUMENT CHANGED: DWG# 1-P-FD-008-H015 Rev. 2 SHT/VOL NO.: 001  
 (PROVIDE TYPE, NUMBER AND REV. THAT CHANGE IS BASED ON)

ACTUAL CHANGE TO BE MADE: Replace existing snubber with LISEGA Hydraulic Snubber as detailed below :

Hanger No.	Existing Snubber	Replaced by New LISEGA Part no.		
		Snubber	Pin	Stud / Pin
1-P-FD-008-H015B	PSA0001	303856RC1	30-1003-050	30-1003-050

New Cold Set (CS) (in.)	New Hot Set (HS) (in.)	New Stroke (in.)	Flip (Y / N)	Shroud Removed (Y / N)
1.6	1.91	4	N	N

Construction / DOC. Updater Note:

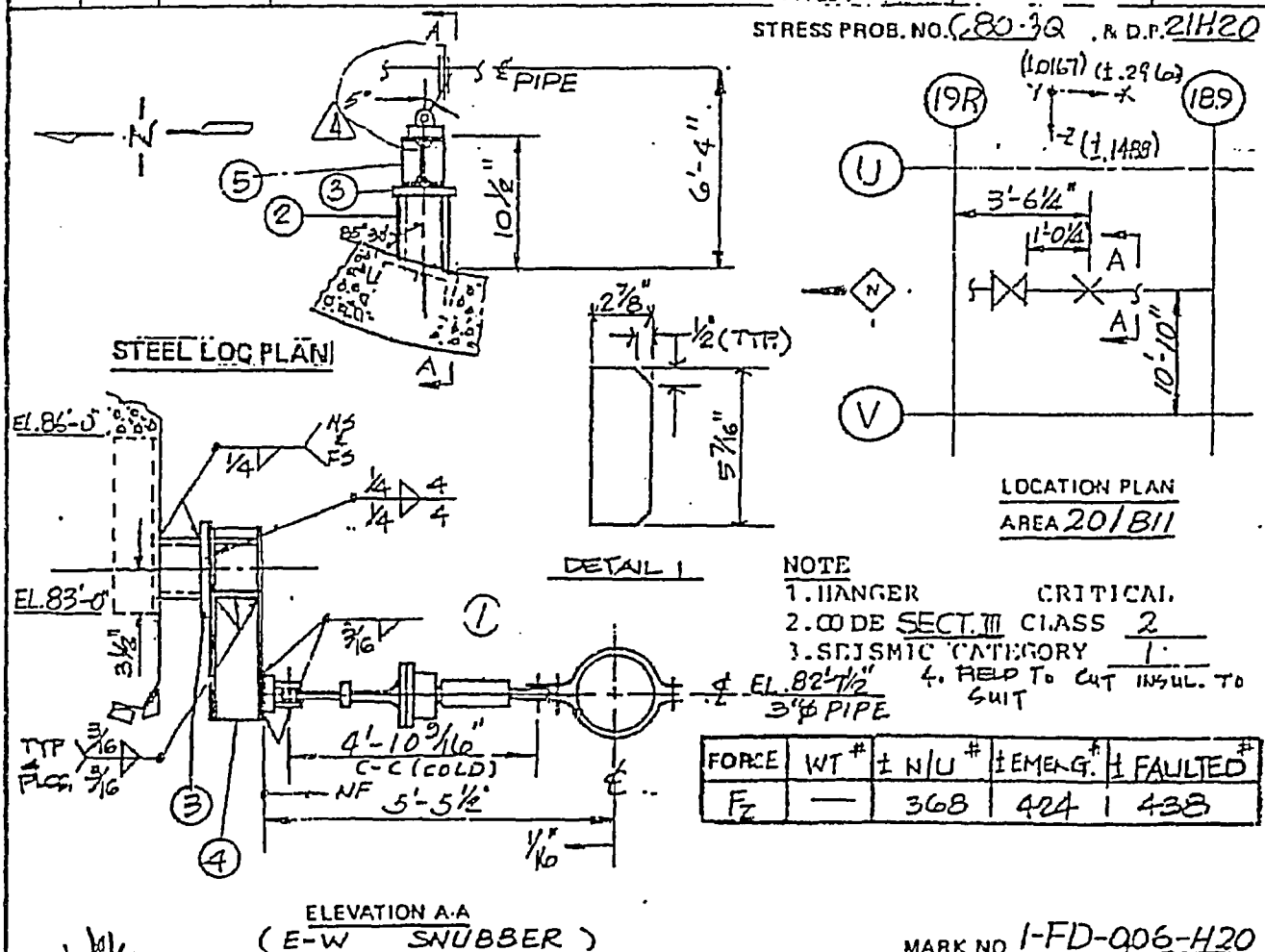
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- "Flip" and "Shroud Removed" condition may be changed, from what is specified, as long as it is properly documented (as-built) on this MD.
- Remove any design load information that appears on the drawing.

0	ORIGINAL ISSUE	<i>MCC</i> M. C. Chang 8-1-97	<i>JA</i> T. Nickerson 8-12-97		
REV. NO.	REVISION SUMMARY	PREPARED BY & DATE	PEER REVIEW & DATE	INSTALLED MCRs	INSTALLER & DATE

*PH7*

ITEM NO	NO HEAD	FIG. NO.	SIZE	DESCRIPTION	MAT'L
1	1	307	# 1/2	MECHANICAL SHOCK-ARRESTOR. PIPE O.D. = 3 1/2" , STROKE. = 2 1/2" CS = 1 3/8" , HS = 1 5/16" , MVT. = 4" (RETRACTS), LOAD = 550 LBS. W = 3'-8 1/4" ACCELERATION = .02g, MAT'L PER R & PV. CODE SECT. III	
2	1	-	TS 6 X 6 X 1/2	X 0'-4 1/8" LG. ASTM A500 GR. B (FLD. CUT TO SUIT)	
3	1	-	P 1/2" X 7" X 7"		
4	1	-	W. 6 X 2.0 X 1'-4" LG		
5	4	-	P 3/8" X 2 7/8" X 5 7/16" LG. (SEE DET. 1)		

NOTE: ALL MAT'L TO BE SA-36 U.N.O.



PUBLIC SERVICE ELECTRIC AND GAS COMPANY HOPE CREEK GENERATING STATION NOS. 1 & 2 UNITS		SAN FRANCISCO		REF. DWGS PIPE P- STEEL C-0703-1 SH. 1, REV. 19	
PIPE SUPPORT REACTOR BLDG. R.H.R. CROSS-CONNECT VACUUM BREAKERS FROM TORUS		JOB NO. 10855	DRAWING NO. 1-P-FD-006-H20(Q)	REV. 4	MARK NO 1-FD-006-H20 BY CHK DESIGN PV ENGR STRS PRO

B48

H-SNUB - 429  
 P114

PART 2 - MODIFICATION AND TESTING, SECTION 5.0  
 FORM NC.DE-WB.ZZ-0003-7  
 MODIFICATION DOCUMENT COVER SHEET

MD NO.: H 84  
 CHANGE NO.: 4EO-3507  
 PACKAGE NO.: 03  
 CP REV. NO.: 0

PAGE NO. 1  
 REV. NO. 0

5 1 1/2"

DOCUMENT CHANGED: DWG# 1-P-FD-006-H020 Rev. 4 SHT/VOL NO.: 001  
 (PROVIDE TYPE; NUMBER AND REV. THAT CHANGE IS BASED ON)

ACTUAL CHANGE TO BE MADE: Replace existing snubber with LISEGA Hydraulic Snubber as detailed below :

Hanger No.	Existing Snubber	Replaced by New LISEGA Part no.		
		Snubber	Pin	Stud / Pin
1-P-FD-006-H020	PSA0.50	301856RE2	30-1003-038	30-1025-038, L=4

New Cold Set (CS) (in.)	New Hot Set (HS) (in.)	New Stroke (in.)	Flip (Y / N)	Shroud Removed (Y / N)
N/A	N/A	4	N	N

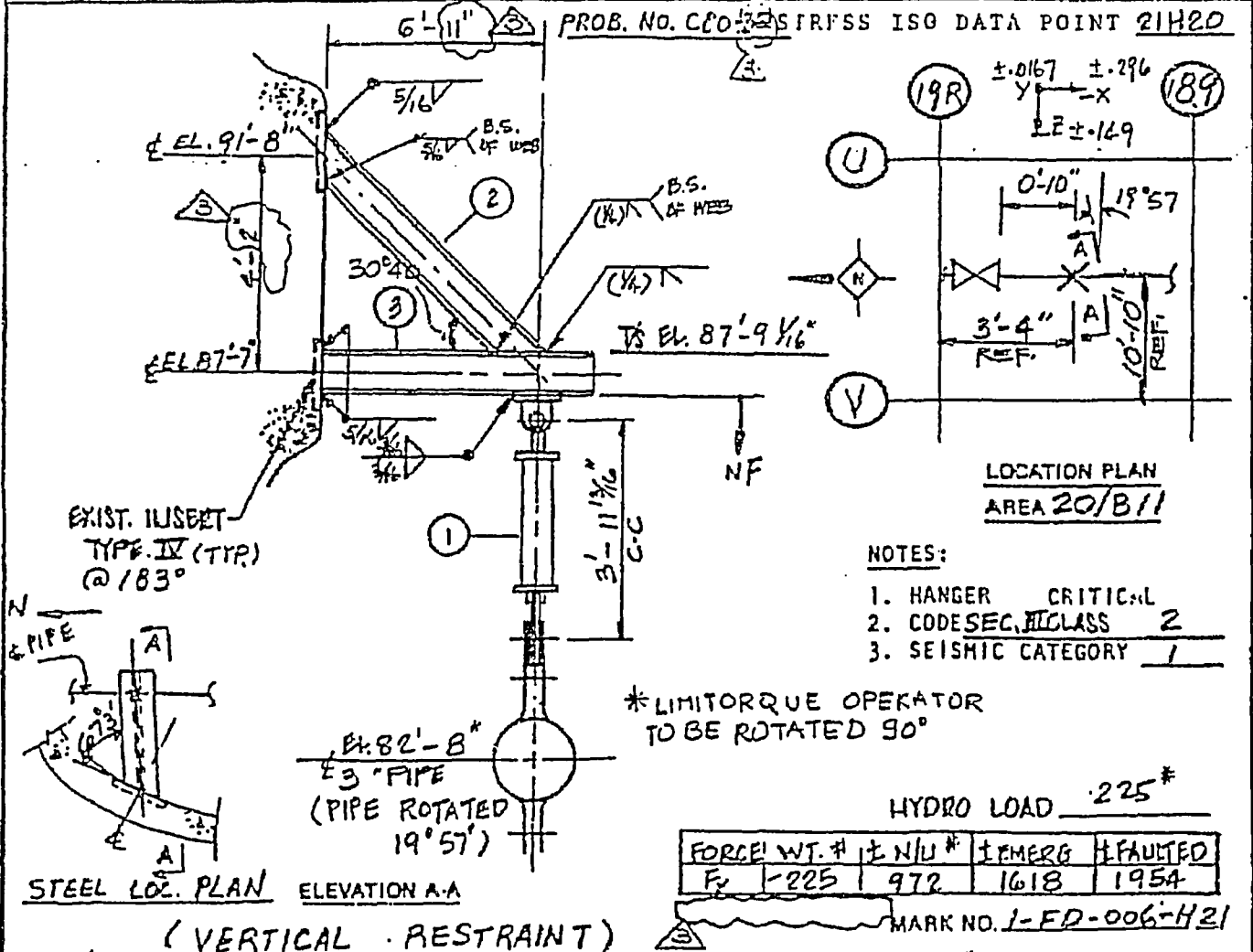
Construction / DOC. Updater Note:

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- "Shroud Removed" refers to whether or not the new snubber housing is to be removed due to interference concerns.
- "Flip" and "Shroud Removed" condition may be changed, from what is specified, as long as it is properly documented (as-built) on this MD.
- Remove any design load information that appears on the drawing.

0	ORIGINAL ISSUE	M. C. Chang 8-1-97 <i>MC</i>	T. Nickerson 8-12-97 <i>TN</i>		
REV. NO.	REVISION SUMMARY	PREPARED BY & DATE	PEER REVIEW & DATE	INSTALLED MCRS	INSTALLER & DATE

*BH*

ITEM NO	NO REQ'D	FIG. NO.	SIZE	DESCRIPTION	MAT'L
1	1	211	F B	Sway Strut Assv., 3 1/2" O.D. PIPE, L = 3'-2 1/16", Load = SEE TABLE BELOW	
2	1	—	W 4 X 13 X 8'-0" C-C LG. (SEE ELEV. A-A & STL. LOC. PLAN)		
3	1	—	W 4 X 13 X 7'-3" C-C LG. (SEE STEEL LOC. PLAN)		
NOTE: ALL MAT'L TO BE SA-36 U.N.D.					



ISSUED FOR FINAL STRESS CALC. & INCORPORATED	BY	CH'K	DESIGN	APV	ENG	STRS PROJ
FIELD REV. # F1						

PUBLIC SERVICE ELECTRIC AND GAS COMPANY HOME CREEK GENERATING STATION NOS. 1 & 2 UNITS	 SAN FRANCISCO	100 1-P-BC-06 REV. 19
		REF. DWGS. PIPE — STEEL C-0703-1 SH. 1 REV. 11
PIPE SUPPORT REACTOR BLDG RHR CROSS-CONNECT VACUUM BREAKERS FROM TORUS	JOB NO. 10855	DRAWING NO. 1-P-FD-006-H21 (Q)
		REV. 3




8-03-00-G06 M-413-P


# AT 588 R550 PUN

Q'ty	Part No.	Description	Part	Material	DIN	Material	LISEGA	DIN	Special Conditions	Part No.
		DAB Hydraulique Hydraulische Stoßbremse Shock absorber		complet Zusammenstellung complete drawing						32200-1-3072
		Ensemble piston Kolbenstangeinheit piston rod unit	1	Ensemble Baugruppe construction group						32202-3-3072
	7323	Tige de piston Kolbenstange piston rod	11	Rd 55-327	1013	1 20 Cr 13 SA 192 F6a CL2 A 736-420	131 335 336			32203-3-3072
	7325	Partie avant du piston Kolbenhälfte vorn piston half front	17	Pf 110-29	1013	1 20 Cr 13 SA 192 F6a CL2 A 736-420	131 335 336			32204-4-3072
	7325	Partie arrière du piston Kolbenhälfte hinten piston half rear	17	Rd 110-45	1013	1 20 Cr 13 SA 192 F6a CL2 A 736-420	131 335 336			32205-4-3072
	5144	Ruban de guidage Führungsband guide band	14	# 106 x # 190 x 10	7735	MM Composite Harthewebe MM 2055	172		Fa Merkel 03389-213 425	
	5442	Siege de Soupape Ventilsitz valve seat	15	PM # 15-26	17517	Co 2n 39 Pb 2 SB 293-C 373	141 000			5446-4-5445
	5460	Soupape Ventilvoiben valve core	16	10 15-10	7013	1 20 Cr 13 SA 192 F6a CL2 A 736-420	131 335 336			5445-4-5445
	5437	Ressort de soupape Ventilfeder valve spring	17	d=8.06 ; Di=9.43 ; Dp=4.9 Da=5.5 ; Lb=2.5 ; Lc=6.5 Ib=6 ; Ic=7.5	7075	1 43 10 17216/225	131 305		Hire a Freud + weill Kettensagen und anpassen cald chains and correct draw	5434-4-5447
	5418	Vis sans tête Gewindestift inserted pin	18	M 6-10	916	1 43 05 17140				
	4724	Joint de piston (ensemble) Konnaktstangeeinheit contact piston sealing set	13	# 10 x # 92 x 28		Viton/Armoel Harthewebe	174/173			Fa Merkel 00142-250-150
Q'ty	Part No.	Description	Part	Material	DIN	Material	LISEGA	DIN	Special Conditions	Part No.
7										
5										
5										
4										
3										
2										
2										
1										
<p>REVISION</p> <p>1988 Datum Name</p> <p>Bearbeiter 08.03 Bu</p> <p>Geprüft 19.04</p> <p>OS 11.04</p> <p>AV 17.4</p> <p>30 72 .6</p> <p>32201-1-3072</p> <p>3</p> <p>LISEGA</p>										

10-Ring	118	# 31 * 2	Mon 75153h	159	Ex Merkell	
15195 O-Ring					02575-230 073	
0-ring	117					
	117					
Fond de cylindre Zylinderböden	2	Ensemble 2				32176-4-3072
Cylinder bottom		Blugruppe 2				
Cylinder bottom		construction group 2				
Fond de cylindre Zylinderböden	21	Id 160-114	1013	1 20 Cr 13 SA 492 F6 a CL2 A 236-423	131 335 336	32207-3-3072
Cylinder bottom						
Siege de soupape, arriere Ventilsitz, hinten	22	PM # 20-46	17572	(0.7h 2779) SB 293-C 370	141 010	54167-4-5415
valve Seal, rear						
Couverture de soupape Ventildeckel	23	PM # 20-62	17572	Ex 2h 29 F63 SB 293-C 370	141 010	54164-4-5415
valve lid						
Soupape, arriere Ventilkolben, hinten	74	PM 15-10	1013	1 20 Cr 13 SA 492 F6 a CL2 A 236-423	131 335 336	54165-4-5415
valve cone, rear						
Resortri de soupape Ventilfeder	25	0 # 06 ; D # 24.3 ; 0 # 04.9 ; Dj # 55 ; la # 25 ; ln # 4.5 ; # # 6 ; ln # 2.5	2075	(M19)	305	54136-4-5460
valve spring						
Circle Sicherungsring	26	# 20 * 4	472	Federstaht		54136-4-5460 Kaltgezogen und anschließend trocken- und oxidiert 2mm galvanisch verzinkt (Fa. Seeger) galvanisch verzinkt (Fa. Seeger) galvanic zinc (Fa. Seeger)
0-Ring	27	# 32 * 35		Mon 75153h	159	Ex Merkell 02575-230 728
0-Ring						
0-ring						
Werkstoff / Material	LISEGA	Best.Nr. / Order No.	30242	Datum / Date	30.03.03	30 72 .6
Werkstoff / Material	LISEGA	Best.Nr. / Order No.	30242	Datum / Date	19.06.	
Werkstoff / Material	LISEGA	Best.Nr. / Order No.	30242	Datum / Date	19.06.	32207-3-3072
Werkstoff / Material	LISEGA	Best.Nr. / Order No.	30242	Datum / Date	19.06.	
Werkstoff / Material	LISEGA	Best.Nr. / Order No.	30242	Datum / Date	19.06.	
Werkstoff / Material	LISEGA	Best.Nr. / Order No.	30242	Datum / Date	19.06.	
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Werkstoff / Material	LISEGA	Best.Nr. / Order No.	30242	Datum / Date	19.06.	
Werkstoff / Material	LISEGA	Best.Nr. / Order No.	30242	Datum / Date	19.06.	



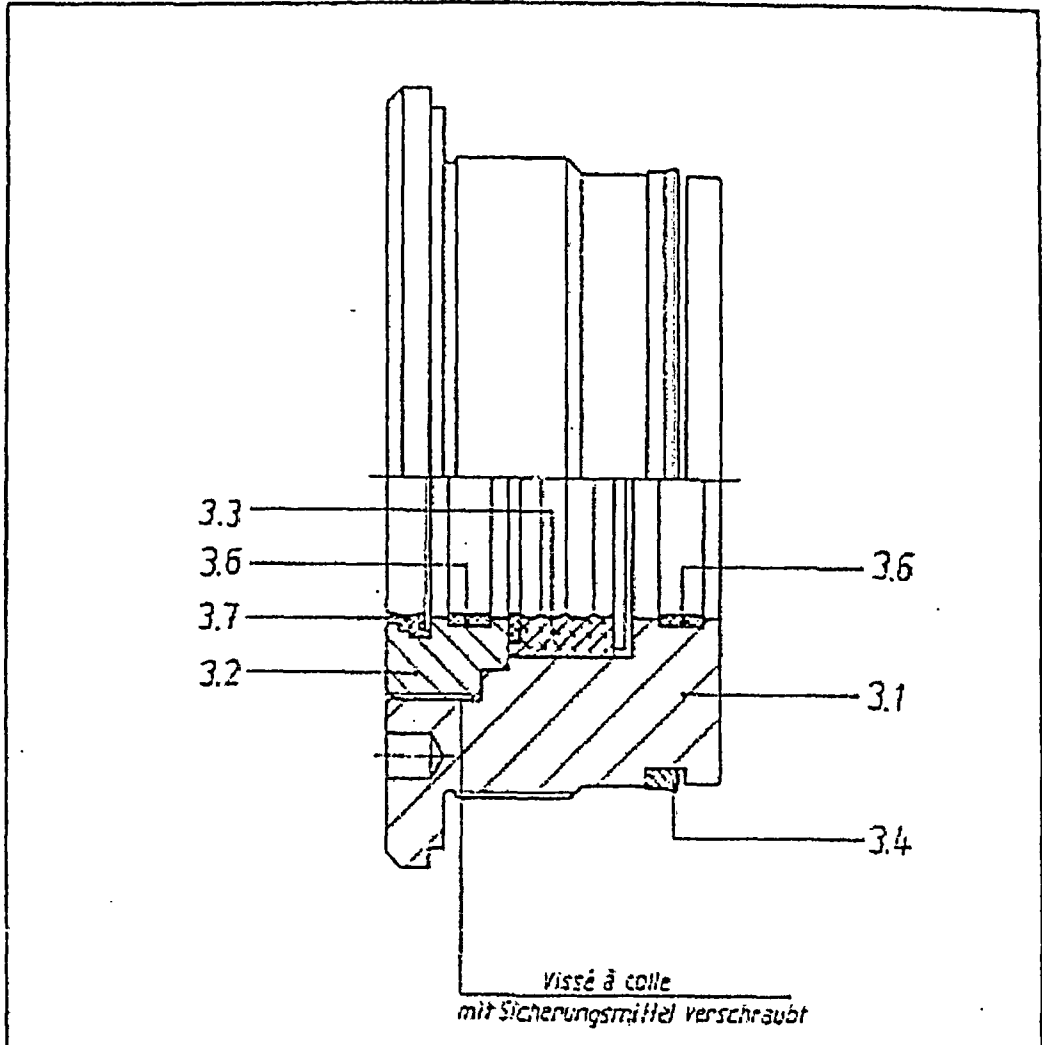
Pos	Zeichn. / B. / F. / Archiv	Bezeichnung / Description	Teil / Part	Material / Semifinished material	DIN	Werkstoff / Material	LISEGA Spez	DIN 50029	Besondere Bedingungen / special conditions	Zerlegungszeichnung / Draw or parts list / etc.																									
1	4794	Joint compact de fixation Kompaktstangenverbindung compact-rod-seal	23	Ø 400 x 190 x 7,5		Viton / Norel	174			Fa. Merkel 01541-257.927																									
			23																																
1		Ensemble embout fileté Schraubbochse komp. Threaded bush compl.	3	Ensemble 3 Baugruppe 3 construction group 3						32209-4-3072																									
1		Embout fileté Schraubbochse Threaded bush	31	Rd 160 x 63	1013	270Cr13 SA 191 F6 x G 2 A 716-420	131 335 336			32209-3-3272																									
1		Boque de maintien Gewindering Threaded ring	32	Rd 85 x 25	1013	270Cr13 SA 191 F6 x G 2 A 716-420	131 335 336			32209-3-3072																									
1	4744	Joint compact de fixation (ensemble) Kompaktstangenverbindung compact-rod-sealing-set	24	Ø 50 x 65 x 21		Viton / Norel / Ptek	174/175			Fa. Merkel 00155-199.320																									
1	4794	Joint compact de fixation Kompaktstangenverbindung compact-rod-seal	24	Ø 400 x 190 x 7,5		Viton / Norel	174			Fa. Merkel 01541-257.927																									
			25																																
2	5136	Ruban de guidage Führungsband guide band	25	Ø 50 x 65 x 8	7735	Mat. Composite Hartgewebe HqM 2085	172			Fa. Merkel 03394-219.923																									
3	4764	Joint raieur double Doppeltabstreifer double scraper ring	27	Ø 50 x 65 x 8		Viton	176			Fa. Merkel 02516-249.640																									
			4																																
<table border="1"> <thead> <tr> <th>7</th> <th>1988</th> <th>Datum</th> <th>Name</th> <th></th> </tr> </thead> <tbody> <tr> <td>6</td> <td>Bearbeiter</td> <td>08.03.</td> <td>Bu</td> <td>30 72 .6</td> </tr> <tr> <td>5</td> <td>Geprüft</td> <td>19.06.</td> <td></td> <td></td> </tr> <tr> <td>4</td> <td>OS</td> <td>17.4.</td> <td></td> <td>32209-3-3072</td> </tr> <tr> <td>3</td> <td>AV</td> <td>17.4.</td> <td></td> <td></td> </tr> </tbody> </table>											7	1988	Datum	Name		6	Bearbeiter	08.03.	Bu	30 72 .6	5	Geprüft	19.06.			4	OS	17.4.		32209-3-3072	3	AV	17.4.		
7	1988	Datum	Name																																
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1	Astion du réservoir Speicherkolben, kompl. reservoir piston	5	Ensemble 5 Baugruppe 5 construction group 5				32211-4-3072		
1	Astion du réservoir Speicherkolben piston reservoir	5.1	Ø 130 x Ø 131 x 75	Gx-Gx Pb 15.5 SB 283-C 3770	140 090		32212-3-3072		
1	Joint à terre Nutting packing ring	5.2	Ø 130 x Ø 145 x 11	Viton	166		F3 Merket 02826-249.672		
1	Joint à terre Nutting packing ring	5.3	Ø 130 x Ø 150 x 11	Viton	166		F3 Merket 02826-249.671		
2	Ruban de guidage Führungsband guide band	5.4	Ø 132 x Ø 167 x 6	7775 Mat Composite Machgarbe MQW 2085	172		F3 Merket 03385-224.794		
		5.5							
1	Cape de protection Schutzrohr, kompl. protective tube	6	Ensemble 6 Baugruppe 6 construction group 6				32213-4-3072		
1	Tubage protection Schutzrohr protective tube	6.1	Tube 200 x 4 x 260 Rohr	14301 SA 312 TP 304	2453		32214-4-3072		
1	Couverture de protection Schutzdeckel protective lid	6.2	Pd 200 x 15	1013 120713 14021 17440			32215-3-3072		
6	Goupille élastique RMS Kerbstift grooved pin	6.3	Ø 4 x 40	1477 14305 17460					
		6.4							
Des Teil / F. Artikel Ersatz / Guarnies / Nr		Bearbeitung Description	Teil Part	Werkzeug Semi-finished material	DIN	Werkstoff Material	LISEGA 3092	DIN SCC63	best. der Abh. / spez. Zeichnung / Stück / Menge spec. of drawing / drawing / Qty / Qty
							1989	08.03.	30 77 .6
							Bearbeitet 19.04.	Bu	
							05 AV	19.4. 19.4.	32201-1-3072
									


Qte	Ref	Lib	Qte	Lib	Qte	Lib	Qte	Lib	Qte	Lib	
7		Tube de cylindre Zylinderrohr cylinder tube	7	Rd 135-330 Konstant 132, 105 x 320	1013	X 200/13 SA 191 F6 x Cl.2 A 216-400	131 335 336			für die KTA-Ausführung 32216-3-3072	
8		Pièce de raccordement Anschlußflange, Koppel connection joint	8	Entierme 8 Baugruppe 8 construction group 8						52343-4-5257	
2	0175	Pièce de raccordement Anschlußflange connection joint	81	EM 61 x 120-190		1443 Y SA 168 CLF	324			zingage galvanique (argent) galvanisch verzinkt (silber) galvanic zinc (silver)	
2	0282	Patte Gelenklager joint bearing	82	GE 5000		70205 W3 1.3505 SEM 350-53					
4	0401	Vis 5 pans tête FR Zylindererschraube head cap screw	83	M12 x 30	312	3.8				zingage galvanique (argent) galvanisch verzinkt (silber) galvanic zinc (silver)	
			84								
3	3004	Plaque signalétique Typenschild name plate	9	Table 03 x 70 x 120 R		14301 17480				französisch-deutsch-engl. - mehrsprachig englisch - 2011/1b	
6	0229	Cou canal à tête cono Halbrundkerensager round headed conical nails	91	42 x 3	2476	14334 17140					
1		Tube réservoir Mantelrohr reservoir tube	10	Ecouille 190 x 6,5 x 263 Konstant		14301 SA 312 TP 304	270			32217-3-3072	
1		Couvercle du réservoir Speicherdeckel reservoir lid	11	Rd 190 x 20	1013	X 200/13 SA 191 F6 x Cl.2 A 216-400	131 335 336			32218-3-3072	
1		Fond du réservoir Speicherboden reservoir bottom	12	Rd 190 x 28	1013	X 200/13 SA 191 F6 x Cl.2 A 216-400	131 335 336			32219-3-3072	
Qte / Quantité		Lib / Beschreibung		Part / Teil	Matériau / Material	DIN	Werkstoff / Material	LISEGA Spez	DIN	besondere Bedingungen / special conditions	Zeichnungs-Symbol / Drawing position
								1988	08.03.	Bu	50 72 .6
								Geprüft	13.01		32201-3-3072
								OS	17.12		
								AV			
Best-Nr								LISEGA			
Anlage											
Blende											

Q'ty	Part No.	Description	Part No.	Material	DIN	Workstoff Material	LISEGA Spec	DIN	Special Conditions	Technical Stock
			13							
1		Tube d'écartement Distanzrohr distance tube	14	Tube 139,7 x 26 x 6B Pipe	2453	14301				32221-4-3072
			15			17440				
1		Ressort du réservoir Springsfeder reservoir Spring	15	d = 11,10 x R139; d = 11,5 d = 11,1; l = 240; l = 225 d = 5; h = 6,5	2076	14310	305			54201-4-5447
1	4680	Purneur Entlüftungsventil deairating valve	17	(#N°: 3 3518-07002					racourcir de 6 mm bm 6 mm gekürzt shorted by 6mm	Fa. Springer
1	5325	Voyant de niveau d'huile, cot. Niveauanzeige, koppf. oil gauge glass	18	Ensemble 18 Baugruppe 18 construction group 18						30221-4-3052
1		Corps de voyant Schauglasaufnahme holding of oil sight glass	18.1	FH 0 34 x 12	17572	(u 2n 39 Po 7) 59 293 - C3710	141 010			30222-4-3052
1	3223	Circlip Sicherungsring Circlip	18.2	a 21 x 10	412	Federstahl			Zinnlage galvanique (Fa Seeger) galvanisch verzinkt (Fa Seeger) galvanic zinc (Fa Seeger)	
1		Verre - Tempax Tempax - Glas Templex	18.3	a 70 x 11 x 6 x 3					rodé geschliffen polished	
1	4656	Joint plat Flachdichtung flat seal	18.4	a 29 x 16 x 2		Wingert				
1	5103	O-Ring O-Ring o-ring	18.5	15 x 1,5		viton 1615 Sn	159			Fa Merkel 00575-213.467
Q'ty	Teil / Part	Beschreibung / Description	Teil / Part	Material / Material	DIN	Werkstoff / Material	LISEGA Spec	DIN	besondere Bedingungen / special conditions	Technische Stückliste / Technical Stock
							1788	Datum / Date		
							Bearbeitet / Worked	08.03.	Bu	30 72 .6
							Geprüft / Checked	19.04.		
							05	12.11.		3 2 2 0 1 - 1 - 3 0 1 2
							AV	19.9.		
NOT:										
Best-Nr:										
Anlage:										
Änderung:										

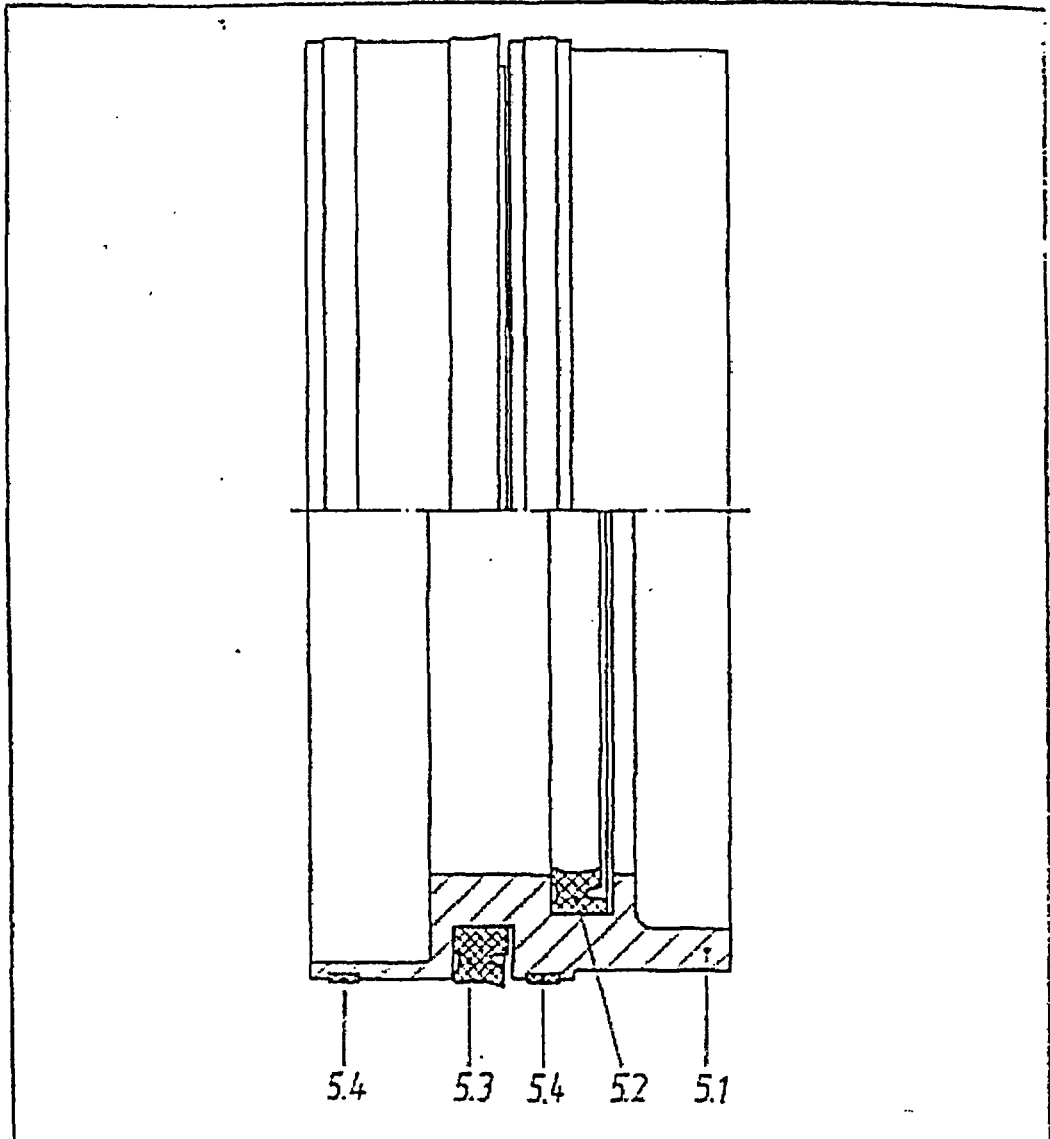
Pos	Zeichn	Artikel	Benennung	Teil	Halbzeug	DIN	Werkstoff	LISEGA	DIN	besondere Bedingungen	Erweiterte Stück Nr.																																								
Stücke	Quantitäten	Nr	Description	Art	Semi-finished material		Material	Spez	60043	special conditions	drawn part list no																																								
			G-Ring	185	28 x 15		Viton 7615 Sn				Fa Metall																																								
		5182	O-Ring o-ring	19							02575-217.722																																								
				20																																															
			Vis sans tête	21	M6 x 10		A4-70																																												
		5118	Gewindestift threaded pin																																																
			Vis sans tête	22	M5 x 6		A4-70																																												
		5103	Gewindestift threaded pin																																																
			O-Ring	23	ø 130 x 6		Viton 7615 Sn				Fa Metall																																								
		5182	O-Ring o-ring								02575-208.738																																								
			O-Ring	24	ø 130 x 4		Edelstahl																																												
		3457	Sicherungsring O-Ring				Viton 7615 Sn				Fa Metall																																								
		5184	O-Ring o-ring	25	ø 162 x 4						02575-208.737																																								
				26																																															
			Fluid for silicones	27	20 ml		350 GSI				150																																								
		4330	Siliconfussstift silicon fluid																																																
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Kon	Best-nr	Anlage:	Kunde	7	1988	08.03.	30 72 .6																																												
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Revision				1	23																																														



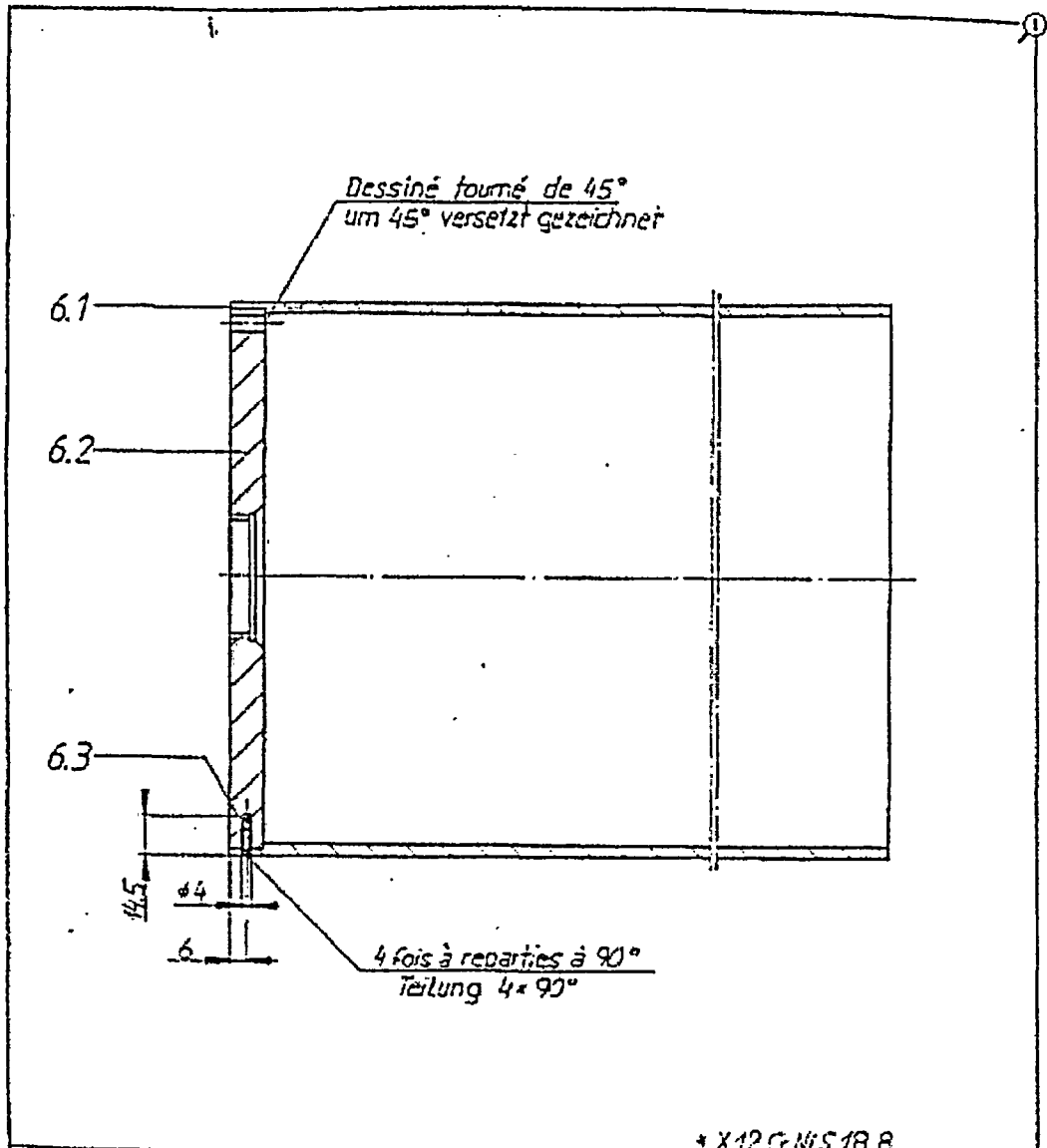
\* Viton / Nomex / Peek

17	Doppelabstreifer	177	Ø 50 x 258 x 2	Viton	176	Fa. Merkel
12	Führungsband	178	Ø 50 x Ø 56 x 8	Nomex	177	Fa. Merkel
1	Kompaktstanzendichtung	179	Ø 100 x Ø 110 x 7,5	Viton/Nomex	174	Fa. Merkel
1	Kompaktstanzendichtung	179	Ø 50 x Ø 55 x 7	Nomex	174	Fa. Merkel
1	Gewindestift	172				32210-3-3072
1	Schraubmutter	171				32209-3-3072
1	Stückzahl	Benennung	Teil	Maßstab	DIN Werkstoff	DIN USEGA 500431 Spez. Zeichnungs Nr.
Kunde		Anlage		Best.Nr.		
Stück-Pass		Last/Hgr	E-	Weg	auf/ab	L-
Stück-Pass		Last/Hgr	E-	Weg	auf/ab	L-
Stück-Pass		Last/Hgr	E-	Weg	auf/ab	L-
		Frage made DIN 7168	Embout fileté, Ens. 3 Schraubmutter, Baugr. 3 30 72 . 6		 <b>LISEGA</b>	
		Maßstab	1:1	Datum	22 Juli	Name
		Beord.	27.07	Geprüft	27.07	2
		1:1	27.07	27.7.	22	2
1	Für Ring-Backing →	10.1.88				
	Komp. Diagramm angeschlossen	By				
Nr.	1879	Benennung	IV			

12/12/04  
Revision 0



23	Führungsband	5.4	Ø 170 x Ø 167 x 6	7735 Hartguss	1772
17	Nutring	5.2	Ø 170 x Ø 150 x 11	Viton	165 Fa. Merkel
11	Nutring	5.2	Ø 170 x Ø 145 x 11	Viton	165 Fa. Merkel
7	Speicherkolben	5.1			32212-4-3072
Ges. je Lfd. St. Stückzahlen	Benennung	Teil	Maßstab	DIN Werkstoff	DIN LISEGA 50049° Ser. Zeichnungs Nr.
Kunde	Anlage	Best.Nr.			
Stck. Pos	Last/Hor	E =	Weg	auffab	L =
Stck. Pos	Last/Hor	E =	Weg	auffab	L =
Stck. Pos	Last/Hor	E =	Weg	auffab	L =
	Frei- made DIN 7162	Piston du reservoir Speicherkolben, Baugr. 5 30 72.5			
	Maßst.	1997	Datum	Name	32211-4-3072   0
	Beorb.	7 Juli	Dresden	Zeichner	
	Geprüft	17.07.			
	AVCS	17.7.			
Nr	Revision	Beorb.	AV	Erlaubnisstempel Nr.	




\* X 12 G-NIS 18 8

Stückzahl	Benennung	Teil	Halbzeug	DIN Werkstatt	DIN WISEGA 50049 Spez.	Zeichnungs Nr.
4	Korbstift	16 31	4 x 14	1472	*	
1	Schutzgeckel	16 21				32215-9-3072
1	Schutzrohr	16 11				32214-4-3072

Stück	Pos	Material	Art	Weg	Notiz
1	1	16 31	E-	Weg	aufiab L-
1	2	16 21	E-	Weg	aufiab L-
1	3	16 11	E-	Weg	aufiab L-

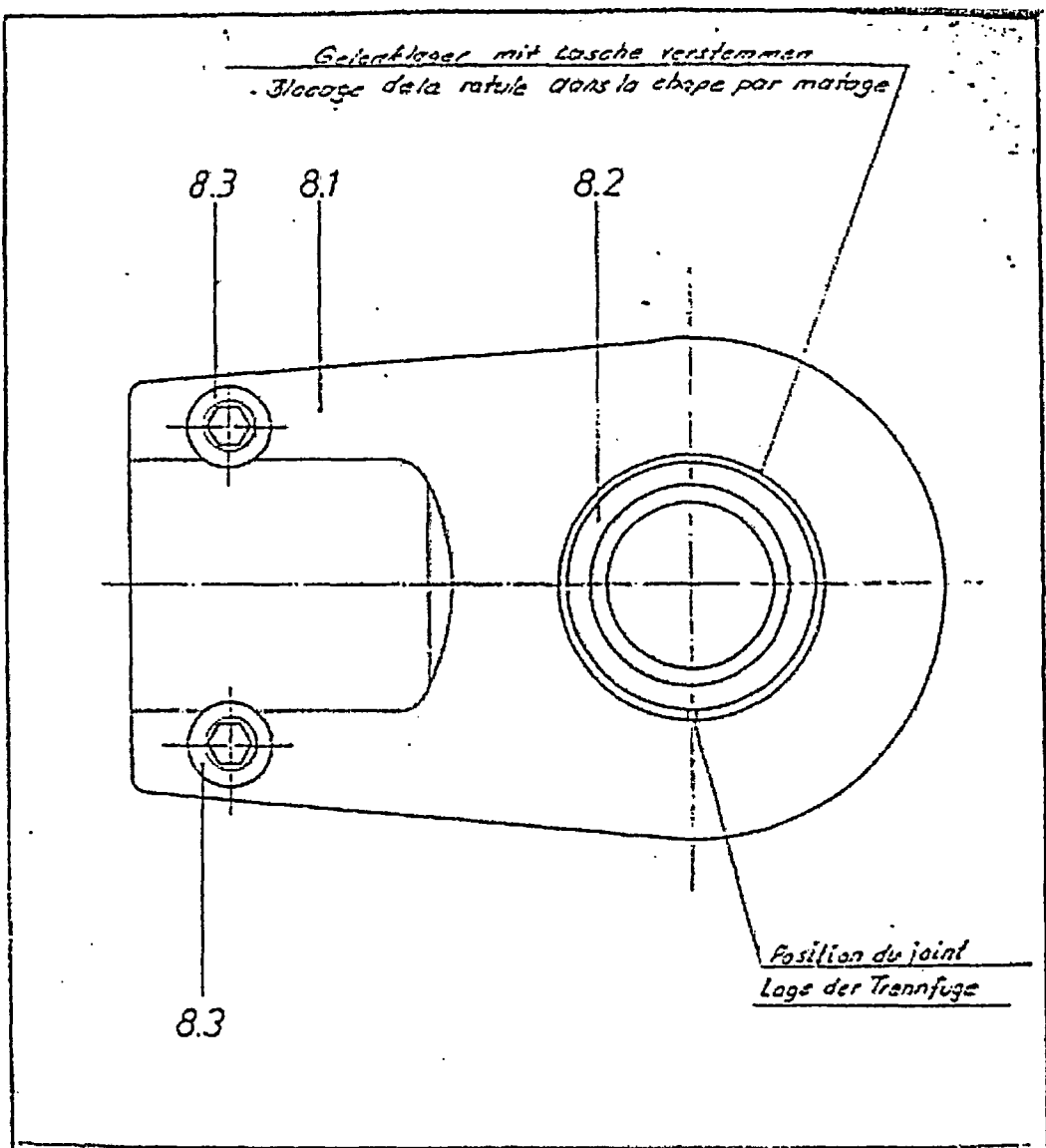
  

Freigegeben	DIN	1988	Capot de protection, compl	 <b>LISEGA</b>
1-1	1988	1988	Schutzrohr, kompl.	
			30 72 5	

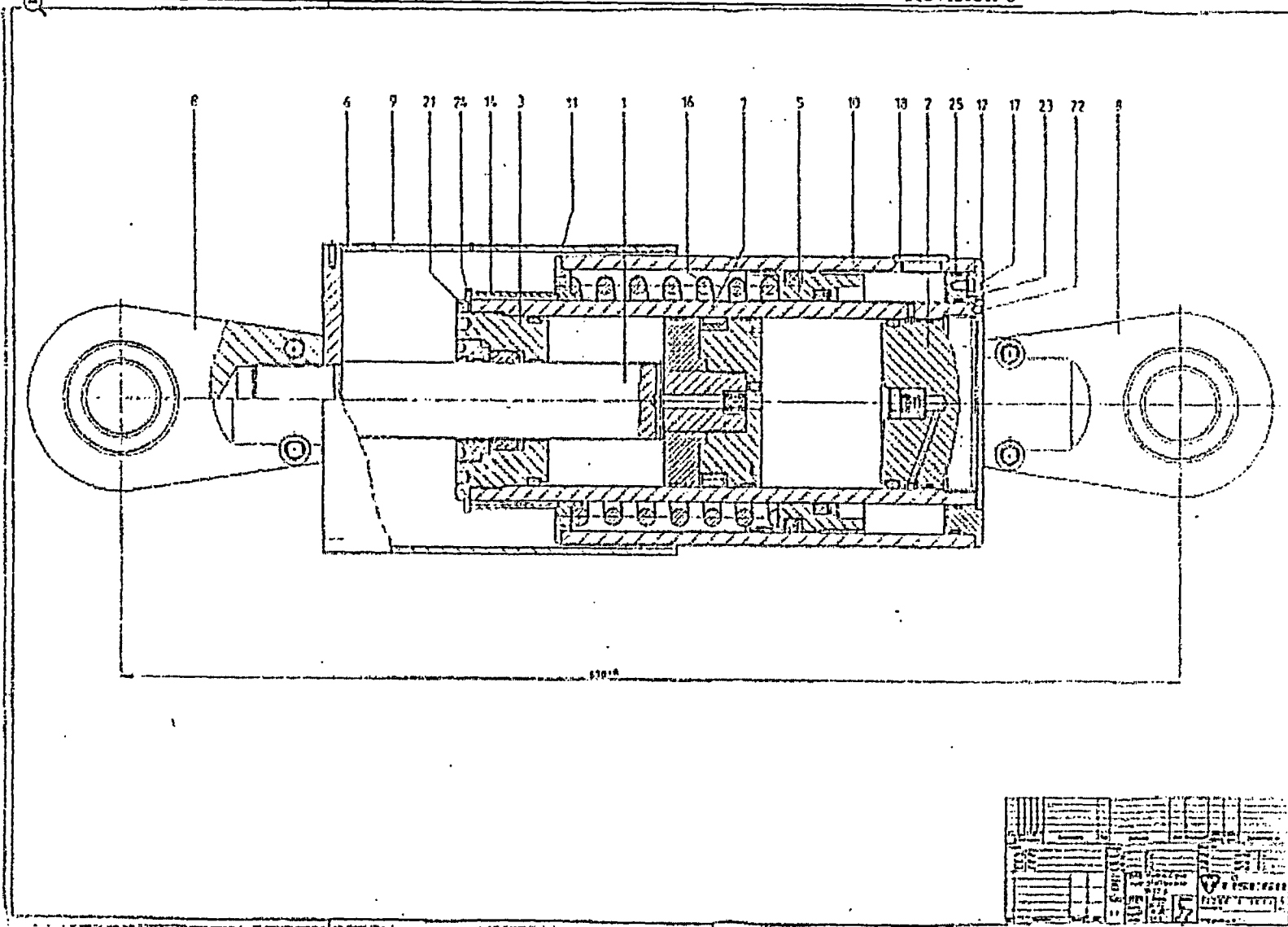
  

Matr.	Datum	Name	3 2 2 1 3 - 4 - 3 0 7 2	0
1-1	7.3.	BU		
	19.08.	E A		
	13.8.	12.8.		





4	Zuhlerschr	Ø 3 M 12 x 30	P/2	B.B		
2	Gelenklager	A 2 G 5 50-20				
2	Anschlußlasche	A 1			52343-2-5257	
Gez. je 12 B f Stückzahlen	Benennung	Teil	Maßstab	DIN	Verast DIN 50040	Zeichnungs Nr
Kunde	Anlage	Best Nr				
Stck Pos	Last/Mor	E =	Weg	auf ab	L =	
Stck Pos	Last/Mor	E =	Weg	auf ab	L =	
Stck Pos	Last/Mor	E =	Weg	auf ab	L =	
	Frei maß DIN 7168	Anschlußlasche, handl. Zug B 247919				
3	Beitrag 22 02 entfallen	Maßst.				
2	Beitrag 22 02 entfallen	Bearb.	11/09			Zeichnungs Nr
1	Form-End-messung	Geprüft	11/05			
11/	revision	Beard	AV QS	11/05	11/05	



Attachment D Causal Factor Evaluation for Pipe Support Observations

Possible Cause	Existing Data Supporting Cause	Data Required to Confirm Cause
	Existing Data Refuting Cause	Data Required to Disprove Cause
<b>Tandem snubber test failure (1-P-FD-006-H15A &amp; B)</b>		
Water hammer overload from piping damaging snubbers	<ul style="list-style-type: none"> <li>Both snubbers failed in an apparent overload condition</li> </ul>	
	<ul style="list-style-type: none"> <li>Inspection of frame, pads, pins, and clevises showed no evidence of impact, wear, or damage</li> <li>The piping support configuration on both sides of the damaged snubber precludes overload without damaging the adjacent supports. The adjacent supports have been inspected or examined and are satisfactory.</li> </ul>	
Hydraulic snubber test machine anomaly		
	<ul style="list-style-type: none"> <li>Previous and subsequent tests were satisfactory</li> <li>The replacement snubbers passed their test requirements</li> </ul>	
Snubber internal active component failure	<ul style="list-style-type: none"> <li>Lisega tear down indicates internal poppet sticking and a mechanism that permits failure on test machine.</li> <li>There is no physical indication on piping or pipe support frame that suggests a high load on the snubber</li> <li>There is a cycle limit on the snubbers. Extended HPCI run entering R12 may have affected performance</li> </ul>	<ul style="list-style-type: none"> <li>Evaluate extended HPCI run entering R12 and assess impact on snubbers</li> </ul>
<b>Snubber as found setting not per design (1-P-FD-006-H22)</b>		
Error in data collection	<ul style="list-style-type: none"> <li>ISI records not complete</li> <li>Some evidence in ISI records shows the snubber has been in this condition since installation</li> </ul>	<ul style="list-style-type: none"> <li>ISI complete NUCR evaluation and establish condition at installation 20210035</li> </ul>
Disassembled and reinstalled with wrong setting	<ul style="list-style-type: none"> <li>Pipe supports not always treated with appropriate reverence during maintenance</li> </ul>	
Significant rotation of piping and valve due to waterhammer		
	<ul style="list-style-type: none"> <li>The valve this snubber supports is vertical</li> <li>Adjacent struts and clamps do not show any evidence of rotation</li> </ul>	

Strut misaligned 15 to 20 degrees (1-P-FD-006-H04)		
Significant axial movement of piping and valve due to waterhammer	None <ul style="list-style-type: none"> <li>Rupture disk failure would be likely with nearby waterhammer loads that would cause this large displacement.</li> <li>Axial restraint from nearby struts is significant. Axial pipe movement unlikely.</li> <li>No apparent axial damage at wall penetration bellows</li> </ul>	<ul style="list-style-type: none"> <li>Confirm rupture disks tested satisfactory</li> <li>Complete inspection of bellows 20213732</li> </ul>
Inspection data error	<ul style="list-style-type: none"> <li>Engineering walkdown observed less than 4 degree angle, within construction tolerance.</li> <li>Verification walkdown by originator of issue confirms no issue</li> </ul> None	<ul style="list-style-type: none"> <li>Complete NUCR associated with 20210440</li> </ul>
Snubber Extension Tube Bent (1-P-FD-006-H20)		
Excessive Load from waterhammer	<ul style="list-style-type: none"> <li>Support is bowed, a possible indicator of overload</li> <li>Adjacent supports and components show no evidence of high load.</li> </ul>	
Inappropriate snubber lockup	<ul style="list-style-type: none"> <li>Snubber tested satisfactory in RF12 expanded inspection</li> </ul>	
Field misuse	<ul style="list-style-type: none"> <li>Extension tube 7/8" in diameter is susceptible to damage if climbed on or hung from. This is a congested area with frequent valve work.</li> </ul>	<ul style="list-style-type: none"> <li>Calculate lateral capacity</li> </ul>
Spring Can Movement larger than design (1-P-FD-006-H01)		
Water Hammer	<ul style="list-style-type: none"> <li>Movement above design thermal movement</li> <li>Movement above design thermal movement is small 1/8 to 1/4 inch.</li> </ul>	
Nearby Maintenance	<ul style="list-style-type: none"> <li>Hanger is at turbine exhaust outlet and is likely to be disturbed by piping disassembly during turbine maintenance</li> </ul>	<ul style="list-style-type: none"> <li>Confirm maintenance since last spring can painting</li> </ul>
Turbine Induced Vibration	<ul style="list-style-type: none"> <li>Additional deflection is small, vibration deflection is possible.</li> </ul>	