

**Gibbs & Hill, Inc.**

ENGINEERS DESIGNERS CONSTRUCTORS

*S. B. Burwell*

DIRECT DIAL EXTENSION

(212) 760-4450

November 20, 1979

GTN- 41826

Texas Utilities Generating Company  
Post Office Box 1002  
Glen Rose, Texas 76043

Attention: Mr. J. T. Merritt  
Manager of Construction and Engineering

Gentlemen:

TEXAS UTILITIES GENERATING COMPANY  
COMANCHE PEAK STEAM ELECTRIC STATION  
1981-83 - 2300 MW INSTALLATION  
G&H PROJECT NO. 2323  
STAFF ANALYSES OF DYNAMIC ASYMMETRIC LOADS ON PRIMARY  
COOLANT SYSTEM SUPPORTS

In accordance with the request of Messrs. S. B. Burwell and R. K. Mattu of the NRC at a meeting of October 17, 1979 at the Comanche Peak Site, Glen Rose, Texas, Gibbs & Hill is forwarding a copy of the following additional for the subject verification analyses: stiffness values of supporting concrete for the RCS equipment supports. This information is given in the form of figures 1 to 4, Tables 1 to 4 and a microfilm of a computer printout.

The supporting points of the RCS are separated into three groups according to the nature of the supports and their relative locations within the reactor building. The stiffness of one group is considered to have only a small effect on the other and therefore is separable. The three groups are as follows:

1. Steam generator lateral supports (8 points)
2. Reactor coolant pump and cross-over leg lateral restraints (4 points)
3. RCS vertical supports (9 points)

*Boose*

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November 20, 1979

Texas Utilities Generating Company

The corresponding supporting points are shown on Figures 1 through 3.

The stiffness matrices of these groups are presented in the form of a computer printout. Six degrees of freedom (DOF) is global coordinates are considered for each support node. Thus the size of the matrices are 48 X 48, 24 X 24 and 54 X 54 respectively. Tables 1 through 3 show the DOF versus nodal directions. Because of symmetry, only the upper triangular matrix is given in the printout. The units are pounds, radians and feet. The matrices are given by row in the format of (2I5, 5E14.5) with the first integer representing the row number of a matrix and the second the sequence of cards in a row.

The flexibility matrices, obtained by inverting the stiffness matrices, are also given for the upper triangular portion in the same way as the stiffness matrices.

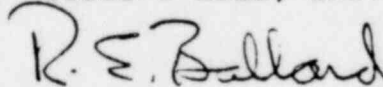
The stiffness matrix (30 X 30) and the corresponding flexibility matrix for the pressurizer supports (see Figure 4) are also given in the print-out. The DOF versus nodal directions for the pressurizer supports are tabulated in Table 4.

Mr. Thimmes, of your office, also asked for verification of the gap dimension between the Steam Generator and the Upper lateral support beam, G&H drawing 1457F34. The dimension is 1/32" in hot position all around.

If we can provide any additional information or clarification, please call R. E. Ballard at 212-760-4438.

Very truly yours,

GIBBS & HILL, INC.



Harvey R. Rock  
Manager of Projects

HRR/REBa:mm1  
1L

cc: ARMS (B&R SITE) Orig. L  
H. C. Schmidt (TUSI DALLAS) 2L 1A  
R. E. Heim (G&H SITE) 1L  
P. VandeVisse (TUSI SITE) 1L, 1A  
S. B. Burnwell (LIGHT WATER REACTORS BRANCH NO. 2, Nuclear  
Regulatory Commission, Washington D.C. 20555) 1L, 1A  
B. F. Saffell, Jr. (EG&G IDAHO, INC. P. O. Box 1625, Idaho Falls,  
ID 83401) 1L, 1A, 1 Microfilm

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POOR ORIGINAL

Diagram illustrating the layout of a steam generator, showing the right-hand coordinate system and the location of the steam generator.

The diagram shows a complex polygonal shape representing the steam generator. A right-hand coordinate system is indicated by the text "RIGHT-HAND COORDINATE SYSTEM" in the upper left corner. The system is defined by a vertical line and a horizontal line intersecting at a point labeled "5".

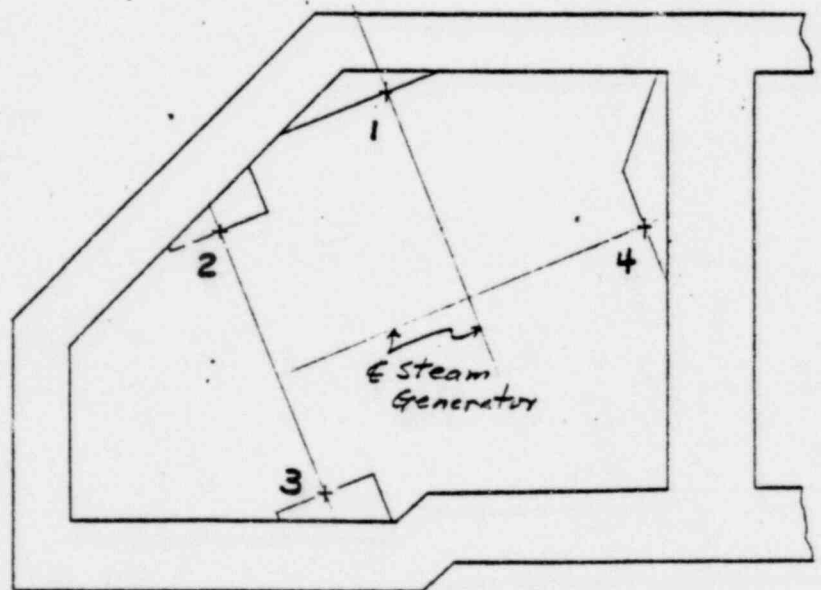
Key points and features labeled in the diagram include:

- Point 5: The intersection of the coordinate axes.
- Point 6: A point on the left boundary.
- Point 7: A point on the bottom boundary.
- Point 8: A point on the right boundary.
- Steam Generator: A label with an arrow pointing to a specific area within the polygon.

LOWER LATER SUPPORT  
EL. 834'-10 7/8"

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APPROVALS											

N 11



UPPER LATERAL SUPPORTS  
EL. 856'.

STEAM GENERATOR  
LATERAL SUPPORTS

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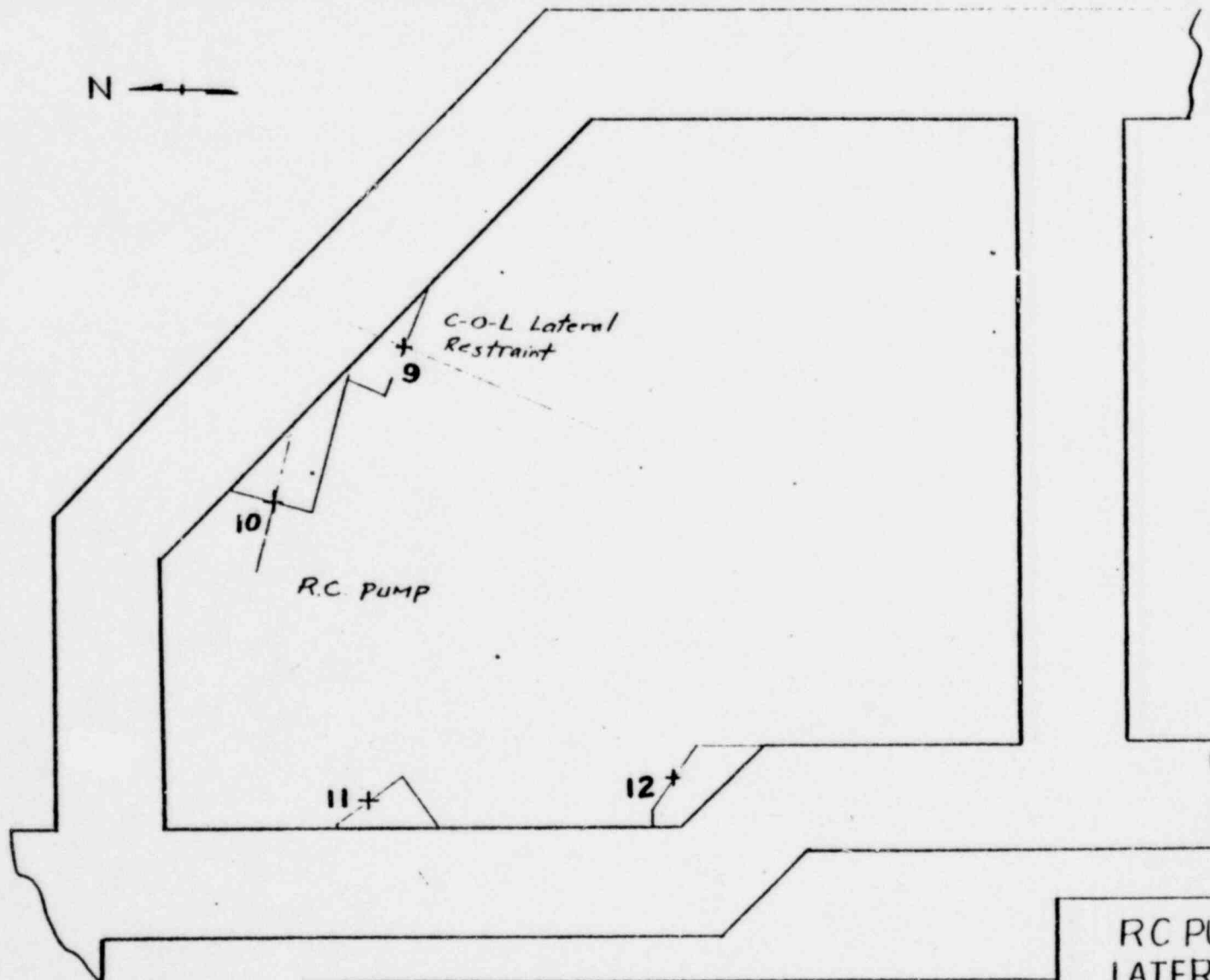
JOB NO. 2323A

Figure 1

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Point 9 @ EL. 823'-4 $\frac{7}{16}$ "  
Point 10, 11 & 12 @ EL. 829'-8 $\frac{1}{4}$ "

[illegible]

ISSUED FOR

# RC PUMP & C-O-L LATERAL SUPPORTS

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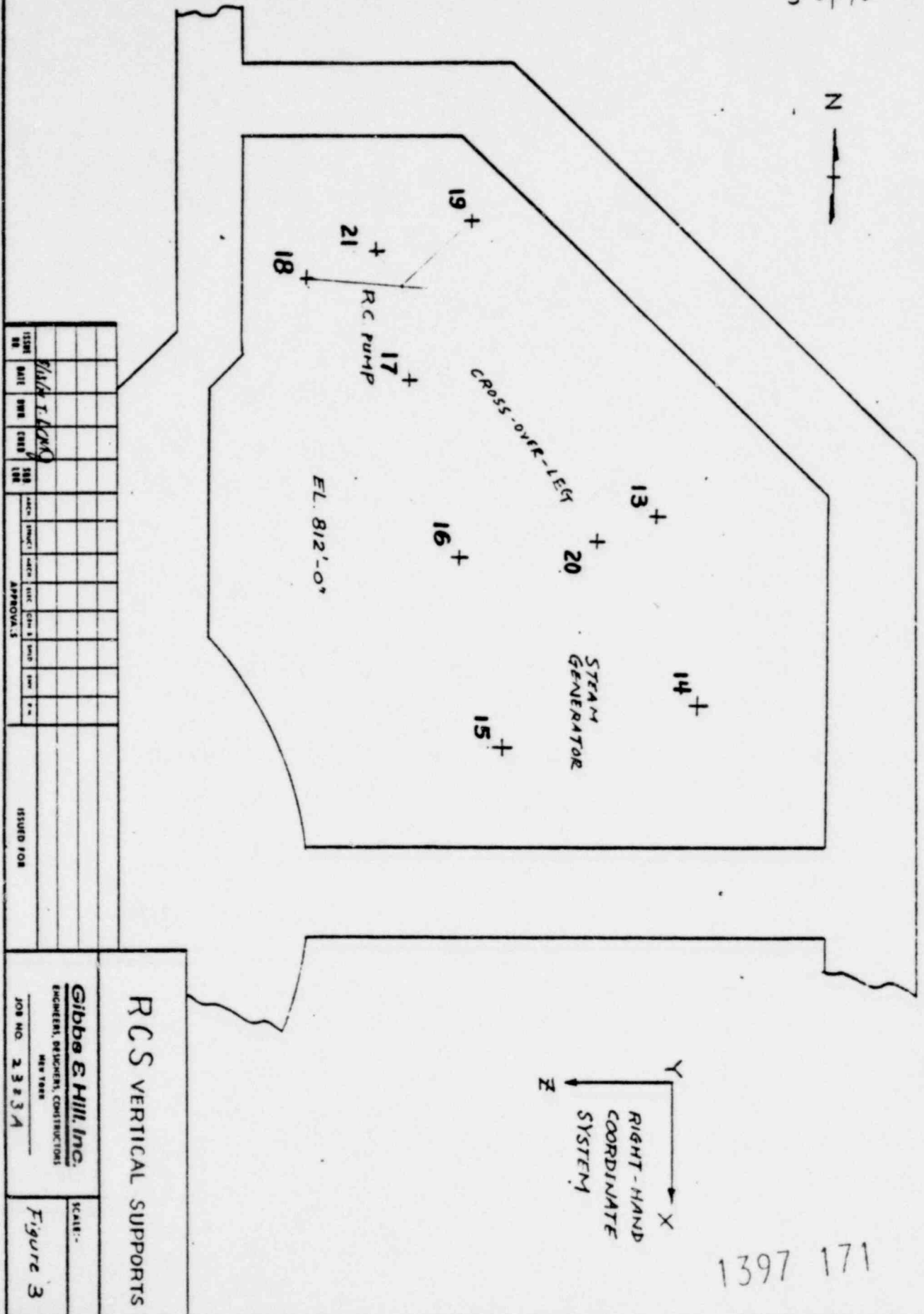
SCALE:-

Figure 2

5 of 10

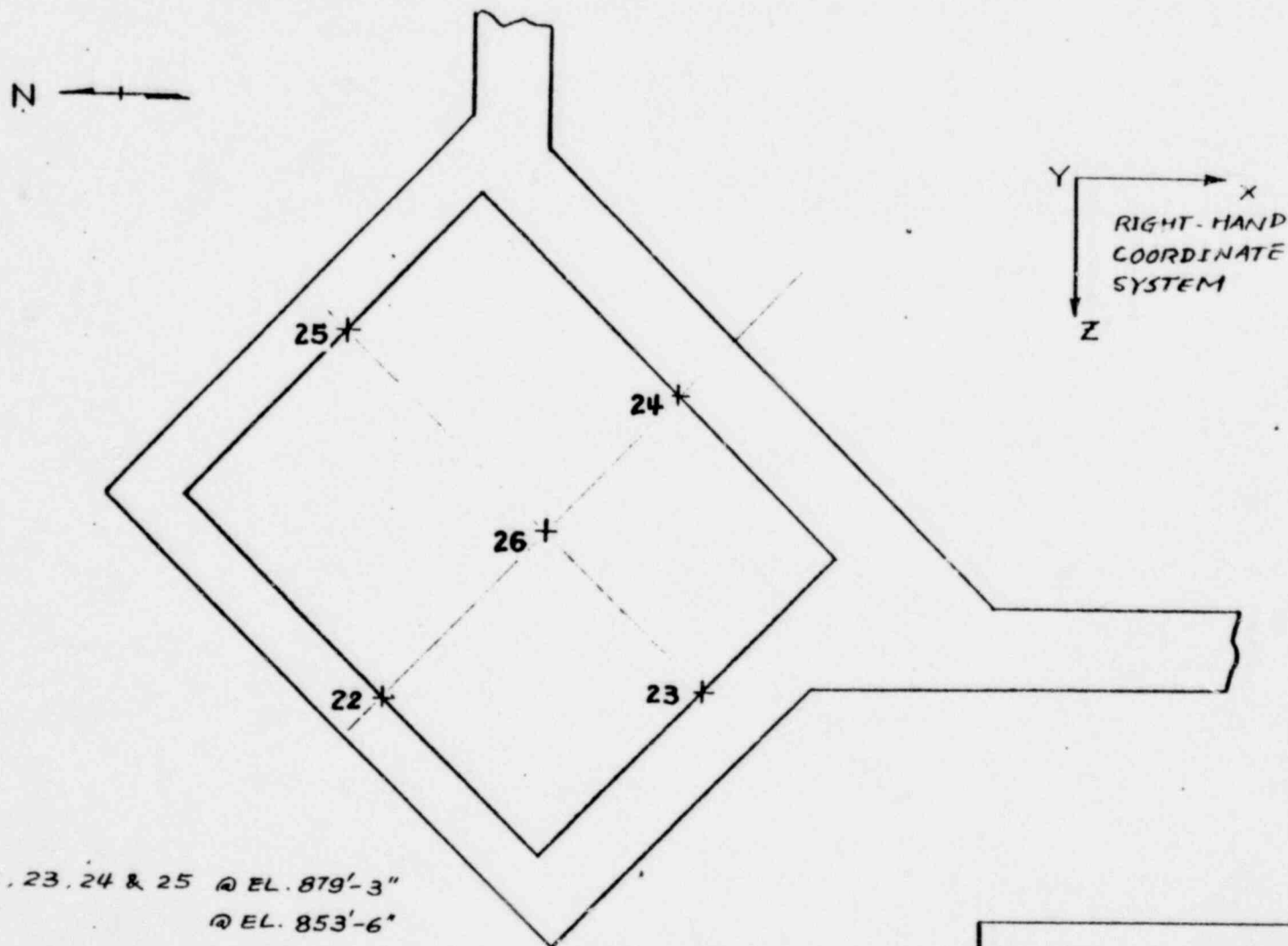
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POOR ORIGINAL



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POOR ORIGINAL



Points 22, 23, 24 & 25 @ EL. 879'-3"  
Point 26 @ EL. 853'-6"

[illegible]

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## PRESSURIZER SUPPORTS

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SCALE:-

Figure 4

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Sheet No. 7 Of 10Chk'd/App'd. By TUG

NEW YORK

G & H Job No. 2323ASubject STIFFNESS/FLEXIBILITY MATRICES (TUSI)

Ref. Dwg./Spec. No. ....

POOR ORIGINAL

Table 1. This is the degree of freedom (DOF) versus nodal direction of motion table for  
STEAM GENERATOR LATERAL SUPPORTS

(Use this table to find the node number associated with a)  
row/column number of stiffness/flexibility matrices)

DOF	NODE	DOF	NODE	DOF	NODE
1	1-X1	2	1-X2	3	1-X3
4	1-X4	5	1-X5	6	1-X6
7	2-X1	8	2-X2	9	2-X3
10	2-X4	11	2-X5	12	2-X6
13	3-X1	14	3-X2	15	3-X3
16	3-X4	17	3-X5	18	3-X6
19	4-X1	20	4-X2	21	4-X3
22	4-X4	23	4-X5	24	4-X6
25	5-X1	26	5-X2	27	5-X3
28	5-X4	29	5-X5	30	5-X6
31	6-X1	32	6-X2	33	6-X3
34	6-X4	35	6-X5	36	6-X6
37	7-X1	38	7-X2	39	7-X3
40	7-X4	41	7-X5	42	7-X6
43	8-X1	44	8-X2	45	8-X3
46	8-X4	47	8-X5	48	8-X6

x1 - Translation in X direction

x2 - Translation in Y direction

x3 - Translation in Z direction

x4 - Rotation about X axis

x5 - Rotation about Y axis

x6 - Rotation about Z axis

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Date *Aug. 15, 1974*Calc By *T. LO*Calc'd/App'd. By *C.M.J.*Subject *STIFFNESS/FLEXIBILITY MATRICES (TUSI)***Gibbs & Hill, Inc.**ENGINEERS, DESIGNERS, CONSTRUCTORS  
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Filing Code *KRB-1C*Sheet No. *8* of *10*G & H Job No. *2323A*

Ref. Dwg./Spec. No. ....

POOR ORIGINAL

Table 2. This is the degree of freedom (DOF) versus  
nodal direction of motion table for

R.C. PUMP &amp; C-O-L LATERAL SUPPORTS

(Use this table to find the node number associated with a)  
row/column number of stiffness/flexibility matrices

DOF	NODE	DOF	NODE	DOF	NODE
1	9-X1	2	9-X2	3	9-X3
4	9-X4	5	9-X5	6	9-X6
7	10-X1	8	10-X2	9	10-X3
10	10-X4	11	10-X5	12	10-X6
13	11-X1	14	11-X2	15	11-X3
16	11-X4	17	11-X5	18	11-X6
19	12-X1	20	12-X2	21	12-X3
22	12-X4	23	12-X5	24	12-X6

X1 - Translation in X direction

X2 - Translation in Y direction

X3 - Translation in Z direction

X4 - Rotation about X axis

X5 - Rotation about Y axis

X6 - Rotation about Z axis

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# POOR ORIGINAL

Table 3. This is the degree of freedom (DOF) versus nodal direction of motion table for  
RCS VERTICAL SUPPORTS

(Use this table to find the node number associated with a row/column number of stiffness/flexibility matrices)

DOF	NODE	DOF	NODE	DOF	NODE
1	13-X 1	2	13-X 2	3	13-X 3
4	13-X 4	5	13-X 5	6	13-X 6
7	14-X 1	8	14-X 2	9	14-X 3
10	14-X 4	11	14-X 5	12	14-X 6
13	15-X 1	14	15-X 2	15	15-X 3
16	15-X 4	17	15-X 5	18	15-X 6
19	16-X 1	20	16-X 2	21	16-X 3
22	16-X 4	23	16-X 5	24	16-X 6
25	17-X 1	26	17-X 2	27	17-X 3
28	17-X 4	29	17-X 5	30	17-X 6
31	18-X 1	32	18-X 2	33	18-X 3
34	18-X 4	35	18-X 5	36	18-X 6
37	19-X 1	38	19-X 2	39	19-X 3
40	19-X 4	41	19-X 5	42	19-X 6
43	20-X 1	44	20-X 2	45	20-X 3
46	20-X 4	47	20-X 5	48	20-X 6
49	21-X 1	50	21-X 2	51	21-X 3
52	21-X 4	53	21-X 5	54	21-X 6

x1 - Translation in X direction

x2 - Translation in Y direction

x3 - Translation in Z direction

x4 - Rotation about X axis

x5 - Rotation about Y axis

x6 - Rotation about Z axis

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NEW YORKSheet No. 10 Of 10Chk'd/Approved By C.M.G.G & H Job No. 2723ASubject STIFFNESS/FLEXIBILITY MATRICES (TUSI)

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**POOR ORIGINAL**

Table 4. This is the degree of freedom (DOF) versus nodal direction of motion table for PRESSURIZER SUPPORTS

(Use this table to find the node number associated with a row/column number of stiffness/flexibility matrices)

DOF	NODE	DOF	NODE	DOF	NODE
1	22-X1	2	22-X2	3	22-X3
4	22-X4	5	22-X5	6	22-X6
7	23-X1	8	23-X2	9	23-X3
10	23-X4	11	23-X5	12	23-X6
13	24-X1	14	24-X2	15	24-X3
16	24-X4	17	24-X5	18	24-X6
19	25-X1	20	25-X2	21	25-X3
22	25-X4	23	25-X5	24	25-X6
25	26-X1	26	26-X2	27	26-X3
28	26-X4	29	26-X5	30	26-X6

X1 - Translation in X direction  
 X2 - Translation in Y direction  
 X3 - Translation in Z direction  
 X4 - Rotation about X axis  
 X5 - Rotation about Y axis  
 X6 - Rotation about Z axis

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