8/1/84

9/14

J. Anderson presented ① summary of what was done

M. Das Gupta presented ② design criteria

Aux building designed to ACI 318-71
some not including settlement stresses
i.e. SSE not
underpinning designed to ACI 349-80
including settlement stresses

② results, i.e. areas of max. stresses
due to settlement after lockoff only

Hard to guess existing stresses
in building

do not include existing settlement loads

due to nature of connections between main aux & control tower
should be included

1ST Question how were subgrade modulus calculated?
(soil springs)
(soil modulus)

Answer by forcing diff. settlement to be ½"

by trial & error, values abritrary

| only slab @ 659 being modified

2nd question ~~Explain load confirmations~~

explain slab fix @ EL 659 ~~plus stresses~~
to be done after underpinning complete

answer

* submit drawings

fix just handles extra load needed
ie. = existing capacity + fix = total capacity
for SSE only
no settlement

* new question - are stains (existing rebar vs long fix) compatible

* new question - do we need monitoring of fix (ie. strain gages)
due to settlement over 40 YRS

[~~rods will be tightened~~ (will get slack out of system) befor grouting & torquing of floor pl bolts]

[Eye bar]

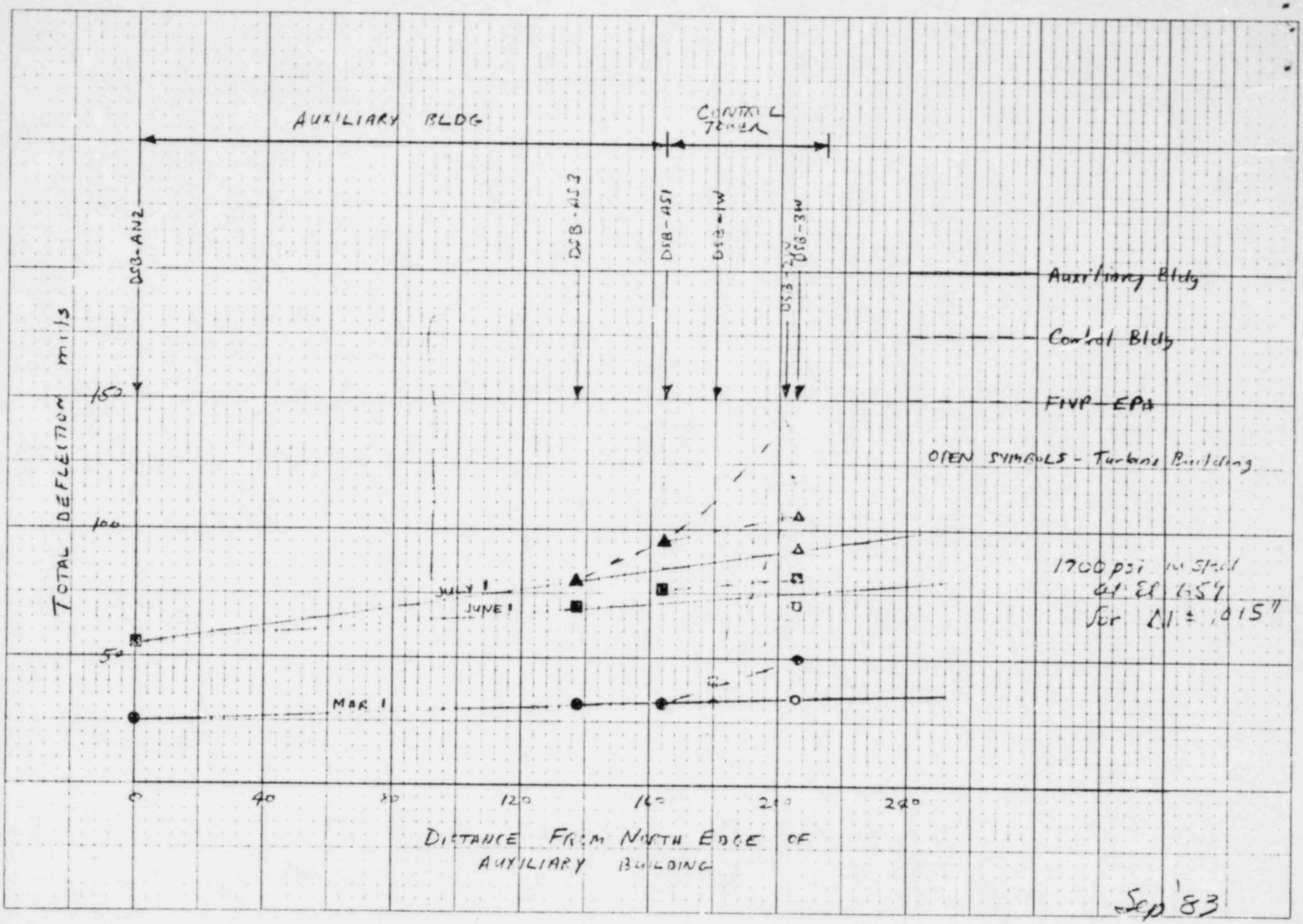
(*) check with mechanical to see if equipment can take elongation

<u>3rd question</u> rigid body rotation

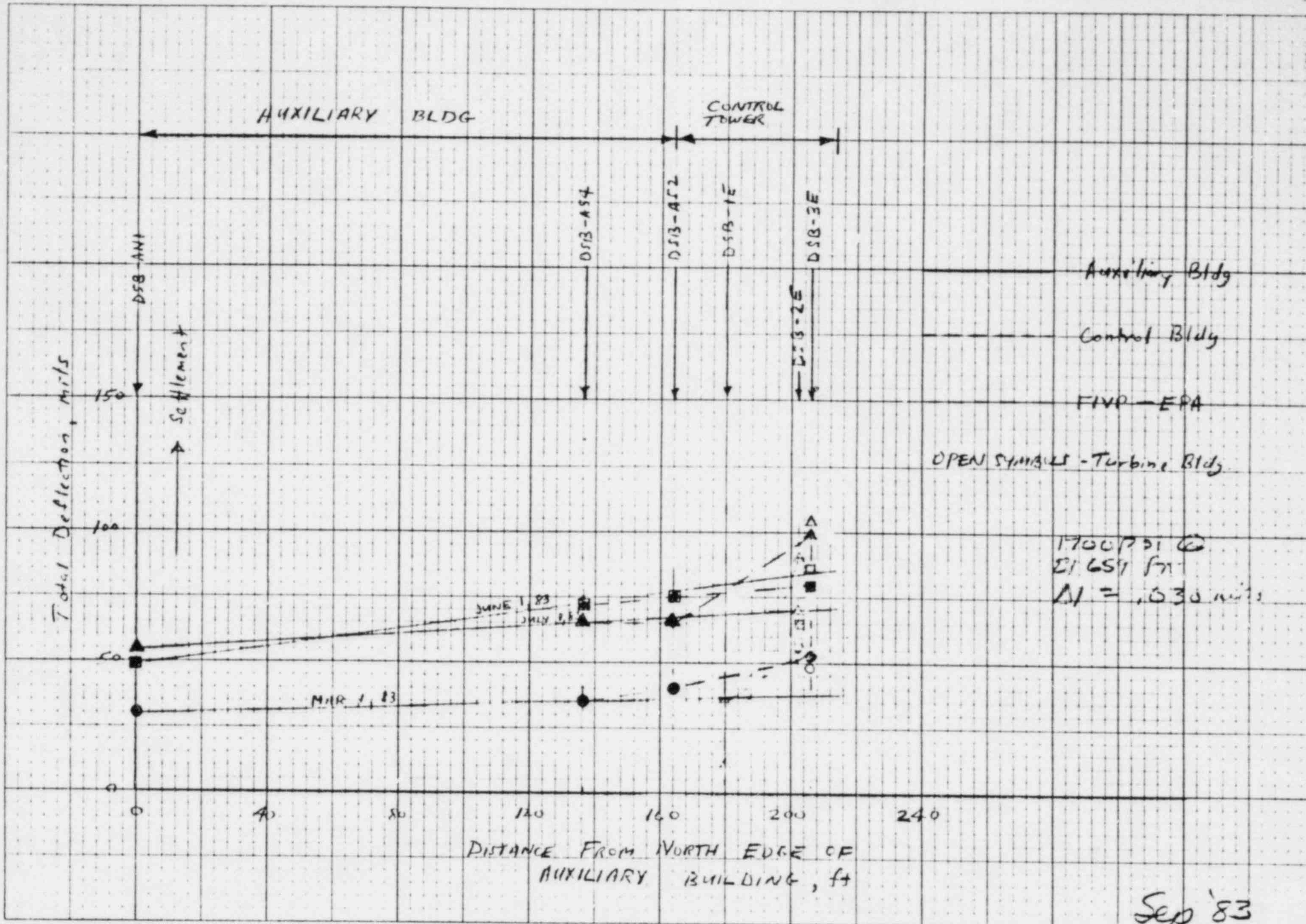
plot for $\frac{1}{4}$" (old run) plus Δ_2 for both

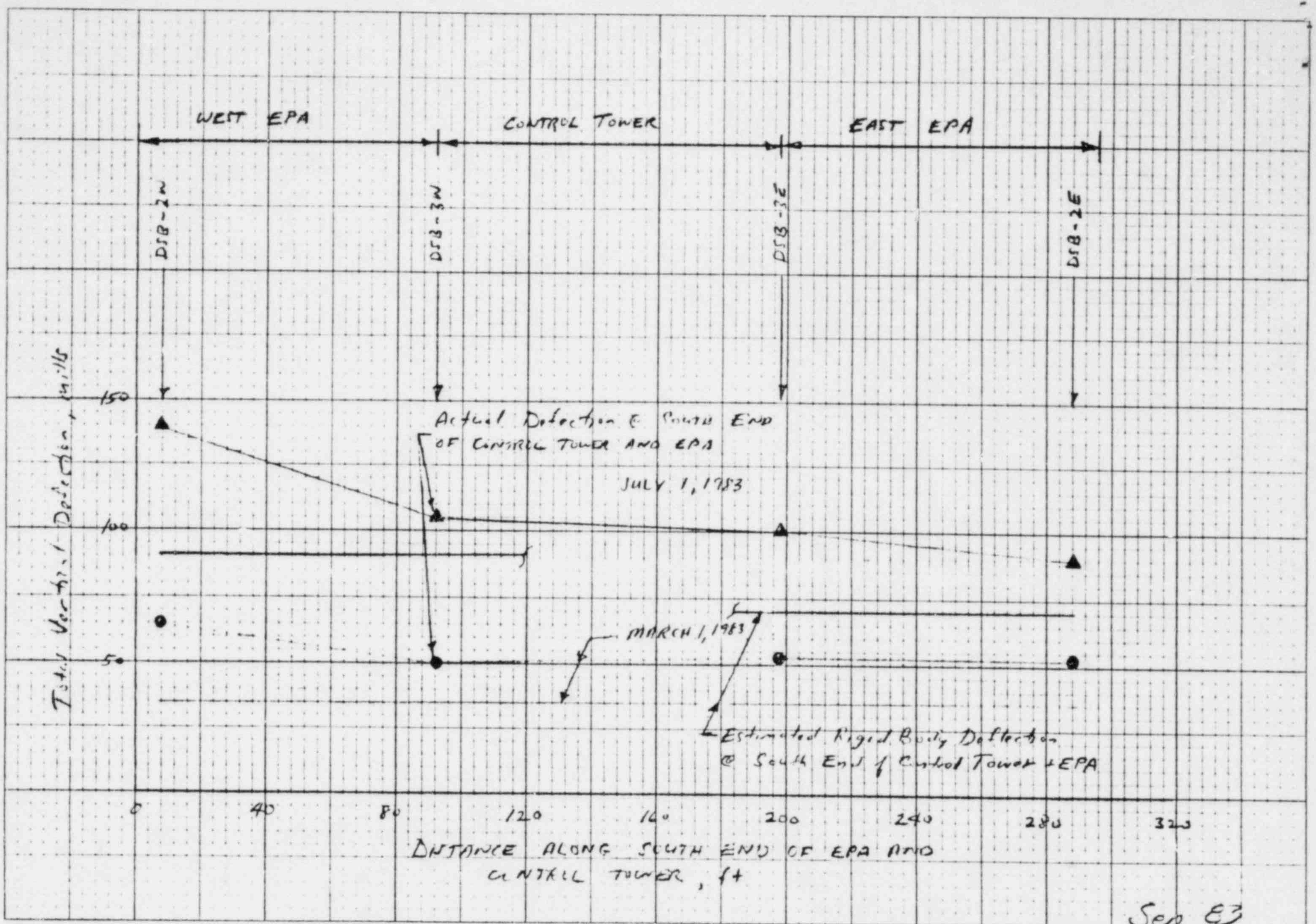
* [gave us Δ_1 plot for new parameters with .24" diff. & only .17" Δ_1 ?]

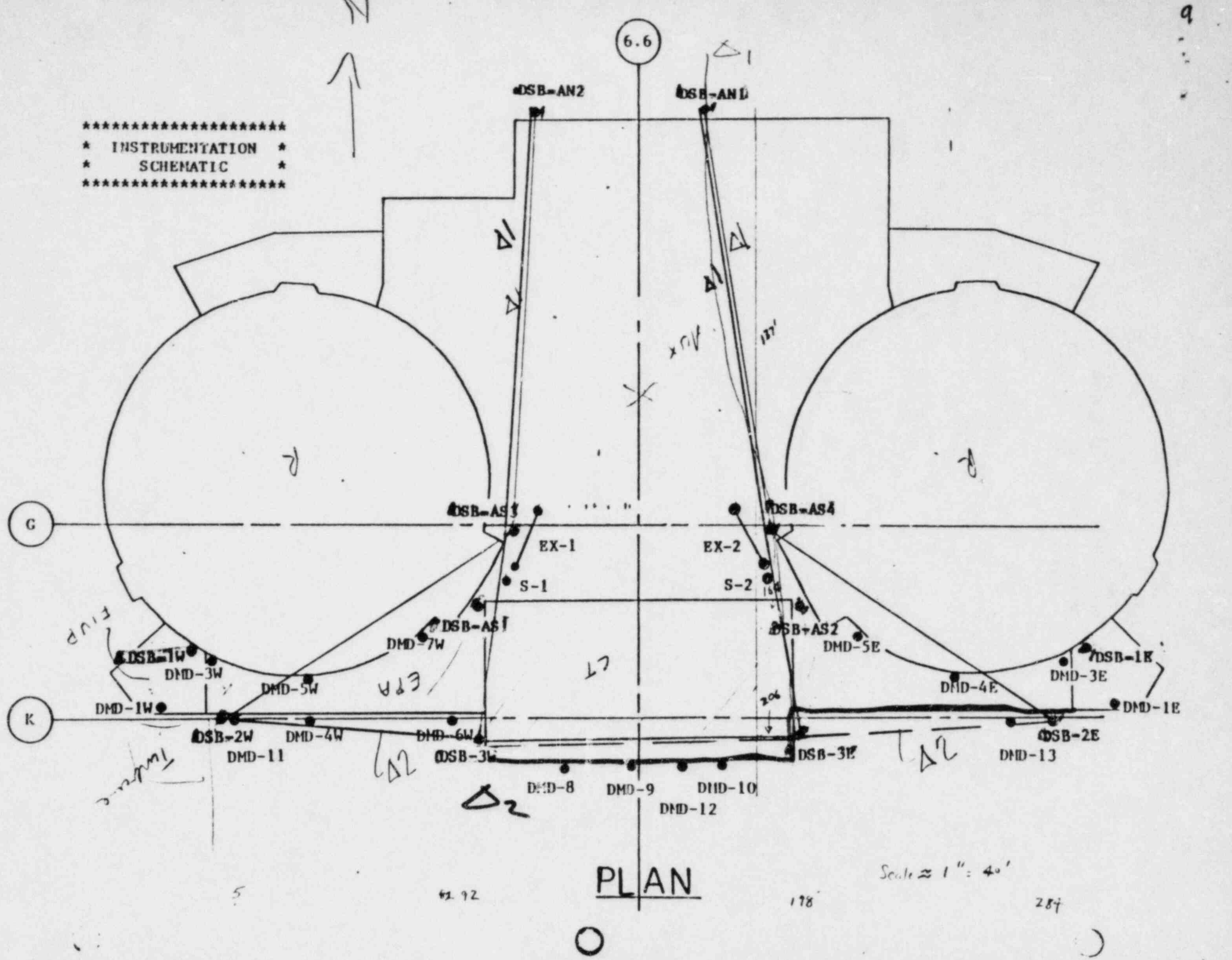
What the hell is diff. on middle of building or Edge to Edge



K&E 10 X 10 TO THE INCH • 7 X 10 INCHES KEUFFEL & ESSER CO. MADE IN USA 46 0782


AUXILIARY BLDG
CONTROL TOWER
DSB-AN1
DSB-AS4
DSB-AS2
DSB-1E
DSB-2E
DSB-3E
Settlement
Total Deflection, mils
150
100
50
0
JUNE 1, 83
JULY
MAR 1, 83
0
40
80
120
160
200
240
DISTANCE FROM NORTH EDGE OF AUXILIARY BUILDING, ft
Auxiliary Bldg
Control Bldg
FIVP — EPA
OPEN SYMBOLS - Turbine Bldg
Sep '83


WEST EPA
CONTROL TOWER
EAST EPA
DSB-2W
DSB-3W
DSB-3E
DSB-2E
Actual Deflection @ South End of Control Tower and EPA
JULY 1, 1983
MARCH 1, 1983
Estimated Rigid Body Deflection @ South End of Control Tower + EPA
Total Vertical Deflection, mills
150
100
50
0
40
80
120
160
200
240
280
320
DISTANCE ALONG SOUTH END OF EPA AND CONTROL TOWER, ft
Sep 83



INSTRUMENTATION SCHEMATIC
6.6
N
DSB-AN2
DSB-AN1
DSB-AS3
DSB-AS4
EX-1
EX-2
S-1
S-2
DSB-AS1
DSB-AS2
DMD-7W
DMD-5E
DSB-1W
DSB-1E
DMD-3W
DMD-3E
DMD-5W
DMD-4E
DMD-1W
DMD-1E
DSB-2W
DMD-4W
DMD-6W
DSB-2E
DMD-11
DSB-3W
DSB-3E
DMD-13
DMD-8
DMD-9
DMD-10
DMD-12
G
K
PLAN

4th question Existing stresses due to settlement

~~ERA connection to Control Tower~~

Answer

@ EL 65-9   30 K/FT in slab ~~old subgrade~~

15 ksi avg in middle

~ 34 ksi in steel @ edges

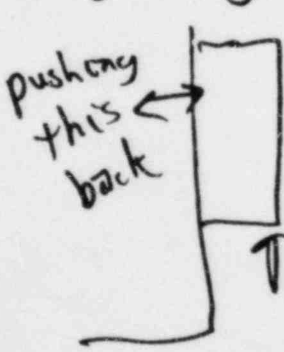
* owe us settlements due to 34 ksi

(No control on upward movement for permanent wall just jack load into it)

~~the~~ Their is control — no movement

Temporary jacking load until 30 mils upward

permanent wall with reduce existing stresses because jacking total load of building



Total load (now its ~ 35%) because of soil

@ N-S walls below 614

Col. Line/5.3 between G & H

40ksi

* owe us stresses @ 70 pcf & 30 pcf

@ EPA to Control tower connection

* owe us stresses @ 70 pcf & 30 pcf

5th question EPA - Control tower connection

vertical ~~[illegible]~~ wall #11 @ 9 each face
both hooked
E-W EPA wall
C 281

floor slab in control tower @ El. 704 # 8 @ 9 top & Bottom
only top ones hooked

vertical wall control tower @ 7.8 N-S wall #11 @ 9 each face
each way

~~RB~~

116 92305-5 312 679 4632

New questions

*(1) look @ fuel pool wall for 1800k

(2) Explain table

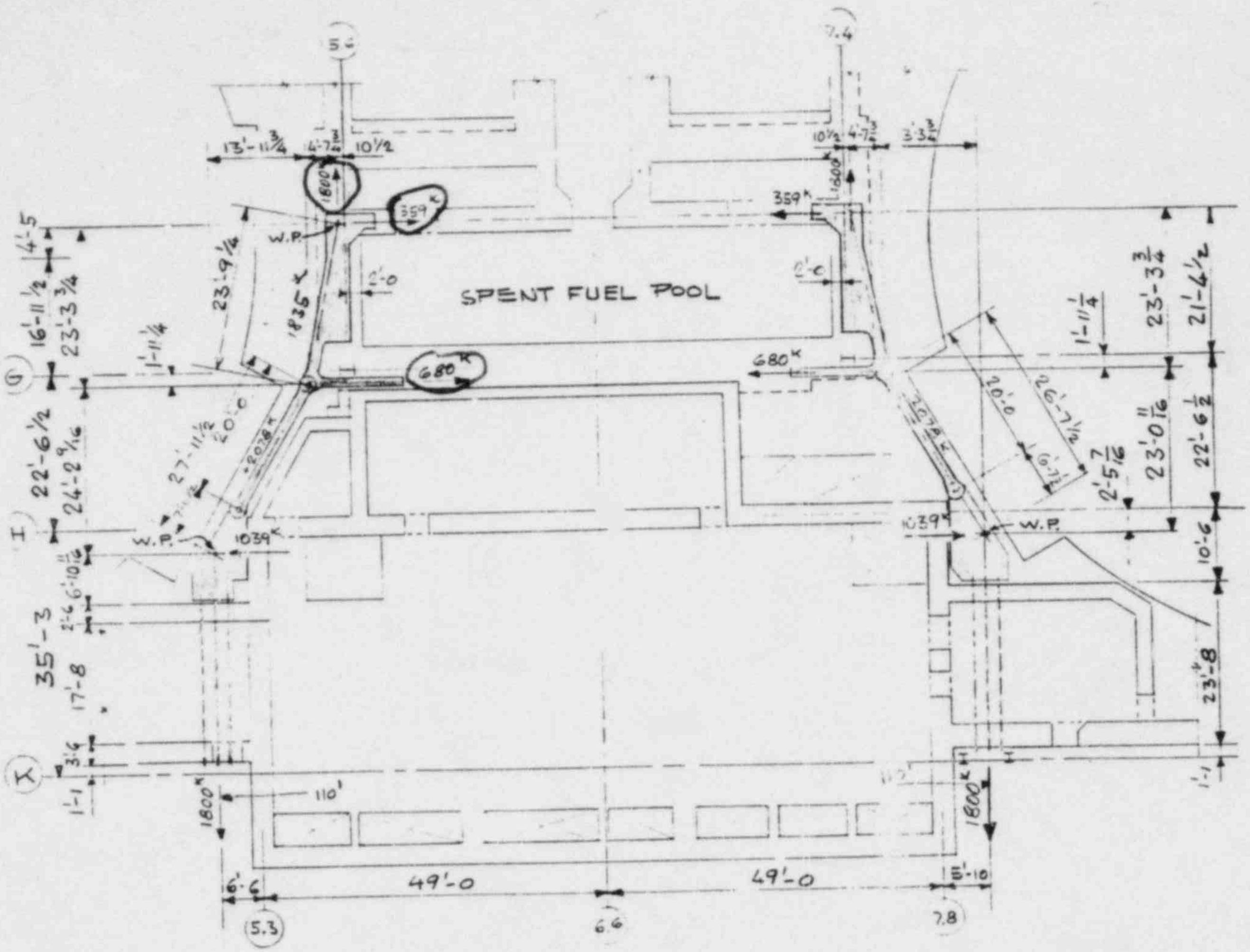
CALCULATION SHEET

ORIGINATOR C. K. STEINER DATE 8-19-83 CALC. NO. ______ REV. NO. ______

PROJECT MIDLAND-UNITS 1 & 2 CHECKED ______ DATE ______

SUBJECT FLOOR FIX @ EL. 659'-0 JOB NO. 7220

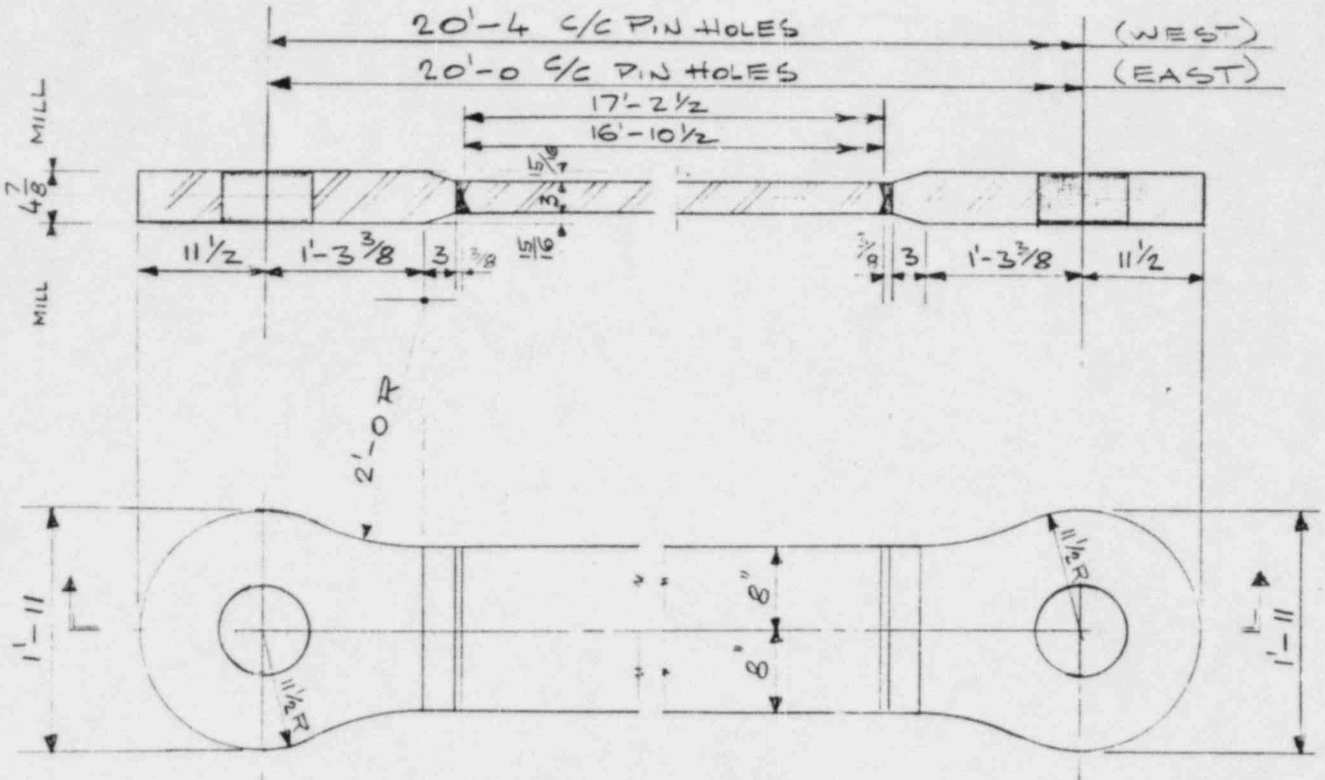
SHEET NO. 1



AAO-519 6/76

CALCULATION SHEET

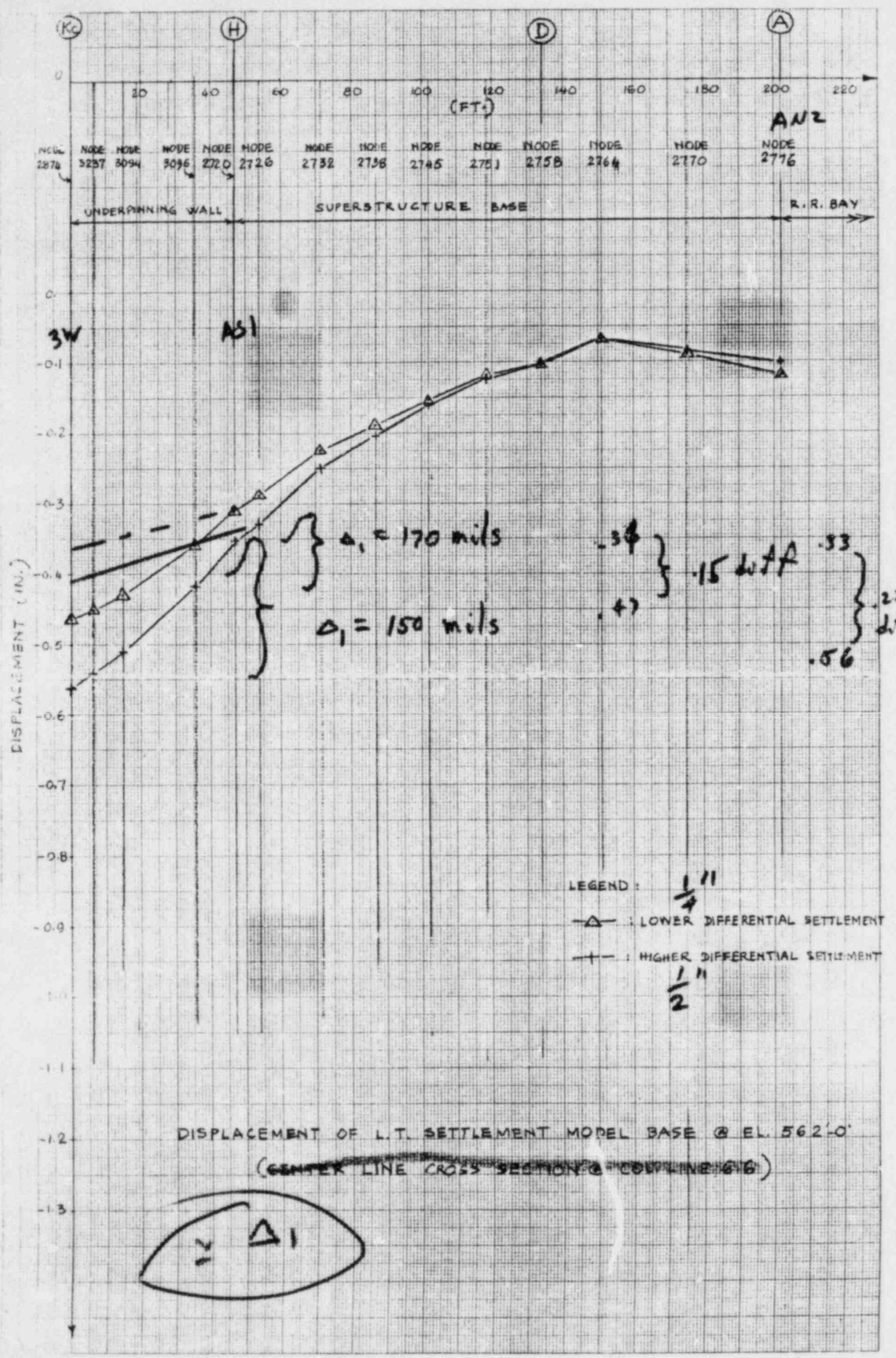
ORIGINATOR C.K. STEINER DATE 8-19-83 CALC. NO DQ61Q REV. NO.
CHECKED DATE
PROJECT MIDLAND - UNIT 1 & 2 JOB NO. 7220
SUBJECT AUX. BLDG. - PERMANENT UNDERPINNING SLAB FIX @ EL. 659'-0 SHEET NO 38



EYE BAR - DET. # 11 (WEST)
EYE BAR - DET. # 12 (EAST)

AAO-515 6/76

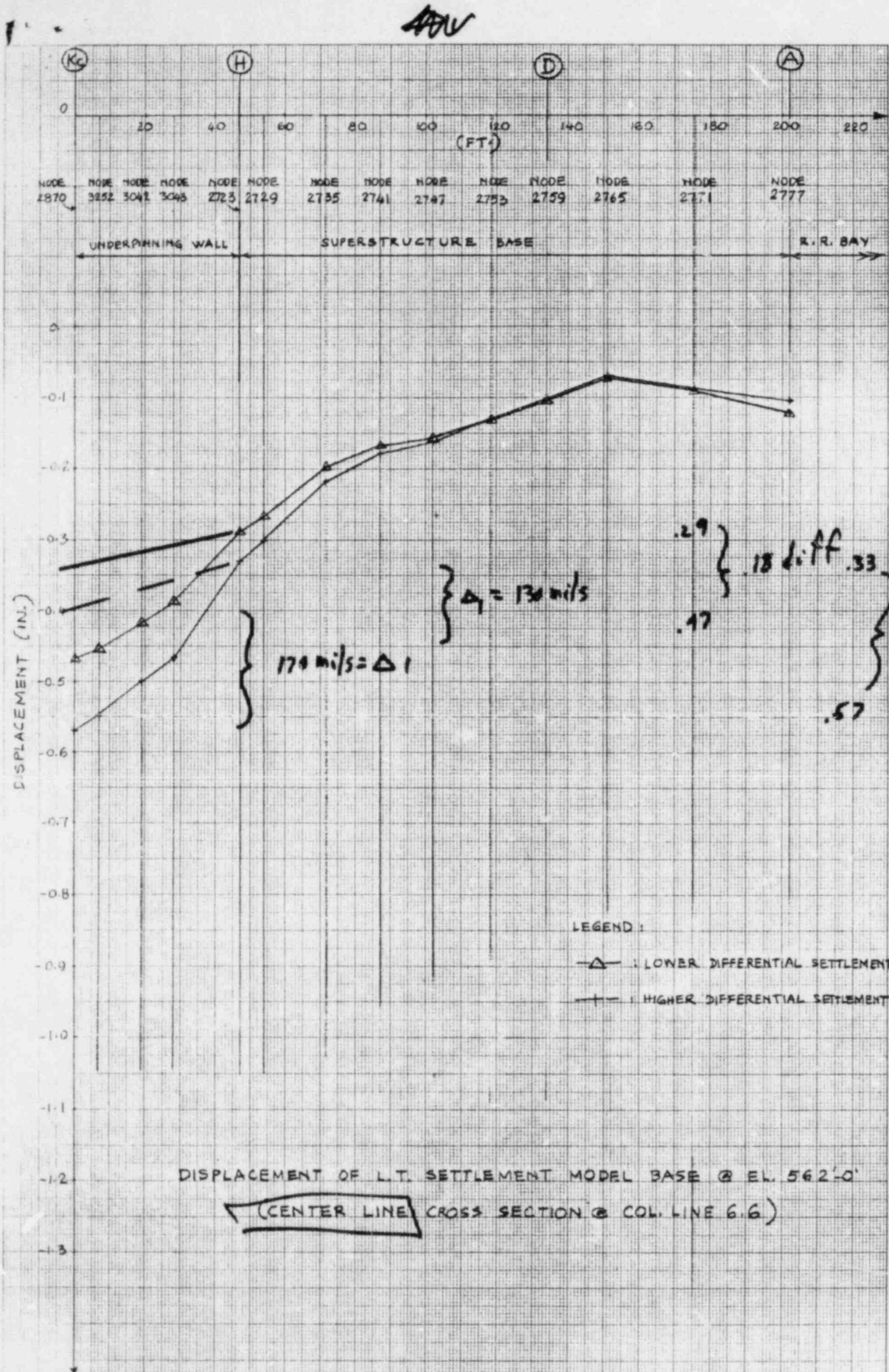
K+E 10 X 10 TO THE CENTIMETER 18 X 25 CM. KEUFFEL & ESSER CO. 47 1512



DISPLACEMENT OF L.T. SETTLEMENT MODEL BASE @ EL. 562'-0'

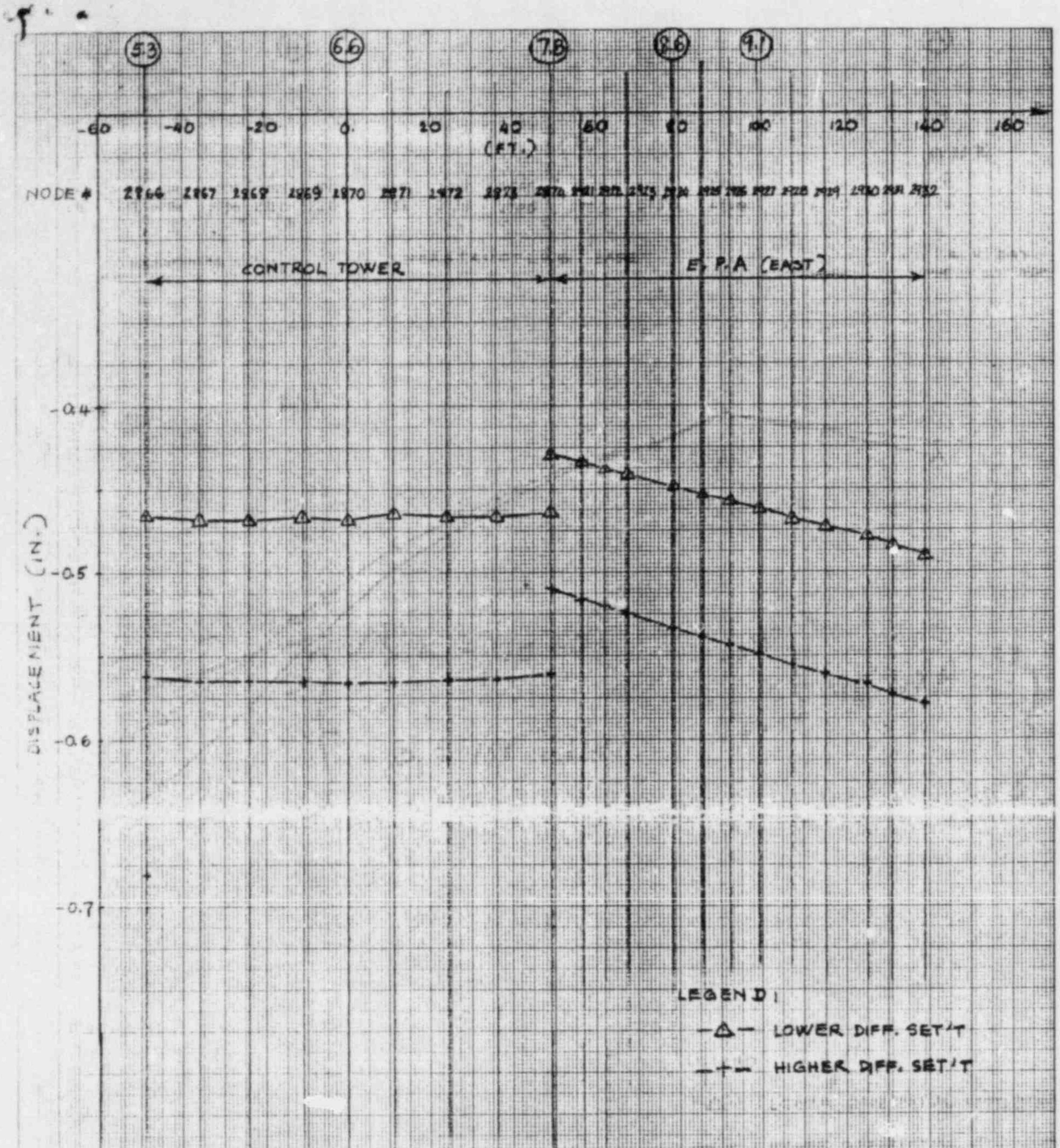
(~~CENTER~~ LINE ~~CROSS SECTION @ COL LINE 6.6~~)

≅ Δ₁



DISPLACEMENT OF L.T. SETTLEMENT MODEL BASE @ EL. 562'-0"

(CENTER LINE CROSS SECTION @ COL. LINE 6.6)



BASE DISPLACEMENT OF L.T. SETTLEMENT MODEL @ EL. 562'-0"

E-W SECTION ALONG K_c & K LINES.

O2

9/15

1st Question — relative stiffness eye bar to rebars in slab

Answer

~~62.30^k TOTAL~~

~~2630^k slab~~

~~3600^k eye bar~~

approximately the same because of the tie rods

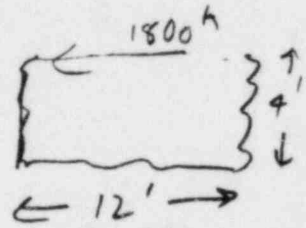
2nd Question — fuel pool wall calcs
i.e. holding eye bar

Answer

5'-9"

12

60s



16" rebar × 54 ksi = 800^k

1000^k shear concrete
120psi

williams 2" ϕ hollow core

18" × 24" C to C

3RD Question ACI 349 stresses

Answer

EL 659 7,150 K. 47 ksi plate
54 ksi rebar

wall 614 59.2 ksi

connection @ 714' (computer)

EL 659 narrow strip

AUXILIARY BUILDING UNDERPINNING

REVIEW OF CRITICAL AREAS

DESCRIPTION	STRESS/LOAD			
	For Lower Diff Settlemt	For Higher Diff Settlemt	Other Load Combin	Capacity of Section
Slab at El 659′ between column lines (G) and (H)	3,480K	3,850K	5,900K 7,150K *	6,230K
N-S walls on column lines (5.3) and (7.8) below El 614′	19.1KSI	24.5KSI	42.8KSI 59.2 " *	54KSI
Slab at El 634′-6 between column lines (C) and (F) and (5.6) and (6.2)	41.4KSI	48.1KSI	42.2KSI	54.0KSI
Slab at El 659′ between column lines (4.7) and (5.6) and (D) and (G)	47.5KSI	50.0KSI	37.3KSI	54.0KSI

31-G-3067-01

* VALUES FOR ACI 349-80 LOAD COMBINATIONS WITH HIGHER ASSUMED DIFFERENTIAL SETTLEMENT (FOR INFORMATION ONLY). THESE CORRESPOND TO MIDLAND FSAR RESPONSE SPECTRA. [illegible]

4TH Question — Settlement stresses

Answer

	not cracked 30 kcF	cracked 70 kcF
wall 614	19.4	40
slab 659	14.3 AVG.	15 AVG.
connection	computer run	
slab 659 narrow		

REBAR STRESSES FOR PARAMETRIC STUDIES

Description	Existing Stress ksi	Parametric Study I						Parametric Study 2	
		Construction Stage 1		Construction Stage 2		Construction Stage 3			
		After Soil Removal	With Jacking Load	After Soil Removal	With Jacking Load	After Soil Removal	With Jacking Load		
Well Below El 614'-0" On Line 5.3 Between Column Lines G and H	40 19.4*	44	39	37	27	48	26	40	54 ksi Allowable
Slab At El 659' Between Column Lines G and H	15 14.3*	17	13	12	0*	23	0*	20	54 ksi Allowable

*Compressive stress in slab; Hence, no tensile stress in rebar.

K-70

TABLE 2-4

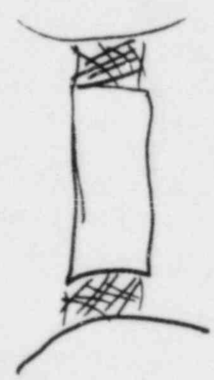
* THESE VALUES CORRESPOND TO A SOIL MODULUS OF 30 KCF UNDER THE MAIN AUXILIARY BUILDING " ARE AVERAGE STRESS VALUES.

G-2513-13

5TH Question — Explain critical areas stresses other slab @ 659

Answer

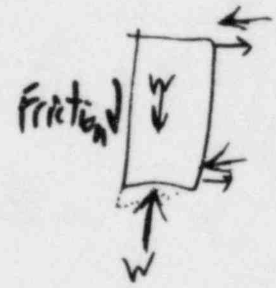
narrow slab adjacent to fuel pool



6th question — supply active jacking plots

(1) Crack map 659

(2) existing stresses ✓



(3) new chart

(4) computer run @ Ecfinnation

(5) why zero stresses in writing, also address procedure to establish allow diff settlement

OUR question → ~~[illegible]~~ is building ok

3000 → 1500

(6) ~~[illegible]~~ ✓

(7) jack holding time with NRC HOLD pt.

(8) diff settlement criteria

redrawing June 9th

AUXILIARY BUILDING UNDERPINNING

REBAR STRESS IN CRITICAL AREAS

LOCATION	EXISTING CONDITION stacked SOIL SPRINGS		HIGHEST LONG TERM SOIL SPRING FSAR COMBINATIONS	LONG-TERM SOIL SPRING - ACI-349-80 (FOR INFORMATION ONLY)	COMMENTS
	30 KCF	70 KCF			
SLAB AT EL. 659'-0" BTWN. COL. LINES G & H	14.3 KSI (AVE.)	15.0 KSI (AVE.)	51.0 KSI REBAR 42.6 KSI EYEBAR (AVE.)	62.0 KSI REBAR 51.6 KSI EYEBAR (AVE.)	1. FSAR & ACI-349-80 VALUES ARE FURNISHED FOR HIGHER POSTULATED DIFFERENTIAL SETTLEMENT AND FOR FSAR SEISMIC ANALYSIS. 2. STRESSES FOR EXISTING CONDITION CORRESPONDS TO 1.4D + 1.7L. ~1.5
WALLS BELOW EL. 614'-0" BTWN. COL. LINES G & H	19.4 KSI (AVE.)	40.0 KSI (AVE.)	42.8 KSI (AVE.)	59.2 KSI (AVE.)	
SLAB AT EL 634'-6" BOUNDED BY COL. LINES 5.6, 6.2, C, & F	* 28.0 KSI (AVE.)	* 38.9 KSI (AVE.)	42.2 KSI (AVE.)	55.2 KSI (AVE.)	
SLAB AT EL. 659'-0" BOUNDED BY COL. LINES 4.7, 5.6, D, & G	* 32.3 KSI (AVE.)	* 30.8 KSI (AVE.)	37.3 KSI (AVE)	57.2 KSI (AVE)	

SSE without settlements

* PRELIMINARY

AAO-519 8/76

NRC Auxiliary Building Audit
September 15, 1983

N Swanberg	Bechtel
N. RAMANUJAM	CPCO
S. S. AFIFI	Bechtel
JN Leech	CPCo
J.A. MOONEY	CPCO
R. B. Rarden	CPCO
FRANK RINALDI	NRC / DE / SGEB
Gunnar Harstead	NRC Consultant
Ross Landsman	NRC RIII
Joseph Kane	NRC
Steve J Poulos	Geotechnical Engineers Inc
John Schaub	CPCo
Ernie Kayshe	CPCo
GORDON TUVESON	BECHTEL
B. DHAR	BECHTEL

September 8, 1983

Docket Nos: 50-329 OM, OL
and 50-330 OM, OL

PRINCIPAL STAFF			
RA		ENF	
D/RA		SCS	✓
A/RA		PAO	
DPRP		SLO	
DEMA		IRC	
DRMSP			
DE			
SL			
SL		FILE	

orig + 3

MEMORANDUM FOR: Elinor G. Adensam, Chief
Licensing Branch No. 4
Division of Licensing

FROM: Darl S. Hood, Project Manager
Licensing Branch No. 4
Division of Licensing

SUBJECT: NOTICE OF AUDIT MEETING ON AUXILIARY BUILDING CALCULATIONS - MIDLAND PLANT, UNITS 1 & 2

DATE & TIME: September 14 & 15, 1983
8:30 a.m. - 4:30 p.m.

LOCATION: Bechtel
777 E. Eisenhower Parkway
Ann Arbor, Michigan

PURPOSE: Audit calculations of the Midland Auxiliary Building based upon soil modulus determined from underpinning pier load test.

PARTICIPANTS:[1/]

NRC	Consumers Power Company
R. Landsman	J. Mooney, et al.
J. Kane	
S. Poulos (GEI)	**Bechtel**
F. Rinaldi	
G. Harstead (Consultant)	N. Stromberg, et al.

Darl S. Hood, Project Manager
Licensing Branch No. 4
Division of Licensing

cc: See next page

[1/] Meetings between NRC technical staff and applicants for licenses are open for interested members of the public, petitioners, intervenors, or other parties to attend as observers pursuant to "Open Meeting and Statement of NRC Staff Policy", 43 Federal Register 28058, 6/28/78.

SEP 15 1983

8309200069

OFFICE	DL:LB #4	DL:LB #4				
SURNAME	DHood/hmc	EAdensam				
DATE	9/ /83	9/ /83				

MEETING NOTICE DISTRIBUTION

September 8, 1983

Docket File 50-329/330 OM, OL
NRC PDR
Local PDR
TIC
NSIC
PRC System
LB #4 r/f
H. Denton/E. Case
D. Eisenhut/R. Purple
T. Novak
J. Youngblood
A. Schwencer
G. Knighton
C. O. Thomas
J. Kramer
G. Lainas
D. Crutchfield
W. Russell
T. Ippolito
W. Johnston
D. Muller
J. P. Knight
L. Rubenstein
T. Speis
W. Houston
F. Schroeder
M. Ernst
ACRS (16)
Attorney, OELD
D. L. Jordan, DEQA; I&E
J. M. Taylor, DPR; I&E
F. Ingram, PA
Receptionist
Project Manager D. Hood
Licensing Assistant M. Duncan

NRC PARTICIPANTS

R. Landsman – R-3
J. Kane
S. Poulos (GEI)
F. Rinaldi
G. Harstead (Consultant)

bcc: Applicant & Service List

MIDLAND

Mr. J. W. Cook
Vice President
Consumers Power Company
1945 West Parnall Road
Jackson, Michigan 49201

cc: Michael I. Miller, Esq.
Ronald G. Zamarin, Esq.
Alan S. Farnell, Esq.
Isham, Lincoln & Beale
Three First National Plaza,
51st floor
Chicago, Illinois 60602

James E. Brunner, Esq.
Consumers Power Company
212 West Michigan Avenue
Jackson, Michigan 49201

Ms. Mary Sinclair
5711 Summerset Drive
Midland, Michigan 48640

Stewart H. Freeman
Assistant Attorney General
State of Michigan Environmental
Protection Division
720 Law Building
Lansing, Michigan 48913

Mr. Wendell Marshall
Route 10
Midland, Michigan 48640

Mr. R. B. Borsum
Nuclear Power Generation Division
Babcock & Wilcox
7910 Woodmont Avenue, Suite 220
Bethesda, Maryland 20814

Cherry & Flynn
Suite 3700
Three First National Plaza
Chicago, Illinois 60602

Mr. Don van Farrowe, Chief
Division of Radiological Health
Department of Public Health
P.O. Box 33035
Lansing, Michigan 48909

Mr. Steve Gadler
2120 Carter Avenue
St. Paul, Minnesota 55108

U.S. Nuclear Regulatory Commission
Resident Inspectors Office
Route 7
Midland, Michigan 48640

Ms. Barbara Stamiris
5795 N. River
Freeland, Michigan 48623

Mr. Paul A. Perry, Secretary
Consumers Power Company
212 W. Michigan Avenue
Jackson, Michigan 49201

Mr. Walt Apley
c/o Mr. Max Clausen
Battelle Pacific North West Labs (PNWL)
Battelle Blvd.
SIGMA IV Building
Richland, Washington 99352

Mr. I. Charak, Manager
NRC Assistance Project
Argonne National Laboratory
9700 South Cass Avenue
Argonne, Illinois 60439

James G. Keppler, Regional Administrator
U.S. Nuclear Regulatory Commission
[illegible]

cc: Mr. Ron Callen
Michigan Public Service Commission
6545 Mercantile Way
P.O. Box 30221
Lansing, Michigan 48909

Mr. Paul Rau
Midland Daily News
124 McDonald Street
Midland, Michigan 48640

Billie Pirner Garde
Director, Citizens Clinic
for Accountable Government
Government Accountability Project
Institute for Policy Studies
1901 Que Street, N.W.
Washington, D. C. 20009

Mr. Howard Levin, Project Manager
TERA Corporation
7101 Wisconsin Avenue
Bethesda, Maryland 20814

Ms. Lynne Bernabei
Government Accountability Project
1901 Q Street, N.W.
Washington, D. C. 20009

cc: Commander, Naval Surface Weapons Center
ATTN: P. C. Huang
White Oak
Silver Spring, Maryland 20910

Mr. L. J. Auge, Manager
Facility Design Engineering
Energy Technology Engineering Center
P.O. Box 1449
Canoga Park, California 91304

Mr. Neil Gehring
U.S. Corps of Engineers
NCEED - T
7th Floor
477 Michigan Avenue
Detroit, Michigan 48226

Charles Bechhoefer, Esq.
Atomic Safety & Licensing Board
U.S. Nuclear Regulatory Commission
Washington, D. C. 20555

Dr. Frederick P. Cowan
Apt. B-125
6125 N. Verde Trail
Boca Raton, Florida 33433

Jerry Harbour, Esq.
Atomic Safety and Licensing Board
U.S. Nuclear Regulatory Commission
Washington, D. C. 20555

Geotechnical Engineers, Inc.
ATTN: Dr. Steve J. Poulos
1017 Main Street
Winchester, Massachusetts 01890

limited questions for clarifications

1) please present analysis 1500 vs 3000 2) break 3) look @ cals alone with key individuals
3) questions

who's in charge

summarize todays stuff in writing for tomorrow morning

please refresh out memory

if we have time we would like to have a presentation on new jacking, new design of wall without lower bracing, and VAT entrance

Questions

x (1) changes (stresses) 1500-3000

x (2) rigid body rotation

x (3) EPA CONTROL TOWER connection & others

✓ (4) what stresses 659 & other critical areas due to SSE Load

(5) ~~do they include settlement~~ existing Loads No

x (6) how subgrade modulus calculated

x (7) explanation of load combinations

x (8) Loads due to existing settlements

~~(9) what areas are not being modified~~ No

x (10) connection @ fuel pool

OPEN ITEMS

(1) new jacking sequence - June 9 letter

(2) new way of constructing permanent wall without lower bracing

(3) UAT entrance - Hood approval - during audit ✓
phone calls March 7 & 8, June 6
July 15

(4) Audit in Ann Arbor - reanalysis of Aux -

~~(5) Cracks in high stress areas~~

~~(6) [illegible] transcript~~

1

SUMMARY OF SOILS DATA FOR AUXILIARY BUILDING UNDERPINNING ANALYSES

	EPA				CONTROL TOWER				MAIN AUX.		
Case	E (KSF)	Total Settl. (IN)	After Lockoff Settl. (IN)	Unit Soil Spring (KCF)	E (KSF)	Total Settl. (IN)	After Lockoff Settl. (IN)	Unit Soil Spring (KCF)	After Lockoff Settl. (IN)	Unit Soil Spring (KCF)	Comments
I	3000	0.6	0.2	410	3000	0.9	0.3	350	0.1	1160	Based on Bechtel Testimony
II	1333	1.35	0.45	180	2000	1.35	0.45	240	0.2	580	NRC
III	857	2.1	0.7	128	1286	2.1	0.7	175	0.2	580	0.5 inch differential

Attachment I

(2)

AUXILIARY BUILDING UNDERPINNING
DESIGN CRITERIA

- EXISTING STRUCTURE EXCLUDING UNDERPINNING WALL + CONNECTIONS
  - Designed in accordance with Subsections 3.8.6.3.1 through 3.8.6.3.3 of FSAR (ACI 318-71, including settlement effects)
  - Some loading combinations include settlement effects; others do not
- UNDERPINNING WALL + CONNECTIONS
  - Designed in accordance with Subsection 3.8.6.3.5 (ACI 349.80)
  - All load combinations have settlement effects

34-G-3067-03

Attachment 2

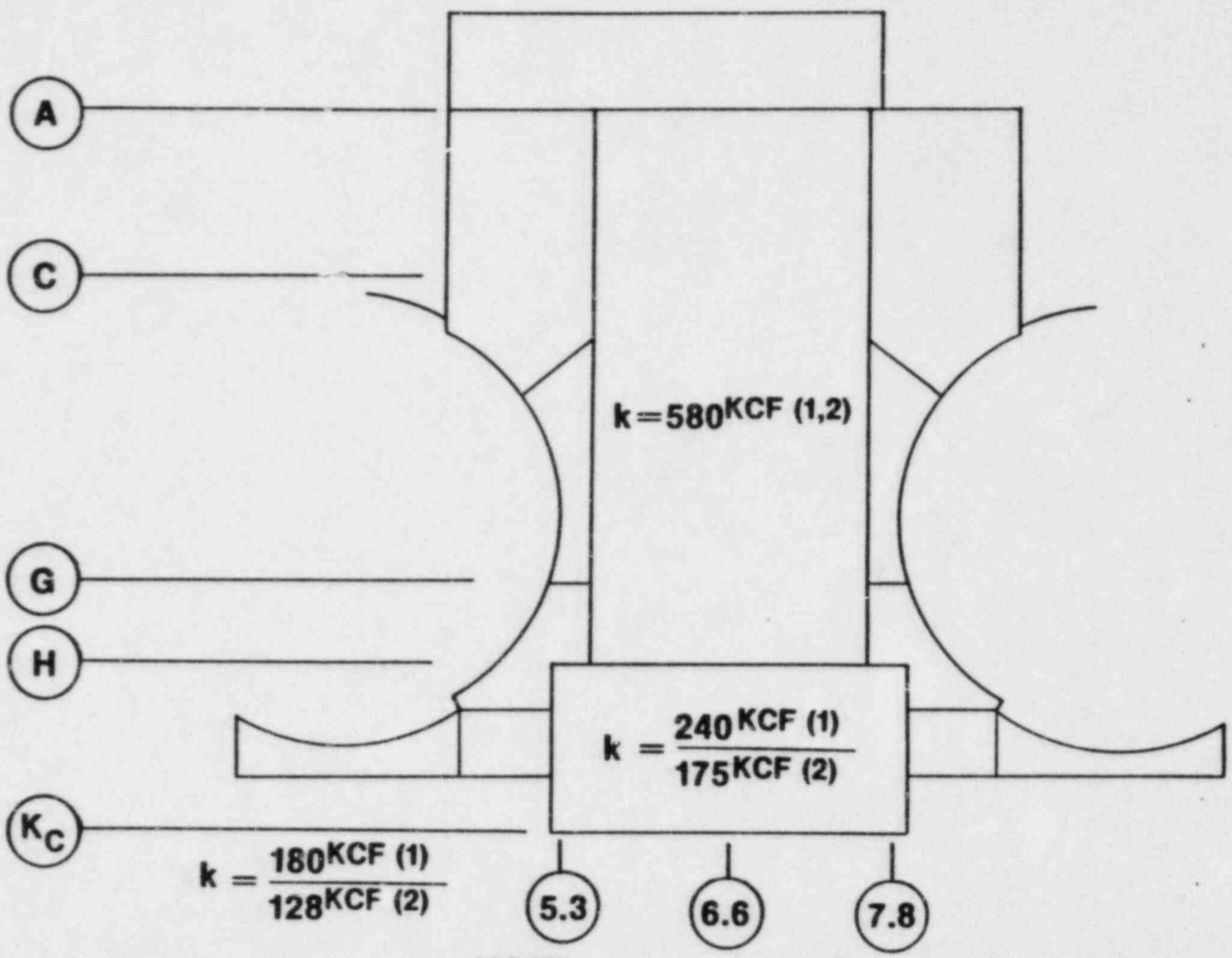
AUXILIARY BUILDING UNDERPINNING
SETTLEMENT ANALYSIS

- Used same methodology as before
- Revised soil springs and added settlement stresses to other stresses in accordance with FSAR

34-G-3067-04

AUXILIARY BUILDING UNDERPINNING

SOIL SPRINGS UNDER AUXILIARY BUILDING

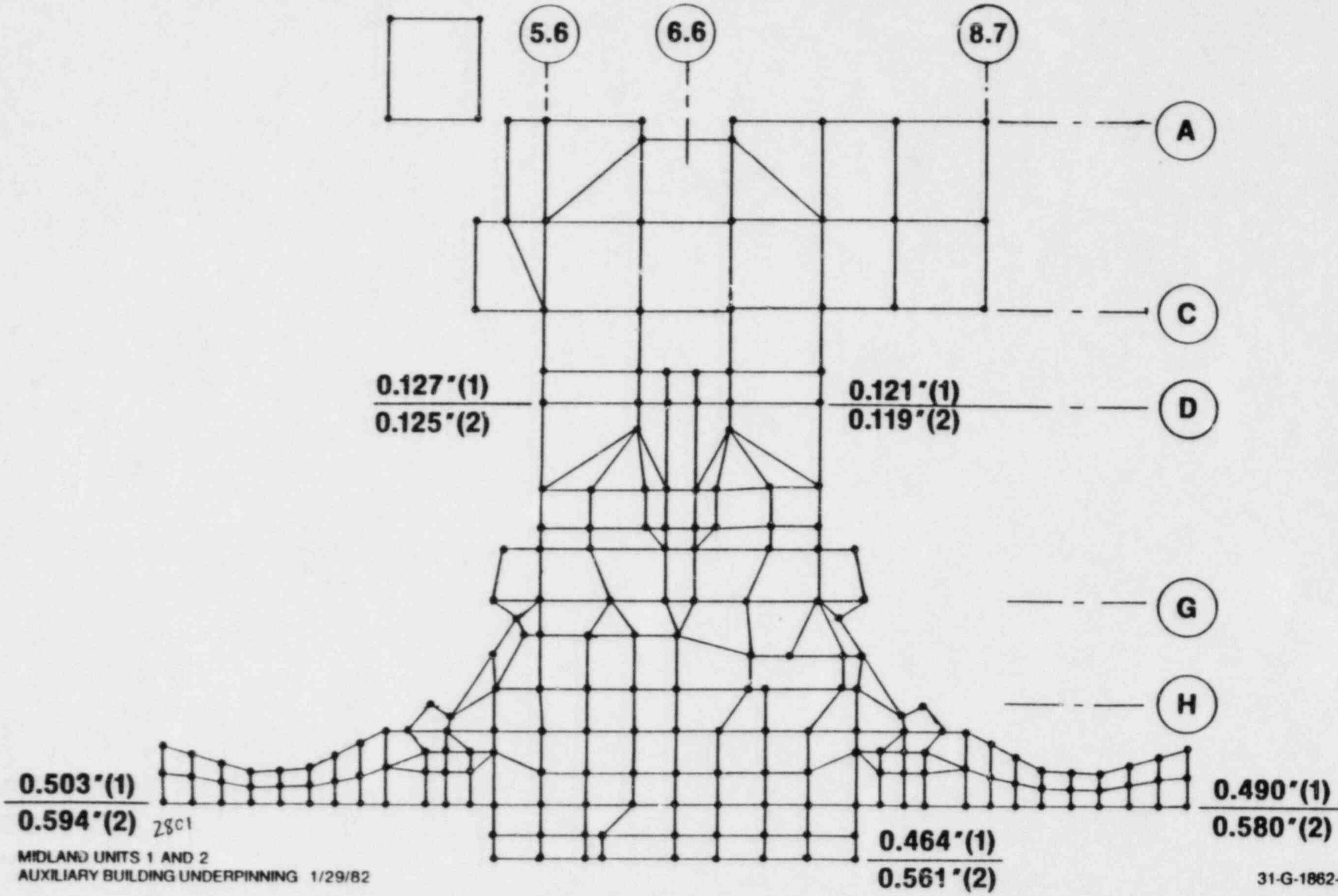


NOTE:

(1) for lower differential settlement

(2) for higher differential settlement

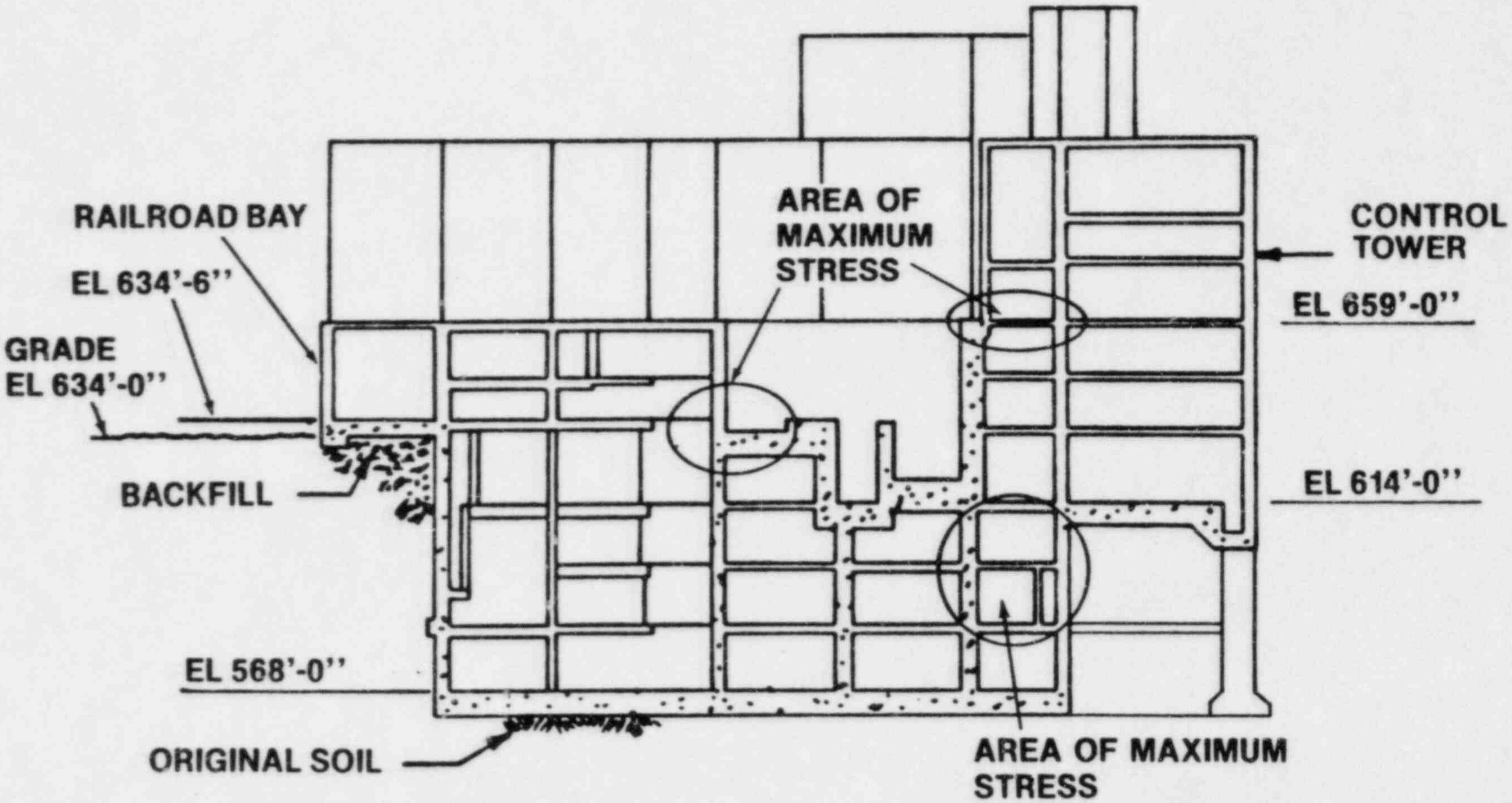
AUXILIARY BUILDING UNDERPINNING
NODAL MESH AT ELEVATION 614'
PLAN VIEW



MIDLAND UNITS 1 AND 2
AUXILIARY BUILDING UNDERPINNING 1/29/82

31-G-1862-02

AUXILIARY BUILDING UNDERPINNING
TYPICAL SECTION
LOCATION OF MAXIMUM STRESS
(Looking East)



G-1555-07

MIDLAND UNITS 1 AND 2
AUXILIARY BUILDING UNDERPINNING 1/26/82

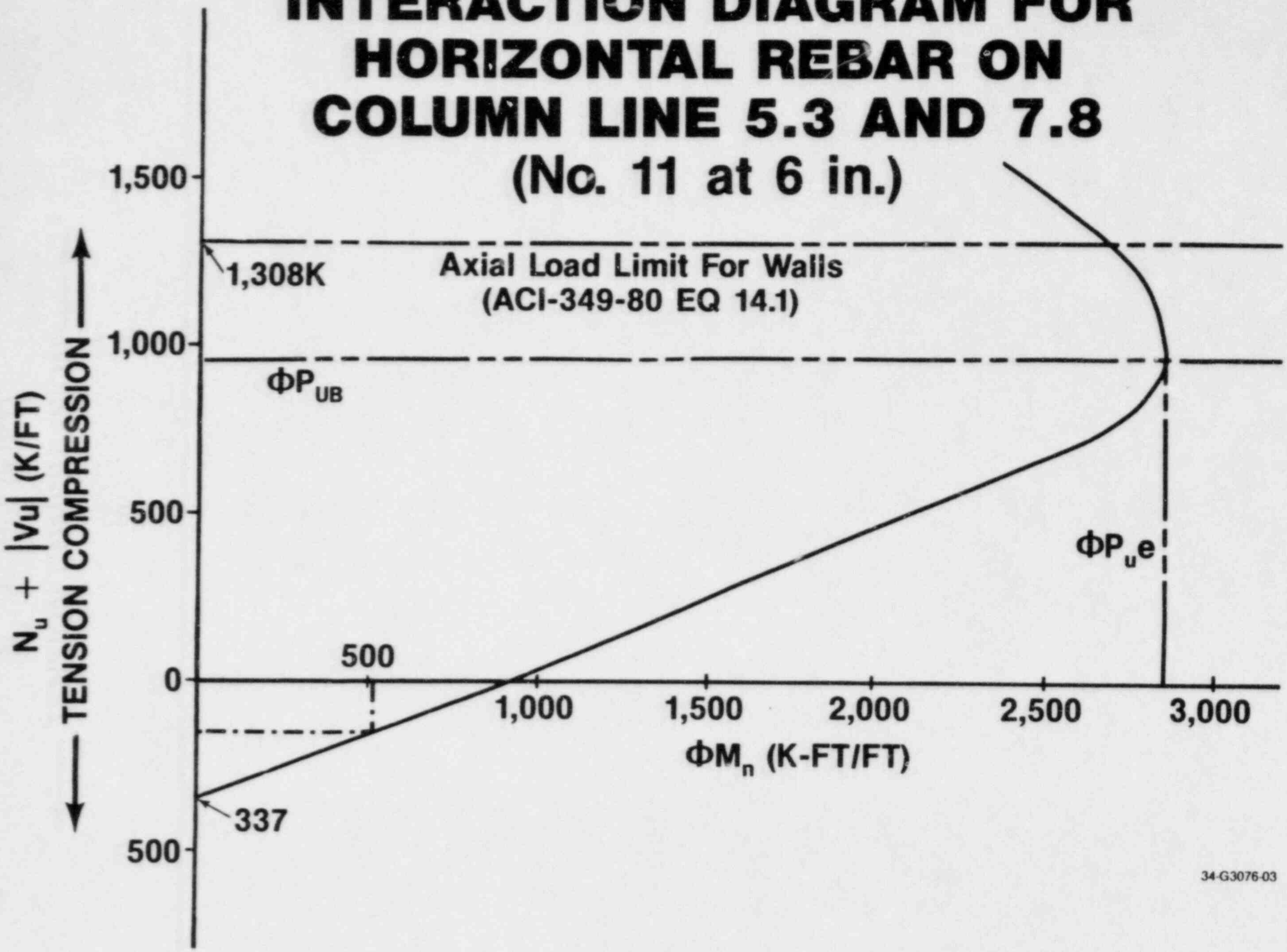
AUXILIARY BUILDING UNDERPINNING
REVIEW OF CRITICAL AREAS

DESCRIPTION	STRESS/LOAD			
	For Lower Diff Settlemt	For Higher Diff Settlemt	Other Load Combin	Capacity of Section
Slab at El 659′ between column lines (G) and (H)	3,480^{K} 71 ksi	3,850^{K} 80 ksi	5,900^{K}	6,230^{K}
N-S walls on column lines (5.3) and (7.8) below El 614′	19.1^{KSI}	24.5^{KSI}	42.8^{KSI}	54^{KSI}
Slab at El 634′-6 between column lines (C) and (F) and (5.6) and (6.2)	41.4^{KSI}	48.1^{KSI}	42.2^{KSI}	54.0^{KSI}
Slab at El 659′ between column lines (4.7) and (5.6) and (D) and (G)	47.5^{KSI}	50.0^{KSI}	37.3^{KSI}	54.0^{KSI}

31-G-3067-01

318 $\frac{1}{4}$" $\frac{1}{2}$" 318 with OBE + settlement   318 SSE without settlement

AUXILIARY BUILDING UNDERPINNING
INTERACTION DIAGRAM FOR HORIZONTAL REBAR ON COLUMN LINE 5.3 AND 7.8
(No. 11 at 6 in.)



AUXILIARY BUILDING UNDERPINNING

UNDERPINNING WALL DESIGN CRITICAL LOADS

NORTH-SOUTH WALLS IN EPA AND CONTROL TOWER									
LOCATION	ELEVATION	HORIZONTAL REBAR				VERTICAL REBAR			
		N_u (K/FT)	V_u (K/FT)	M_u (K-FT/FT)	ϕM_n (K-FT/FT)	N_u (K/FT)	V_u (K/FT)	M_u (K-FT/FT)	ϕM_n (K-FT/FT)
Just North of Column Line K_C on Column Line 5.3	Between EL 565 and EL 574′	124	159	211	260	133	159	9.6	120
Just North of Column Line K_C on Column Line 5.3	Between EL 603′ and EL 614′	112	−231	−51.3	120	−139	−231	−61.6	650
Just South of Column Line H_K	Between EL 565′ and EL 574′	90.6	57.1	459	510	−54.1	57.1	−16.5	−900

34-G3076-02

AUXILIARY BUILDING UNDERPINNING

UNDERPINNING WALL DESIGN CRITICAL LOADS

WALLS ON COLUMN LINES K and K_c
(E-W EPA AND CONTROL TOWER WALLS)

LOCATION	ELEVATION	HORIZONTAL REBAR				VERTICAL REBAR			
		N_u (K/FT)	V_u (K/FT)	M_u (K-FT/FT)	ϕM_n (K-FT/FT)	N_u (K/FT)	V_u (K/FT)	M_u (K-FT/FT)	ϕM_n (K-FT/FT)
Between Column Lines 4.1 and 4.6	Between EL 603′ and EL 614′	75.5	74.6	118	168	47.4	74.6	23.2	180
Just West of Column Lines 5.3	Between EL 603′ and EL 614′	63.6	77.8	24.7	170	9.3	77.8	19.7	190

34-G-3076-01

3.8.6.3 Loads and Loading Combinations

The containment, internal structures, other Seismic Category I structures, and foundations are designed for all credible conditions of loadings, including normal loads, loads resulting from a loss-of-coolant accident, thermal loads, test loads, missile-generated loads, adverse environmental conditions, and loads resulting from a pipe rupture where applicable.

Wind and tornado loads, flood design bases, and seismic loads are given in Sections 3.3, 3.4, and 3.7. Missile effects and the postulated pipe rupture effects are discussed in Sections 3.5 and 3.6.

All the loads postulated in the plant are listed. All loads listed, however, are not necessarily applicable to all the structures and components in the plant. The loads and the applicable load combinations for which each structure is designed depend on the conditions to which that particular structure could be subjected.

Steel structures other than pipe whip restraints were designed by the working stress method. Soil bearing pressure was checked for the actual loads. All reinforced concrete structures were designed by the ultimate strength method except the containment.

The loads used in the design of containment are presented in Subsection 3.8.1.3. The loads used in the design of the remaining Seismic Category I structures are presented in the following subsections.

The design of structures is separated into two parts.

a. The portions of existing structures that were constructed before remedial work

b. The new remedial foundations including their connections to the existing structures

Design of the existing structure is based on the set of load and load combinations specified in Subsection 3.8.6.3.1 through 3.8.6.3.3. Design of remedial work including the connection to the existing structure is based on the load combinations given in Subsection 3.8.6.3.5. 44

The stability of all Category I structures including containments is investigated for the load combinations given in Subsection 3.8.6.3.4.

3.8.6.3.1 Loads and Definition of Terms

The following loads are considered: dead loads, live loads, earthquake loads, pipe rupture loads, thermal loads, wind and tornado loads, hydrostatic loads, differential settlement, and jacking preload effects. | 47 | 44

a. Dead Loads

The dead load includes the weight of the following:

1. Interior framing and slabs including base slabs

2. Walls, roofs, and floors

3. All internal structures including partitions, platforms, hangers, cable trays, and pipes with fluid

4. Electrical conductors and equipment as specified on the drawings supplied by the manufacturers of the equipment and installed within a structure

5. Hydrostatic and soil loads, where applicable

b. Live Loads

The live load includes the weight of the following:

1. The design floor and roof loads

2. Laydown loads

3. Pool and tank liquid loads

4. All vertical loads except dead load

5. Where applicable, lateral pressure of the soil

6. Main piping loads

7. Equipment live loads including fuel handling equipment and load materials

8. All live loads transmitted by internal structures

c. Seismic Loads

Seismic loads for safe shutdown earthquake load and the operating basis earthquake load were considered. A more detailed discussion is presented in Section 3.7.

d. Pipe Rupture Loads

Pipe rupture loads include the jet impingement forces from postulated pipe breaks, differential pressures that might build up across compartments, and loads due to pipe whipping or pipe restraint. Pipe rupture effects are further discussed in Section 3.6.

e. Thermal Loads

Thermal loads include the temperature gradients through the spent fuel pool walls and floor, the primary and secondary shield walls, forces on internal structures due to the thermal expansion and contraction of the liner plate, piping, and equipment, including increases in water temperature during operating and accident conditions.

f. Wind and Tornado Loads

Wind and tornado loads were considered and are discussed in detail in Section 3.3. Tornado missile effects are discussed in Subsection 3.5.3.

All structures whose failure could endanger Seismic Category I structures, systems, or equipment, are designed to withstand the effects of the wind and tornado loadings and to provide protection of Seismic Category I systems and components from tornado missiles.

The structures are analyzed for tornado loading not coincident with the safe shutdown earthquake.

g. Hydrostatic Loads

Lateral hydrostatic pressure loads and buoyant forces resulting from the displacement of groundwater or probable maximum flood (PMF) have been applied to the structures and are accounted for in the design and discussed further in Section 2.4.

h. Jacking Preload

The design considers the effects of jacking loads in the existing structure and the underpinning wall. 44

The following variables are used in the loading combination equations:

U = Required strength to resist design loads or their related internal moments and forces

For the ultimate load capacity of a concrete section:

U is calculated in accordance with ACI 318-63 Part IV-8 for design calculations initiated prior to February 1, 1973

U is calculated in accordance with ACI 318-71 for design calculations initiated after February 1, 1973

F_y = Specified minimum yield strength for structural steel

f_s = Allowable stress for structural steel; f_s is calculated in accordance with the AISC Code, 1963 Edition for design calculations initiated prior to February 1, 1973. f is calculated in accordance with the AISC Code, 1969 Edition, with Supplements 1, 2, and 3 for design calculations initiated after February 1, 1973. 33

D = Dead loads

P_L = Effects of jacking preload on structure 44

L = Live loads

M = Loads due to hydrotest fluids

R = Local force or pressure on structure or penetration caused by rupture of any one pipe

T = Effects of differential settlement 44

T_O = Thermal effects during normal operating conditions

H_O = Force on structure due to thermal expansion of pipes under operating conditions 44

T_A = Total thermal effects which may occur during a design accident other than H_A 44

H_A = Force on structure due to thermal expansion of pipes under accident condition 44

E = Operating basis earthquake (OBE)

E' = Safe shutdown earthquake load (SSE)

B = Hydrostatic forces due to the PMF elevation of 635.5 feet

W = Design wind load

W' = Tornado wind loads, including missile effects and differential pressure

A cross reference of terminology used in SRP 3.8.4 and those listed above are presented in Table 3.8-26.

Ø = Capacity reduction factor

The capacity reduction factor (Ø) provides for the possibility that small adverse variations in material strengths, workmanship, dimensions, control, and degree of supervision, while individually within required tolerances and the limits of good practice, occasionally may combine to result in undercapacity.

In the load equations, the following factors are used:

Ø = 0.90 for reinforced concrete in flexure

Ø = 0.85 for tension, shear, bond, and anchorage in reinforced concrete, applicable only for calculations in accordance with ACI 318-63

Ø = 0.75 for spirally reinforced concrete compression members

Ø = 0.70 for tied compression members

Ø = 0.90 for fabricated structural steel

Ø = 0.90 for reinforced steel in direct tension

Ø = 0.85 for lap splices for reinforcing steel, applicable only for calculations in accordance with ACI 318-63

Ø = 0.90 for welded or mechanical splices of reinforcing steel

3.8.6.3.2 Loading Under Normal Conditions

For loads encountered during normal plant operation, the design is based on referenced codes and standards.

a. Concrete

Reinforced concrete structures are designed for ductile behavior, that is, with steel stresses controlling.

Design of concrete structures satisfies the most severe loading combinations, based on the load factors shown below:

1) $U = 1.5D + 1.8L$ - applicable to calculations started before February 1, 1973

$U = 1.4D + 1.7L + 1.0P_L$ - applicable to calculations started after February 1, 1973 |44

2) $U = 1.4 (D + L + M)$ |41

3) $U = 1.25\ (D + L + H_O + E) + 1.0\ T_O + 1.0P_L$

4) $U = 1.25\ (D + L + H_O + W) + 1.0\ T + 1.0P_L$

5) $U = 0.9\ D + 1.25\ (H_O + E) + 1.0\ T + 1.0P_L$ 44

6) $U = 0.9\ D + 1.25\ (H_O + W) + 1.0\ T + 1.0P_L$

In addition, for ductile moment resisting concrete frames and for shear walls: 41

7) $U = 1.4\ (D + L + E) + 1.0\ T + 1.25\ H_O + 1.0P_L$

8) $U = 0.9\ D + 1.25\ E + 1.0\ T + 1.25\ H_O + 1.0P_L$

For structures which include settlement effects:

9) $U = 1.05D + 1.28L + 1.05T + 1.0P_L$

10) $U = 1.4D + 1.4T + 1.0P_L$ 44

includes T

11) $U = 1.0D + 1.0L + 1.0W + 1.0T + 1.0P_L$

12) $U = 1.0D + 1.0L + 1.0E + 1.0T + 1.0P_L$

For structural elements carrying mainly earthquake forces, such as equipment supports:

13) $U = 1.0\ D + 1.0\ L + 1.8\ E + 1.0\ T_O + 1.25\ H_O + 1.0P_L$

b. Structural Steel

Design of steel structures satisfies the following loading combinations without exceeding the specified stresses:

1) $D + L + P_L$ 44
..................stress limit = f_s

2) $D + L + T_O + H_O + E + P_L$ 44
..................stress limit = $1.25f_s$

3) $D + L + T_O + H_O + W + P_L$ 44
..................stress limit = $1.33f_s$

4) $D + L + M$
..................stress limit = $1.33f_s$ 44

In addition, for structural elements carrying mainly earthquake forces, such as struts and bracing:

5) $D + L + T_O + H_O + E + P_L$ 44
..................stress limit = f_s

3.8.6.3.3 Loading Under Accident Conditions

The Seismic Category I structures, except as provided in BC-TOP-9A and BN-TOP-2, are proportioned to maintain elastic behavior when subjected to various combinations of dead, live, jacking preload, differential settlement, seismic, hydrostatic, thermal, tornado winds and differential pressure, and sustained accident pressure loads. The upper limit of elastic behavior is considered to be the yield strength of the effective load-carrying structural materials. The yield strength F_y for steel (including reinforcing steel) is considered to be the guaranteed minimum given in appropriate ASTM specifications. The yield strength for reinforced concrete structures is considered to be the ultimate resisting capacity as calculated from the "Ultimate Strength Design" portion of the ACI Code. 44 39 47

The deflections or deformations of structures and supports are evaluated to ensure required functional capabilities are maintained under all postulated loading conditions.

The engineered safeguards systems components are protected by barriers from all credible missiles which might be generated. 39

a. Concrete

The concrete structures satsify the most severe of the following loading combinations:

1) $U = 1.05\ D + 1.05\ L + 1.25\ E + 1.0\ T_A + 1.0\ H_A + 1.0\ R + 1.0\ P_L$

2) $U = 0.95\ D + 1.25\ E + 1.0\ T_A + 1.0\ H_A + 1.0\ R + 1.0P_L$

3) $U = 1.0\ D + 1.0\ L + 1.0\ E' + 1.0\ T_O + 1.25\ H_O + 1.0\ R + 1.0\ P_L$

NO-T

4) $U = 1.0\ D + 1.0\ L + 1.0\ E' + 1.0\ T_A + 1.0\ H_A + 1.0\ R + 1.0\ P_L$

5) $U = 1.0\ D + 1.0\ L + 1.0\ B + 1.0\ T_O + 1.25\ H_O + 1.0\ P_L$

6) $U = 1.0\ D + 1.0\ L + 1.0\ T_O + 1.25\ H_O + 1.0\ W' + 1.0\ P_L$

b. Structural Steel

Steel structures satisfy the most severe of the following loading combinations without exceeding the specified stresses:

1) $D + L + R + T_O + H_O + E' + P_L$ . ...stress limit[(a)] $= 1.5f_s$ 41

2) $D + L + R + T_A + H_A + E' + P_L$ 47
$\ldots\ldots\ldots\ldots\ldots\ldots$ stress limit[a] $= 1.5f_s$

3) $D + L + B + T_O + H_O + P_L$
$\ldots\ldots\ldots\ldots\ldots\ldots$ stress limit[a] $= 1.5f_s$ 41

4) $D + L + T_O + H_O + W' + P_L$
$\ldots\ldots\ldots\ldots\ldots\ldots$ stress limit[a] $= 1.5f_s$

[a]For the cases above, the maximum allowable stress, 47
except for local areas affected by missiles,
whipping pipes, and jet impingement which do not
affect overall stability, is limited to 0.9 F_y for
bending, and axial tension or compression when buckling
is precluded and 0.5 F_y for shear. Bearing allowables
shall be as given in the AISC Specification. 39

In the above factored load combinations for steel, accident thermal loads are neglected when it can be shown that they are secondary and self limiting in nature, and that the material is ductile.

Design of energy absorbing steel elements to resist pipe break loads may consider the effects of strain hardening of the material.

The time phasing between loadings is used where applicable to satisfy the above equations.

Structural members subjected to postulated impact
effects are designed in accordance with BC-TOP-9-A, 39
Rev. 2.

Structural members subjected to missile and pipe
break loads are designed in accordance with
Bechtel's BC-TOP-9-A, Rev. 2, and Bechtel's
BN-TOP-2, Rev. 2. Table 3.8-40 shall be used for
ductility ratios. 39

3.8.6.3.4 Other Loadings

In addition to the previous load combinations listed, the structures were checked for overturning, sliding, and flotation utilizing the load combinations and minimum safety factors indicated below:

Load Combination	Minimum Factor of Safety Overturning	Sliding	Flotation
D + H + E	1.5	1.5	---
D + H + W	1.5	1.5	---
D + H + E'	1.1	1.1	---
D + H + W'	1.1	1.1	---
D + B	---	---	1.1

where H is the lateral earth pressure

3.8.6.3.5 Loads and Loading Combinations for the Underpinning Walls

The underpinning walls and piers and their connection with the existing structure are designed using the load combinations of this subsection only. The definitions of loads used especially for these combinations are shown as follows.

Normal loads which are encountered during normal plant operation and shutdown:

D = dead loads or their related internal moments and forces

L = applicable live loads or their related internal moments and forces. Only 25% of the floor design live load (except snow load) will be used in analysis of the building for global effects and under operating conditions. 44

F = lateral and vertical pressure of liquids, or their related internal moments and forces

H = lateral earth pressure, or its related internal moments and forces

P_L = effect of jacking preload

T_O = thermal effects and loads during normal operating or shutdown conditions

R_O = maximum pipe and equipment reactions if not included in the above loads

T = effects of differential settlement

U = required strength to resist design loads or their related internal moments and forces. U is calculated in accordance with ACI 349-80.

Severe environmental loads which could infrequently be encountered during the plant life:

E_0 = loads generated by the operating basis earthquakes

W = loads generated by the operating basis wind specified for the plant

Extreme environmental loads are loads which are credible but highly improbable.

E_{ss} = loads generated by 1.5 times the safe shutdown earthquake (as defined in Section 3.7) for underpinning wall design

W_t = loads generated by the design tornado specified for the plant. They include combined loads due to the tornado wind pressure, tornado-created differential pressures, and tornado-generated missiles.

Abnormal loads are generated by a postulated high-energy pipe break accident:

P_a = maximum differential pressure load generated by a postulated break 44

T_a = thermal loads under accident conditions generated by a postulated break and including T_0

R_a = pipe and equipment reactions under accident conditions generated by postulated break and including R_0

Y_r = loads on the structure generated by the reaction on the broken high-energy pipe during a postulated break

Y_j = jet impingement load on a structure generated by a postulated break

Y_m = missile impact load on a structure generated by or during a postulated break, such as pipe whipping

The underpinning walls satisfy the most severe of the following loading combinations:

include T

1) $U = 1.4\ (D + T) + 1.4\ F + 1.7\ L + 1.7\ H + 1.7\ R_0 + P_L$

2) $U = 1.4\ (D + T) + 1.4\ F + 1.7\ L + 1.7\ H + 1.9\ E + 1.7\ R_0 + P_L$

3) $U = 1.4\ (D + T) + 1.4\ F + 1.7\ L + 1.7\ H + 1.7\ W + 1.7\ R_0 + P_L$

4) $U = (D + T) + F + L + H + T_O + R_O + E_{ss} + P_L$

5) $U = (D + T) + F + L + H + T_O + R_O + W_t + P_L$

6) $U = (D + T) + F + L + H + T_a + R_a + 1.5 P_a + P_L$

7) $U = (D + T) + F + L + H + T_a + R_a + 1.25 P_a + (Y_r + Y_j + Y_m) + 1.25 E_O + P_L$

8) $U = (D + T) + F + L + H + T_a + R_a + P_a + (Y_r + Y_j + Y_m) + E_{ss} + P_L$

9) $U = 1.05 (D + T) + 1.05 F + 1.3 L + 1.3 H + 1.3 T_O + 1.3 R_O + P_L$

10) $U = 1.05 (D + T) + 1.05 F + 1.3 L + 1.3 H + 1.4 F_O + 1.3 T_O + 1.3 R_O + P_L$

11) $U = 1.05 (D + T) + 1.05 F + 1.3 L + 1.3 H + 1.3 W + 1.3 T_O + 1.3 R_O + P_L$

3.8.6.4 Design and Analysis Procedures

Design and analysis procedures for the containment including the base slab are discussed in Subsection 3.8.1.4.

For all other Seismic Category I structures including foundations and containment internals, the basic techniques used for analysis and design are the conventional methods used in engineering practice such as the theory of concrete structures or beam theory, and those based on plate and shell theories of different degrees of approximation.

These are discussed in more detail in Subsections 3.8.3.4, 3.8.4.4, and 3.8.5.4.

The seismic analysis of these structures is covered in Section 3.7. The structures are proportioned to withstand the forces from all postulated loadings. 44

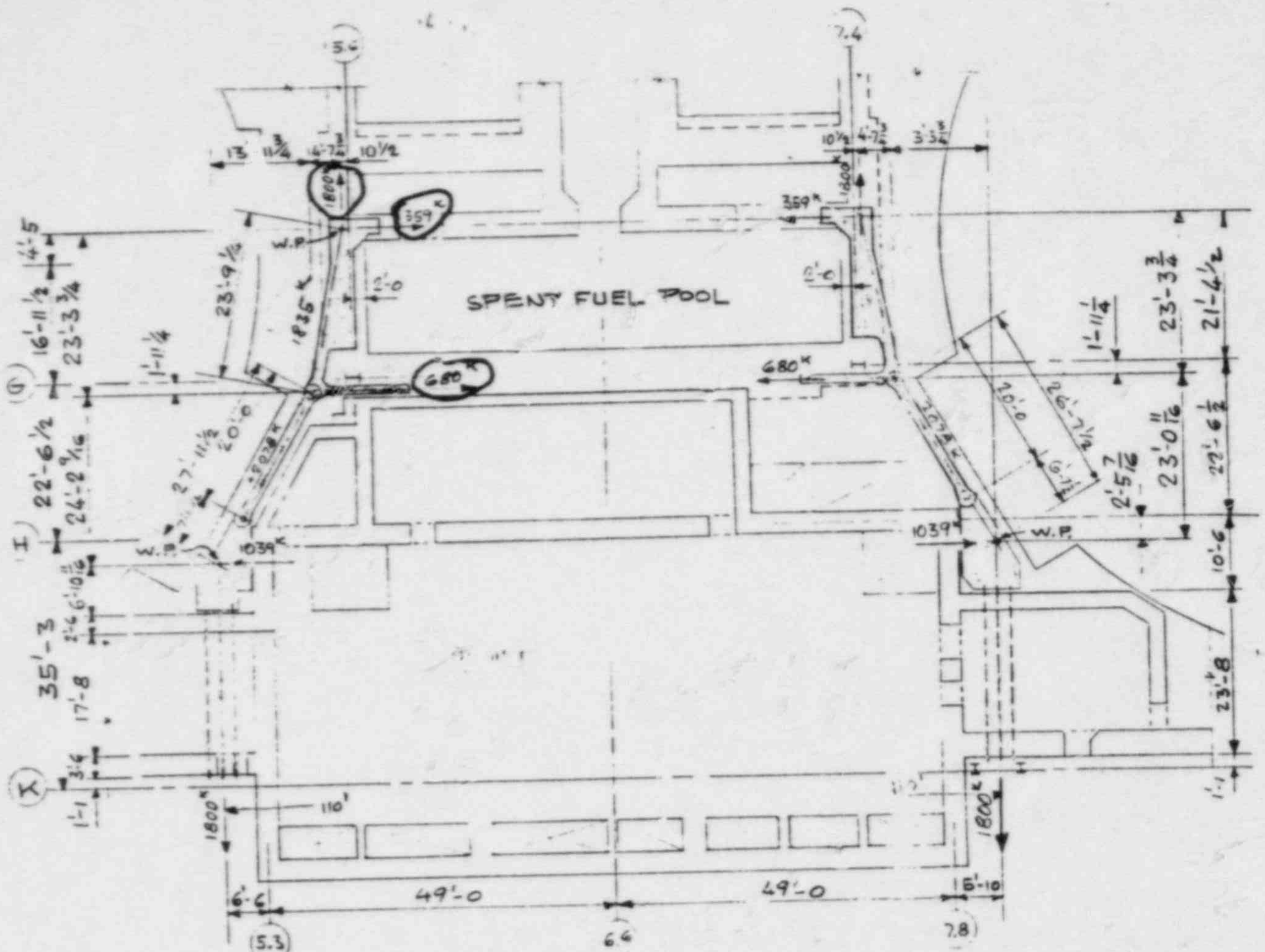
3.8.6.5 Structural Acceptance Criteria

The fundamental acceptance criterion for the containment is the successful completion of the structural integrity test, with measured responses within the limits predicted by analyses. The limits are predicted based on test load analyses, test load combinations, and code allowance values for stress, properties, and construction tolerances as described in Subsection 3.8.1. In this way, the margins of safety associated with the design and construction of the containment are, as a minimum, the accepted margins associated with nationally recognized codes of practice.

Attachment 3

CALCULATION SHEET

ORIGINATOR	C. K. STEINER	DATE	8-19-83
CALC. NO		REV. NO.	
CHECKED		DATE	
PROJECT	MIDLAND-UNITS 1 & 2	JOB NO	7220
SUBJECT	FLOOR FIX @ EL. 659-0	SHEET NO	1



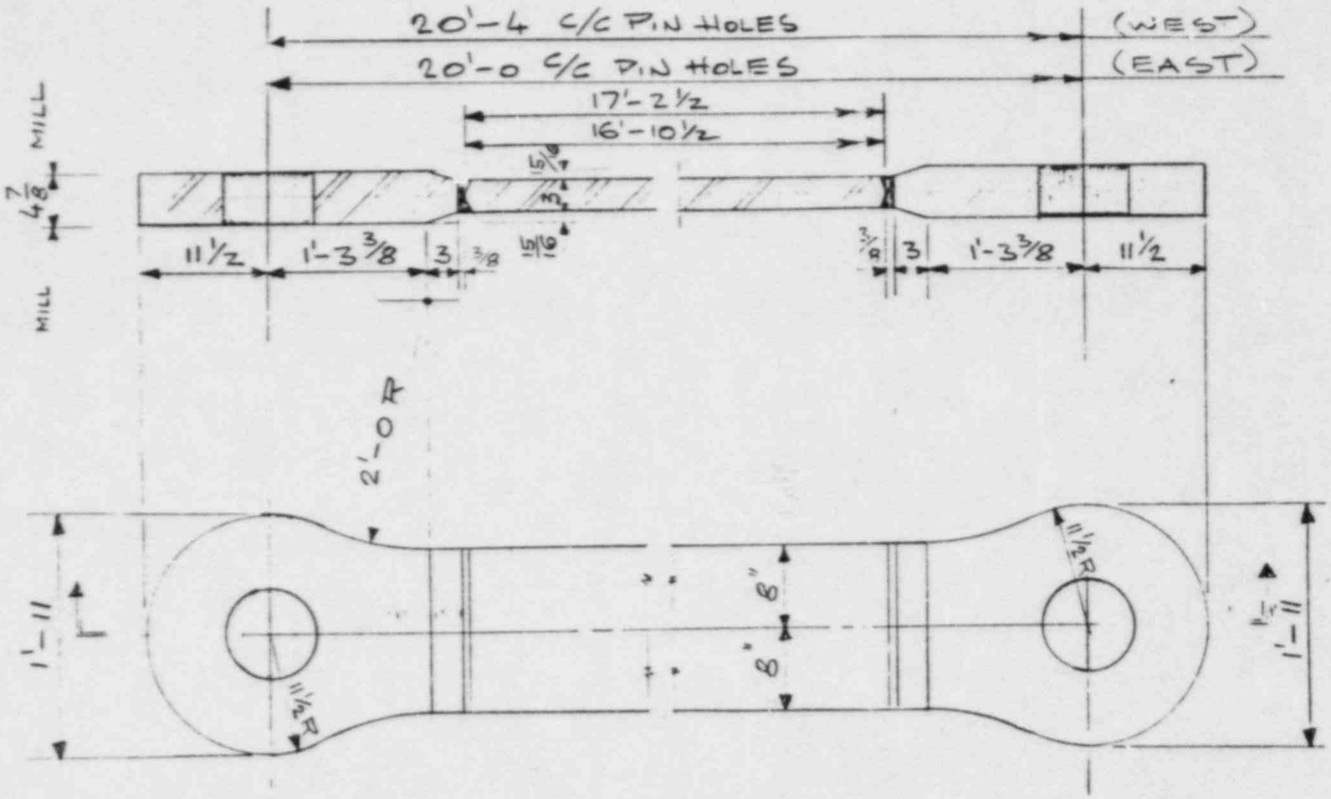
CALCULATION SHEET

ORIGINATOR C. K. STEINER DATE 8-19-83 CALC. NO. DQ61Q REV. NO.

PROJECT MIDLAND - UNIT 1 & 2 CHECKED DATE

AUX. BLDG. - PERMANENT UNDERPINNING JOB NO. 7220

SUBJECT SLAB FIX @ EL. 659'-0 SHEET NO. 38



EYE BAR - DET. # 11 (WEST)

EYE BAR - DET. # 12 (EAST)

AAO-513 6/76

Attachment 4

CALCULATED DISPLACEMENTS AT DEEP SEATED BENCHMARKS FOR K=30

(NOTE = NO ELEMENT CRACKED)

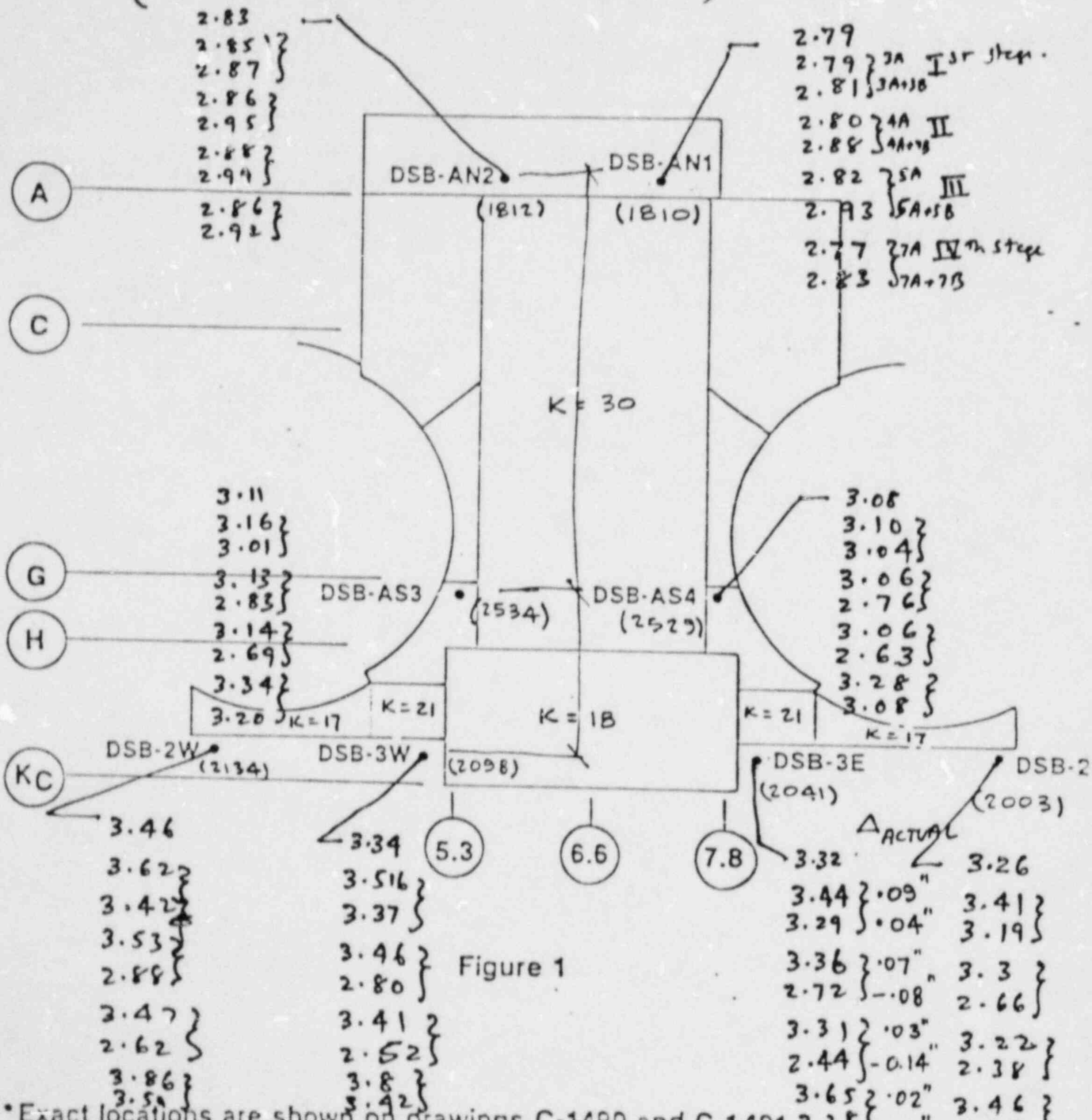


Figure 1

*Exact locations are shown on drawings C-1490 and C-1491

K. Razdan.

CALCULATED DISPLACEMENTS AT DEEP SEATED BENCHMARKS FOR K = 70

(NOTE: 13 ELEMENTS CRACKED)

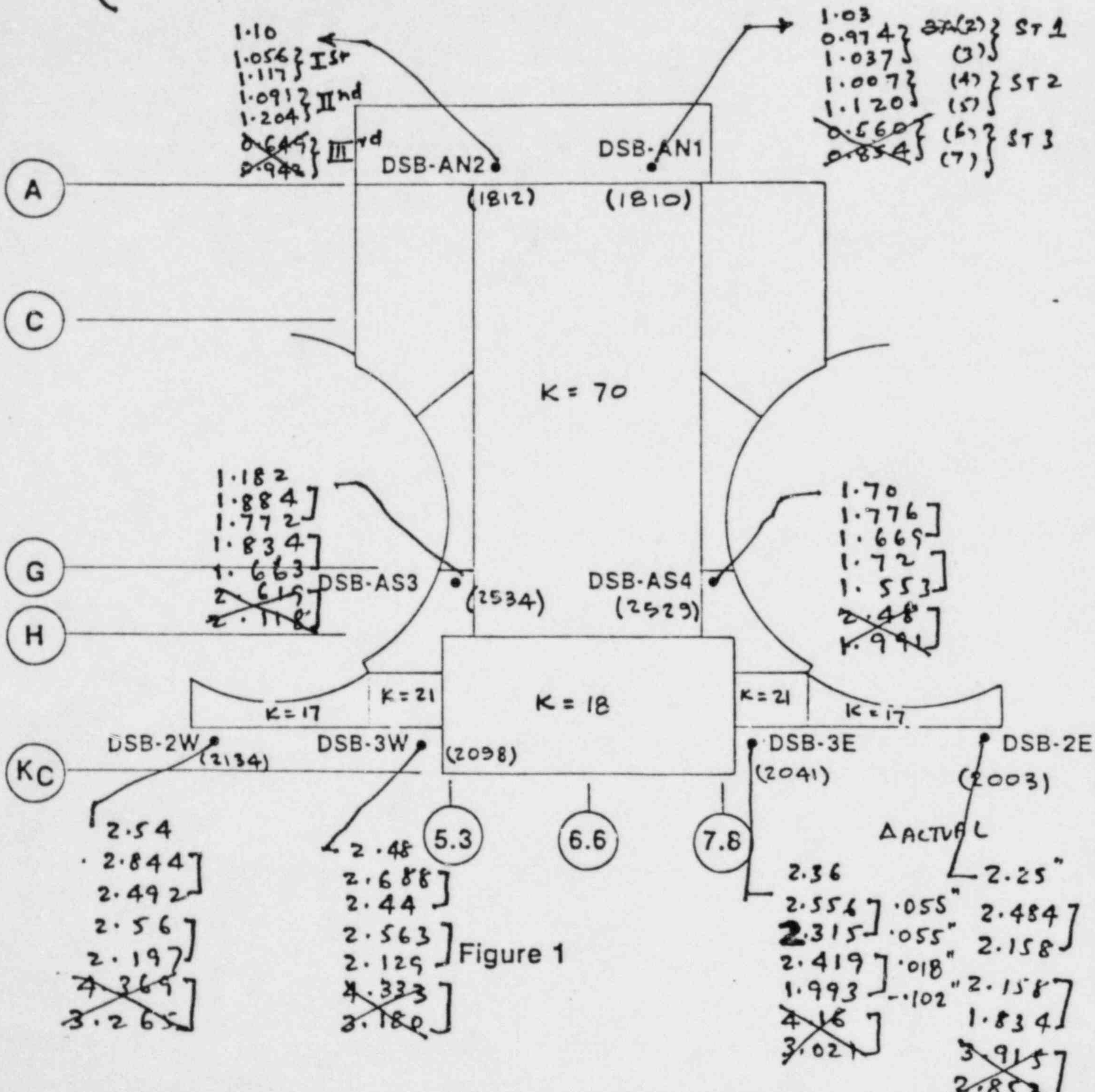
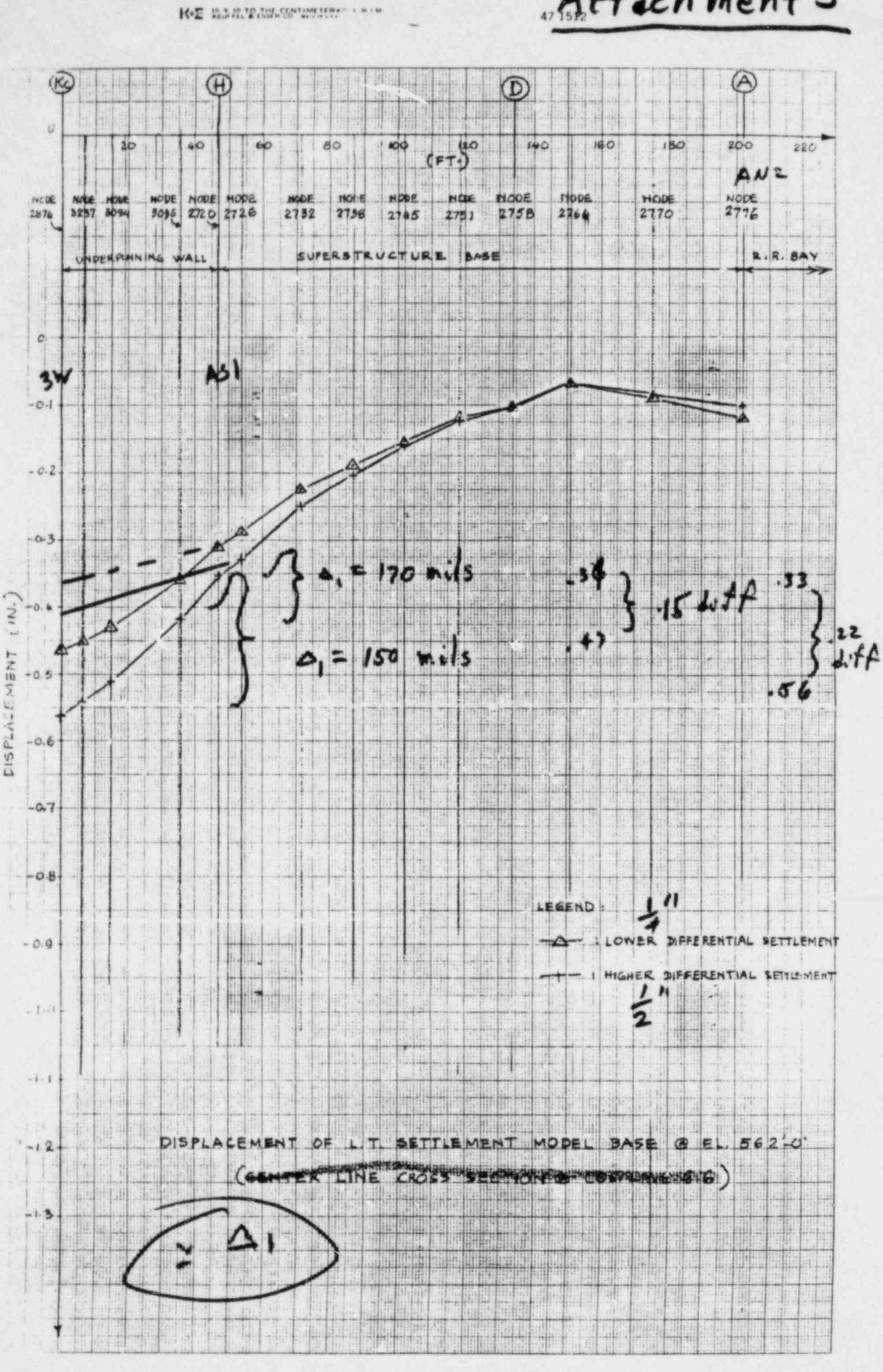


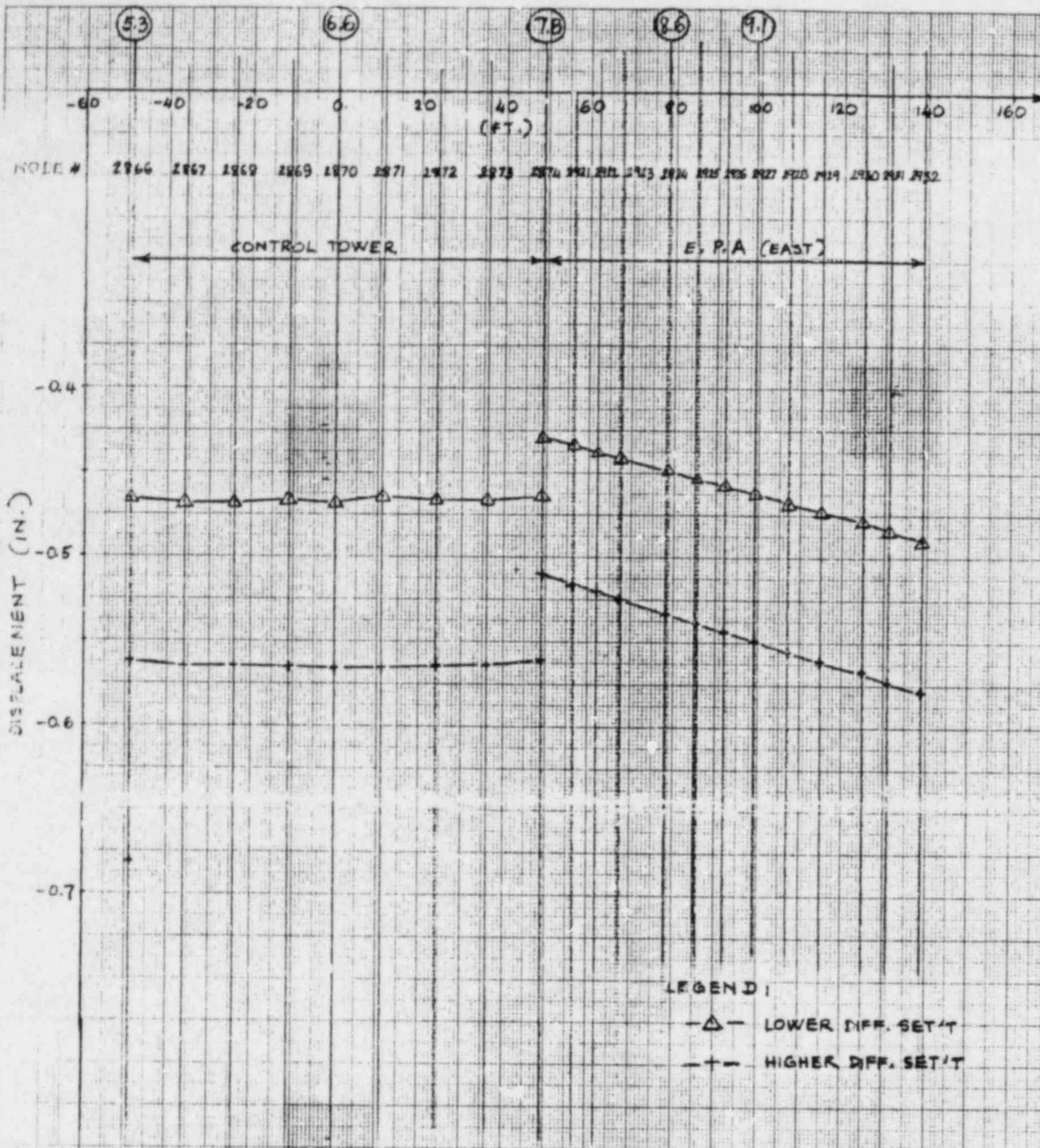
Figure 1

*Exact locations are shown on drawings C-1490 and C-1491

G 2516-02

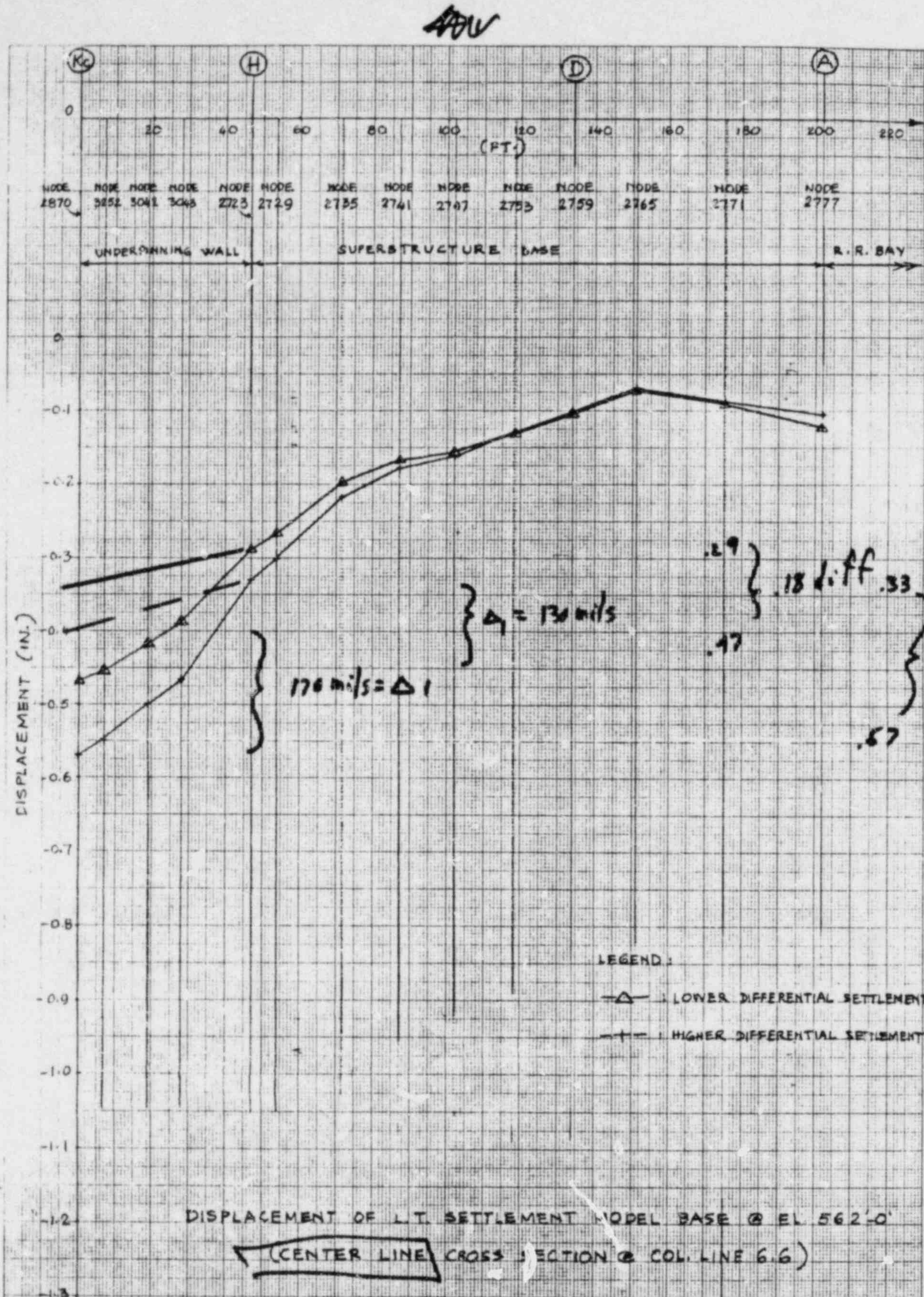
Attachment 5





BASE DISPLACEMENT OF L.T. SETTLEMENT MODEL @ EL. 562'-0"
E-W SECTION ALONG K_c & K LINES.

O2



DISPLACEMENT OF L.T. SETTLEMENT MODEL BASE @ EL 562'-0'
(CENTER LINE CROSS SECTION @ COL. LINE 6.6)

CALCULATION SHEET

Attachment 6

ORIGINATOR ______ DATE ______ CHECKED ______ DATE ______

PROJECT ______ UNITS 1 & 2 ______ JOB NO ______

SUBJECT Aux. Bldg. Slab Fix @ El. 659 SHEET NO ______

- Relative Slab & Eyebar System Stiffnesses -

Element Stiffnesses:

Eye bar ———— 6,697 K/in

3 - 4¼ Rods ———— 3,432 K/in

Slab ———— 2,489 K/in

Total For Eyebar and Rods:

$$\frac{1}{\frac{1}{6,697} + \frac{1}{3,432}} = 2,269$$

Therefore total stiffness, slab + Eyebar system

= 2269
  2489
  4,758 K/in

Total N-S Seismic Tension: 6230 K { Slab - 2630 K; Fix - 3600 K }

Load that can be allocated to the eyebar system:

$$= \frac{2269}{4758} \times 6230 = 2,970^{K}$$

or **[1,485]** K ea. side Based on Rel. stiff.

NOTE - Approx. 20% additional Cap'y (1800 K) ea. side is used to insure Ductility of concrete embedments.

Attachment 7

AUXILIARY BUILDING UNDERPINNING

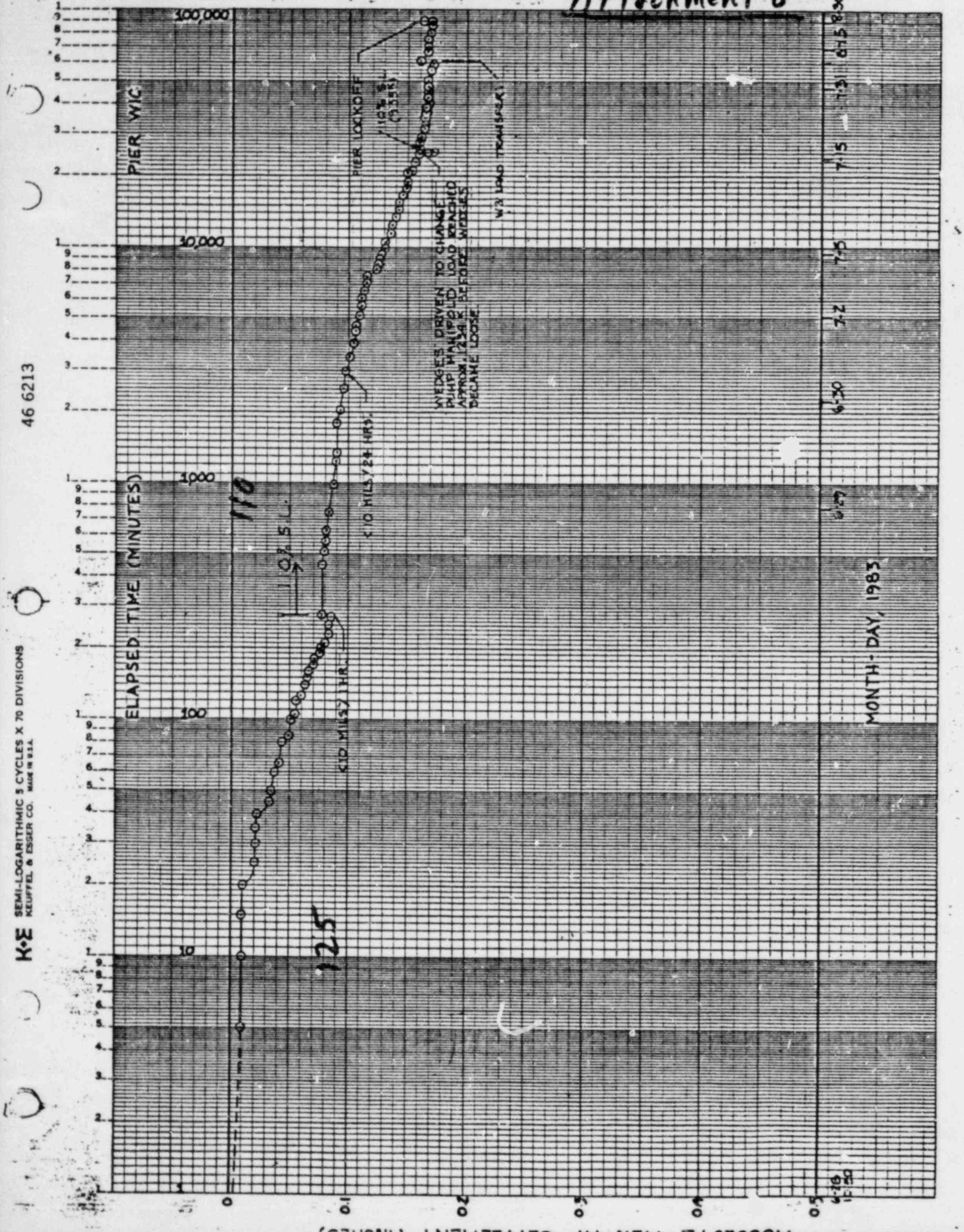
REBAR STRESS IN CRITICAL AREAS

LOCATION	EXISTING CONDITION (attached) SOIL SPRINGS 30 KCF	EXISTING CONDITION SOIL SPRINGS 70 KCF	(HIGHEST) LONG TERM SOIL SPRING FSAR COMBINATIONS	LONG-TERM SOIL SPRING - ACI-349-80 (FOR INFORMATION ONLY)	COMMENTS
SLAB AT EL. 659'-0" BTWN. COL. LINES G & H	14.3 KSI (AVE.)	15.0 KSI (AVE.)	51.0 KSI REBAR 42.6 KSI EYEBAR (AVE.)	62.0 KSI REBAR 51.6 KSI EYEBAR (AVE.)	1. FSAR & ACI-349-80 VALUES ARE FURNISHED FOR HIGHER POSTULATED DIFFERENTIAL SETTLEMENT AND FOR FSAR SEISMIC ANALYSIS. 2. STRESSES FOR EXISTING CONDITION CORRESPONDS TO 1.4D + 1.7L. ~1.5
WALLS BELOW EL. 614'-0" BTWN. COL. LINES G & H	19.4 KSI (AVE.)	40.0 KSI (AVE.)	42.8 KSI (AVE.)	59.2 KSI (AVE.)	
SLAB AT EL. 634'-6" BOUNDED BY COL. LINES 5.6, 6.2, C, & F	* 28.0 KSI (AVE.)	* 38.9 KSI (AVE.)	42.2 KSI (AVE.)	55.2 KSI (AVE.)	
SLAB AT EL. 659'-0" BOUNDED BY COL. LINES 4.7, 5.6, D, & G	* 32.3 KSI (AVE.)	* 30.8 KSI (AVE.)	37.3 KSI (AVE)	57.2 KSI (AVE)	

* PRELIMINARY

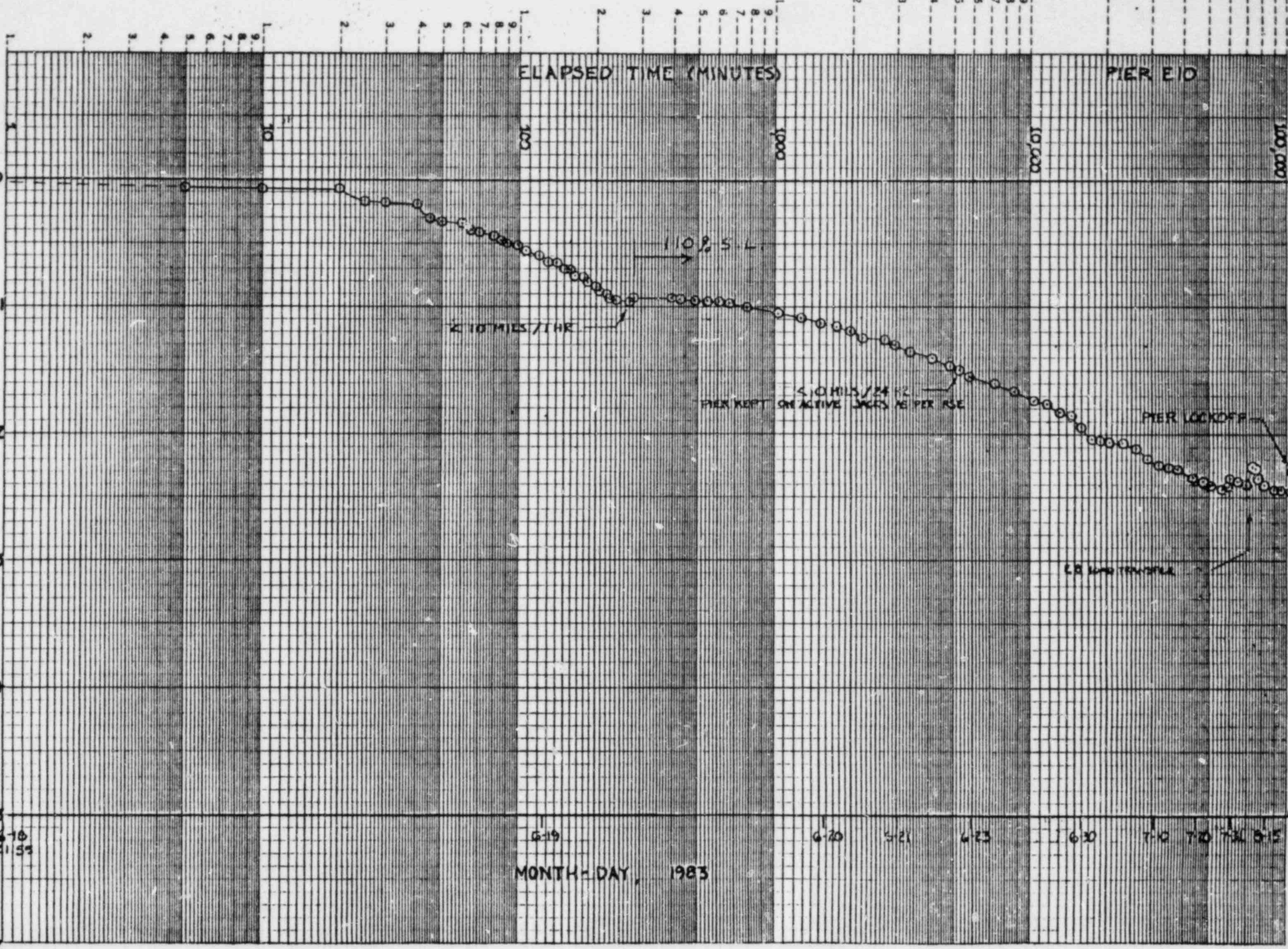
SSE without Settlements

Attachment 8



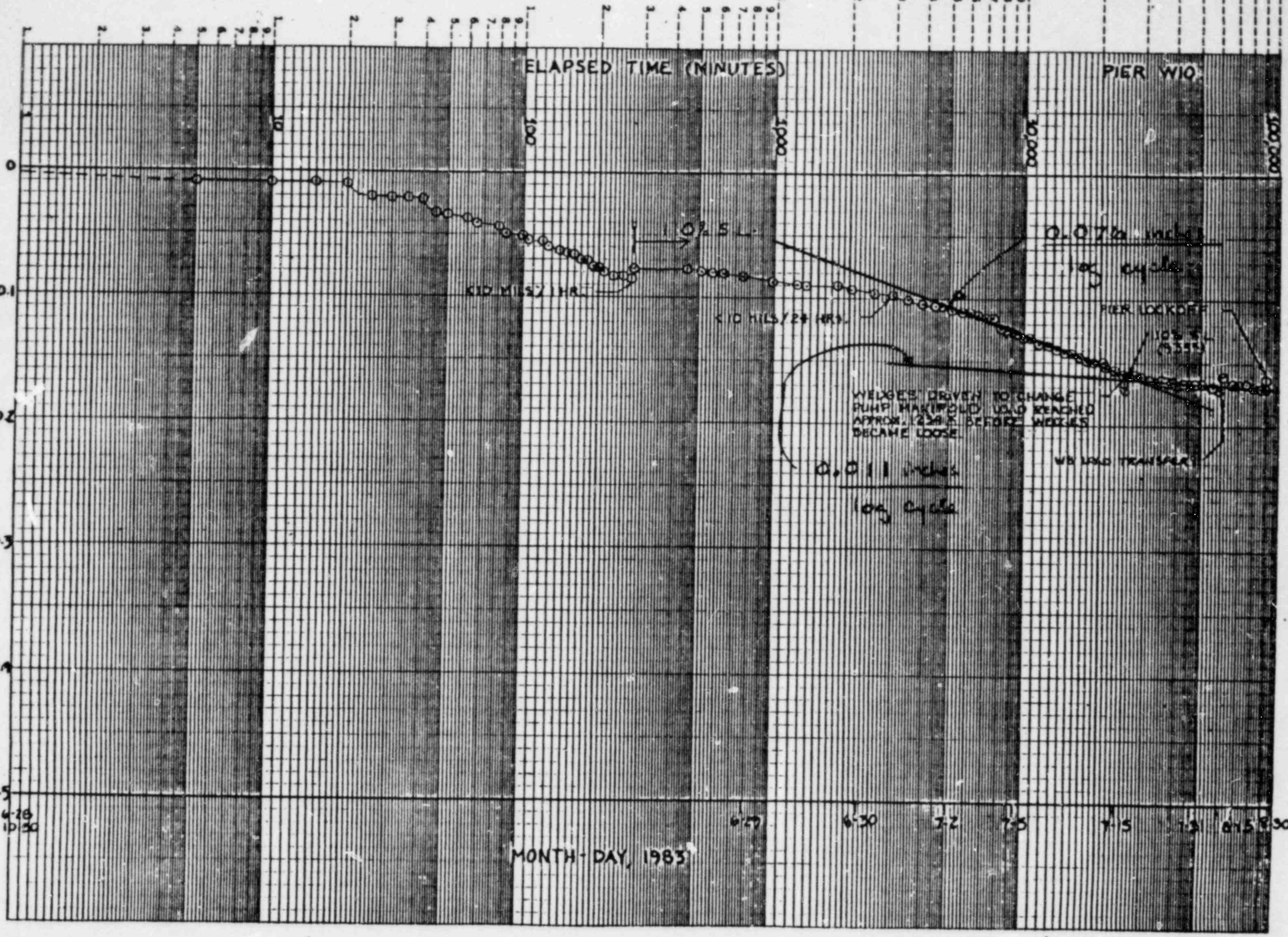
KE SEMI-LOGARITHMIC 5 CYCLES X 70 DIVISIONS
KEUFFEL & ESSER CO. MADE IN U.S.A.

46 6213



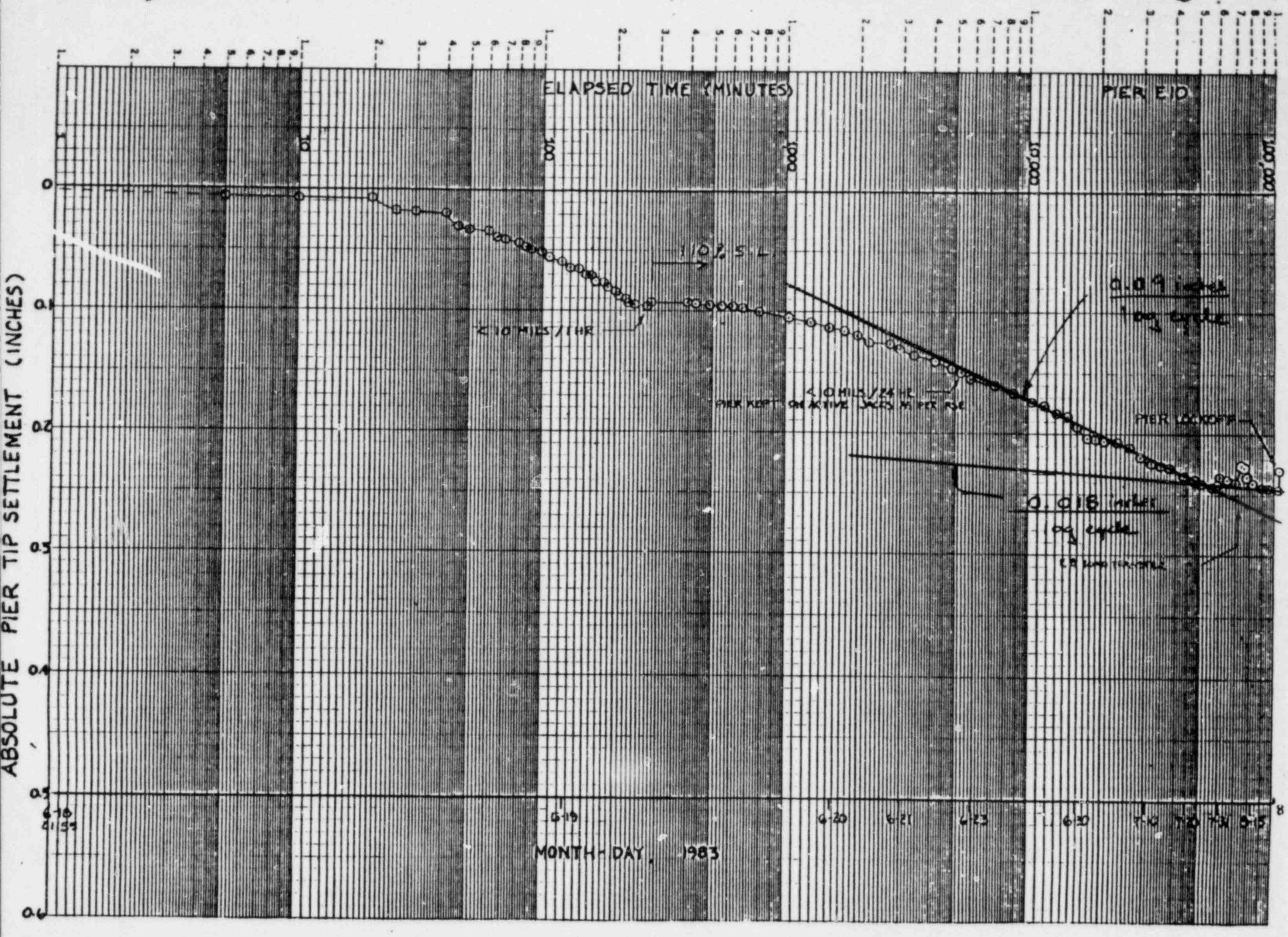
K•E SEMI-LOGARITHMIC 5 CYCLES X 70 DIVISIONS
KEUFFEL & ESSER CO. MADE IN U.S.A.

46 6213



K·E SEMI-LOGARITHMIC 5 CYCLES X 70 DIVISIONS
KEUFFEL & ESSER CO. MADE IN U.S.A.

46 6213



FACILITY: Midland RPT. NO.(S) 83-20 + 83-21

THE AMOUNT OF EACH TO BE REPRODUCED

DATE MAILED: 10/5/83

17 LETTER WITH CONCURRENCES, W/ENCL(S)

12 LETTER WITHOUT CONCURRENCES, W/ENCL(S)

REPORT ONLY

2 766 FORMS, YELLOW/GRAY BOOK INPUT FORMS, ETC.

THANK YOU/RESPONSE LETTERS

LETTER WITH CONCURRENCE, W/LICENSEE'S LTR

LETTER WITHOUT CONCURRENCES, W/LICENSEE'S LTR

RIII'S LETTER ONLY, W/CONCURRENCES

RIII'S LETTER ONLY, W/O CONCURRENCES

LICENSEE'S LTR ONLY

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MIDLAND

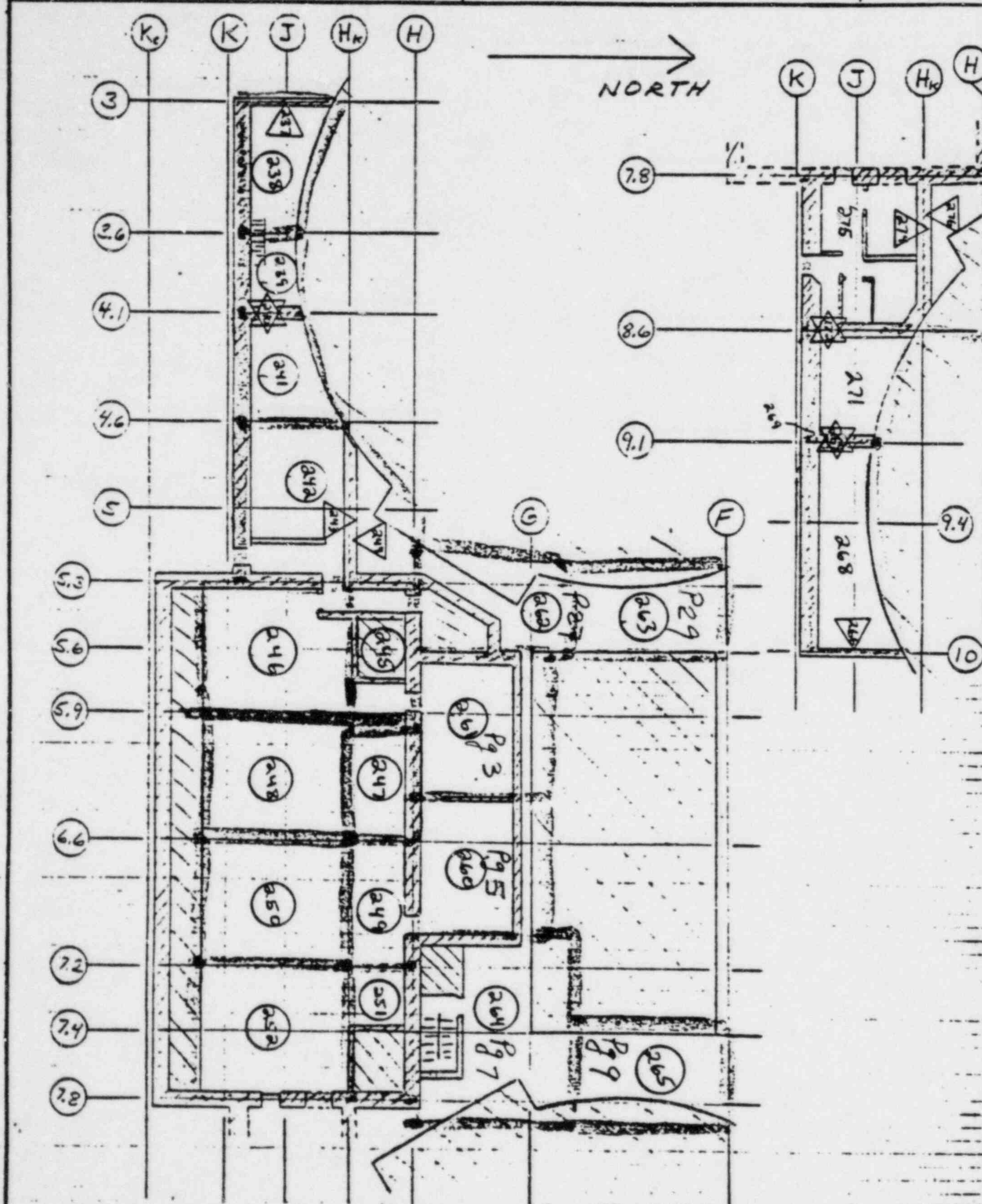
CALLEN
CHERRY
GADLER
MARSHALL
MILLER
SINCLAIR
STAMIRIS
LEVIN
GARDE
BARNABEI

-IS

S MIS
PE

Attachment 9

Wiss, Janney, Elstner & Associates, Inc. 330 Pfingsten Rd. Northbrook, Illinois 60062			FLOOR PLAN EL. 659' K_c - F AND 3-10	SHEET NUMBER 4/18
MADE BY WRH	CHECKED BY	DATE 1/5/83		PROJ. NUMBER 810843Q



7220-C-198-1346-1

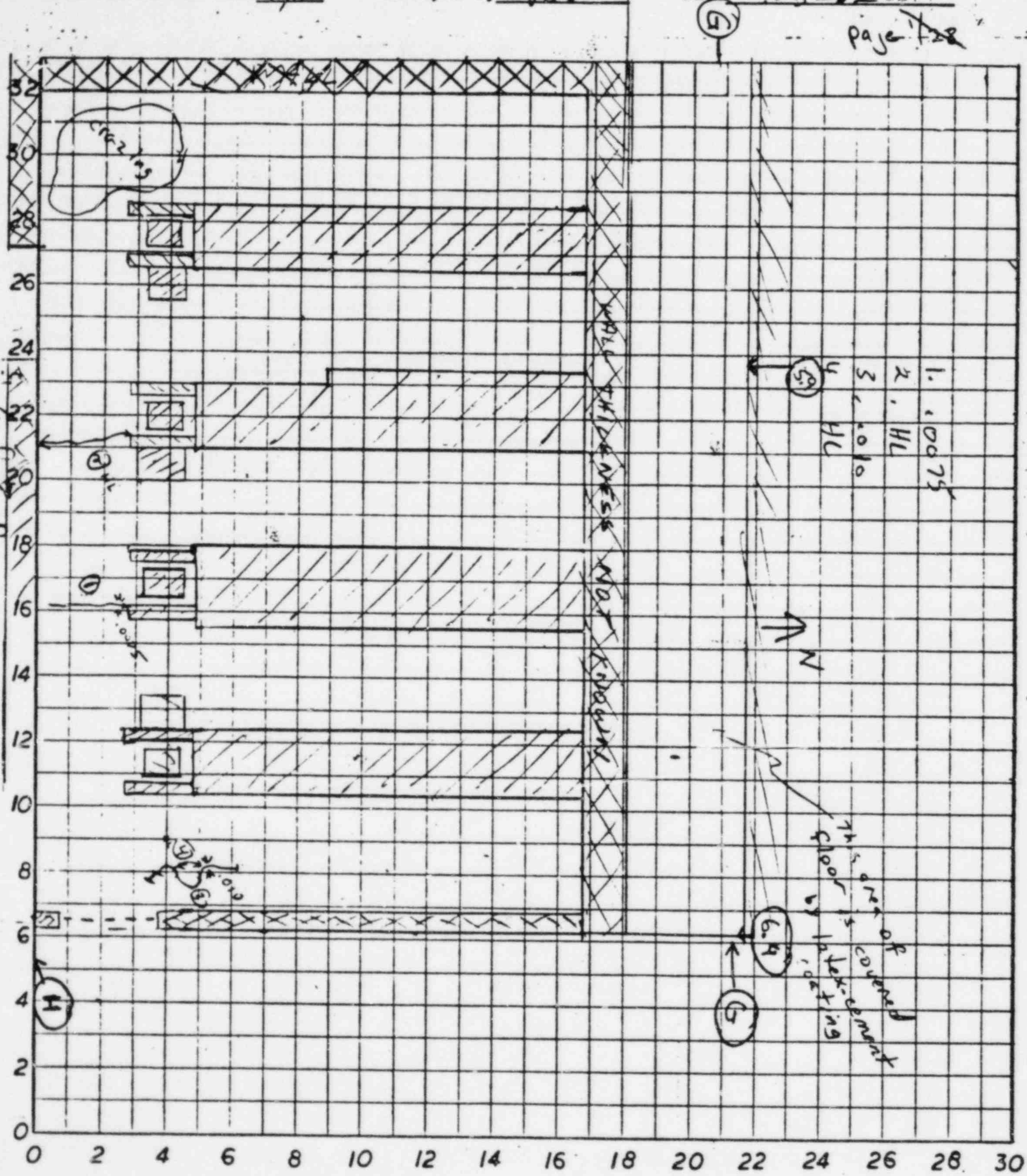
Auxiliary Building
OP 43 - 3 Floor

Elevation 659
Comparator No. C1-1
Calibration Due Date N/A

Location G-H [illegible] 5.6-6.4
Sequence No. 1
Surveyed By RJH

Reviewed By WR Hamm[illegible]
WJE (Level II Inspector)
Date 9-3-82

page [illegible]



7220-C198-369-1

ELEV. 659'
LOCATION FLOOR G-H 5.6 → 6.4
page 2/2

MEASURED CRACK WIDTH SUMMARY

CRACK NO.	DATE 9/3/82											
1	.0075											
2	HL											
3	0.010											
4	HL											

7220-C198-369-1 4

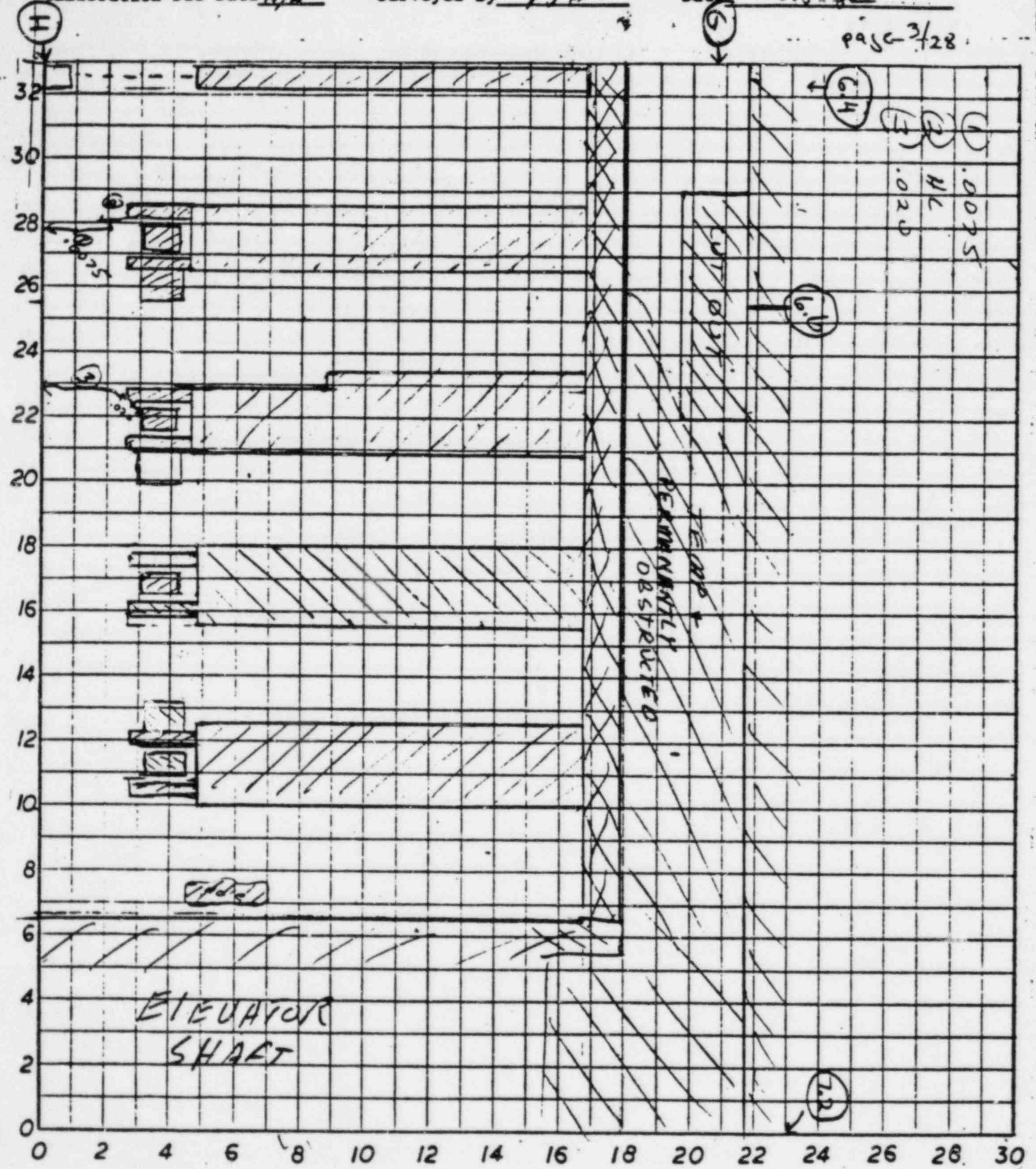
Auxiliary Building
OP 43 - 3

Elevation 659 Floor
Comparator No. C1-1
Calibration Due Date N/A

Location G-H 6.4+~7.0
Sequence No. 1
Surveyed By PJH

Reviewed By WR Hamm
WJE (Level II Inspector)
Date 4-3-8

page 3/28



appears to be topping over floor

7220-C198-369-2

5

ELEV. 659

LOCATION FLOOR G-H, 6.4 * 7.0

page 4/28

02078

MEASURED CRACK WIDTH SUMMARY

CRACK NO.	DATE											
	9/3/82	C1-1 1/4/83										
1	.0075											
2	HL											
3	.020	0.020										

7220-C198-369-2

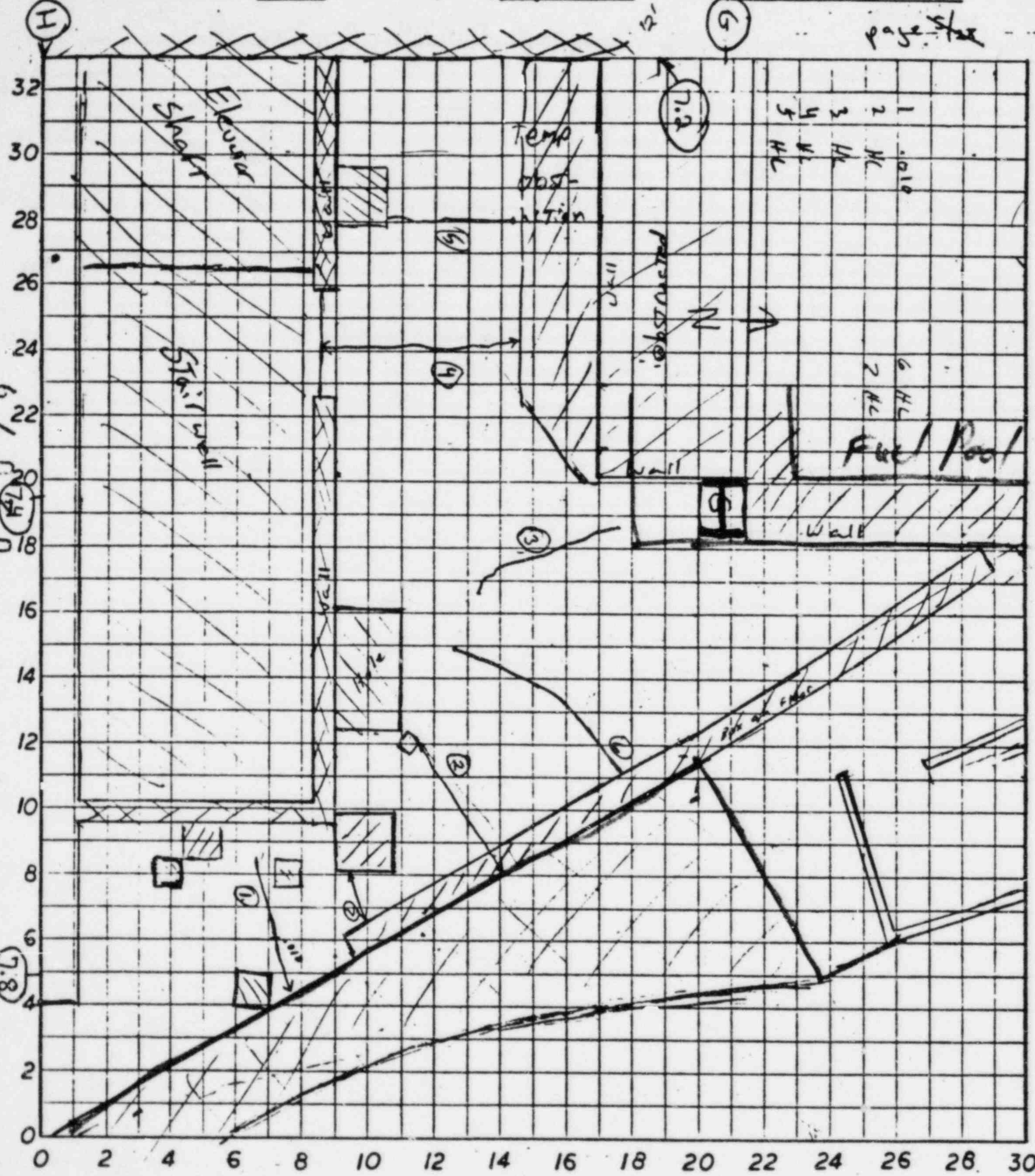
6

Auxiliary Building
OP 43 - 3 G-H

Elevation 659
Comparator No. CL-1
Calibration Due Date N/A

Location Floor 7.8-Continued
Sequence No. 1
Surveyed By PJH

Reviewed By M Lomer
WJE (Level II Inspector)
Date 9-3-82



7220-C198-369-1

7

8411030007

EL 659

Loc: Floor 7.8-cont.
G-H

page 8/[illegible]

MEASURED CRACK WIDTH SUMMARY 3 0

CRACK NO.	DATE 9/3/82											
1	.010											
2	HL											
3	HL											
4	HL											
5	HL											
6	HL											
7	HL											

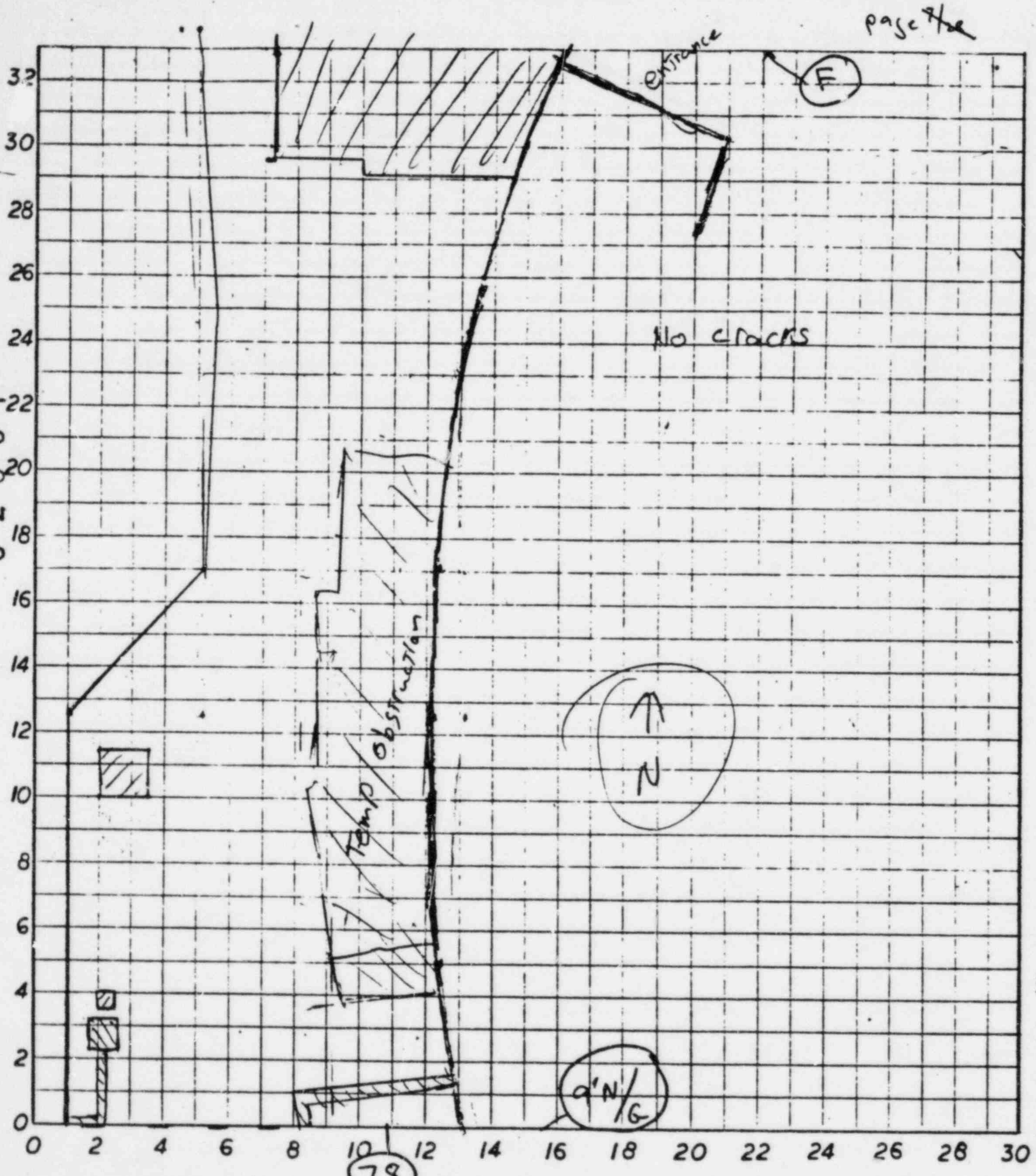
7220-C198-369-1

Auxiliary Building
OP 43 - 3

Elevation 659
Comparator No. C1-1
Calibration Due Date N/A

Location G-F 7.8 Floor Containment
Sequence No. 1
Surveyed By PJH

Reviewed By [illegible signature]
WJE (Level II Inspector)
Date 9-3-82



7220-C198-369-1

LOC G-F 7.8 cont. Floor
EL 659

MEASURED CRACK WIDTH SUMMARY

CRACK NO.	DATE											
	9/3/82 No Cracks											

7220-C198-369-1

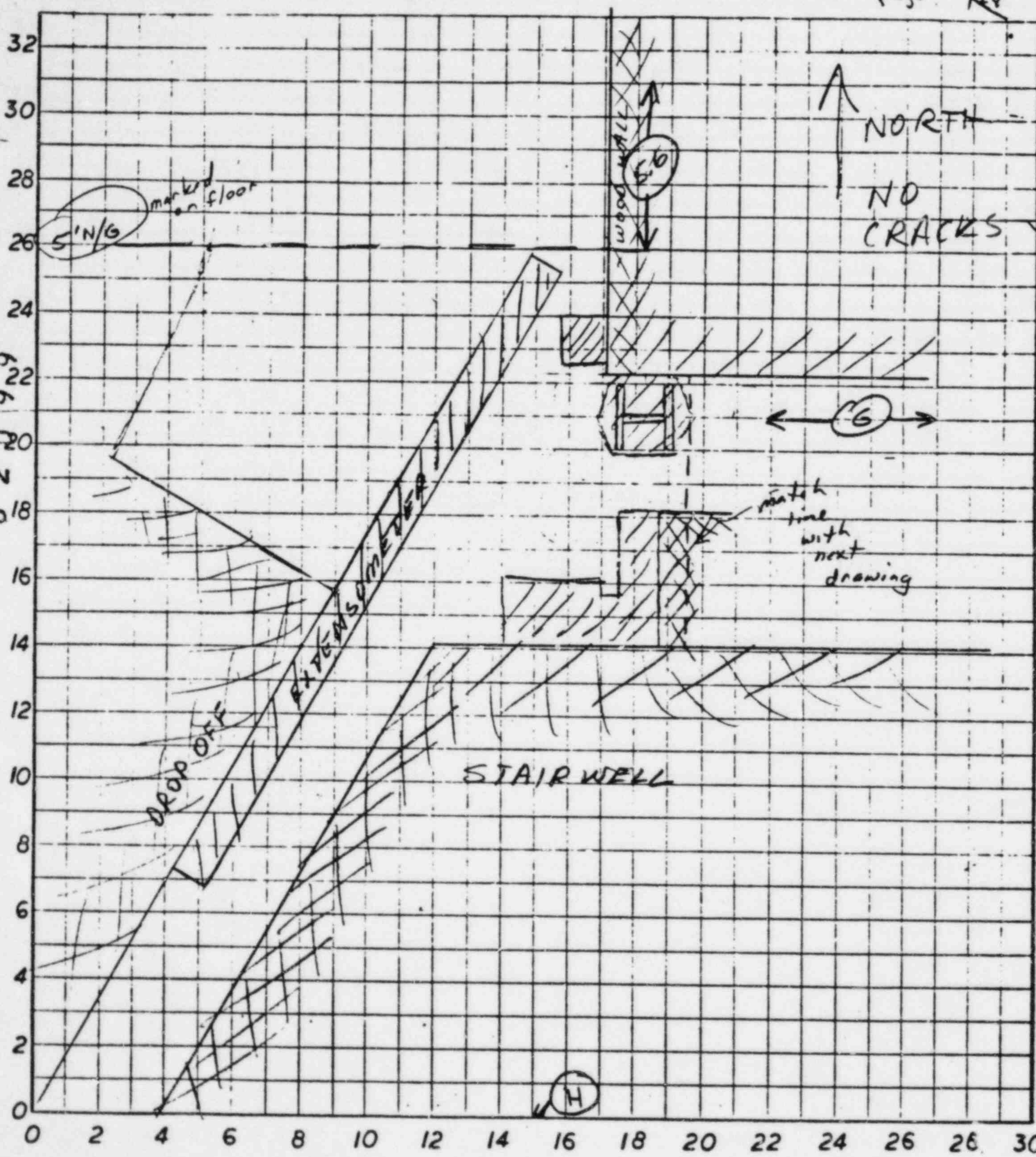
Auxiliary Building
OP 43 - 3

Elevation 659'
Comparator No. C1-1
Calibration Due Date N/A

Location FLOOR H-6 ~5.3-5.6
Sequence No. 1
Surveyed By WRH

Reviewed By M Corman
WJE (Level II Inspector)
Date 9/8/82

page 25/28



7220-C198-369-1

Loc. Floor H-6

659' - 5.3 & 5.6

page 26/27

MEASURED CRACK WIDTH SUMMARY

CRACK NO.	DATE
	9/8/92
	no cracks

7220-C198-369-1

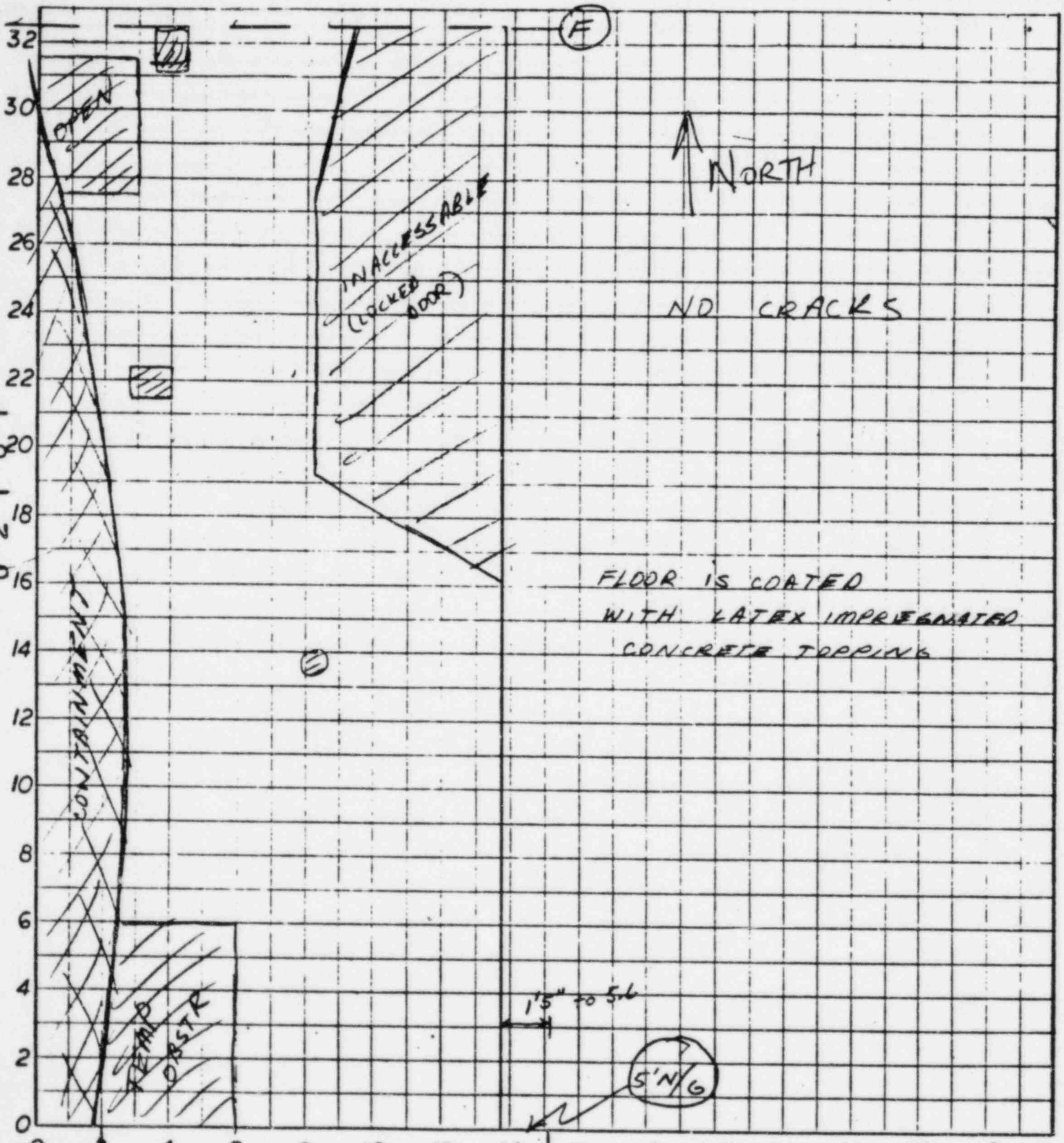
Auxiliary Building
OP 43 - 3

Elevation 659'
Comparator No. C1-1
Calibration Due Date N/A

Location 5.3-5.6 5'N/6 - F (FLOOR)
Sequence No. 1
Surveyed By WRH.

Reviewed By M [signature]
WJE (Level II Inspector)
Date 9-8-82

page 29/38



7220-C198-369-1

MEASURED CRACK WIDTH SUMMARY

CRACK NO.	DATE											
	9/8/82											
	None											

UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D. C. 20555

SEP 9 1983

PRINCIPAL STAFF			
RA		ENF	
D/RA		SCS	
A/RA		PAO	
DPRP		SLO	
DRMA		RC	
DRMSP			
DE			
ML			
OL		FILE	

Docket Nos. 50-329/330

MEMORANDUM FOR: G.E. Lear, Chief, Structural & Geotechnical Engineering Branch,

FROM: Elinor G. Adensam, Chief
Licensing Branch No. 4
Division of Licensing

SUBJECT: CLARIFICATION OF NRR ASSISTANCE IN RESOLVING MIDLAND SOILS ISSUES

Recent discussions with Region III have occurred to clarify R. F. Warnick's memorandum of March 16, 1983 (Enclosure 1) addressing NRR assistance in resolving Midland soils issues. The clarification focused on the statement that "Region III has assumed all responsibility for reviewing the remedial soils work at the Midland site" Region III agrees that this statement does not apply to changes representing a significant departure from the Midland SER and its supplements or associated hearing testimony. Such changes are to be handled through the normal licensing process (i.e., by formal request from CPCo to NRR and SER supplements).

Accordingly, in the execution of the Task Interface Agreement 83-40 (TAC #51341; accomplishment No. 141433) included in Enclosure 1, NRR should be alert to recognize early where changes requested by CPCo represent a significant departure from our earlier evaluation, and to assure that such requests and reviews are accomplished in accordance with NRC regulations for licensing reviews and documentation requirements. Please assure that any such changes are identified promptly to the Licensing Project Manager, Darl Hood, in order that proper coordination and documentation be achieved.

Elinor G. Adensam

Elinor G. Adensam, Chief
Licensing Branch No. 4
Division of Licensing

Enclosure:
As stated

8309300010

SEP 16 1983

TASK NO. 83 - 40
DATE: APRIL 8 1983
TAC #: 51341

TASK INTERFACE AGREEMENT

PROBLEM: Midland 1/2 - Soils Issue

LEAD OFFICE: /__/ I&E /__/ NRR /X/ REGION III /__/ JOINT

NOTIFICATION:

REFERENCES: Memo to TNovak fm RWarnick dated 03/16/83, subject: NRR Assistance in Resolving Midland Soils Issue

ACTION PLAN:

NRR:

1. Assist Region III in reviewing the remedial soils work at Midland. Assistance is expected to include evaluation of possible deviations from licensee commitments in the SER, advice to the Region III reviewer, and occasional site visits. (SGTEB)

The exact schedule cannot be defined but the PM forcasts that NRR assistance after ~~12/83~~ 6/84 is unlikely.

Region III will contact NRR (PM) on case basis.

NRR: Designate Lead Project Manager to assign TACS and coordinate correspondence, meetings, and reports (~~ORB#~~ /LB#4 - D. Hood).

OFFICE COORDINATORS:

TNW T. Ippolito (X27415)

R. Vollmer 3/31/83 (X27207)

T. Novak 4/5 (X27425)

(X)

APPROVED:

(X)

N.A. TNW I&E C. Norelius

Region- III

F. J. Miraglia 4/5 (X27492)

NRR

cc: V. Stello, ROGR	J. Sniezek, I&E	T. Speis, , NRR	G. Holahan, NRR
Regional Admin.	R. DeYoung, I&E	D. Eisenhut, NRR	Lead Project Manager
J. Taylor, I&E	J. Heltemes , AEOD	R. Vollmer, NRR	R. Purple, NRR
	H. Denton, NRR	G. Lainas, NRR	R. [illegible], NRR
E. Jordan, I&E	E. Case, NRR	T. Novak, NRR	[illegible]
R. [illegible], I&E	R. Mattson, NRR	F. Miraglia, NRR	[illegible]
W. Mills, I&E	H. Thompson, NRR	F. [illegible], NRR	[illegible]

UNITED STATES
NUCLEAR REGULATORY COMMISSION
REGION III
799 ROOSEVELT ROAD
GLEN ELLYN, ILLINOIS 60137

MAR 1 6 3/16/83

MEMORANDUM FOR: T. Novak, Assistant Director for Licensing, Division of Licensing

FROM: R. F. Warnick, Director, Office of Special Cases

SUBJECT: NRR ASSISTANCE IN RESOLVING MIDLAND SOILS ISSUE

Region III has assumed all responsibility for reviewing the remedial soils work at the Midland site. However, we expect the licensee to periodically request relief from commitments made in the SSER. NRR's assistance will be requested when this occurs.

The expertise of NRR will also be required from time to time for consultation with Mr. Ross Landsman during his review of the remedial soils activities. A schedule cannot be defined at this time. NRR's assistance will be requested on a case by case basis as the need arises.

We also recommend that periodic site visits be made in order for your personnel to maintain their awareness of the underpinning effort. These visits could be limited to observations of critical work activities such as the pier 11 load tests and the drift work to the control tower. The schedule for these activities can be obtained from Ross Landsman.

Should you have any questions please contact Wayne Shafer (FTS 384-2656).

RF Warnick

R. F. Warnick, Director
Office of Special Cases

cc: A. B. Davis
J. H. Sniezek, IE
J. C. Stone, IE
D. Hood, NRR M/S-116

8312140044

NRC FORM 197 (6-80)

U.S. NUCLEAR REGULATORY COMMISSION

TECHNICAL ASSIGNMENT CONTROL FORM

TAC NUMBER: F1041

NEW ASSIGNMENT | NEW INFORMATION

SECTION I. REQUEST DATA

PREPARED BY: Darl S. Hood

(AD) DATE PREPARED: MO DAY YR

(AE) AE TITLE GENERAL DESCRIPTION (Limit to 120 characters): NRR Support of RIII Midland Soils issue

(AZ) PLANNED ACCOMPLISHMENT NUMBER: 141433

(AG) REQUEST CONTACT: D Hood | (AX) REQUESTER'S INITIALS: DSH | (AB) REQUESTING ORGANIZATION: NRR DL/LB4

(AH) REQUESTING TARGET DATE: MO DAY YR

(AI) REQUESTING REMARKS (Limit to 120 characters):

(AJ) MULTI-PLANT ACTION NUMBER

SECTION II. SYSTEMS CONTROL DATA

A. OPERATING REACTOR ACTIONS (Used with Activity Code 31)

FACILITY NAME: Midland Plant Units 1&2

(BA) DOCKET: 50-329/330

(AR) INITIATION DATE: 4 15 83

(AV) AMENDMENT FEE CLASS: I ☐ II ☐ III ☐ IV ☐ V ☐ VI ☐

B. TOPICAL REPORT REVIEWS (Used with Activity Code 51)

VENDOR'S NAME

REPORT IDENTIFICATION SYMBOL

(DA) PROPRIETARY (P)

(AR) REPORT DATE: MO DAY YR

(AS) ADDITIONAL INFORMATION REQUEST DATE: MO DAY YR

(EA) NON PROPRIETARY VERSION (NP)

(AT) SUBMIT DATE: MO DAY YR

(AU) LETTER TO VENDOR DATE: MO DAY YR

(AV) ACCEPTED ☐ NOT ACCEPTED ☐ WITHDRAWN ☐

(FA) NON PROPRIETARY REPORT

SECTION III. REVIEW DATA

(AC) ACTIVITY CODE (Enter "S" for Safety related or "E" for Environmental related. UNK for all other)

OPERATING REACTOR ACTIONS	(31)	GENERIC ACTIVITIES	(58)
PROCESS DEVELOPMENT EVALUATION PROGRAM	(40)	UNRESOLVED SAFETY ISSUES	(61)
TOPICAL REPORT REVIEWS	(51)	CORRESPONDENCE	UNK
DESIGNATED GENERIC	(57)		

REVIEWER'S SURNAME	(CA) REVIEWER'S INITIALS	(CB) ESTIMATED HOURS	(CC) ESTIMATED COMPLETION DATE MO DAY YR	(CD) ACTUAL COMPLETION DATE MO DAY YR
D. Hood	DSH	150	6 30 84	
J. Kane	JXK	250	6 30 84	
F. Rinaldi	FYR	100	6 30 84	

~~Howe~~
Gardner
Landsman

Consumers
Power
Company

J A M[illegible]oney
Executive Manager
Midland Project Office

PRINCIPAL STAFF			
RA	X	ENF	
D/RA		SCS	
A/RA		PAO	
DPRP		SLO	
DRMA		RC	
DEMSP			
DE			
ML			
OL		FILE	

General Offices: 1945 West Parnall Road, Jackson, MI 49201 • (517) 788-0774

September 7, 1983

Mr J J Harrison
Midland Project Section
U S Nuclear Regulatory Commission
Region III
799 Roosevelt Road
Glen Ellyn, IL 60137

MIDLAND ENERGY CENTER GWO 7020
REMEDIAL SOILS DISCUSSIONS BETWEEN CPCo AND NRC
File: 0485.16 UFI: 42*05*22*04 Serial: CSC-6871
70*01

This letter is to confirm discussions with Region III's Dr. Landsman and Mr. Gardner and with Mr. Wheeler and Mr. Wieland of CPCo on September 1, 1983. The following agreements were reached:

1. Dr. Landsman indicated the NRC concurrs with the Engineering logic change which allows the drifts from Kc-2 to Kc-3 and Kc-10 to Kc-11 to be constructed before Piers Kc-3 or Kc-10 are jacked.

2. Dr. Landsman concurred with eliminating the activity entitled "Construct Concrete Invert and Layback Soil Kc-2 to Kc-3" and "Construct Concrete Invert and Layback Soil Kc-11 to Kc-10" from the work activity list.

3. It was pointed out to Dr. Landsman that a Consumers Power letter, serial CSC-6863, dated 8/25/83, has the incorrect activity number to "Install Pier W13", due to a typing error. The number for this activity should be 165054035 instead of 165053035. This incorrect number was also in an NRC approval letter, dated 8/29/83. For the purposes of documentation, it was agreed that the NRC approval letter dated 8/29/83 authorized the activity "Install Pier W13" and an additional authorization letter from NRC is not required.

4. On September 1, 1983, a discussion was held between Dr. Landsman and our Mr. Puhalla in which Dr. Landsman concurred with relocating LS-10 from an interior piezometer to an exterior piezometer, and also concurred with FCR C-6556 to Drawing C-1320 which deletes wells 555, 561, 576 from the dewatering schedule and adds them to the piezometer schedule.

If you have any questions please contact this office.

JAMooney

JAM/RMW/klm

~~8309150002~~

SEP 12 1983