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 AUTH. NAME AUTHOR AFFILIATION
 UHRIG, R.E. Florida Power & Light Co.
 RECIPIENT NAME RECIPIENT AFFILIATION
 EISENHUT, D.G. Division of Licensing

SUBJECT: Forwards response to base plate flexibility action items noted in summary of 820525 meeting in Bethesda, MD.

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NOTES:

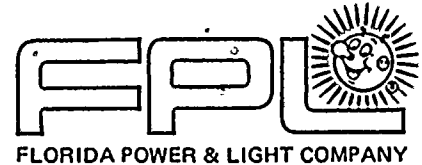
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	LIC BR #3 LA		1	0	NERSES, V.	01	1	1	
INTERNAL:	ELD/HDS2		1	0	IE FILE		1	1	
	IE/DEP EPDS	35	1	1	IE/DEP/EPLB	36	3	3	
	NRR/DE/CEB	11	1	1	NRR/DE/eqb	13	3	3	
	NRR/DE/GB	28	2	2	NRR/DE/HGEB	30	2	2	
	NRR/DE/MEB	18	1	1	NRR/DE/MTEB	17	1	1	
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	NRR/DHFS/PTRB20		1	1	NRR/DSI/AEB	26	1	1	
	NRR/DSI/ASB	27	1	1	NRR/DSI/CPB	10	1	1	
	NRR/DSI/CSB	09	1	1	NRR/DSI/ETSB	12	1	1	
	NRR/DSI/ICSB	16	1	1	NRR/DSI/PSB	19	1	1	
	NRR/DSI/RAB	22	1	1	NRR/DSI/RSB	23	1	1	
	NRR/DST/LGB	33	1	1	<u>REG FILE</u>	04	1	1	
	RGN2		2	2	RM/DDAMI/MIB		1	0	
EXTERNAL:	ACRS	41	10	10	BNL (AMDTS ONLY)		1	1	
	DMB/DSS (AMDTS)		1	1	FEMA-REP DIV	39	1	1	
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	NSIC	05	1	1	NTIS		1	1	

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THE UNITED STATES OF AMERICA
 DEPARTMENT OF THE ARMY
 OFFICE OF THE CHIEF OF STAFF
 WASHINGTON, D. C. 20315

REPORT OF THE CHIEF OF STAFF
 ON THE STATE OF THE ARMY
 FOR THE YEAR 1964

Category	Item	Value	Unit	Notes
Personnel	Active Personnel	1,000,000	Personnel	
	Reserve Personnel	500,000	Personnel	
	Contract Personnel	100,000	Personnel	
	Medical Personnel	50,000	Personnel	
	Chaplain Personnel	10,000	Personnel	
	Aviation Personnel	20,000	Personnel	
	Special Operations Personnel	15,000	Personnel	
	Communications Personnel	15,000	Personnel	
	Engineering Personnel	15,000	Personnel	
	Other Personnel	15,000	Personnel	
Equipment	Small Arms	1,000,000	Weapons	
	Artillery	500,000	Weapons	
	Armored Vehicles	100,000	Equipment	
	Aviation Equipment	200,000	Equipment	
	Special Operations Equipment	100,000	Equipment	
	Communications Equipment	100,000	Equipment	
	Engineering Equipment	100,000	Equipment	
	Medical Equipment	50,000	Equipment	
	Chaplain Equipment	10,000	Equipment	
	Other Equipment	100,000	Equipment	
Construction	Buildings	1,000,000	Construction	
	Infrastructure	500,000	Construction	
	Transportation	100,000	Construction	
	Aviation Facilities	200,000	Construction	
	Special Operations Facilities	100,000	Construction	
	Communications Facilities	100,000	Construction	
	Engineering Facilities	100,000	Construction	
	Medical Facilities	50,000	Construction	
	Chaplain Facilities	10,000	Construction	
	Other Facilities	100,000	Construction	
Maintenance	Repairs	1,000,000	Maintenance	
	Overhaul	500,000	Maintenance	
	Parts	100,000	Maintenance	
	Aviation Maintenance	200,000	Maintenance	
	Special Operations Maintenance	100,000	Maintenance	
	Communications Maintenance	100,000	Maintenance	
	Engineering Maintenance	100,000	Maintenance	
	Medical Maintenance	50,000	Maintenance	
	Chaplain Maintenance	10,000	Maintenance	
	Other Maintenance	100,000	Maintenance	



July 27, 1982
L-82-311

Office of Nuclear Reactor Regulations
Attention: Mr. Darrell G. Eisenhut, Director
Division of Licensing
U. S. Nuclear Regulatory Commission
Washington, D.C. 20555

Dear Mr. Eisenhut:

Re: St. Lucie Unit No. 2
Docket No. 50-389
Response to Base Plate Flexibility Action Items

Enclosed please find our response to the action items noted in "Summary of meeting held in Bethesda, Maryland with FPL on May 25, 1982 regarding Base Plate Flexibility" which was prepared by your Mr. Victor Nerses and is dated May 28, 1982.

Should you have any questions please contact us accordingly.

Very truly yours,

A handwritten signature in cursive script that reads 'Robert E. Uhrig'.

Robert E. Uhrig
Vice President
Advanced Systems and Technology

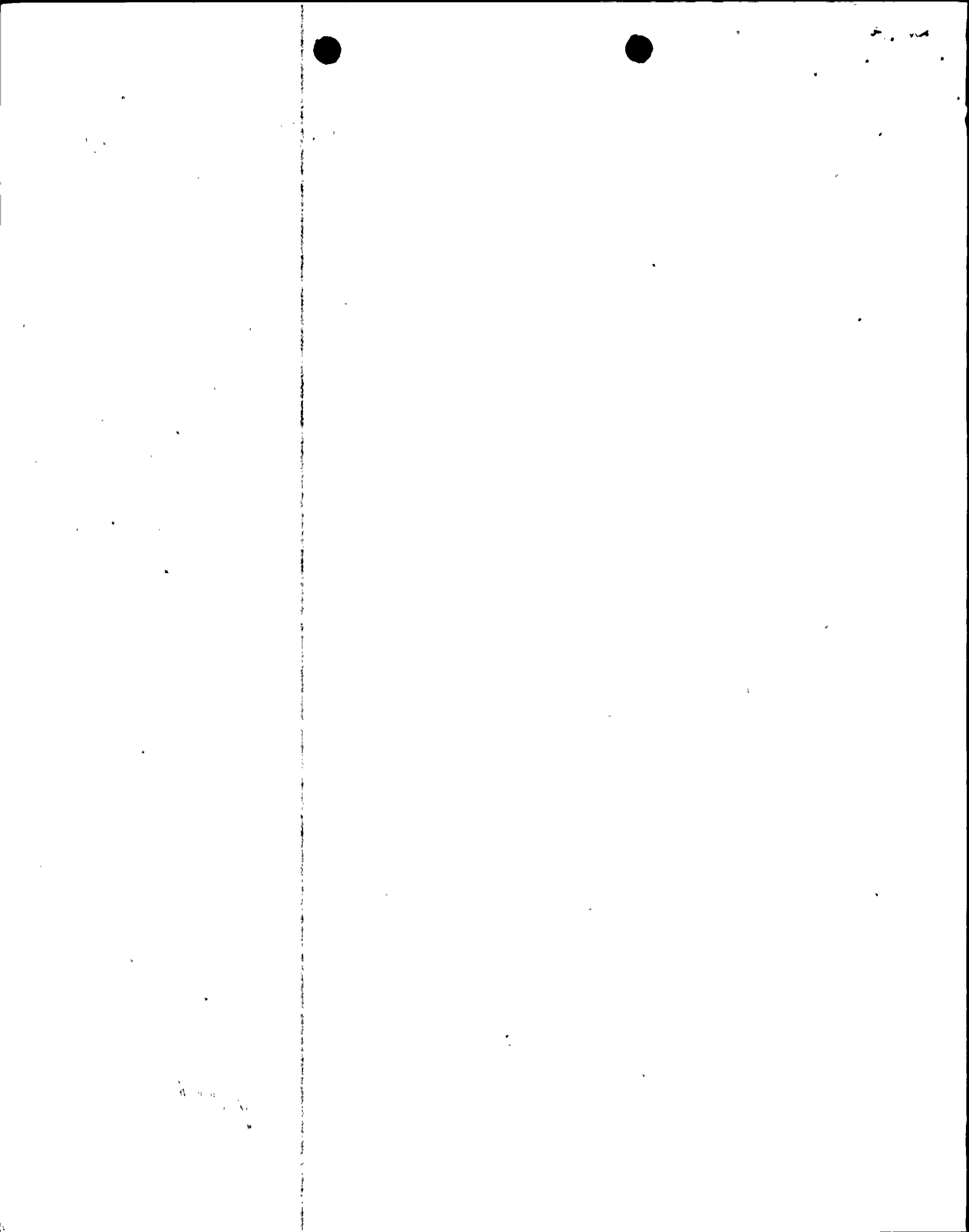
REU/RŞ/cab

Attachment

cc: J. P. O'Reilly, Region II
Harold F. Reis, Esquire

13001

8208030468 820727
PDR ADDCK 05000389
A PDR



FLORIDA POWER & LIGHT COMPANY
ST. LUCIE UNIT 2
RESPONSE TO BASE PLATE FLEXIBILITY
ACTION ITEMS FROM MAY 25, 1982
MEETING WITH THE NRC

Reference: "Summary of meeting held in Bethesda, Maryland with FPL on May 25, 1982, regarding Base Plate Flexibility", dated May 28, 1982, prepared by Victor Nerses, Project Manager, Licensing Branch No. 3, Division of Licensing.

Action Item 1:

FP&L will confirm that a safety factor of 15 was used across the board on safety-related application piping hangers. This confirmation will be submitted formally to the NRC by June 11, 1982.

Response to Item 1:

A safety factor of 15 was used across the board (i.e. applied to dead, thermal and seismic loads) in the design of small-bore safety-related pipe supports which required the use of expansion anchors. There are 79 such supports at St. Lucie Unit 2. All the small-bore safety-related pipe supports were designed by Ebasco Engineering.

The large-bore safety-related pipe supports at St. Lucie Unit 2 were designed by Bergen-Paterson. 33 of these supports required the use of concrete expansion anchors. It has been determined that Bergen-Paterson did not use a factor of safety of 15 in the design of these supports. In order to verify the design adequacy of expansion anchor applications for large-bore safety-related pipe supports, FPL proposes to analyze 10 of the 33 Bergen-Paterson designs which represent the worst cases using the ANSYS computer program. The results will be compared to the ultimate concrete expansion anchor capacities to determine the actual factors of safety.

A list of the 10 worst case supports is expected from Bergen-Paterson within two weeks. Ebasco Engineering will require from four to six weeks to complete their computer analysis. Therefore, the results of the proposed verification should be forwarded to the NRC by the end of August 1982.

Action Item 2

FP&L will do a calculation for the anchorage design using a "non-proportional" σ_y and submit the results to NRC formally by June 11, 1982.

Response to Item 2:

The previously submitted hand calculation sample has been revised to reflect the use of a single value σ_y , as requested by NRC. A copy is enclosed (attachment A).

Action Item 3

FP&L will determine if it is necessary to develop a sample calculation for base plates with other than 4 bolts for either single axis or biaxial bending.

Response to Item 3:

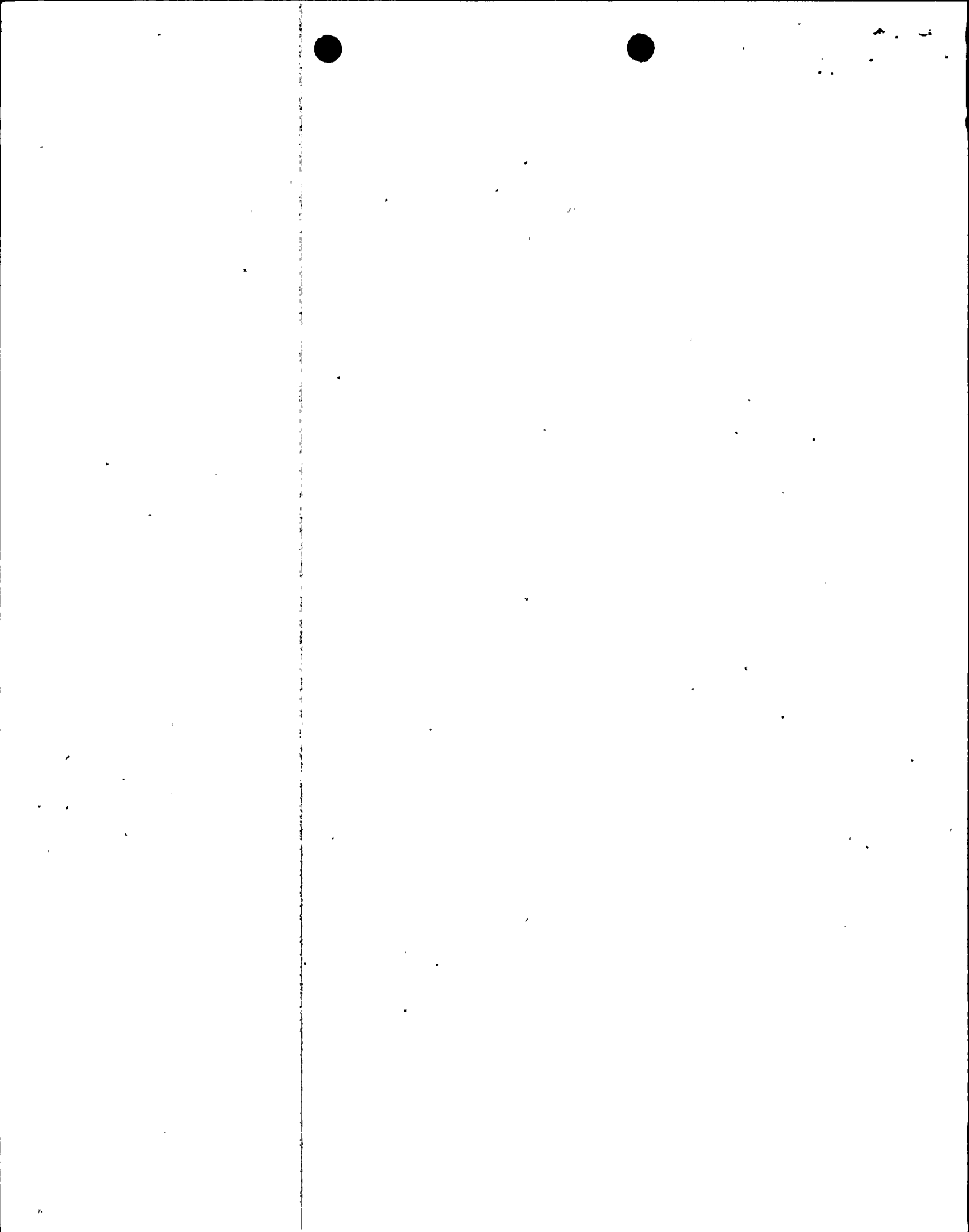
Seven cases of support designs utilizing an expansion anchor detail of other than 4 bolts have been identified. 4 of these designs, judged to be the most severe, were analyzed using the ANSYS finite element computer program. All but one resulted in a factor of safety of at least 15 for bolt tension and shear. The sole exception was a factor of safety 13.1 for bolt tension. Ultimate capacity values used are based on actual tests performed at site. Analysis summary sheets for the 4 cases are enclosed (attachments B,C,D&E).

Action Item 4

FP&L will determine for the cases where expansion anchors were used if SRSS summation of effects are appropriate and formally provide the results of this determination to the NRC by June 11, 1982.

Response to Item 4:

A review of calculations for both small-bore and large-bore support designs indicates that SRSS summation of biaxial effects was, in fact, not used. All such effects were summed directly.



BY S. YAN DATE 10-13-80

NEW YORK

SHEET 9 OF 35

CHKD. BY RPR DATE 10-16-80

OFF NO. 2524

DEPT. NO. 650

CLIENT FLO

PROJECT ST. LUCIE #2

REV. BY S. YAN 6-23-82

SUBJECT INSTRUMENT SUPPORT

CHK BY J. CHIANG 6-23-82

SUPPORT S7 (CONT.)

FOR ANCHORAGE WITH EXP. BOLTS

$$I_y = I_z = 4 \times 3.5^2 = 49$$

$$I_x = 49 \times 2 = 98$$

$$p = \frac{0.2}{4} + \frac{(0.13 + 0.04) \times 3.5}{49}$$

$$= 0.062 \text{ K/BOLT}$$

$$H = \sqrt{\left(\frac{0.01}{4} + \frac{0.01 \times 3.5^2}{98}\right)^2 + \left(\frac{0.07}{4} + \frac{0.01 \times 3.5^2}{98}\right)^2}$$

$$= 0.018 \text{ K/BOLT}$$

LOAD FACTOR = 3.8

$$B = 0.062 \times 3.8 = 0.24 \text{ K/BOLT}$$

$$V = 0.018 \times 3.8 = 0.07 \text{ K/BOLT}$$

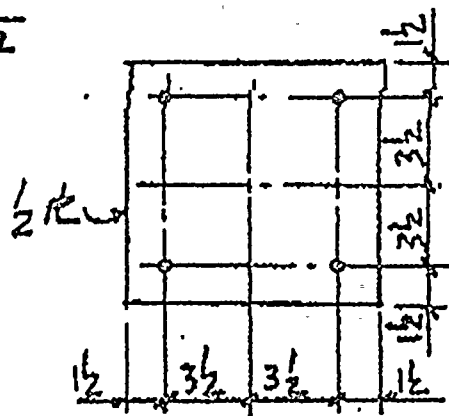
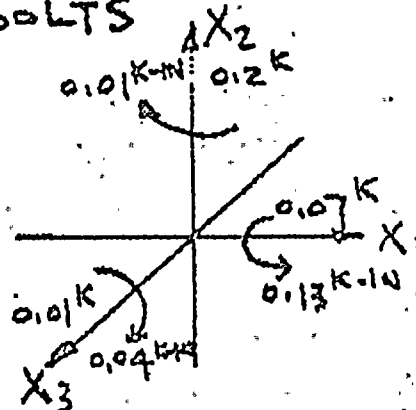
CHECK PRYING ACTION FOR 1/2" ϕ BOLT

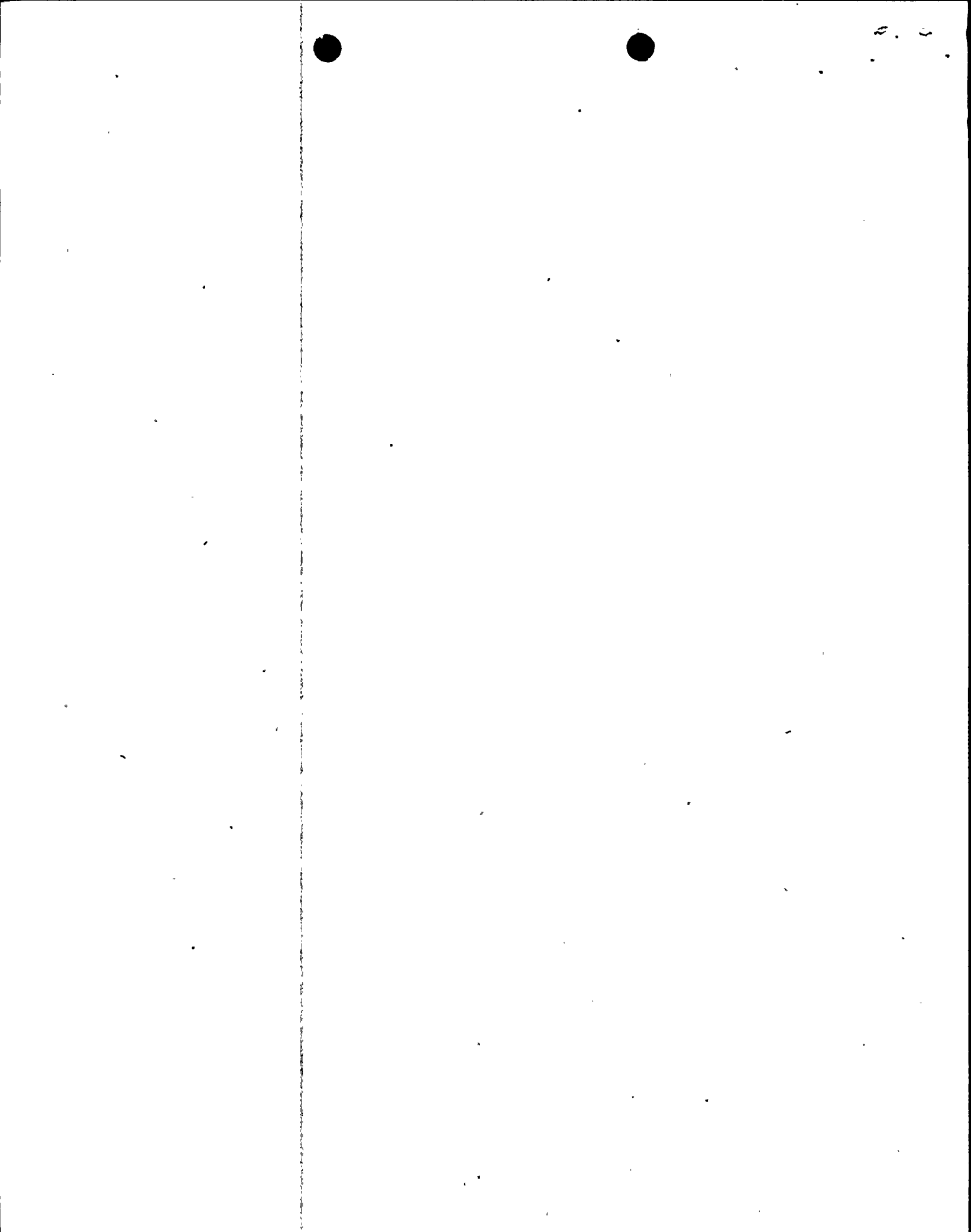
$$\delta = \frac{10 - 2 \times \frac{11}{16}}{10} = 0.8625$$

$$\alpha_1 = \frac{1}{0.8625} \left(\frac{4 \times 0.19 \times 2.065}{5 \times 0.5^2 \times 36} - 1 \right) = -1.12 < 0$$

$$\alpha_2 = \frac{1}{0.8625} \left(\frac{4 \times 0.247 \times 2.0625}{5 \times 0.5^2 \times 36 \times 2.375} - \frac{2 \times 2.0625}{2.375} - 1 \right) = -3.15 < 0$$

$$\alpha_3 = \frac{1}{0.8625} \left(\frac{4 \times 0.076 \times 2.0625}{5 \times 0.5^2 \times 36 \times 2.375} - \frac{2 \times 2.0625}{2.375} - 1 \right) = -3.17 < 0$$





BY S. YAN DATE 6-23-82

NEW YORK

SHEET 10 OF

CHKD. BY DATE 6-23-82

OPS NO. 2524 DEPT. NO. 650

CLIENT FLO

PROJECT ST. LUCIE # 2

SUBJECT INSTRUMENT SUPPORT

SUPPORT S7 (CONT.)

NO. PRYING ACTION

$$B_a = 0.25 \times 7.1 = 1.775 \text{ K} / \text{BOLT}$$

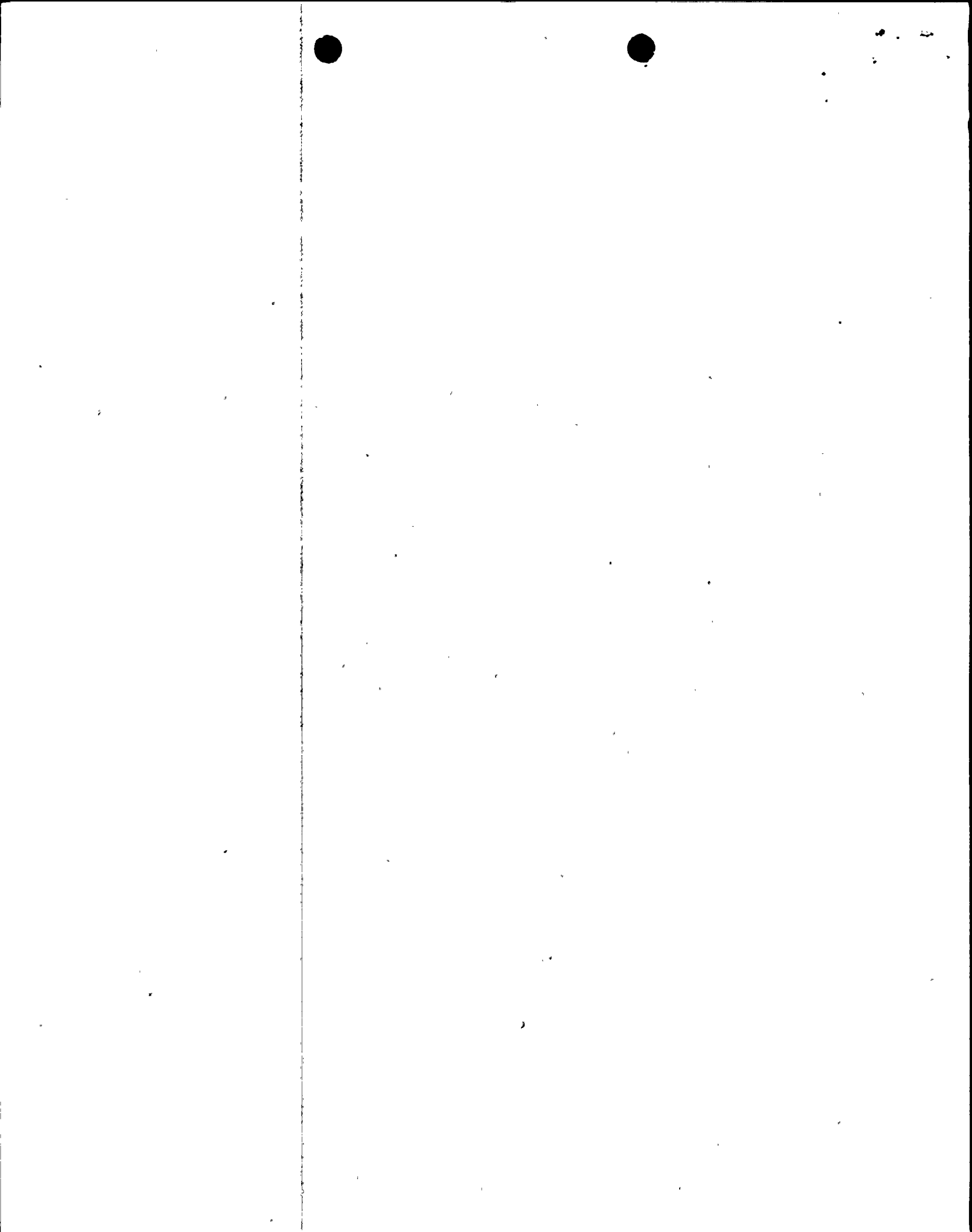
$$V_a = 0.25 \times 6 = 1.5 \text{ K} / \text{BOLT}$$

$$\frac{B}{B_a} + \frac{V}{V_a} = \frac{0.24}{1.775} + \frac{0.07}{1.5} < 1.0$$

O.K.

BY INSPECTION, $\frac{1}{2}$ " \bar{R} IS O.K.

USE 4 - $\frac{1}{2}$ " Φ EXP. BOLT WITH \bar{R} 10 X $\frac{1}{2}$ X 0'-10



ATTACHMENT "B"
EBASCO SERVICES INCORPORATED

BY MZK DATE 6/29/82

NEW YORK

SHEET _____ OF _____

CHKD. BY CHS DATE 6/29/82

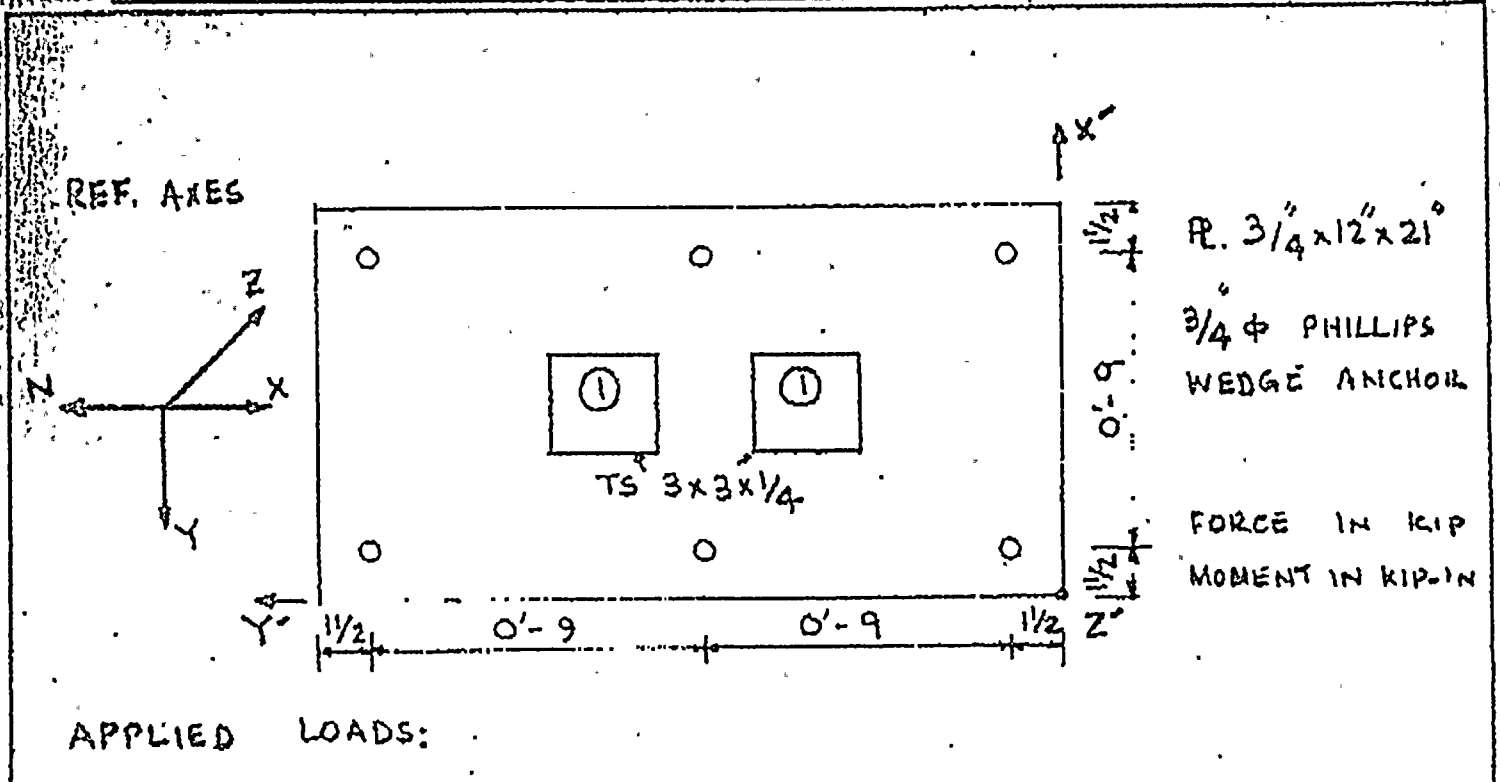
OFF. NO. 2524-902

DEPT. 650
NO. _____

FLIGHT F L Φ

PROJECT ST. LUCIE #2

SUBJECT BASE PLATE ANALYSIS - CW-3006-6 (Release # 341)



APPLIED LOADS:

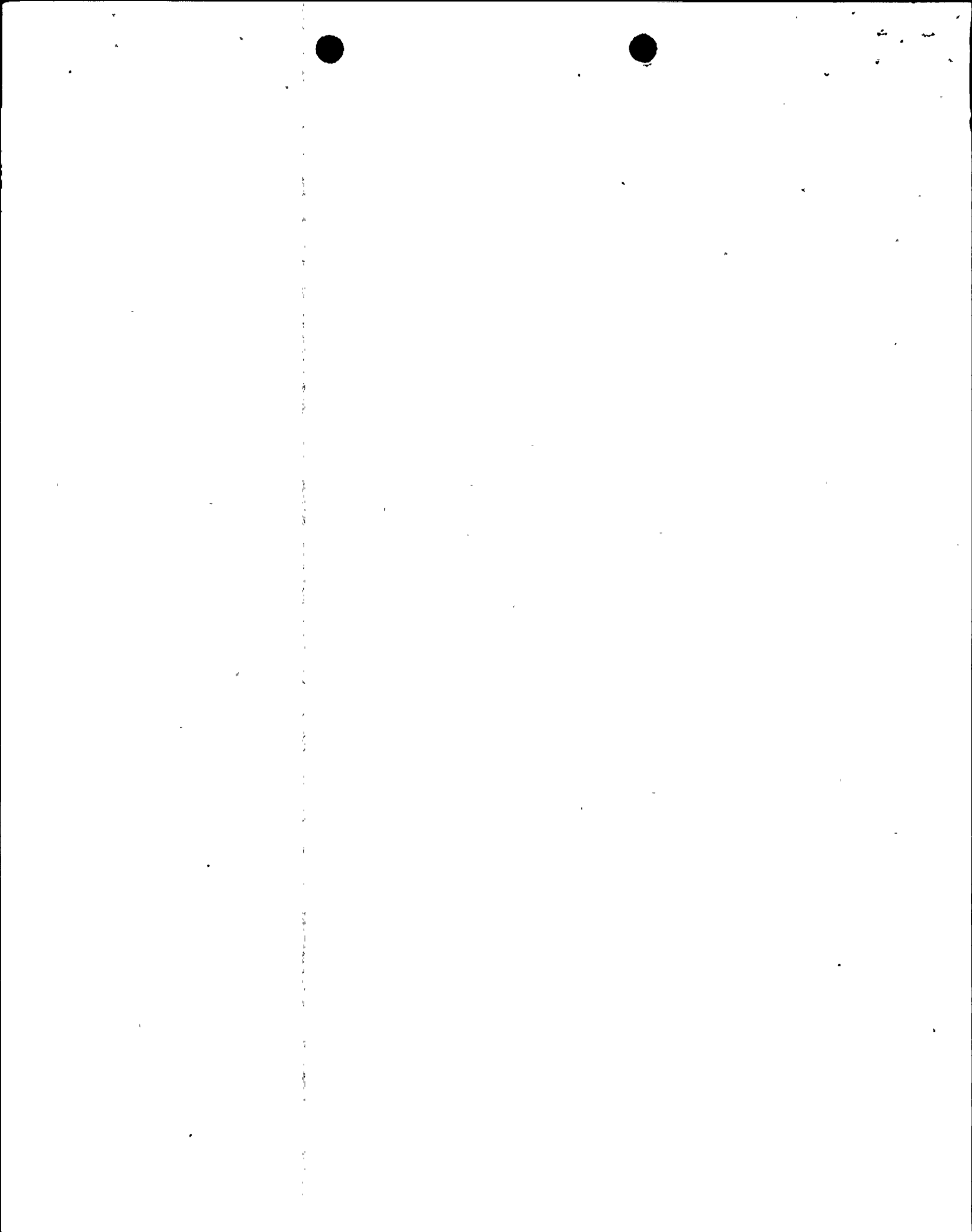
LOCATION OF LOAD	FX'	FY'	FZ'	MX'	MY'	MZ'
①	0.646	-0.0995	0.0	0.597	-3.876	0.0

RESULTS:

BASED ON F.S. OF 15

MAX. BOLT LOAD (TENSION) (KIP)	MAX. BOLT SHEAR (KIP)	MAX. R. STRESS (KSI)	ALLOW. BOLT TENSION	ALLOW. BOLT SHEAR
0.47	0.22	1.91	0.77	0.99

COMPUTER OUTPUT: MZKAJD4 dt 6/29/82



ATTACHMENT C
EBASCO SERVICES INCORPORATED

BY MZK DATE 6/28/82

SHEET _____ OF _____

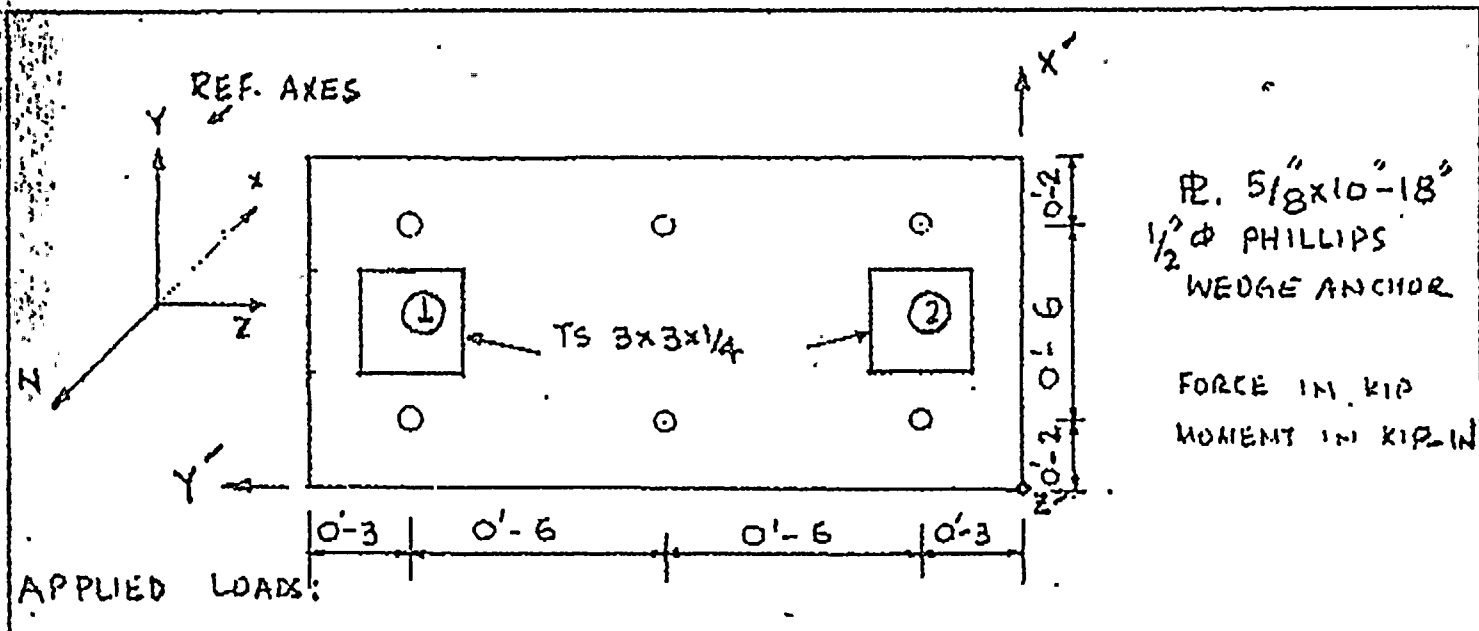
CHKD. BY CHS DATE 6/28/82

SPS NO. 2524.902 DEPT. NO. 550

CLIENT F L φ

PROJECT ST. LUCIE #2

SUBJECT BASE PLATE ANALYSIS - SPS - 427 (Release # 560)



LOCATION OF LOAD	FX'	FY'	FZ'	MX'	MY'	MZ'
①	0.0	-0.616	0.90	2.776	0.0	0.0
②	0.0	-0.412	0.90	1.796	0.0	0.0

RESULTS :

BASED ON F.S. OF 15

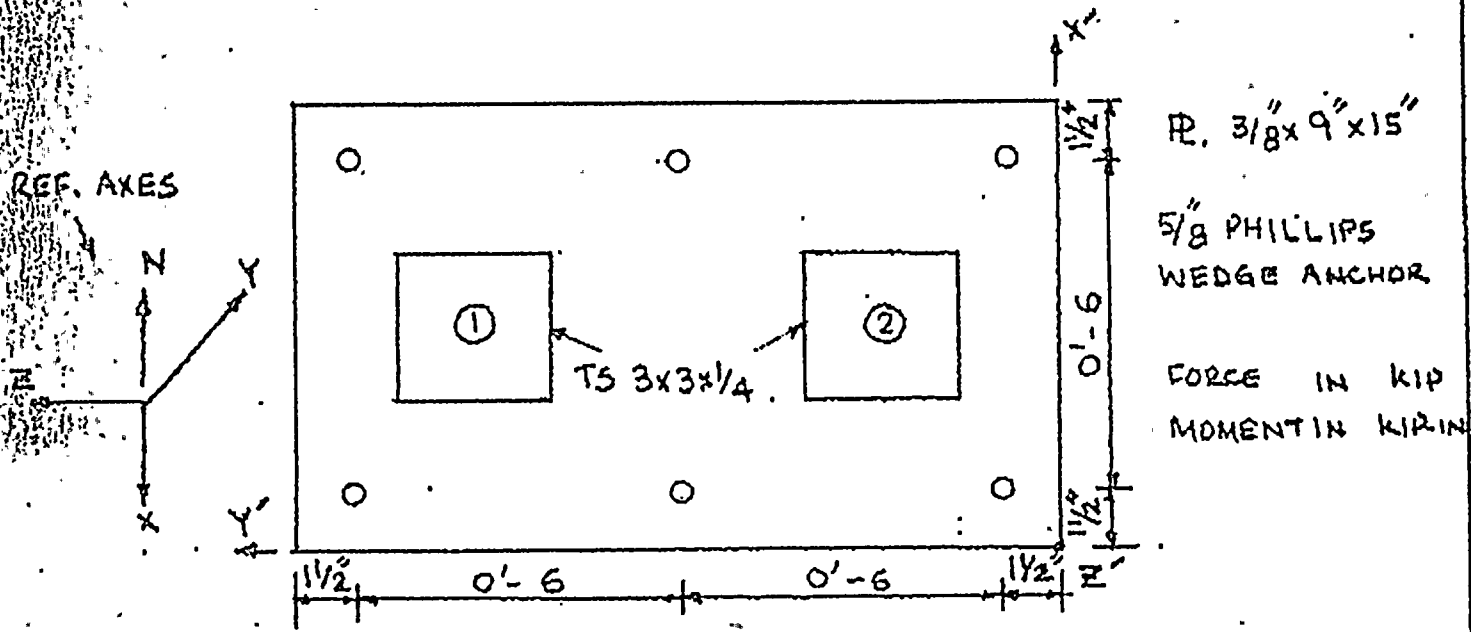
MAX. BOLT LOAD (TENSION) (KIP)	MAX. BOLT SHEAR (KIP)	MAX. PL. STRESS (KSI)	ALLOW. BOLT TENSION	ALLOW. BOLT SHEAR
0.54	0.23	2.33	0.47	0.40

ATTACHMENT "D"
EBASCO SERVICES INCORPORATED

BY MZK DATE 6/28/82
 CHD. BY CKS DATE 6/28/82

SHEET _____ OF _____
 OFS NO. 2524.902 DEPT. NO. 550

CLIENT L
 PROJECT ST. LUCIE #2
 SUBJECT BASE PLATE ANALYSIS - WM-2092-63 (Release # 582)



APPLIED LOADS:

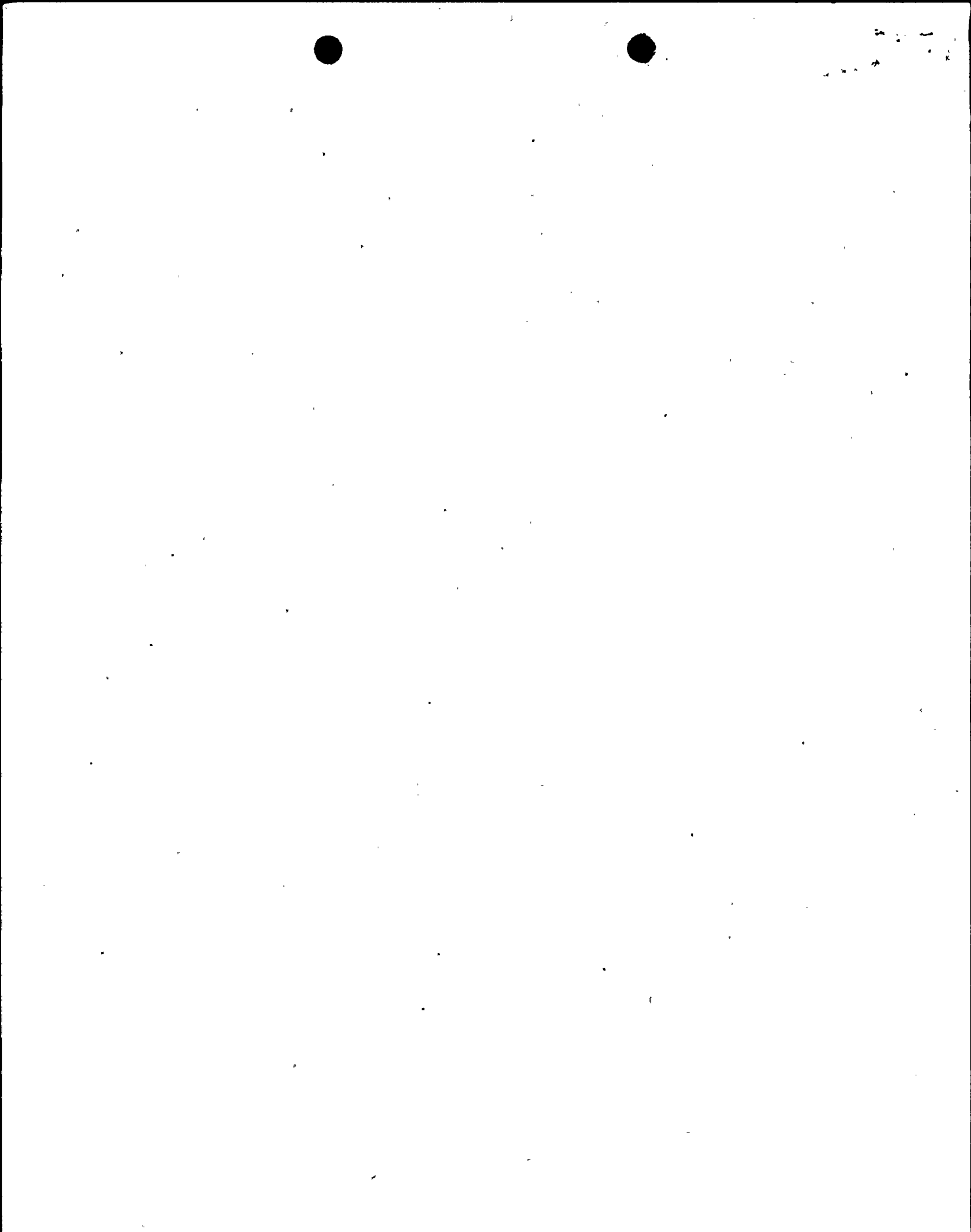
LOCATION OF LOAD	F _{X'}	F _{Y'}	F _{Z'}	M _{X'}	M _{Y'}	M _{Z'}
①	0.0	0.226	-0.189	-5.161	0.0	0.0
②	0.0	0.202	-0.189	-4.951	0.0	0.0

RESULTS:

BASED ON F.S. OF 15

MAX. BOLT LOAD (TENSION) (KIP)	MAX. BOLT SHEAR (KIP)	MAX. R. STRESS (KSI)	ALLOW. BOLT TENSION	ALLOW. BOLT SHEAR
0.38	0.07	6.42	0.69	0.64

COMPUTER OUTPUT: MZKAJQ9 DT. 6/25/82



ATTACHMENT "E"
 MASCO SERVICES INCORPORATED
 NEW YORK

BY MZK DATE 6/28/82

SHEET _____ OF _____

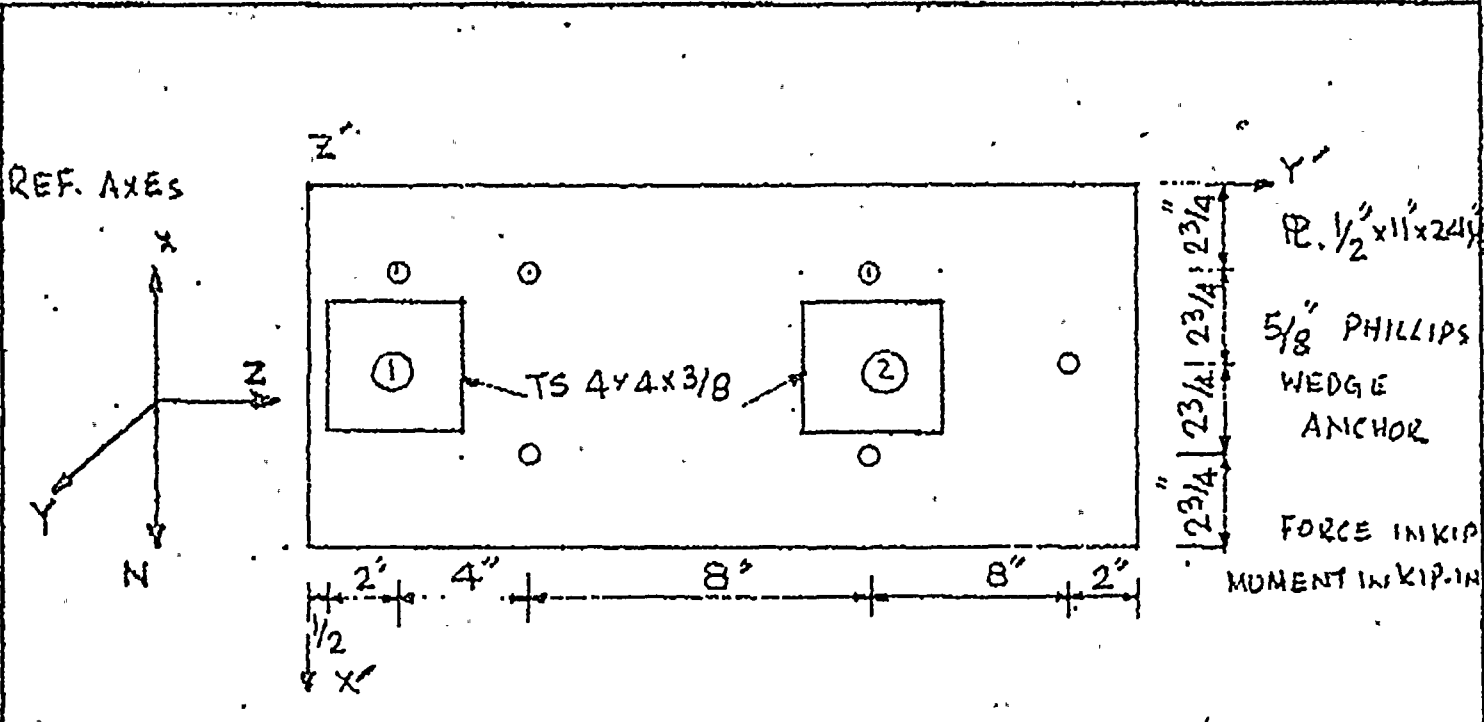
CHKD. BY CHS DATE 6/29/82

DEPT. NO. 2524.902 DEPT. NO. 550

CLIENT F L P

PROJECT ST. LUCIE #2

SUBJECT BASE PLATE ANALYSIS - CH-2081-685 (Release # 604)



APPLIED LOADS:

LOCATION OF LOAD	FX'	FY'	FZ'	MX'	MY'	MZ'
①	0.0	0.023	0.19	-0.209	0.0	0.0
②	0.0	-0.023	0.19	0.209	0.0	0.0

RESULTS :

BASED ON F.S. OF 15

MAX. BOLT LOAD (TENSION) (KIP)	MAX. BOLT SHEAR (KIP)	MAX. PL. STRESS (KSI)	ALLOW. BOLT TENSION	ALLOW. BOLT SHEAR
0.15	0.0	1.05	0.69	0.64

COMPUTER OUTPUT : MZKAJAF

dt. 6/29/82

