

MIDDLE SOUTH  
UTILITIES SYSTEM

**LOUISIANA**  
POWER & LIGHT

142 DELARONDE STREET • P.O. BOX 8008  
NEW ORLEANS, LOUISIANA 70174-8008 • (504) 388-2345

November 30, 1984

W3P84-3337  
3-A1.16.07  
3-A1.01.04  
A4.05

Director, Nuclear Reactor Regulation  
ATTN: Mr. D. M. Crutchfield, Assistant Director  
for Safety Assessment  
Division of Licensing  
U. S. Nuclear Regulatory Commission  
Washington, D.C. 20555

SUBJECT: Waterford 3 SES  
Docket No. 50-382  
Additional Information on Basemat Cracks

Dear Mr. Crutchfield:

On November 16, 1984, Dr. John S. Ma of your staff requested certain design/analysis information regarding the foundation basemat for Waterford 3. The information requested by Dr. Ma related to placement of the reinforcing steel in the mat and diagrams for the North-South bending moments using both constant and variable soil springs. The responses enclosed in Attachments I and II to this letter were provided to Dr. Ma on November 16 and 20, 1984 respectively. Subsequently, on November 26, 1984, Dr. Ma requested additional information with respect to soil spring distributions and North-South bending capacities in both the positive and negative directions. Attachment III to this letter contains the information provided to Dr. Ma on November 27, 1984 in response to his request.

We trust that the information provided adequately addresses Dr. Ma's questions, however, should additional information be required or should you wish to discuss this matter further, please do not hesitate to contact me.

Very truly yours,

K.W. Cook  
Nuclear Support & Licensing Manager

KWC:WAC:sms

ATTACHMENTS

cc: J.T. Collins, NRC Region IV  
G.W. Knighton, NRC-NRR  
J.H. Wilson, NRC-NRR  
G.L. Constable, NRC Resident

T.A. Flipppo, NRC Resident  
INPO Records Center (D.L. Gillispie)  
E.L. Blake  
W.M. Stevenson

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1/1

11/16/84 (R0)  
Sheet 1 of 6

RESPONSE TO DR. J MA'S QUESTION  
OF 11/16/84

Q1. Provide locations of N-S top and bottom reinforcement of the basemat under and outside of the Reactor Building.

Ans. As-built N-S re-bar locations under and outside of the Reactor Building, along Section A-A, are shown in the attached sketches (SH 2/6 to 6/6)

SH 2 Plan of the basemat - showing top and bottom reinforcement distribution, and areas of concern, Areas I, II and III along E-W centerline of the Reactor Building (Section A-A).

SH 3 N-S top re-bar locations for Areas I, II and III

SH 4 N-S bottom re-bar locations for Area I

SH 5 N-S bottom re-bar locations for Area II

SH 6 N-S bottom re-bar locations for Area III

Q2. Provide N-S bending moment diagram along Section A-A of the basemat for the following load conditions:

- a. Constant soil springs with side soils
- b. Constant soil springs without side spoils
- c. Variable soil springs with side soils
- d. Variable soil springs without side soils

Ans. Information will be provided ASAP.

CH2/c

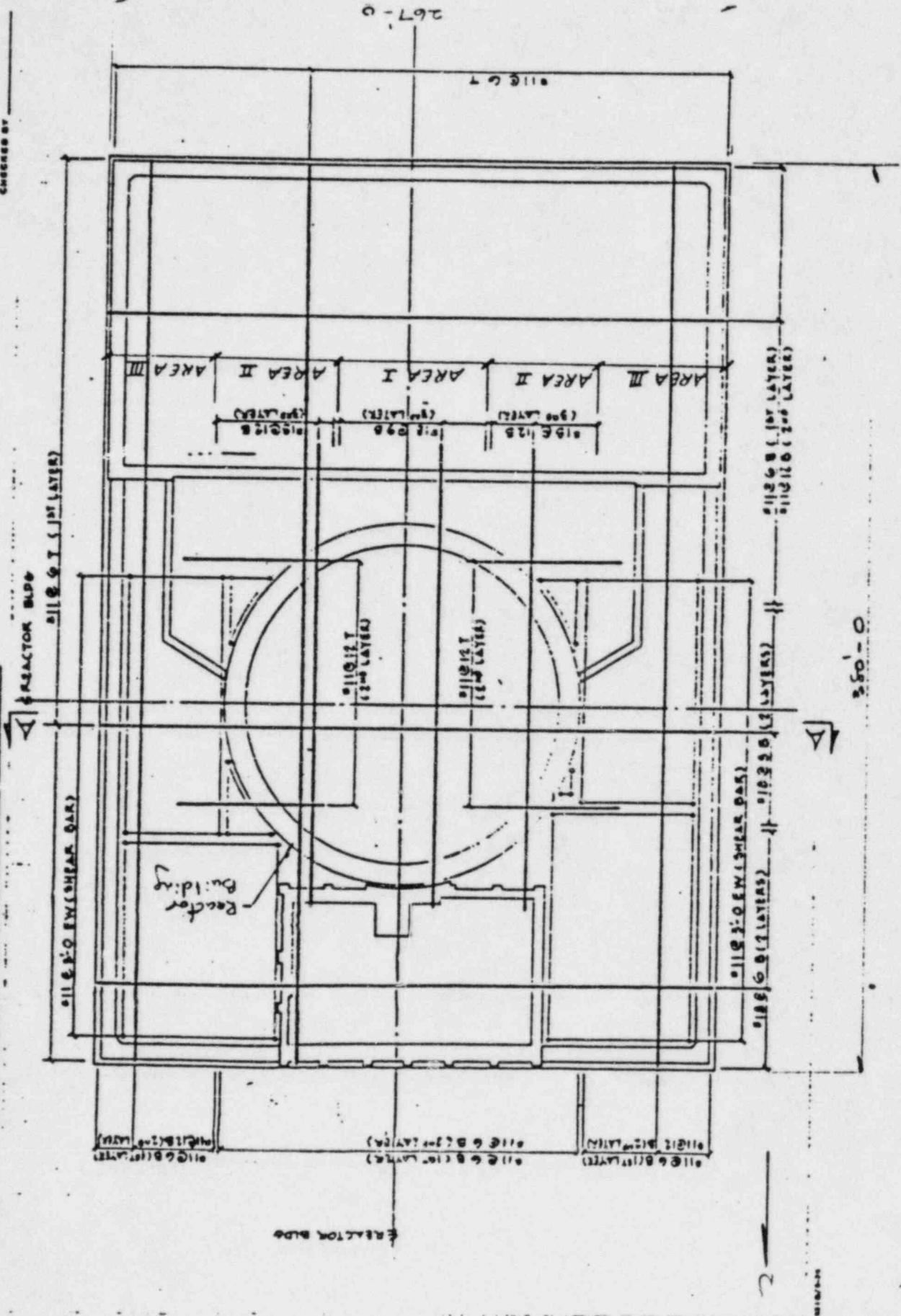
EBASCO SERVICES INCORPORATED

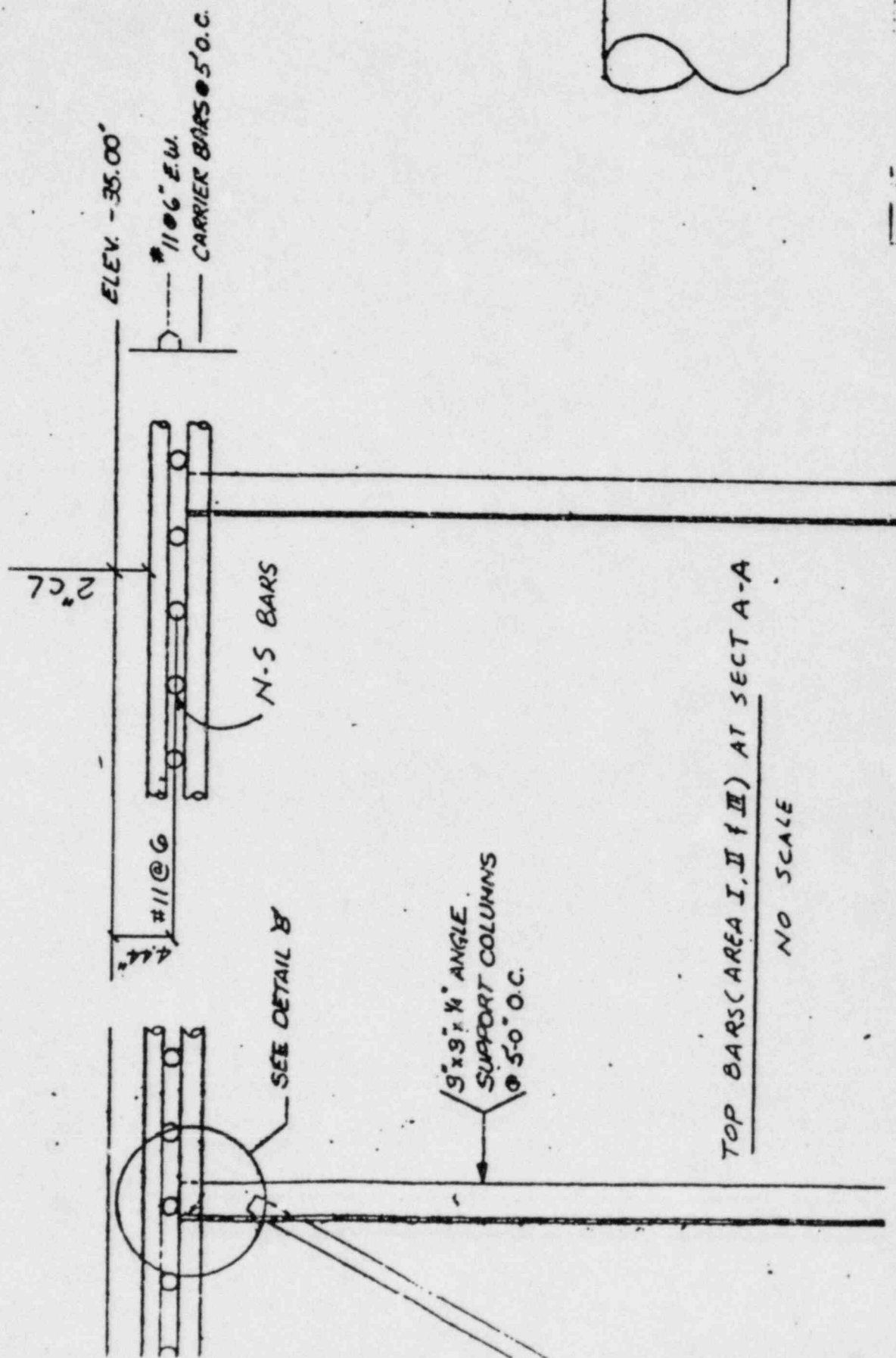
CLIENT LOUISIANA POWER & LIGHT CO

PROJECT WATSFORD 2.5.3 UNIT NO. 3

SUBJECT COMMON PDN PLAN - REINA

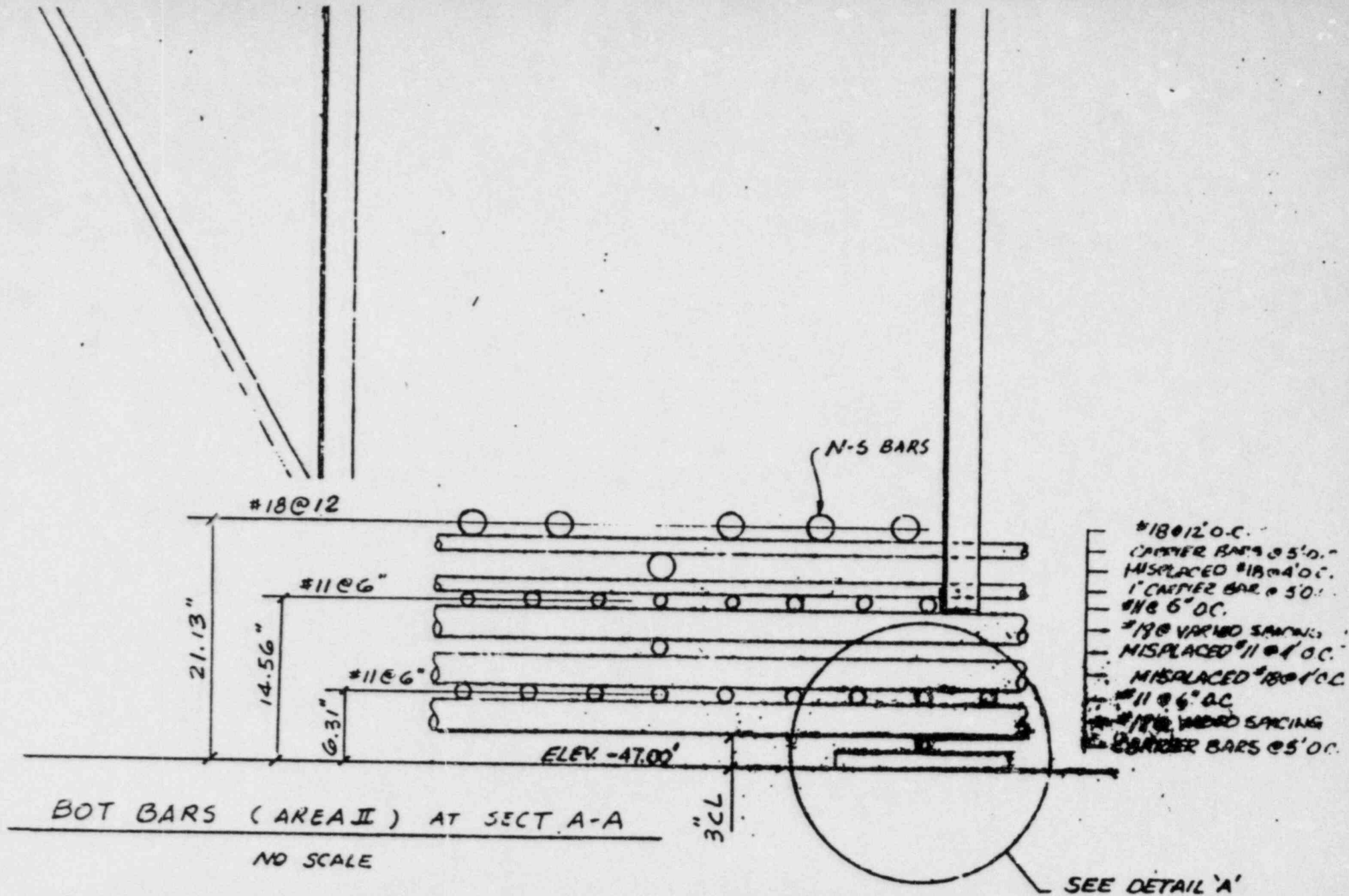
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DATE \_\_\_\_\_

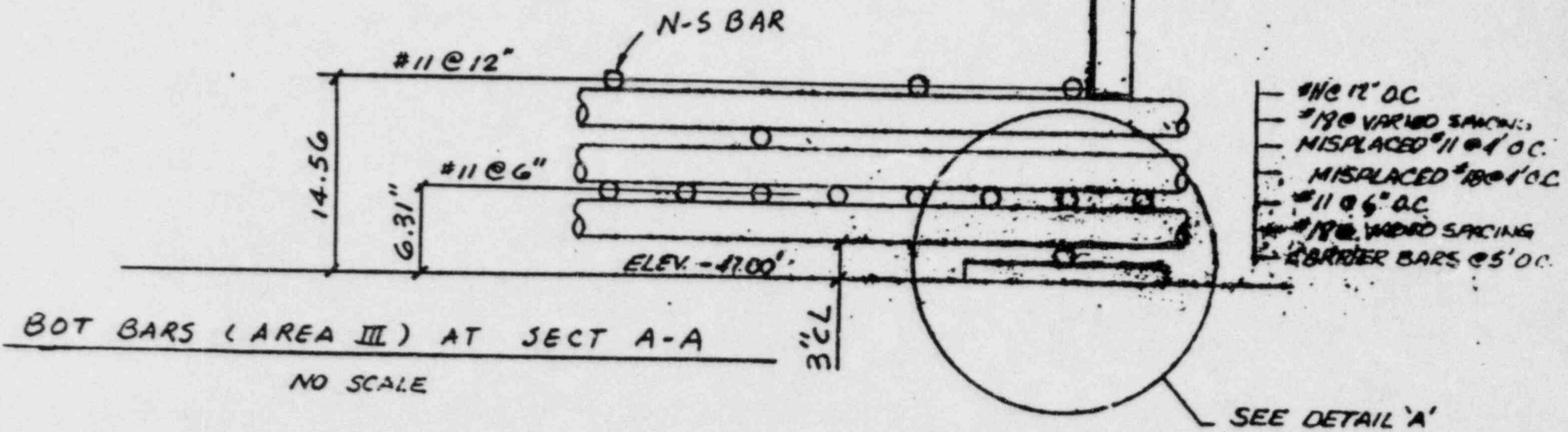












7 pages

11/19/84 (R1)  
Sheet 1 of 7

RESPONSE TO DR. J MA's QUESTION  
OF 11/16/84

Q1. Provide locations of N-S top and bottom reinforcement of the basemat under and outside of the Reactor Building.

Ans. See R0, responses provided on 11/16/84.

Q2. Provide N-S bending moment diagram along Section A-A of the basemat for the following load conditions:

- a. Constant soil springs with side soils
- b. Constant soil springs without side soils
- c. Variable soil springs with side soils
- d. Variable soil springs without side soils

Ans. a&c See Sh 2 of 7  
b&d See Sh 3 of 7



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BY J. Yang DATE Nov. 19 84

CHKD. BY C G LEE DATE NOV. 19. 84

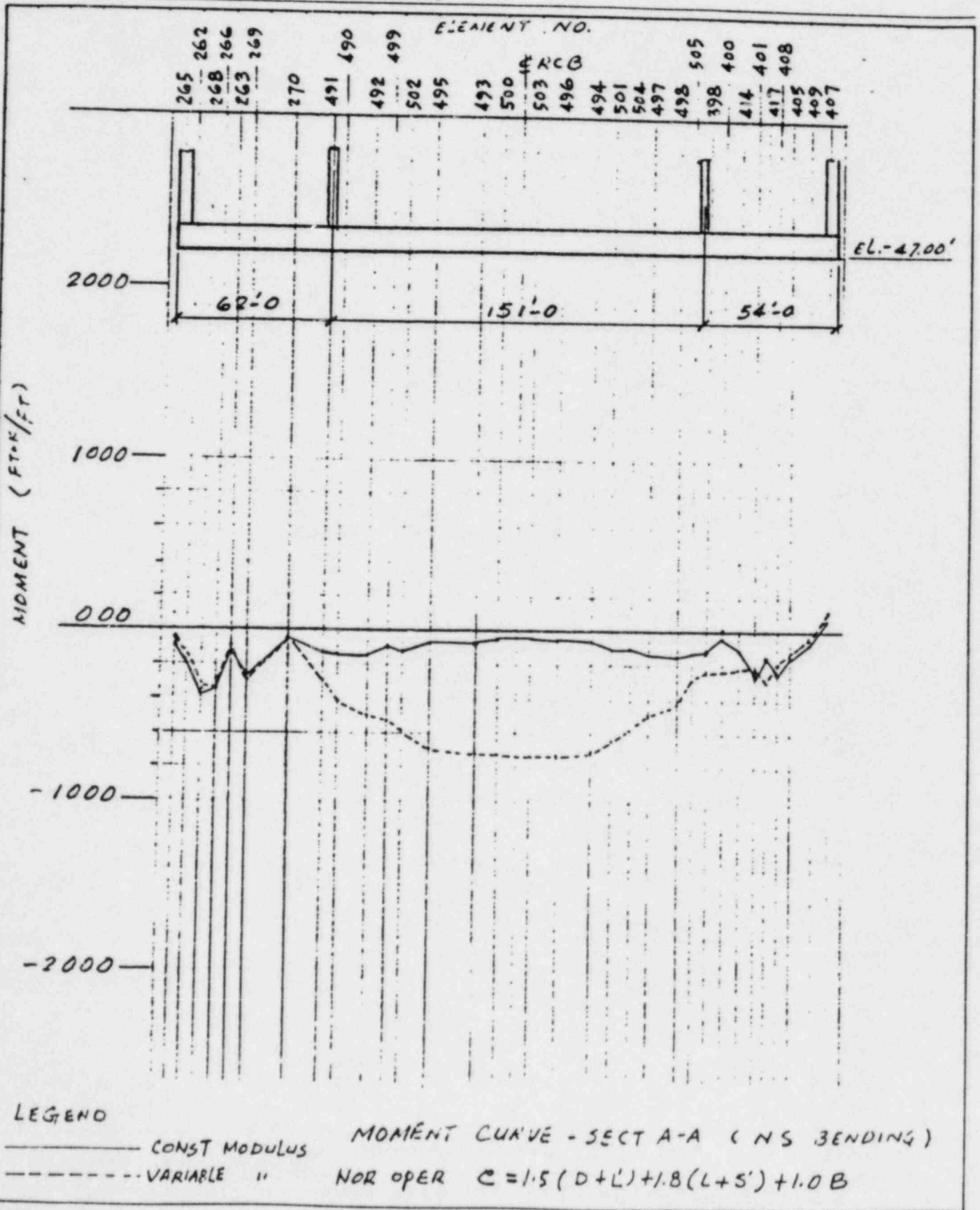
SHEET 2 OF 7

CLIENT LOUISIANA POWER & LIGHT CO. OFS NO.            DEPT. NO.           

PROJECT WATERFORD STEAM ELECTRIC STATION

SUBJECT 1977 1165 MW INSTALLATION - UNIT 3

MAT MOMENT CURVES

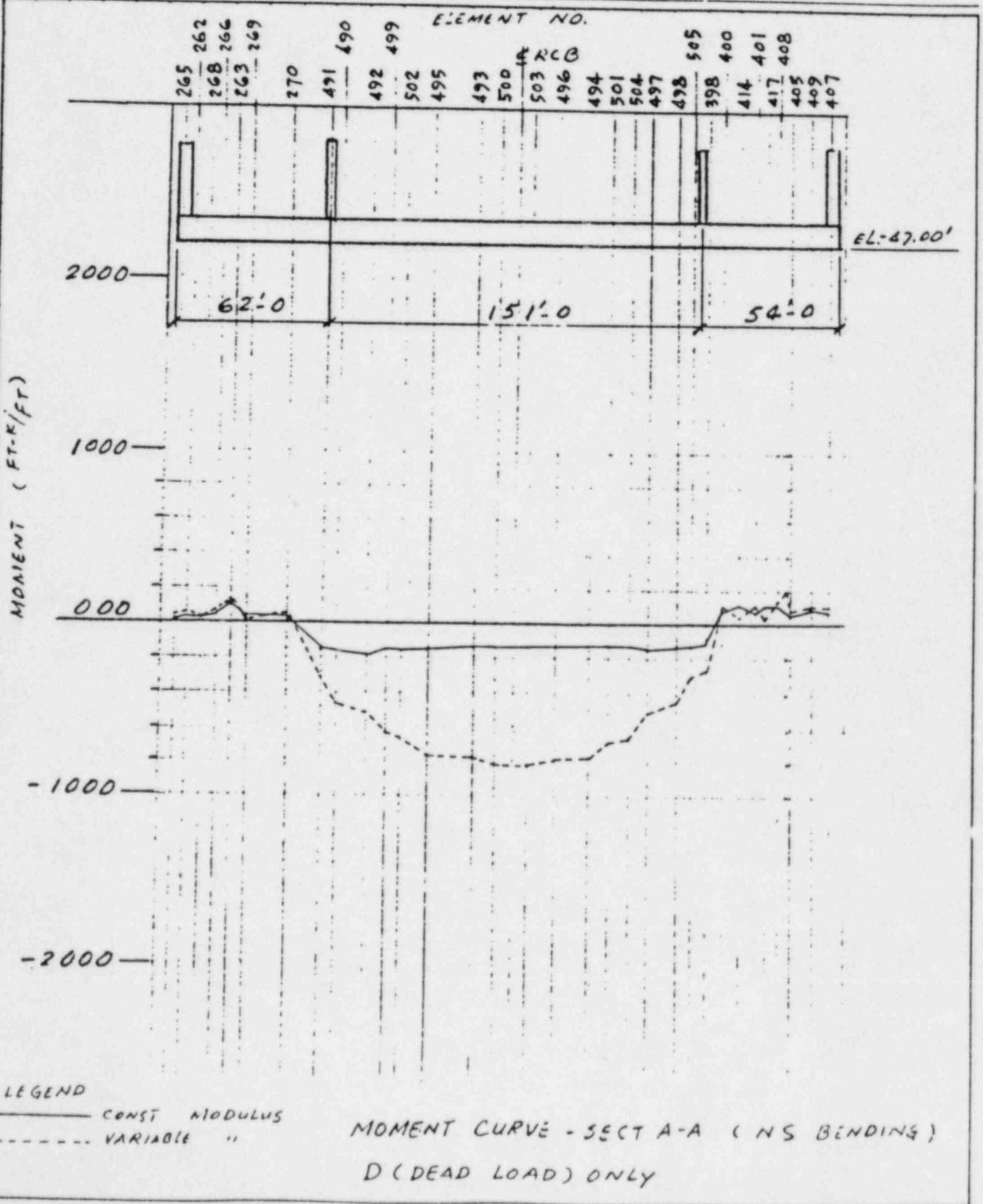


# EBASCO SERVICES INCORPORATED

BY C G LEE DATE 11-19-84  
 CHKD. BY T YAM DATE 11-19-84

SHEET 3 OF 7  
 DEPT. NO. \_\_\_\_\_

CLIENT LOUISIANA POWER & LIGHT CO.  
 PROJECT WATERFORD STEAM ELECTRIC STATION  
1977 1165 MW INSTALLATION - UNIT 2  
 SUBJECT MAT MOMENT CURVES



# EBASCO SERVICES INCORPORATED

BY C G LEE DATE 11-19-84  
 CHKD. BY J. Yang DATE 11-19-84

SHEET 4 OF 7

OPS NO. \_\_\_\_\_ DEPT NO. \_\_\_\_\_

CLIENT LOUISIANA POWER & LIGHT CO.  
 PROJECT WATERFORD STEAM ELECTRIC STATION  
1977 1165 MW INSTALLATION UNIT 2  
 SUBJECT MAT MOMENT

CONSTANT MODULUS

N.S BENDING MOMENT: NOR OPER  $C = 1.5(D+L') + 1.8(L+S) + 1.0G$   
 (@ SECT A-A)

RE NO	MOMENT <sup>1K/</sup>		RE NO	MOMENT <sup>1K/</sup>
265	- 84		408	-230
262	- 194		405	- 175
268	- 396		409	- 89
266	- 372		407	65
263	- 163			
269	- 258			
270	- 55			
491	- 139			
490	- 140			
492	- 161			
499	- 103			
502	- 122			
496	- 86			
493	- 87			
500	- 59			
503	- 55			
496	- 60			
494	- 62			
501	- 104			
504	- 100			
497	- 147			
498	- 142			
505	- 138			
398	- 131			
400	- 54			
414	- 102			
401	- 254			
417	- 174			

# EBASCO SERVICES INCORPORATED

BY CGLCE DATE 11-19-84

CHKD. BY J YANG DATE 11-19-84

SHEET 5 OF 7

OFFS NO. \_\_\_\_\_ DEPT. NO. \_\_\_\_\_

CLIENT LOUISIANA POWER & LIGHT CO.

PROJECT WATERFORD STEAM ELECTRIC STATION

1977 1165 MW INSTALLATION - UNIT 2

SUBJECT N/A T MOMENT

## VARIABLE MODULUS

NS BENDING MOMENT: NOR. OPER. C = 1.5(D+L') + 1.8(L+5') + 1.0B  
(@ SECT A-A)

PL NO	MOMENT <sup>KL</sup>	PL NO	MOMENT <sup>KL</sup>
265	- 64	408	- 200
262	- 184	405	- 139
268	- 396	409	- 49
266	- 358	407	111
263	- 122		
269	- 272		
270	- 54		
491	- 282		
490	- 401		
492	- 474		
499	- 547		
502	- 598		
495	- 695		
493	- 707		
500	- 720		
503	- 722		
496	- 720		
494	- 714		
501	- 622		
504	- 584		
497	- 486		
498	- 428		
505	- 301		
398	- 252		
400	3		
414	- 219		
401	- 210		
417	- 307		



# EBASCO SERVICES INCORPORATED

BY C G LEE DATE 11-19-84

CHKD. BY J YAN4 DATE 11-19-84

SHEET 6 OF 7

CLIENT LOUISIANA POWER & LIGHT CO.

OPS NO. \_\_\_\_\_

DEPT. NO. \_\_\_\_\_

PROJECT WATERFORD STEAM ELECTRIC STATION

1977 1165 MW INSTALLATION - UNIT 2

SUBJECT NIAT MOMENT

NS BENDING MOMENT : CONST MODULUS  
(@ SECT A-A) D (DEAD LOAD) ONLY

PL NO	MOMENT $\frac{K}{J}$	PL NO	MOMENT $\frac{K}{J}$
265	5	408	142
262	27	405	42
268	23	409	105
266	48	407	76
263	139		
269	33		
270	26		
491	-156		
490	-160		
492	-191		
499	-159		
502	-176		
495	-164		
493	-163		
500	-141		
503	-135		
496	-140		
494	-139		
501	-155		
504	-143		
497	-170		
498	-138		
505	-137		
398	-106		
400	82		
414	132		
401	70		
417	135		

# EBASCO SERVICES INCORPORATED

BY C G LEE DATE 11-19-84

CHKD. BY J YAN DATE 11-19-84

SHEET 7 OF 7

CLIENT LOUISIANA POWER & LIGHT CO.

OFFS NO.                      DEPT. NO.                     

PROJECT WATERFORD STEAM ELECTRIC STATION

SUBJECT 1977 1165 MW INSTALLATION - UNIT 3

MAT MOMENT

NS BENDING MOMENT: VARIABLE MODULUS  
(@ SECT A-A) D.L. DEAD LOAD ONLY

# NO	MOMENT <sup>1K/</sup>	# NO	MOMENT <sup>1K/</sup>
265	23	408	163
262	35	405	67
268	20	409	137
266	60	407	118
263	173		
269	13		
270	32		
491	-300		
490	-427		
492	-507		
499	-606		
502	-655		
495	-775		
493	-787		
500	-807		
503	-807		
496	-799		
494	-788		
501	-673		
504	-626		
497	-508		
498	-427		
505	-299		
398	-230		
400	110		
414	33		
401	125		
417	22		

## RESPONSE TO DR. J MA's QUESTION OF 11/26/84

Q1. Provide soil spring distribution related to the basemat N-S bending moment.

Ans. The soil spring distribution is shown in attached Revision -1 of Sh 2/7 and Sh 3/7 of which were submitted previously on 11/19/84.

Q2. Provide N-S bending capacity of the basemat.

Ans. The N-S ultimate bending capacity of the basemat is calculated to be as follows:

a. Positive ultimate bending capacity (Tension at top), Mu is:  
1929 ft - kip/ft.

b. Negative ultimate bending capacity (Tension at bottom), Mu is:

Area I	6,251	ft-kip/ft
Area II	5,605	ft-kip/ft
Area III	2,766	ft-kip/ft

For location of the basemat areas see revised Sh 2/6 which was submitted previously on 11/16/84.

Q3. Revise Sh 3/6 to include #11 @ 12 re-bars.

Ans. See revised Sh 3/6 attached.

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BY J. YANG DATE Nov. 19 84

SHEET 2 OF 7

CHKD. BY C G LEE DATE NOV. 19. 84

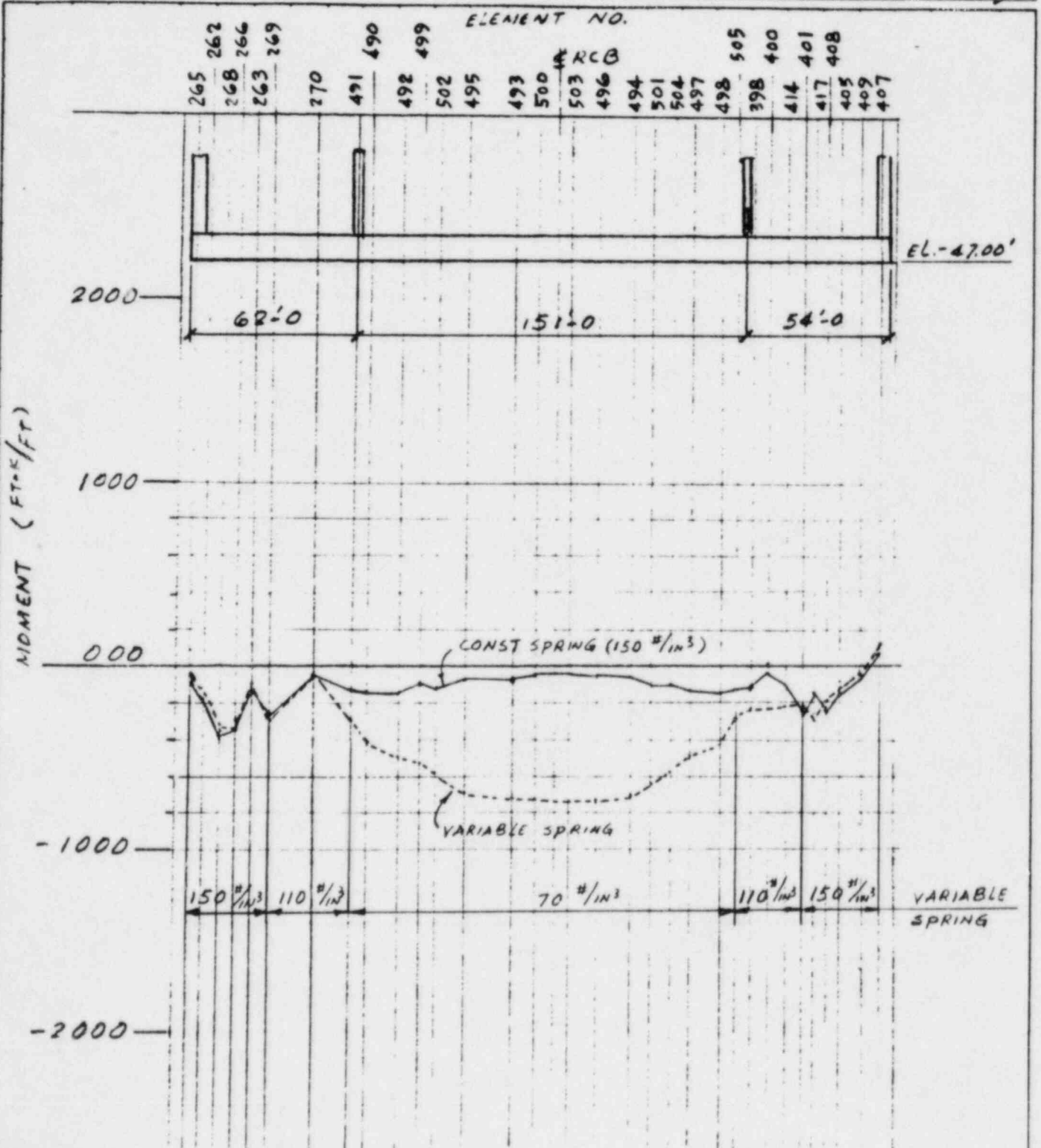
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CLIENT LOUISIANA POWER & LIGHT CO.

PROJECT WATERFORD STEAM ELECTRIC STATION

SUBJECT 1977 1165 MW INSTALLATION - UNIT 3

MAT MOMENT CURVES (POSITIVE MOMENT = TENSION AT TOP)



## LEGEND

————— CONST MODULUS  
 - - - - - VARIABLE "

MOMENT CURVE - SECT A-A (N-S BENDING)

NOR OPER  $C = 1.5(D+L) + 1.8(L+S) + 1.0B$



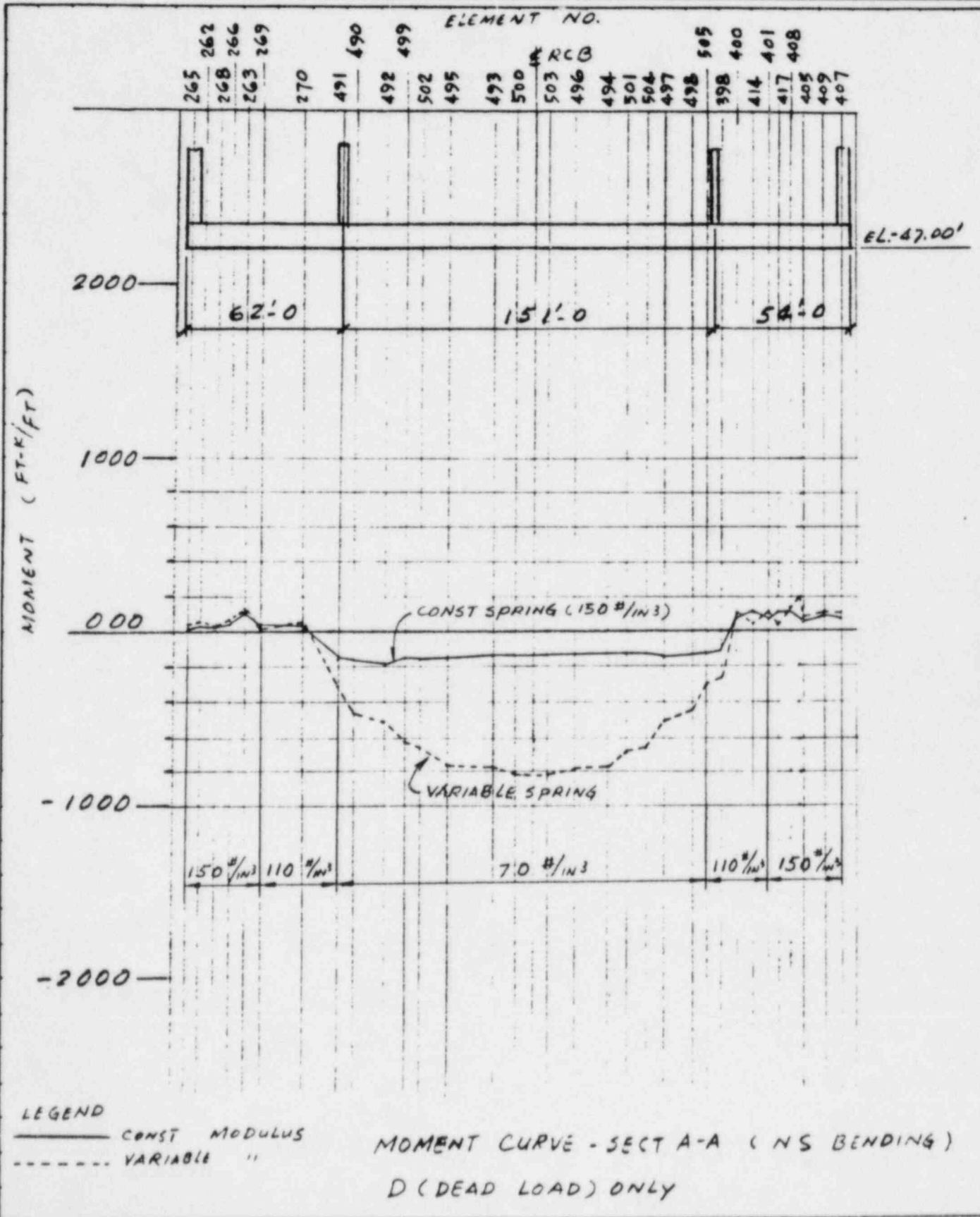
K1 11/26/84

# EBASCO SERVICES INCORPORATED

BY C G LEE DATE 11-19-84  
 CHKD. BY T. YAN DATE 11-19-84

SHEET 3 OF 7  
 DEPT. NO. \_\_\_\_\_

CLIENT LOUISIANA POWER & LIGHT CO.  
 PROJECT WATERFORD STEAM ELECTRIC STATION  
1977 1165 MW INSTALLATION - UNIT 1  
 SUBJECT MAT MOMENT CURVES (POSITIVE MOMENT = TENSION AT TOP)



EBASCO SERVICES INCORPORATED

SHEET 07

CLIENT LOUISIANA POWER & LIGHT CO

PROJECT WATKINS FORD P.E. UNIT NO. 2

SUBJECT COMMERCIAL PDN MAT - REIN

SPS NO.

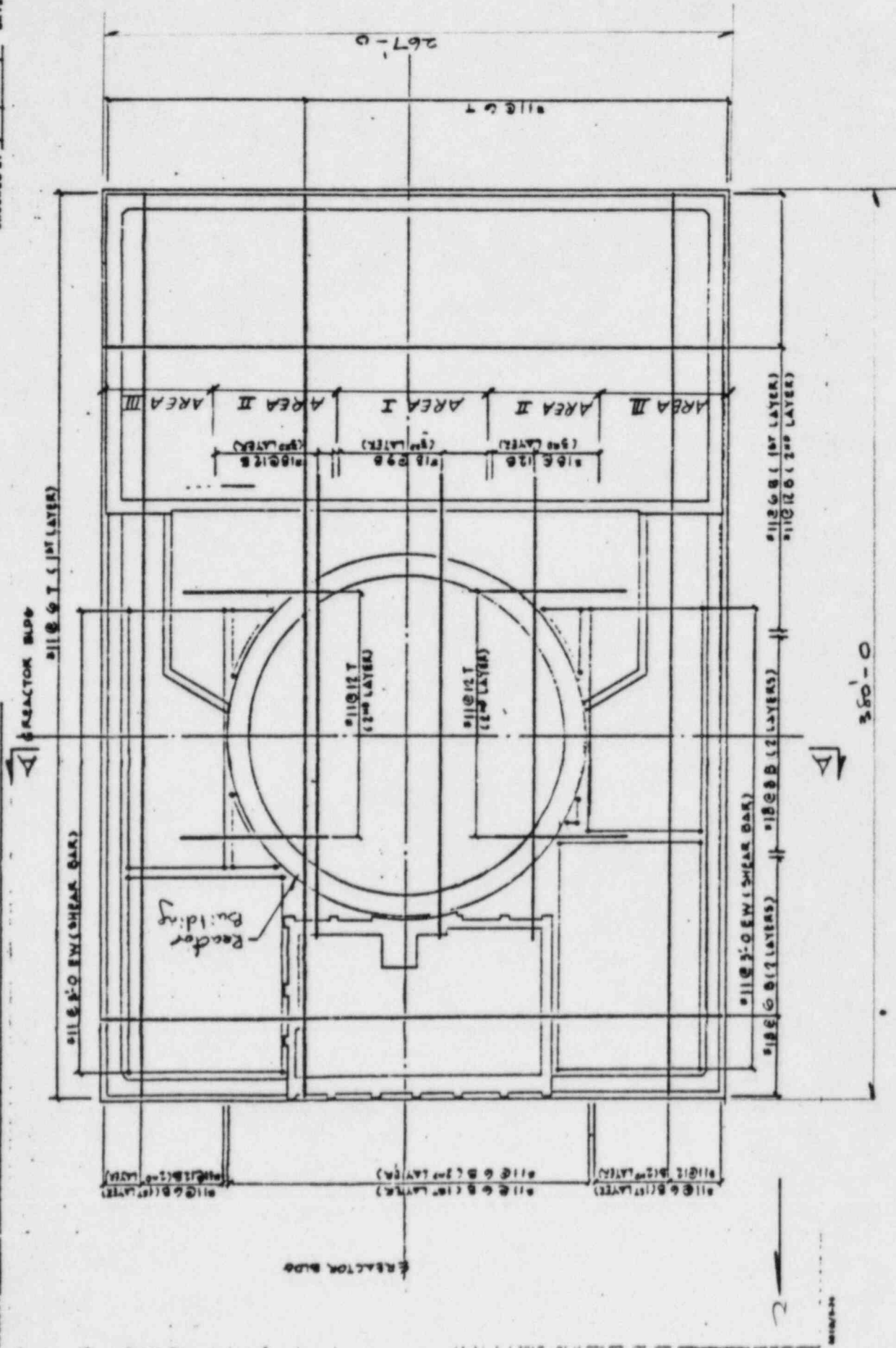
BY C. G. LEE

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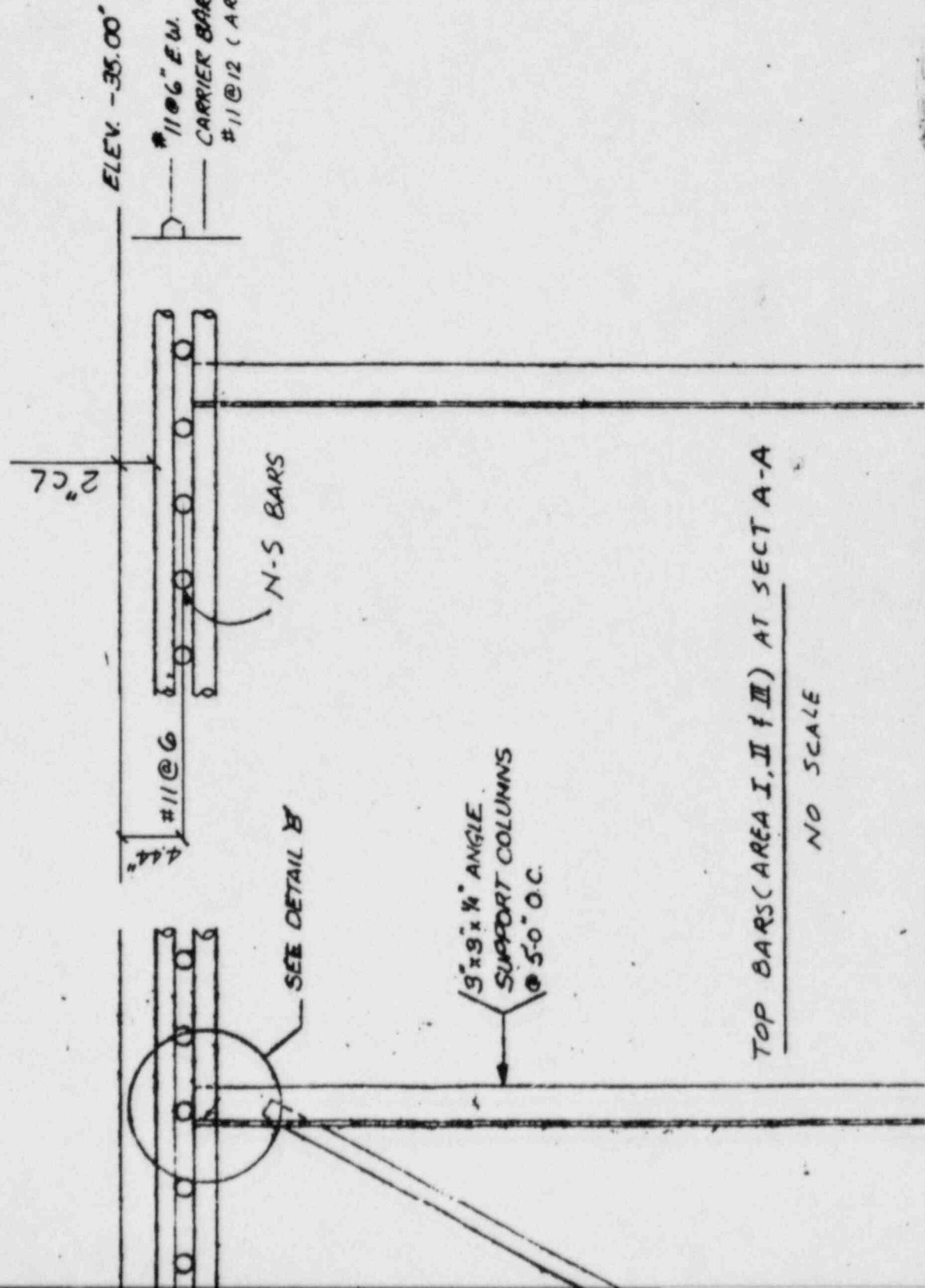
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DATE 11-27-84

DATE 11-27-84



5/2/84



TOP BARS (AREA I, II & III) AT SECT A-A

NO SCALE