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

FEB 22 1984

ocket Nos.: 50-329
and 50-330 OM, OL

APPLICANT: Consumers Power Company

FACILITY: Midland Plant, Units 1 and 2

SUBJECT: SUMMARY OF FEBRUARY 2-5, 1982 MEETING AND AUDIT ON AUXILIARY BUILDING UNDERPINNING

On February 2-5, 1982, the NRC Staff and its consultants met in Ann Arbor, Michigan with Consumer Power Company, Bechtel and their consultants to discuss and audit preparations for underpinning the southern portion of the auxiliary building. Discussions also included underground utilities, the diesel generator building and the service water pump structure.

Enclosure 1 is a summary of this meeting and audit.

The first three columns of Enclosure 2 provide a listing of review issues that were to be audited and were provided by the NRC staff at the start of the audit. The last column of Enclosure 2 was added after the audit and indicates the resolutions reached during the audit on the identified review issues.

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Enclosure:
As stated

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ENCLOSURE 1

Bechtel Associates Professional Corporation

777 East Eisenhower Parkway
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Mail Address: P.O. Box 1000, Ann Arbor, Michigan 48106

MEETING NOTES NO. 1600

MIDLAND PLANT UNITS 1 AND 2

CONSUMERS POWER COMPANY

BECHTEL JOB 7220

DATE: February 2 through 5, 1982

PLACE: Bechtel Ann Arbor Office

SUBJECT: Nuclear Regulatory Commission Audit - Midland Auxiliary Building Underpinning

ATTENDEES:

Nuclear Regulatory Commission	Consumers Power Company	NRC Consultants	Bechtel
D.S. Hood	D. Budzik	G. Harstead	S. Afifi
J.D. Kane	J.K. Meisenheimer	P. Huang*	J. Anderson
F. Rinaldi	K. Razdan	S. Poulos*	T. Bell*
	T. Thiruvengadam	R. Samuels*	T. Chipman*
		H. Singh	M. DasGupta*
			B. Dhar
			S. Lo*
			N. Rawson
			G. Robers*
			S. Rys
			N. Swanberg
			G. Tuveson
			V. Verma
			[illegible]

Other	Bechtel Consultants
M. Sinclair*	D. Bartlett
	E. Burke

*Part-time

REFERENCE: CPCo letter, Serial 16246, J.W. Cook to H.R. Denton, 3/10/82

PURPOSE: To enable the NRC to perform an audit of the design and calculations for the temporary support system during underpinning and construction condition analysis for the auxiliary building

(Note: The audit is to satisfy Special Licensing Condition 5 of Table A.20 of the NRC testimony submitted for the auxiliary building underpinning as part of the soils public hearings. Satisfaction of these conditions will permit removal of soil from beneath the auxiliary building and installation of temporary supporting systems.)

PRINCIPAL AGREEMENTS:

1) D. Bartlett presented a discussion of the construction sequence for installing the temporary support system for the auxiliary building. This system utilizes steel grillage beams supported on concrete piers and steel columns to support the electrical penetration areas, piers, and control tower. The control tower piers will eventually be incorporated into the permanent underpinning system. Viewgraphs used by D. Bartlett are included as Attachment 1.

2) M. DasGupta presented the analysis of the existing structure for the temporary support condition. The analysis considers the staged removal of soil from beneath the structure and the replacement of support by piers and steel beams with hydraulic jacks. Viewgraphs used by M. DasGupta are included as Attachment 2.

3) N. Rawson provided a presentation on the design of the temporary support system. The presentation included details of the grillage beams supported on concrete piers and steel columns for support of the electrical penetration area, struts and bracing for lateral support of the turbine building and control tower piers, and access drifts below the turbine building. It was agreed to provide a method of protecting the face of drifts if left exposed for long periods of time (see the referenced letter). Viewgraphs used by N. Rawson are included as Attachment 3.

4) S. Lo presented the construction and design details of the temporary post-tensioning system which was installed at the roof connections between the electrical penetration areas and the control tower. This system was installed to resist forces induced into these connections resulting from loss of buoyancy during dewatering. Viewgraphs used by S. Lo are included as Attachment 4.

5) For the auxiliary building, design calculations for the temporary support system and construction condition of the existing structure were reviewed by the NRC staff. Discussions were also held regarding underground utilities and tanks, diesel generator building, and service water pump structure (SWPS). Outstanding items from this review and discussions are listed below in the action items.

ACTION ITEMS:

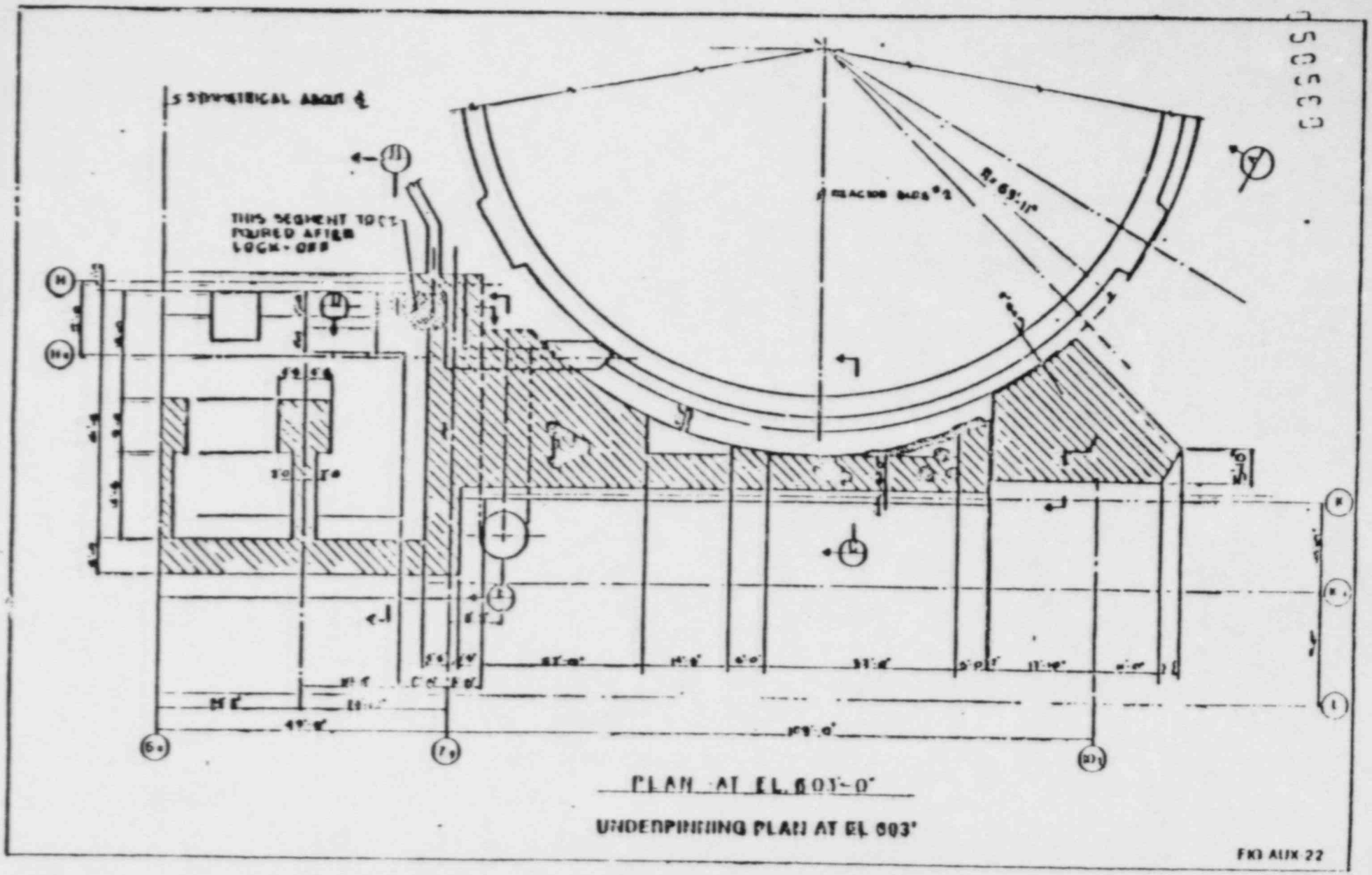
Responsibility		Action	Date Due	Status
Bechtel	1)	Perform calculations to verify passive resistance of soil for lateral forces at truss to pier connection	3/16/82	Calculations revised
Bechtel	2)	Provide justification in the calculations for lateral soil spring constants (sand and clay) for beam on elastic foundation analysis of control tower piers	3/16/82	Calculations revised
Bechtel	3)	Use unreduced value for concrete modulus in calculations for differential settlement effects	2/26/82	Calculations* revised
Bechtel	4)	Perform calculations to verify that the gap between the turbine building and auxiliary building will accommodate settlement and seismic movements		Discussed in 2/26/82 meeting at Bethesda, MD
Bechtel	5)	Perform an analysis of the construction condition with soil removed from the tip of the electrical penetration area assuming a subgrade modulus of 70 kcf under the main part of the auxiliary building	2/26/82	Results provided 2/26/82
NRC	6)	Review pier instrumentation	2/26/82	Comments provided
Bechtel	7)	Provide acceptance criteria for building movements during Phases II and III	2/26/82	Provided at 2/26/82 meeting at Bethesda, MD

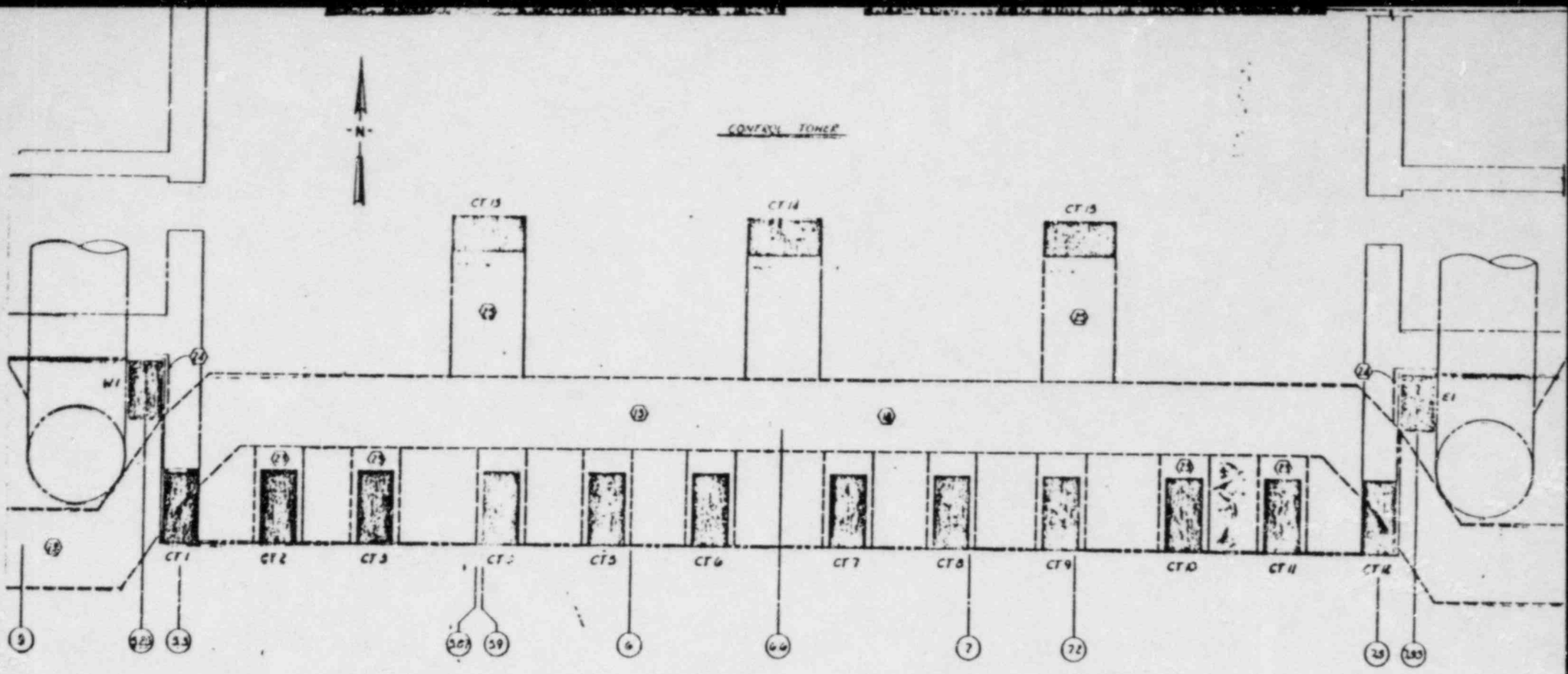
*Results to be submitted to the NRC soon

Responsibility		Action	Date Due	Status
Bechtel	8)	Provide jacking procedures and criteria for Phase III	2/26/82	Provided at 2/26/82 meeting at Bethesda, MD
NRC	9)	Review cracking criteria in auxiliary building report on cracking effects	2/26/82	Comments provided
Bechtel	10)	Provide maximum and minimum jacking loads for Phase III	2/26/82	Provided at 2/26/82 meeting at Bethesda, MD
Bechtel	11)	Include post-tensioning forces in SWPS construction condition analysis	3/16/82	Calculation revised and results discussed during SWPS audit
CPCo	12)	Consider additional finite element analyses of the diesel generator building for the effects of cracking	2/26/82	Position provided at 2/26/82 meeting

5/12/9

Attachments:
1. Construction Sequence
2. Construction Condition Analysis
3. Temporary Support System
4. Temporary Post-Tensioning System


THIS SEGMENT TO BE POURED AFTER LOCK-088
PLAN AT EL 803'-0"
UNDERPINNING PLAN AT EL 803'
FIG AUX 22

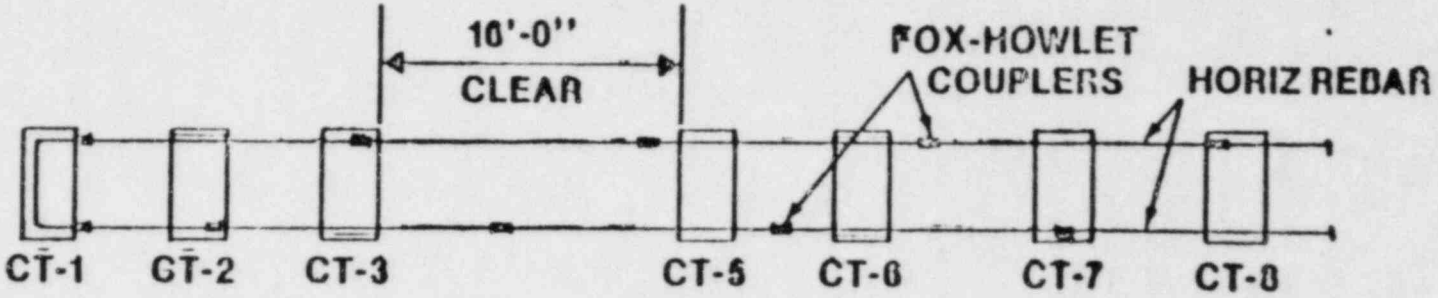


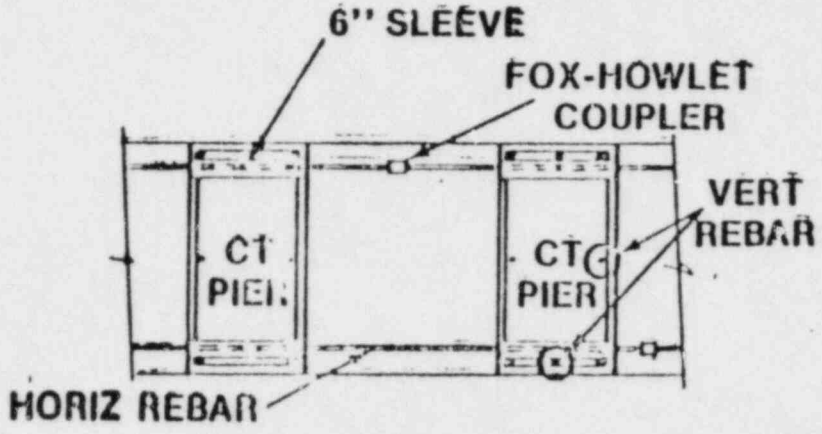
CONSUMERS POWER COMPANY
MIDLAND PLANT UNITS 1 & 2

UNDERPINNING AUXILIARY BUILDING

CONSTRUCTION SCHEMATIC

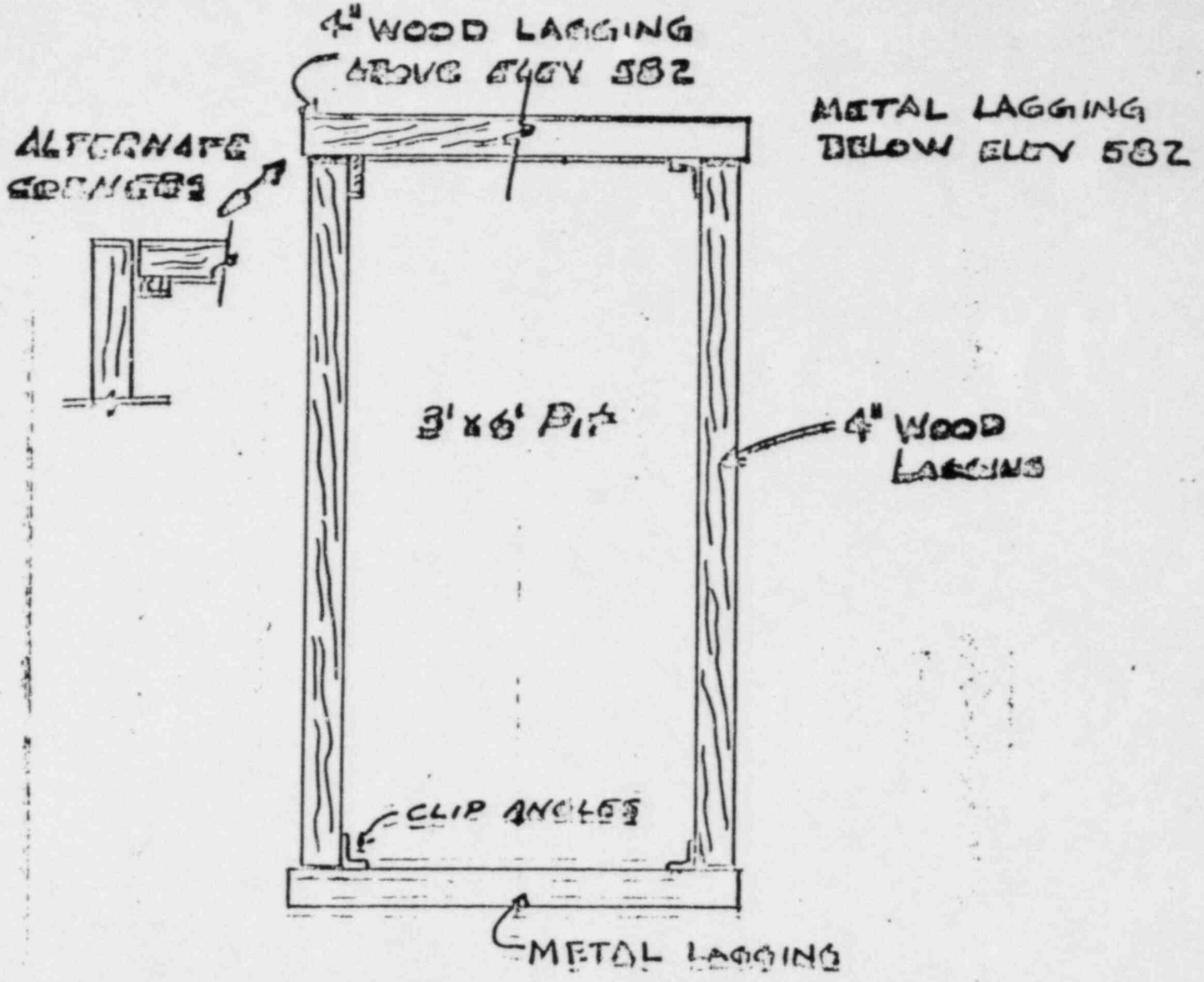
PLAN - CONTROL TOWER
METHOD TO INSTALL
HORIZONTAL REINFORCEMENT





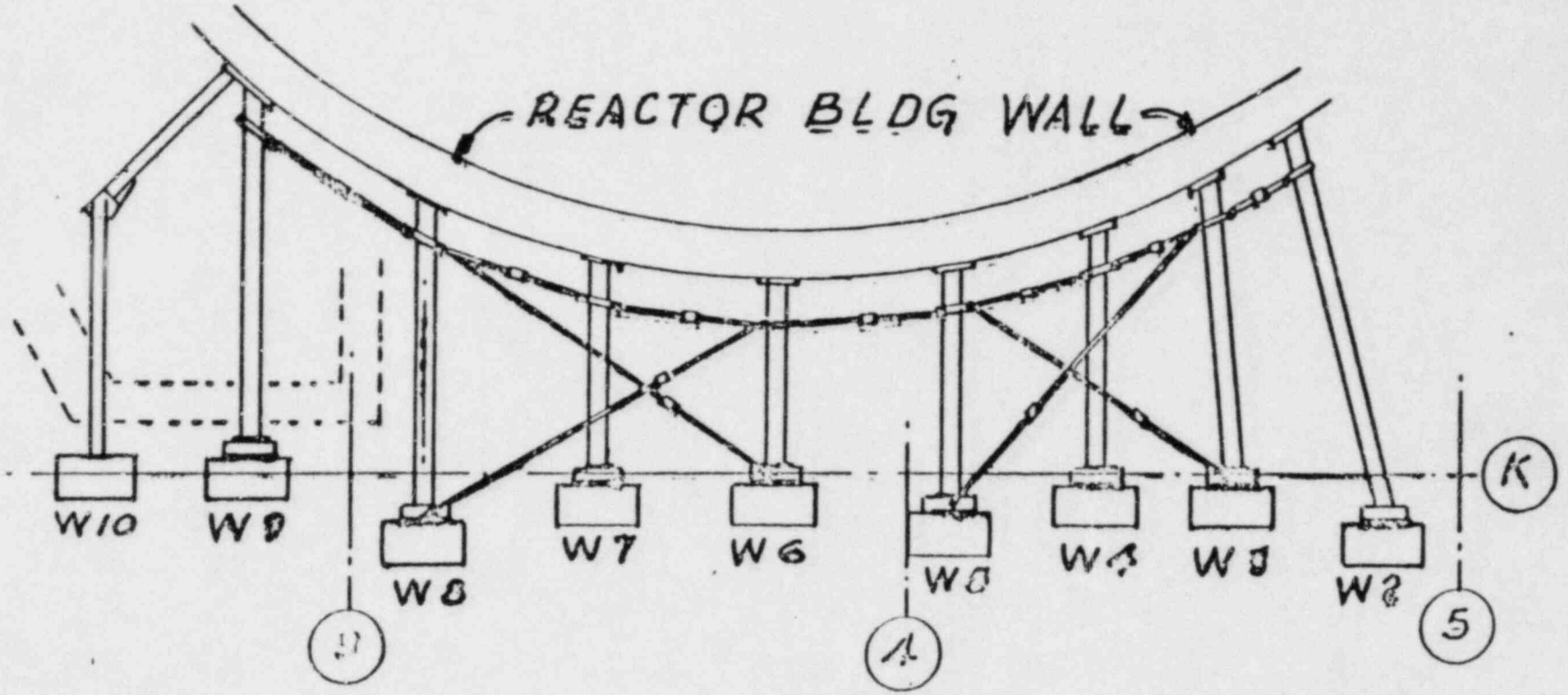
ENLARGED PLAN VIEW

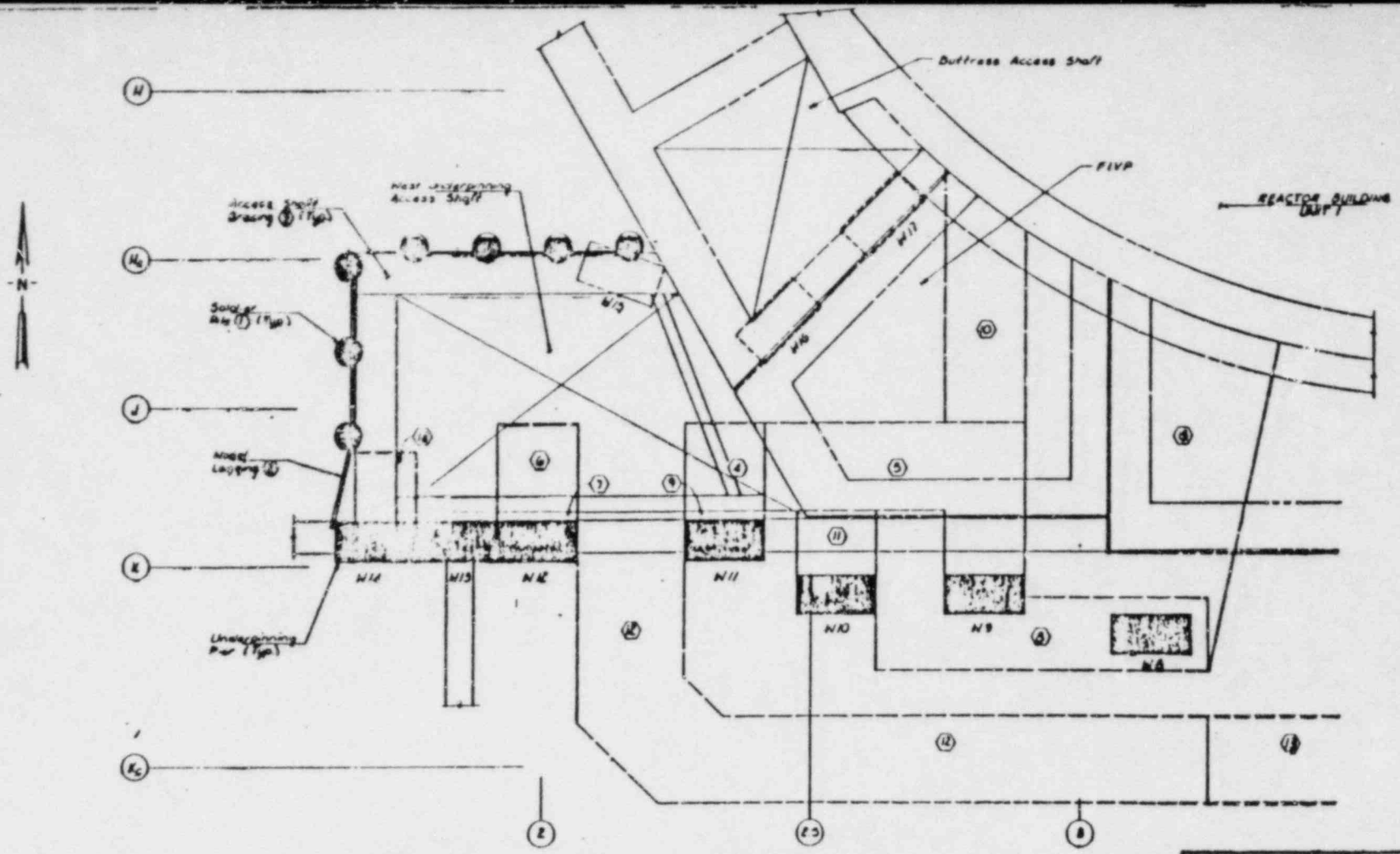
NOTE:
REINFORCING BARS
INSTALLED IN 15'-0" LENGTHS
WITH FOX-HOWLETT COUPLERS
AT STAGGERED LOCATIONS



PLAN VIEW OF
CONTROL TOWER PIT LAGGING

PLAN- STRUT BRACING



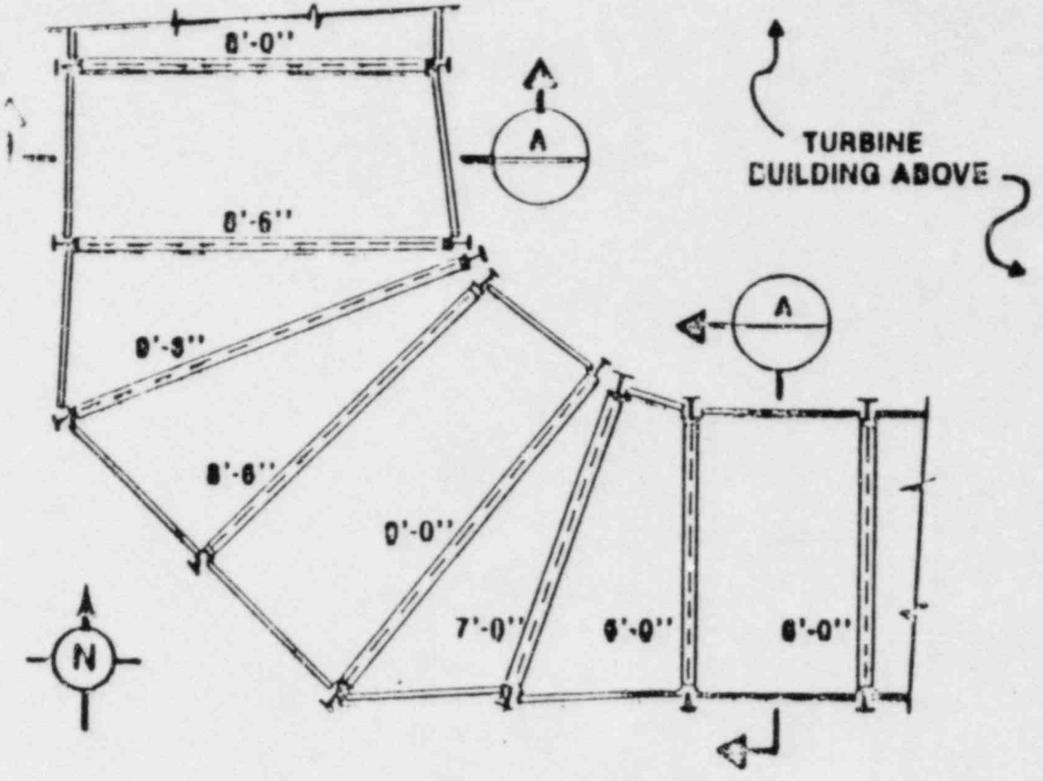


CONSUMERS POWER COMPANY
MIDLAND PLANT UNITS 1 & 2

UNDERPINNING AUXILIARY BUILDING

CONSTRUCTION SCHEMATIC 1

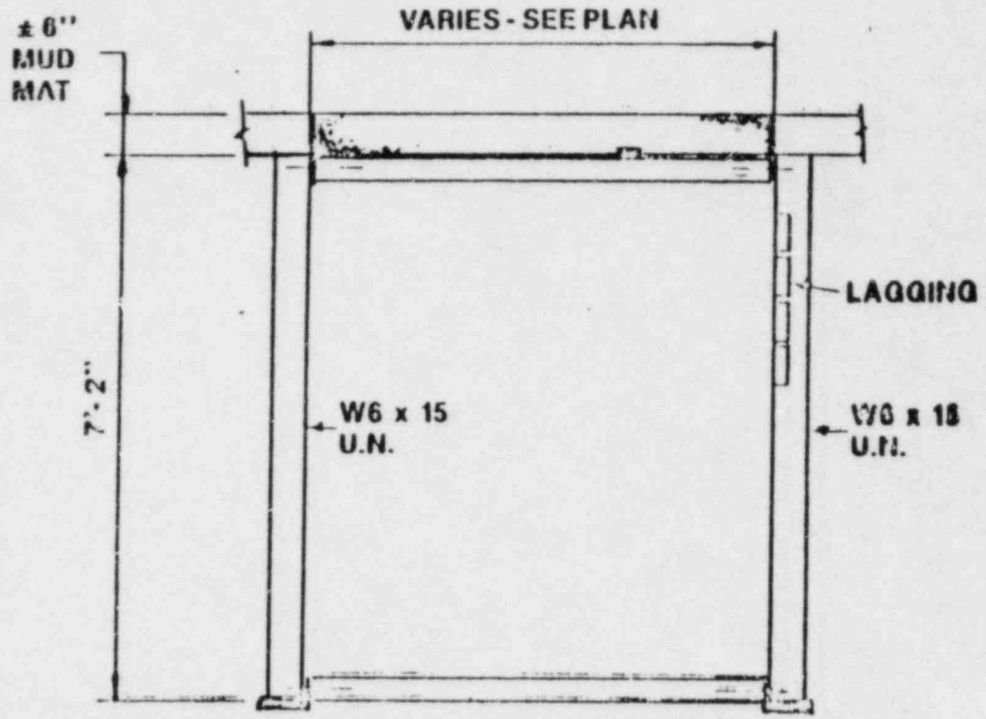
PARTIAL PLAN - ACCESS DRIFT



MIDLAND UNITS 1 AND 2
BUILDING PLAN DRAWINGS 1 12 82

Q 1929 02

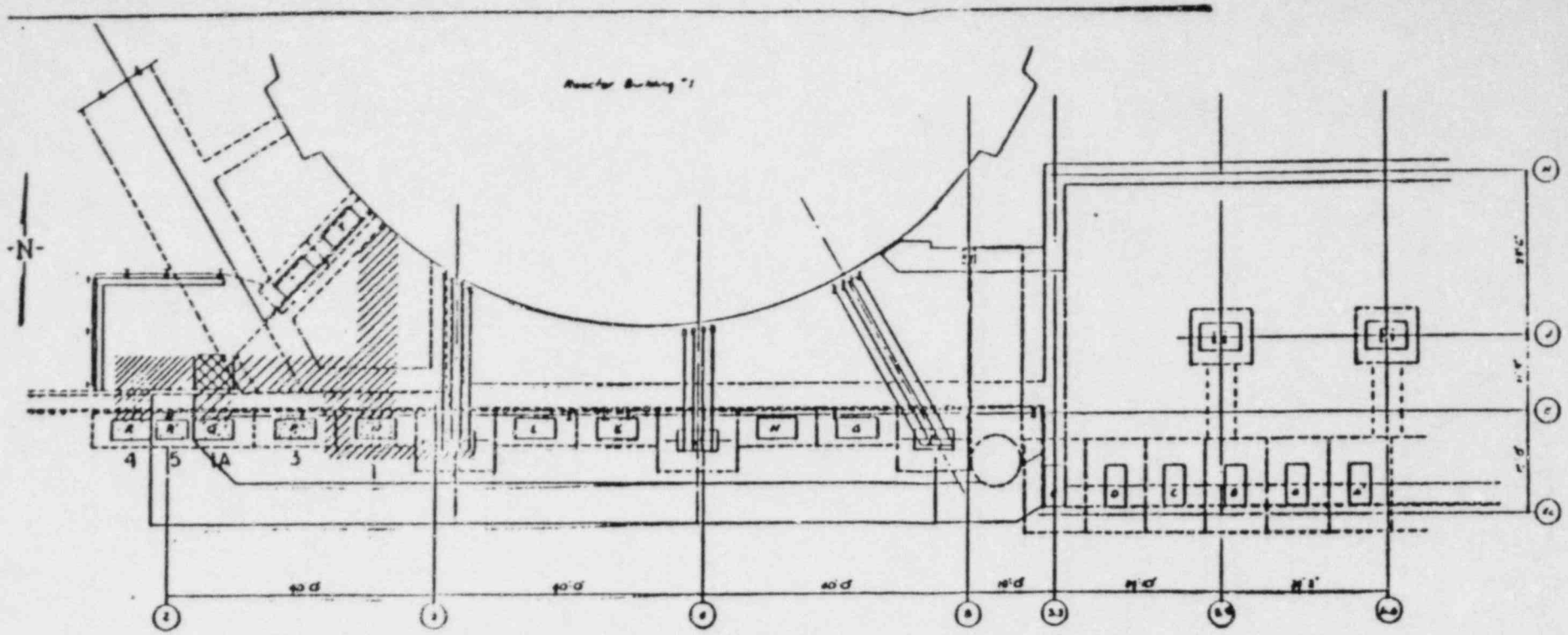
TYPICAL ACCESS DRIFT FRAME



SECTION A

MIDLAND UNITS 1 AND 2
ADDITIONAL BUILDING UNDER PLANNING 1-12-82

0 1829 06



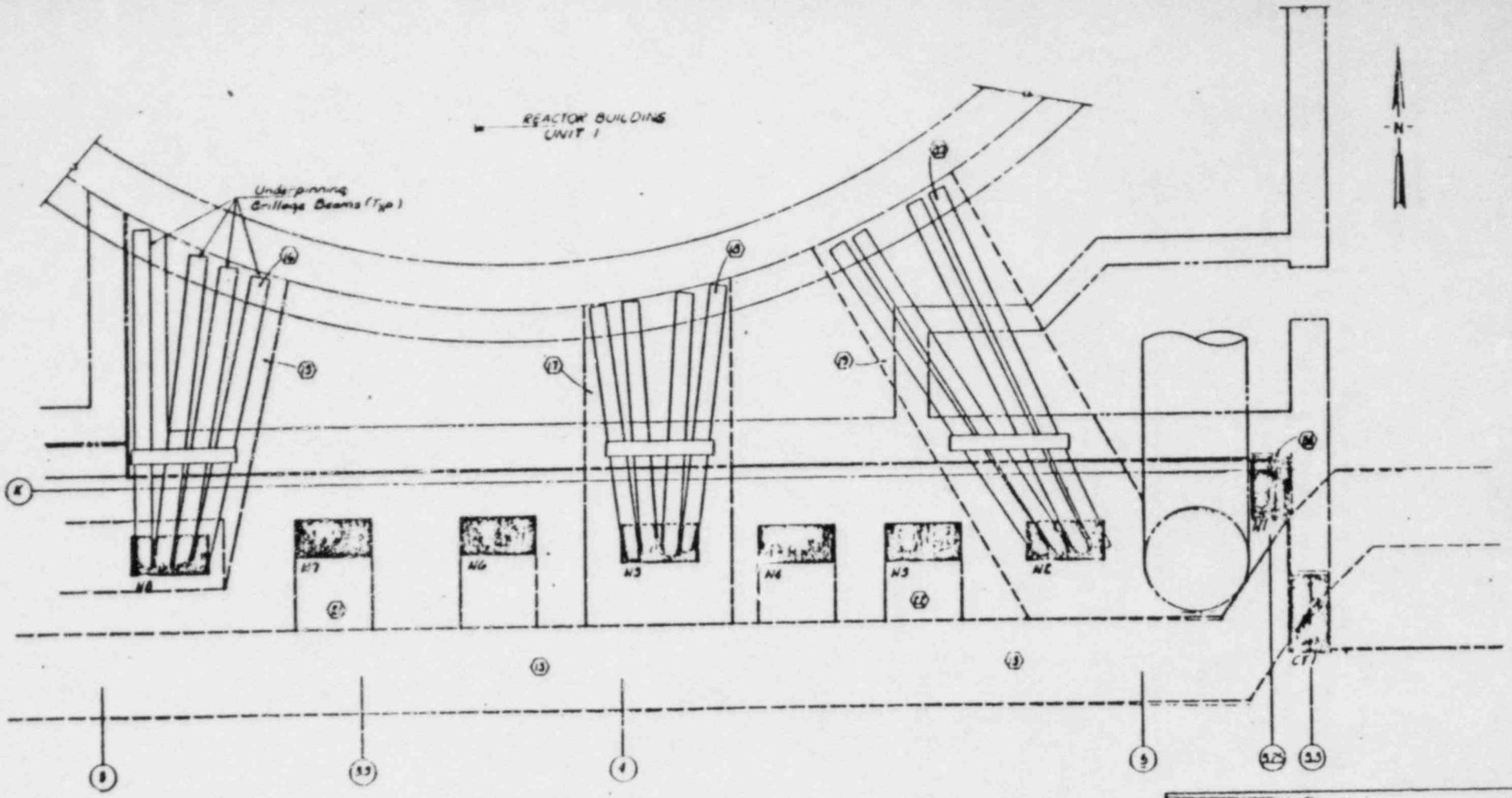
GENERAL PLAN
(WEST SIDE)

CONSUMERS POWER COMPAN
MIDLAND PLANT UNITS 1 & 2

CONCEPT DRAWING
UNDERPINNING AUXILIARY BUILDI

GENERAL PLAN

APPENDIX C FIGURE 1

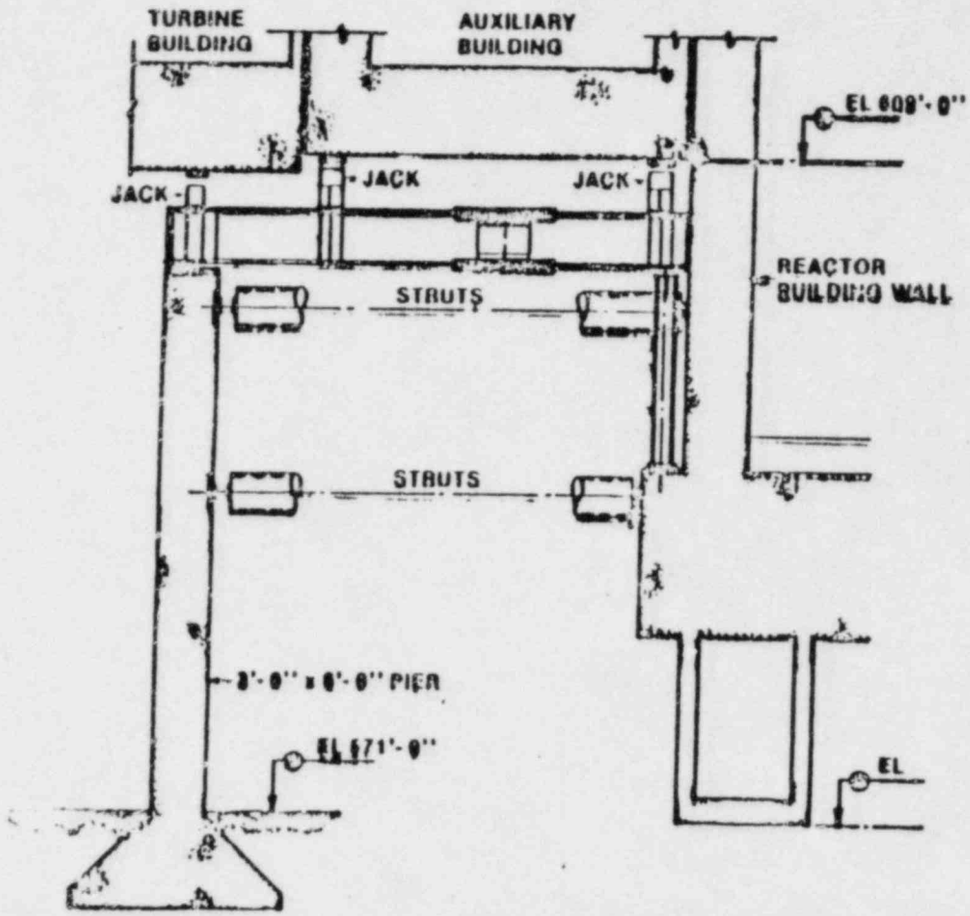


CONSUMERS POWER COMPAN
MIDLAND PLANT UNITS 1 & 2

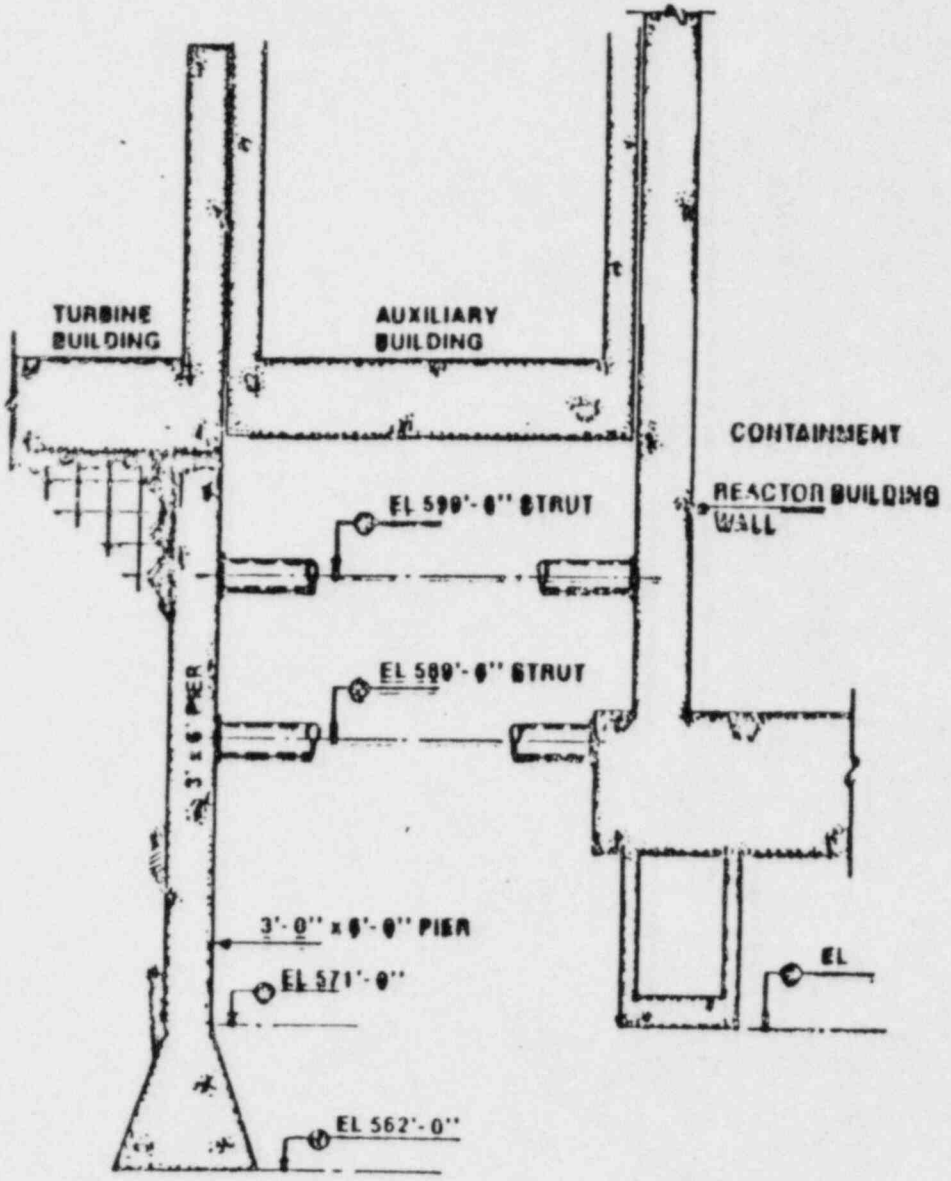
UNDERPINNING AUXILIARY BUILDI

CONSTRUCTION SCHEMATIC 2

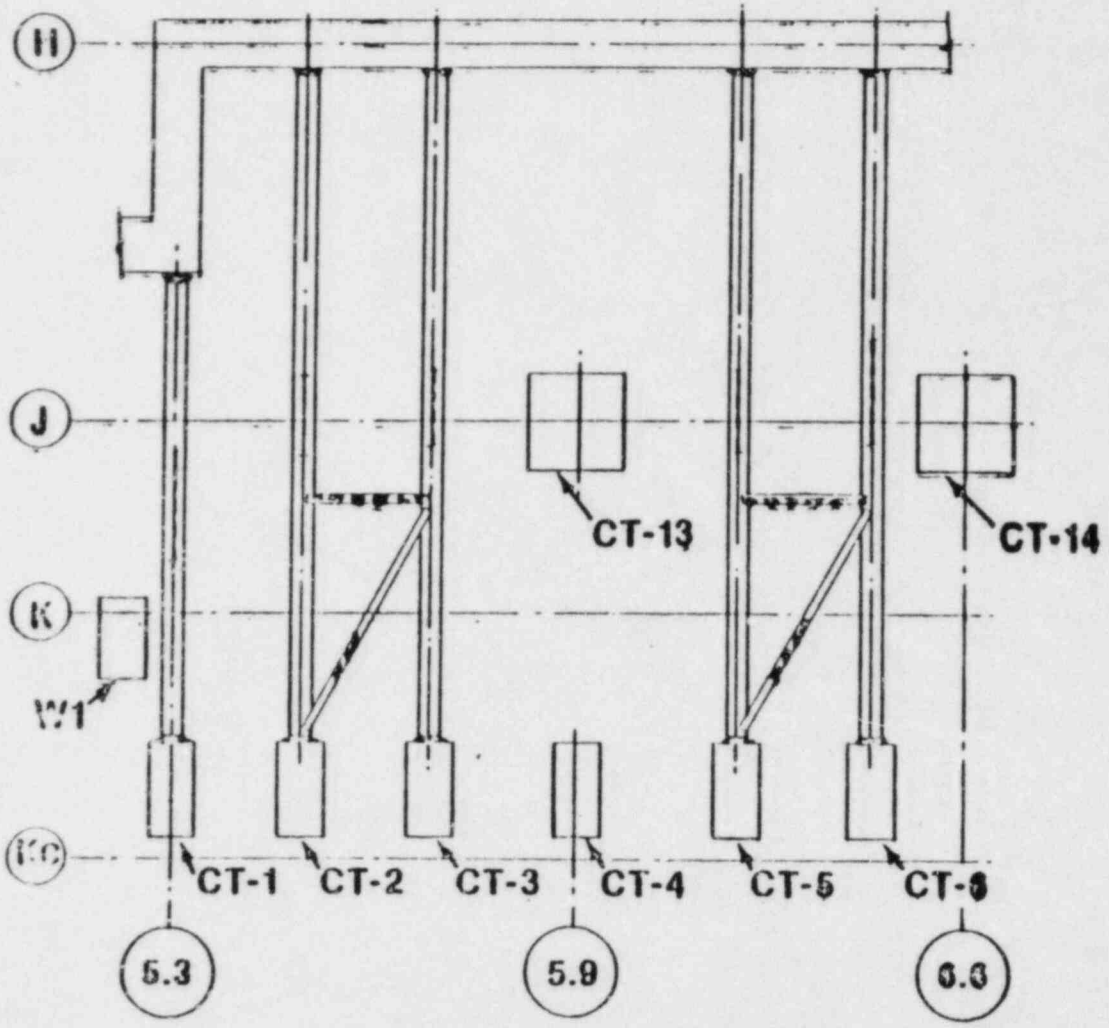
SECTION AT UNDERPINNING GRILLAGE



PIER BRACING



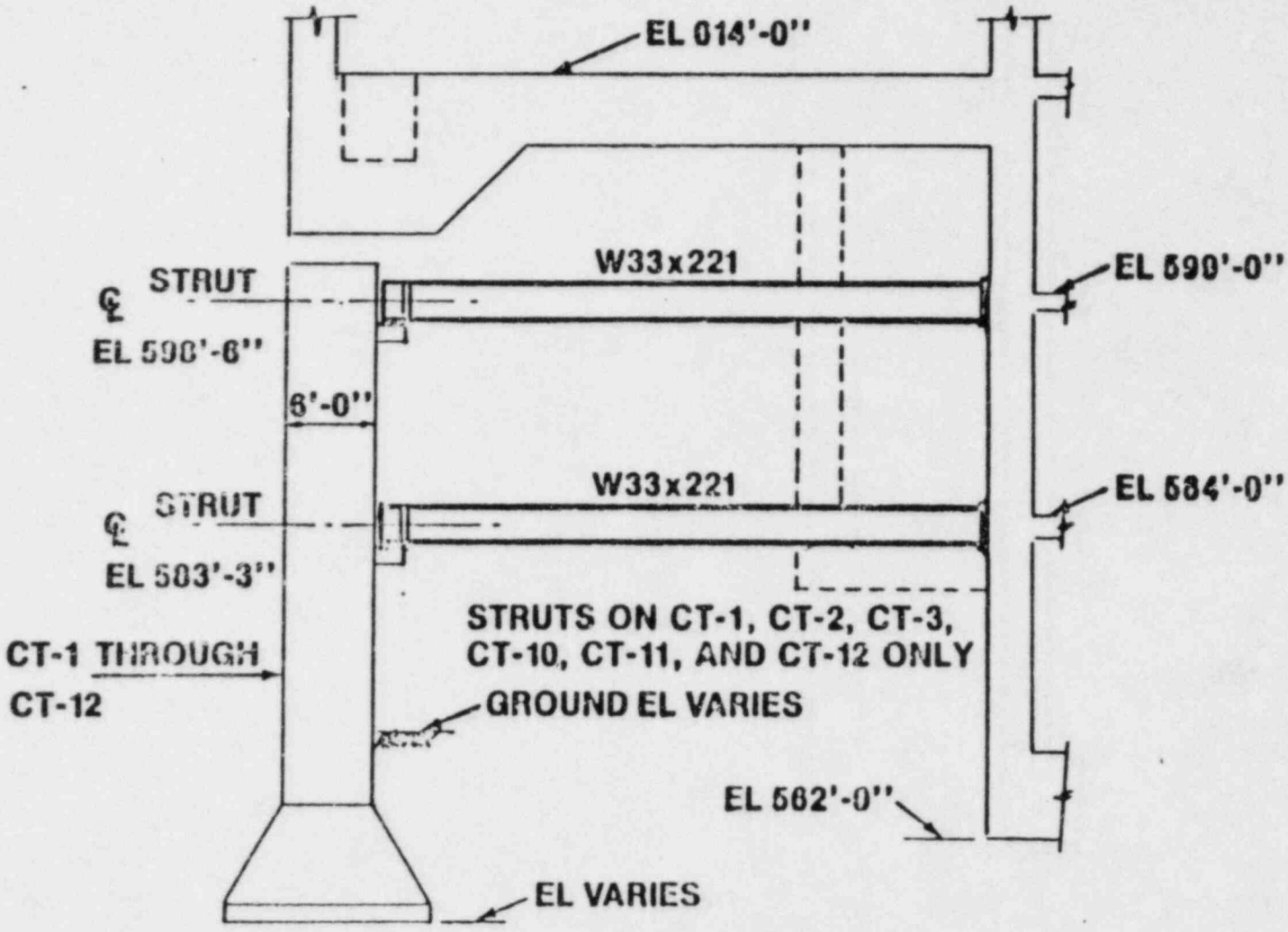
PLAN - CONTROL TOWER
PIERS AND STRUTS



MIDLAND UNITS 1 AND 2
AUXILIARY BUILDING UNDERPINNING 1/27/82

G-1929-21

SECTION - CONTROL TOWER
PIERS AND STRUTS



SECTION B-B

AUXILIARY BUILDING UNDERPINNING CONSTRUCTION CONDITION ANALYSIS

- PURPOSE - TO VERIFY THAT THE STRESSES IN THE STRUCTURE ARE ACCEPTABLE ACCORDING TO DESIGN CRITERIA

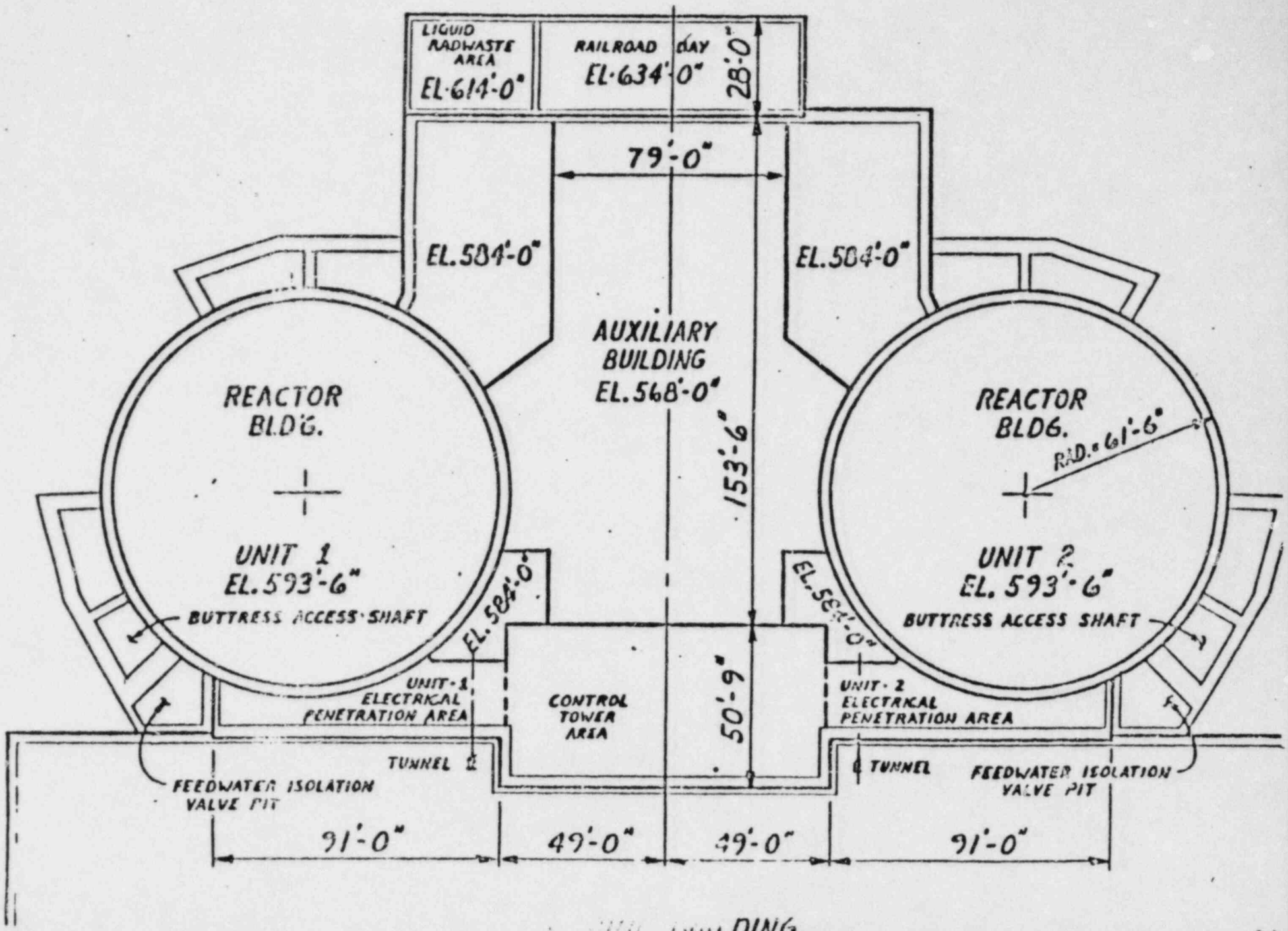
- ANALYSIS CLOSELY FOLLOWS CONSTRUCTION SEQUENCES

- CONSTRUCTION SEQUENCES SIMULATED WITH CONSERVATIVE ASSUMPTIONS

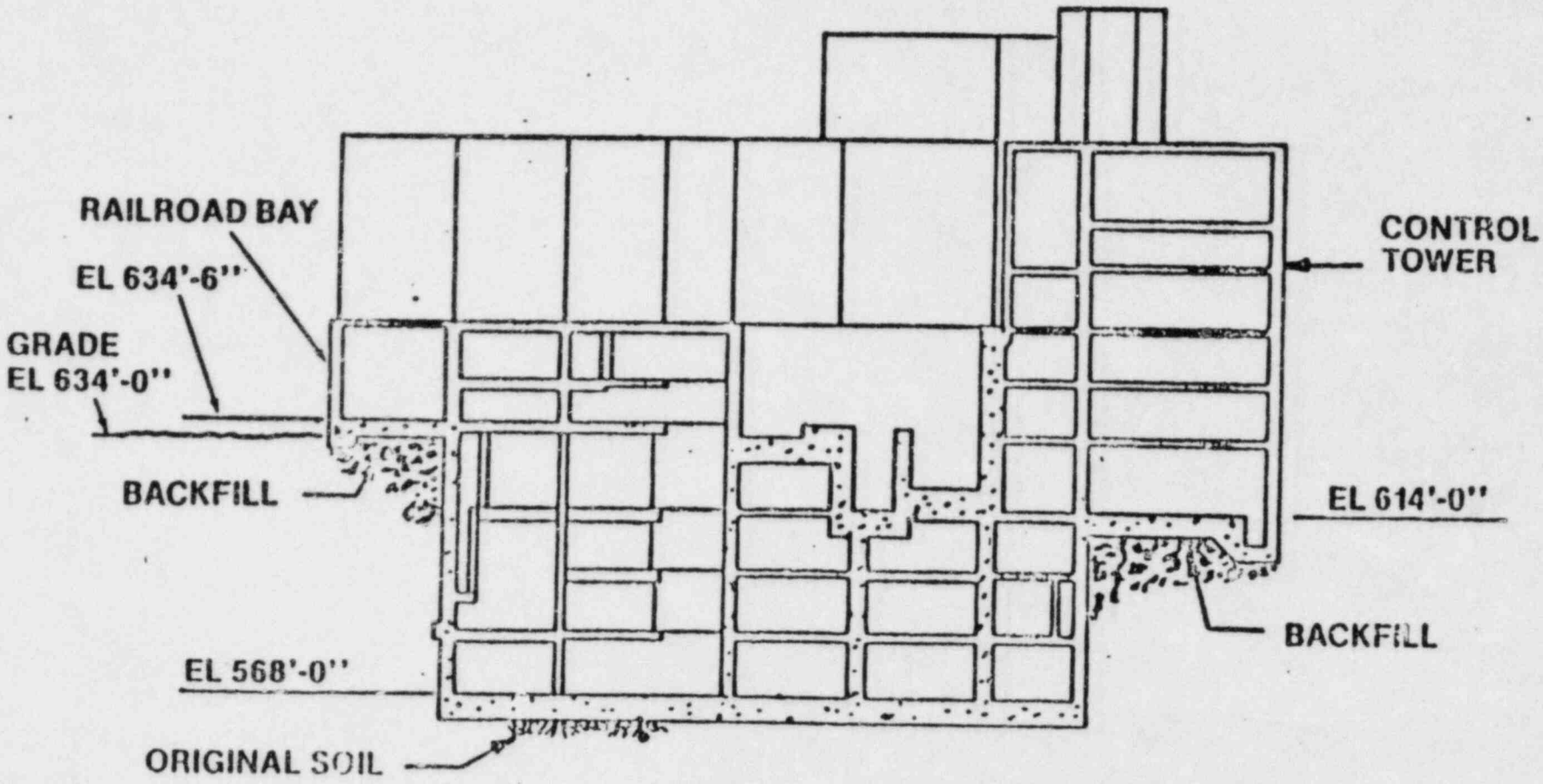
AUXILIARY BUILDING UNDERPINNING
CONSTRUCTION CONDITION ANALYSIS

- ANALYTICAL MODEL
- LOADS
- ALLOWABLE STRESS
- BASE LINE

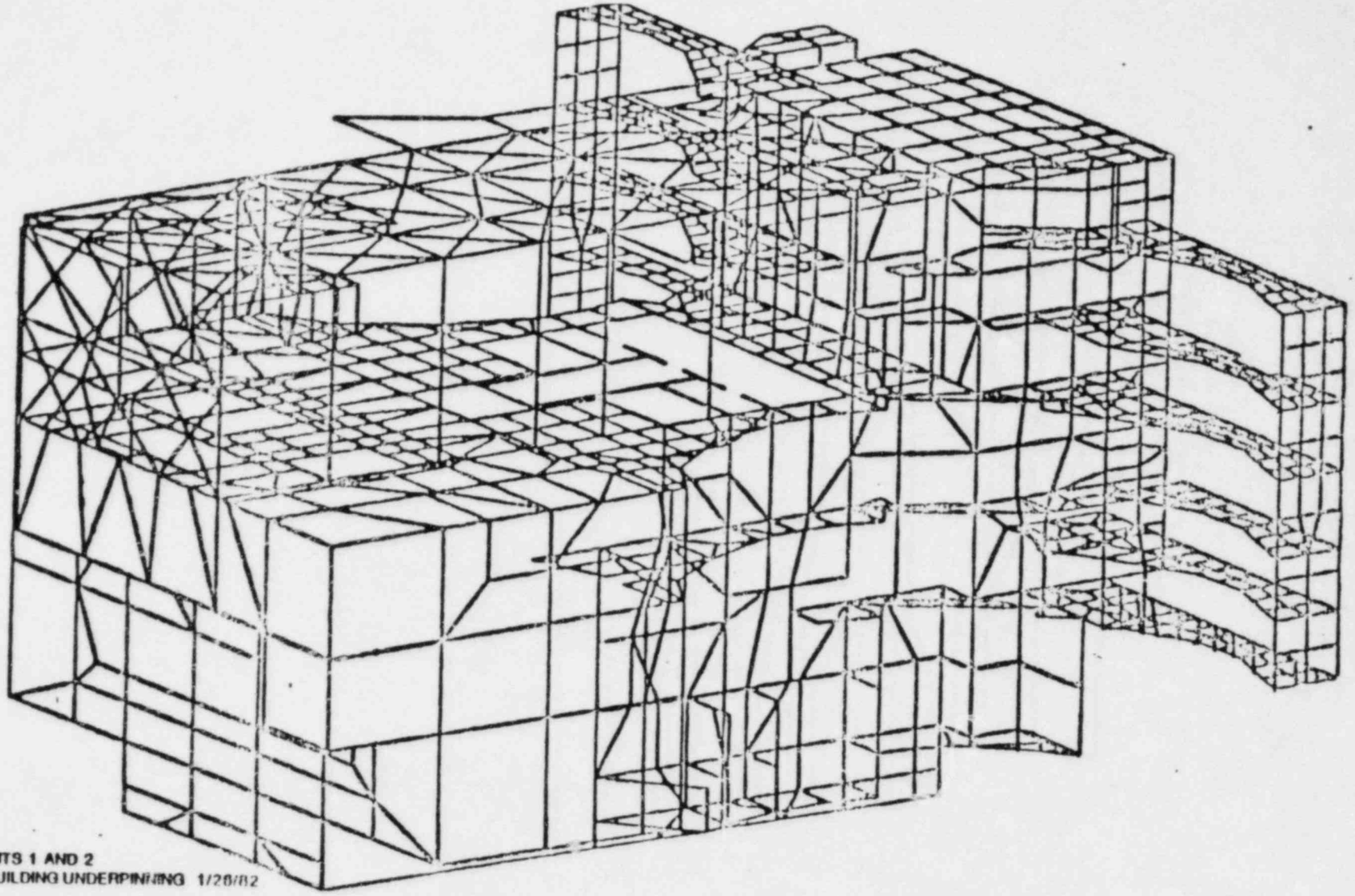
  EXISTING CONDITION WITH BEST ESTIMATED SUPPORT FROM BACKFILL
- INCORPORATE ESTIMATED UNDERPINNING FOR MAJOR CONSTRUCTION STAGES IN MODEL AND EVALUATE CHANGE IN STRESS
- INCORPORATE PROGRESSIVE JACKING
- FINAL STAGE - STRUCTURE ON TEMPORARY SUPPORT
- SOIL PRESSURES
- AREAS FOR MONITORING


LIQUID RADWASTE AREA
EL. 614'-0"
RAILROAD BAY
EL. 634'-0"
28'-0"
79'-0"
EL. 584'-0"
EL. 584'-0"
AUXILIARY BUILDING
EL. 568'-0"
153'-6"
REACTOR BLDG.
UNIT 1
EL. 593'-6"
BUTTRESS ACCESS SHAFT
REACTOR BLDG.
RAD. = 61'-6"
UNIT 2
EL. 593'-6"
BUTTRESS ACCESS SHAFT
EL. 584'-0"
EL. 584'-0"
UNIT-1 ELECTRICAL PENETRATION AREA
CONTROL TOWER AREA
50'-9"
UNIT-2 ELECTRICAL PENETRATION AREA
TUNNEL
TUNNEL
FEEDWATER ISOLATION VALVE PIT
FEEDWATER ISOLATION VALVE PIT
91'-0"
49'-0"
49'-0"
91'-0"

AUXILIARY BUILDING
TYPICAL SECTION
(Looking East)



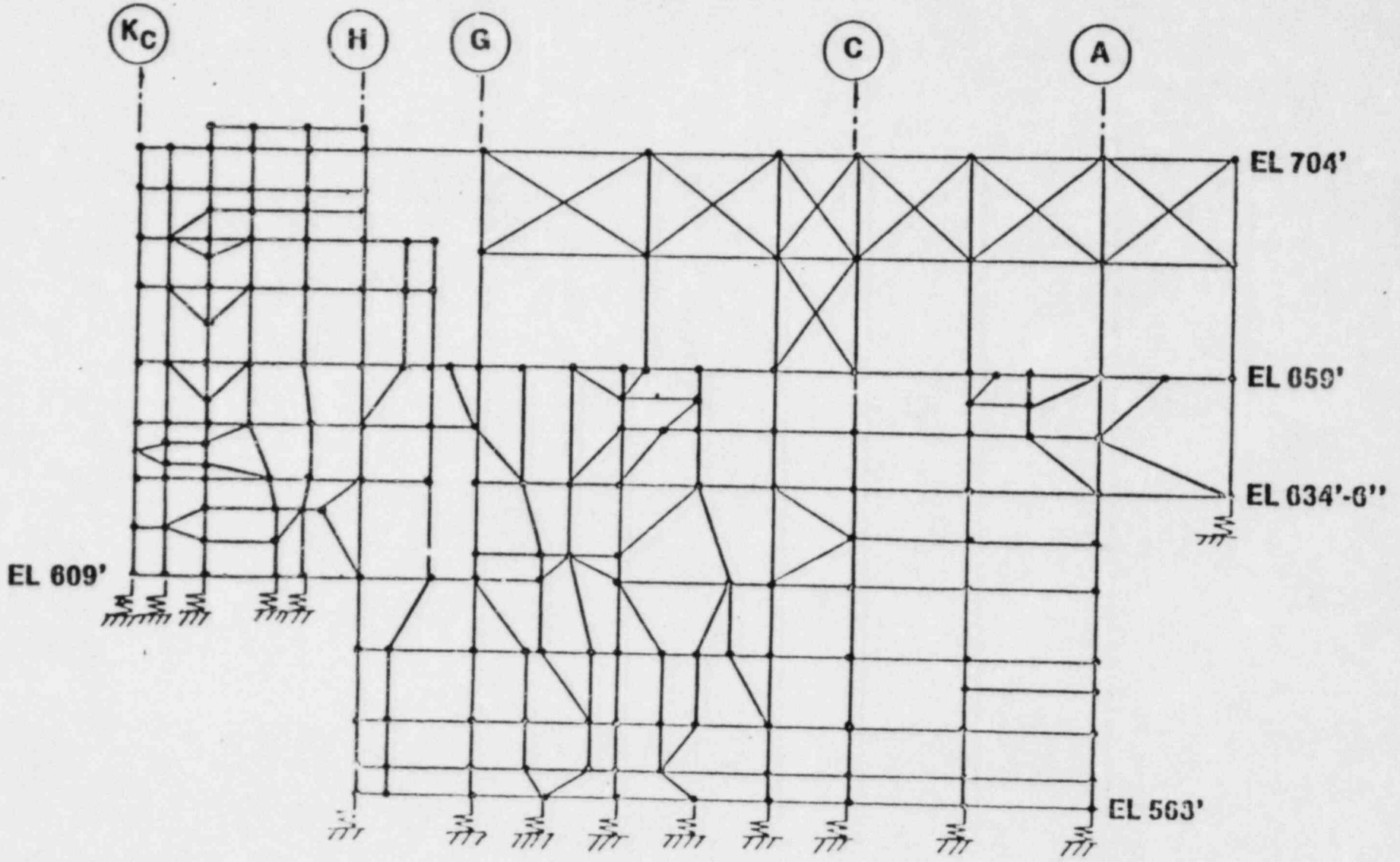
AUXILIARY BUILDING UNDERPINNING
ISOMETRIC VIEW OF MODEL



MIDLAND UNITS 1 AND 2
AUXILIARY BUILDING UNDERPINNING 1/28/82

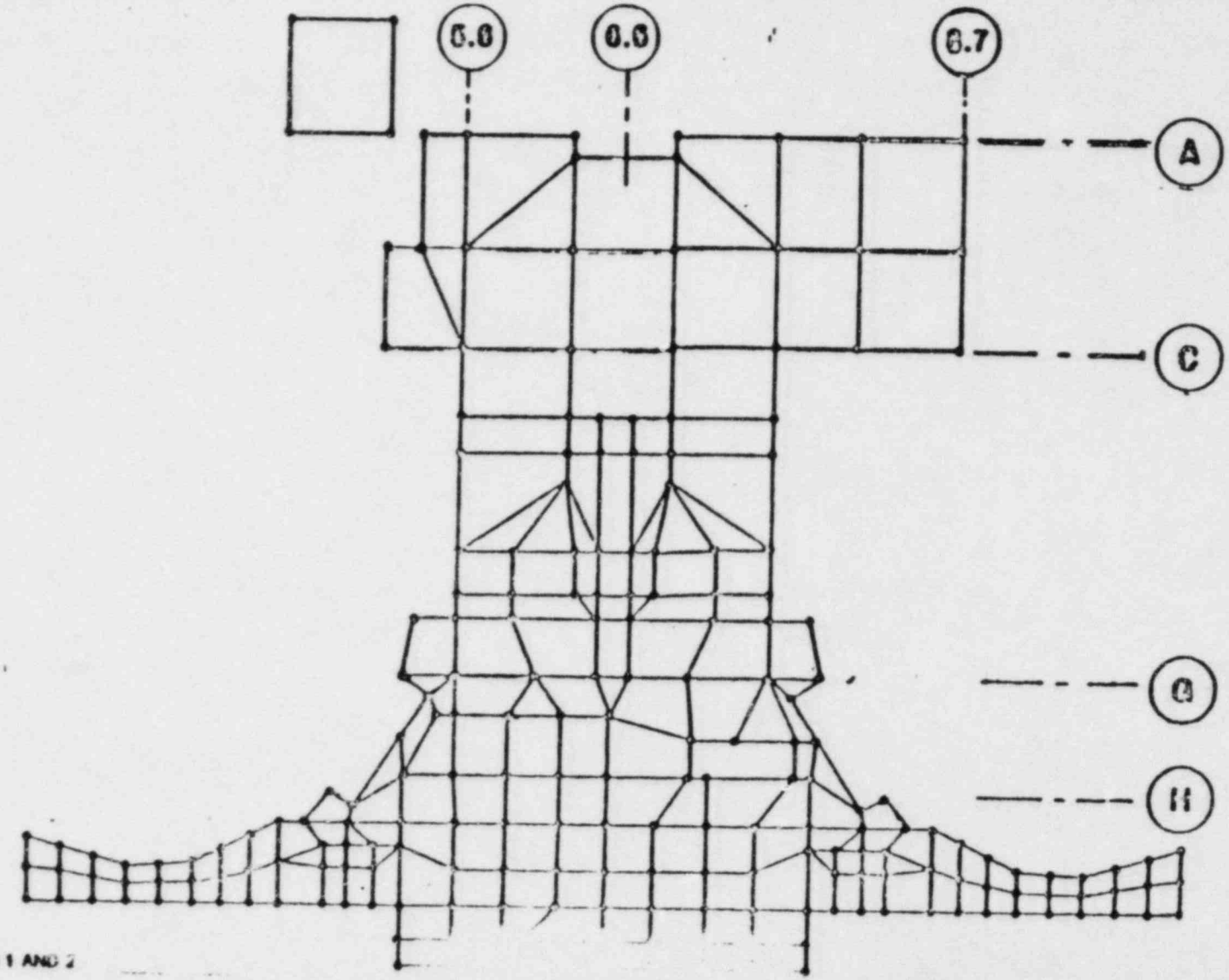
G-1002-23

AUXILIARY BUILDING UNDERPINNING
NODAL MESH AT COLUMN LINE 5.6
ELEVATION VIEW



G-1802-07

AUXILIARY BUILDING UNDERPINNING
NODAL MESH AT ELEVATION 614'
PLAN VIEW



MIDLAND UNITS 1 AND 2

AUXILIARY BUILDING UNDERPINNING CONSTRUCTION CONDITION ANALYSIS
FINITE ELEMENT MODEL

- USE BSAP CE 800
- NO. OF NODES = 2,800
- NO. OF ELEMENTS, INCLUDE BEAMS, PLATES AND TRUSS = 4,000
- BOUNDARY ELEMENTS = 402
- MESH SOUTH OF G-LINE IS FINER THAN MESH NORTH OF G-LINE
- STEEL BEAMS BELOW SLABS NOT MODELED
- OUT OF PLANE BENDING FOR SLABS ANALYZED SEPARATELY

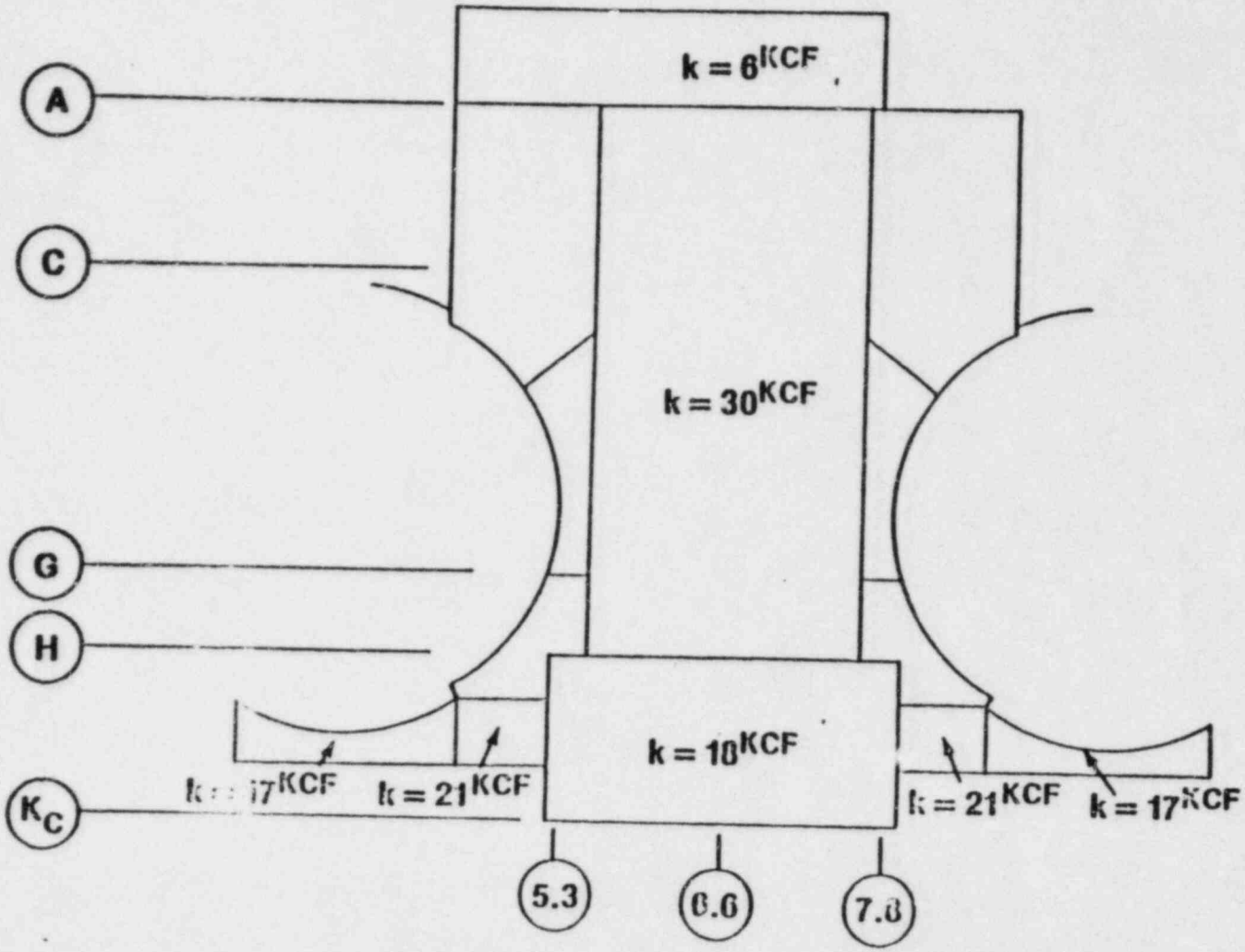
AUXILIARY BUILDING UNDERPINNING
EXISTING STRUCTURE ANALYSIS

- MODEL BOUNDARY CONDITIONS REPRESENTED AS NODAL SPRINGS

- NODAL SPRINGS = SOIL SUBGRADE MODULUS x CONTRIBUTORY AREA

- SUBGRADE MODULUS VALUES COMPUTED BY GEOTECH AND SUBMITTED TO NRC

AUXILIARY BUILDING UNDERPINNING
EXISTING SOIL SPRINGS UNDER AUXILIARY BUILDING



MIDLAND UNITS 1 AND 2
AUXILIARY BUILDING UNDERPINNING 1/20/82

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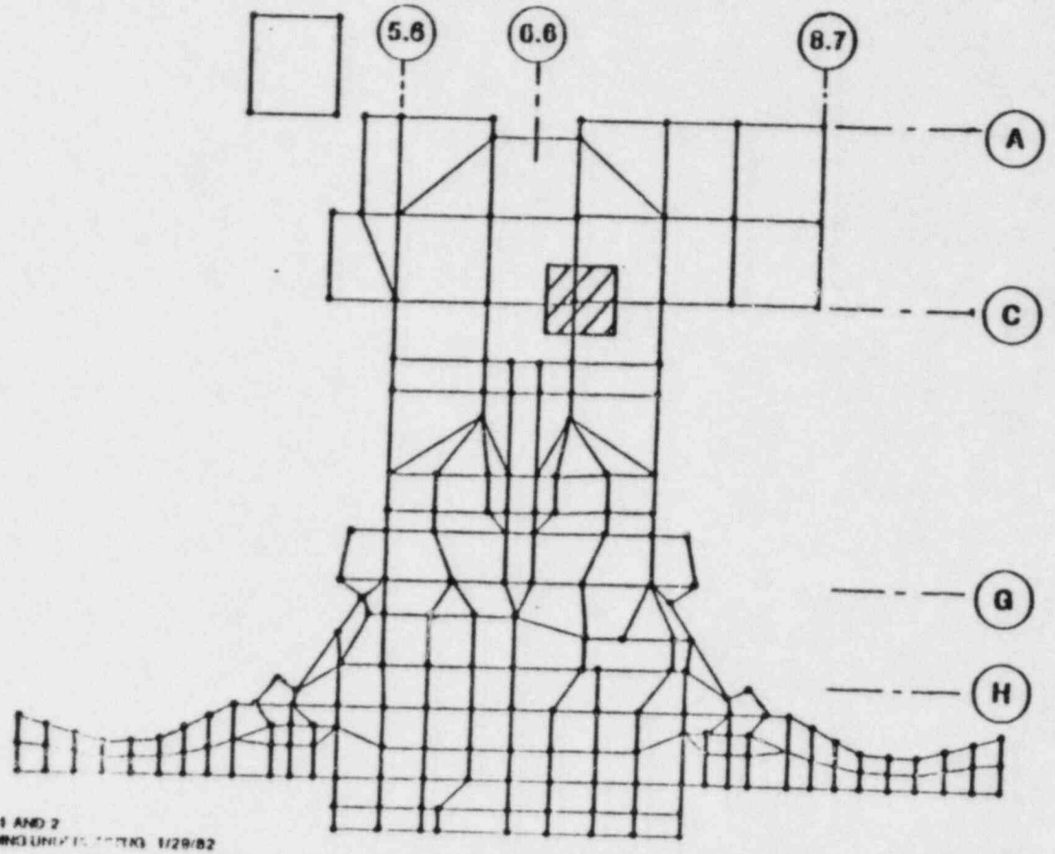
AUXILIARY BUILDING UNDERPINNING
CONSTRUCTION CONDITION
ANALYSIS
NODAL SPRINGS



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

G-1929 26

AUXILIARY BUILDING UNDERPINNING CONSTRUCTION CONDITION ANALYSIS

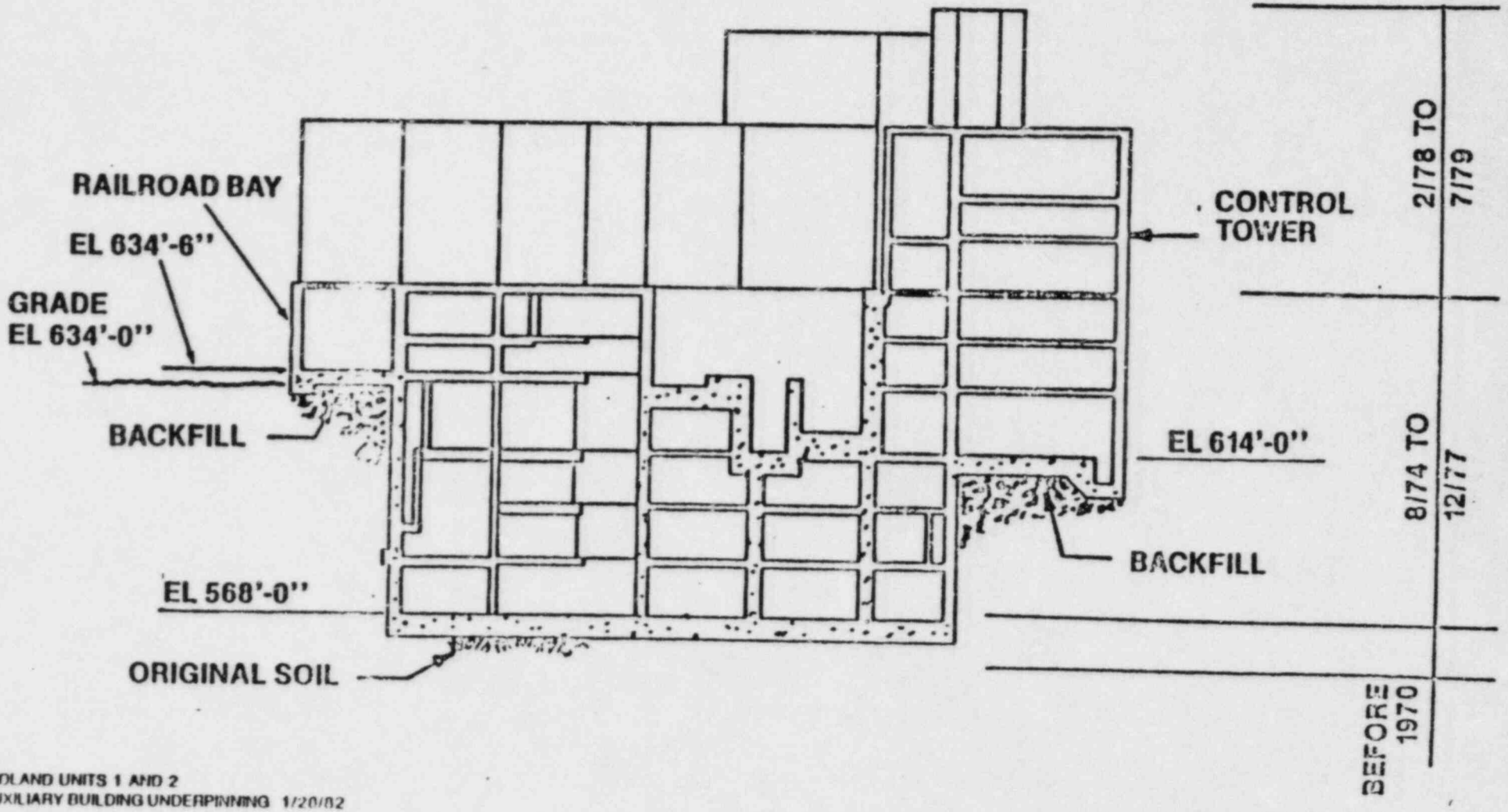
- DEAD WEIGHT OF STRUCTURE
- WEIGHT OF BLOCKWALLS
- EQUIPMENT LOADS
- 25 PERCENT LIVE LOAD ON FLOORS
- JACKING LOAD (progressive)

AUXILIARY BUILDING UNDERPINNING
CONSTRUCTION CONDITION ANALYSIS
ALLOWABLE STRESSES AND LOAD FACTORS

- BASED ON ACI 318-71
- AISC, SEVENTH EDITION
- RESULTS FROM COMPUTER MULTIPLIED BY FACTOR 1.43 TO CORRESPOND TO 1.4D + 1.7L
- CONSERVATIVE ESTIMATE DL= 90% OF TOTAL LOAD
  LL= 10% OF TOTAL LOAD
- 1.4D + 1.7L
  = 0.9 x 1.4 + 0.1 x 1.7
  = 1.26 + 0.17
  = 1.43

(weighted load factor)

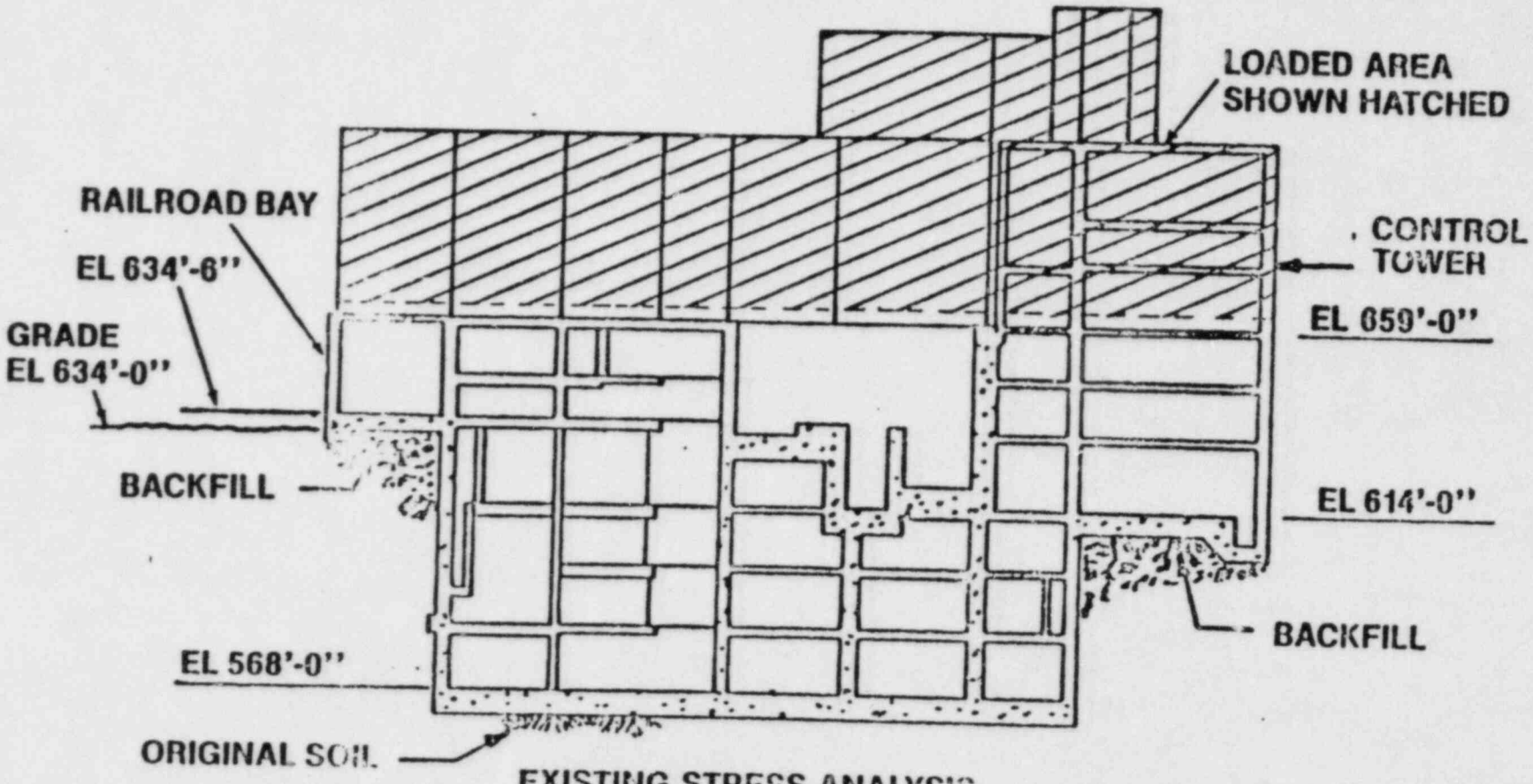
AUXILIARY BUILDING UNDERPINNING
TYPICAL SECTION
(Looking East)



MIDLAND UNITS 1 AND 2
AUXILIARY BUILDING UNDERPINNING 1/20/82

G-1555-07

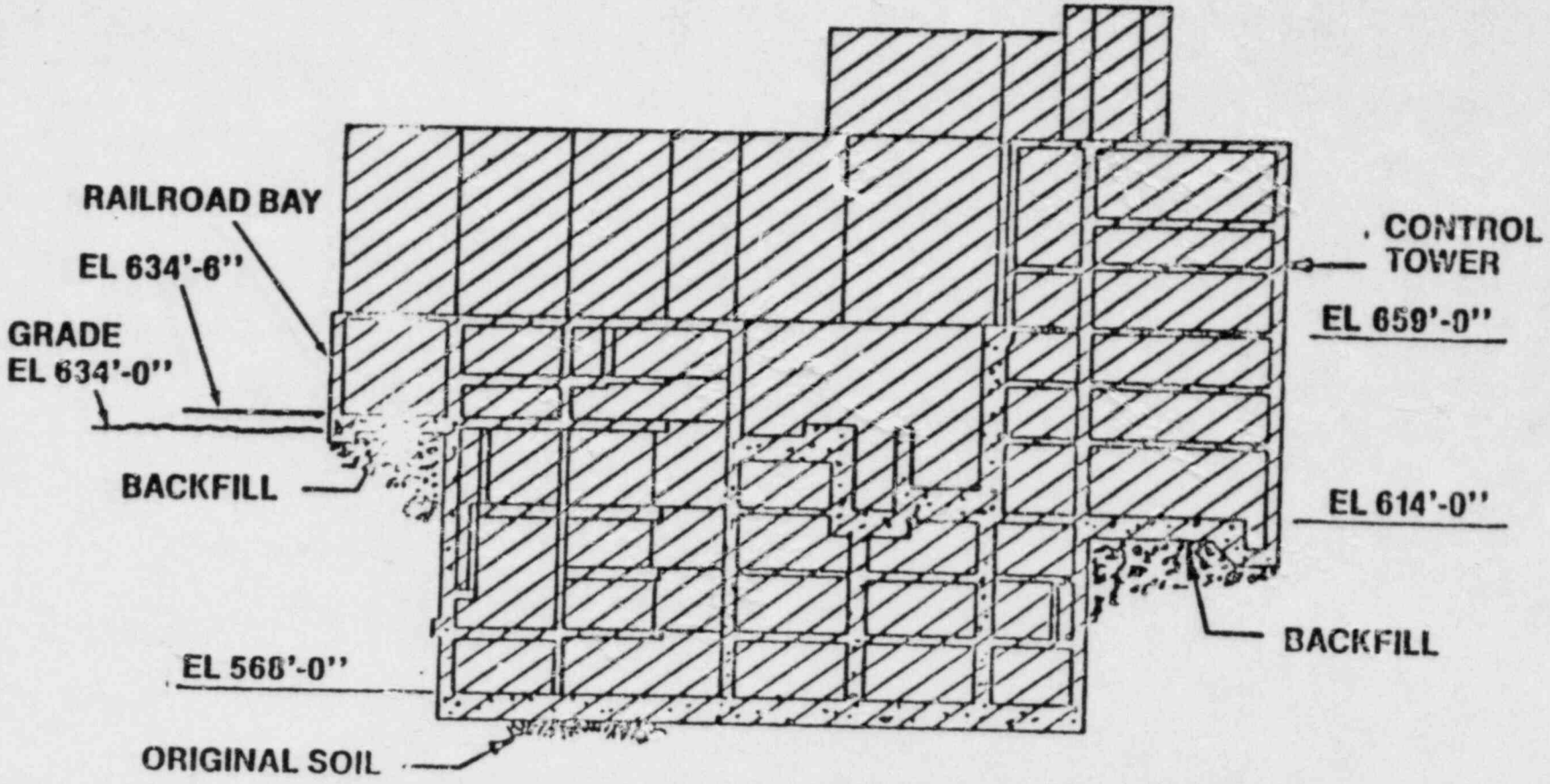
AUXILIARY BUILDING UNDERPINNING
TYPICAL SECTION
(Looking East)



EXISTING STRESS ANALYSIS

LOAD [illegible] EL 659'-0" AND ABOVE

AUXILIARY BUILDING UNDERPINNING
TYPICAL SECTION
(Looking East)



EXISTING STRESSES BELOW EL 659'-0"

MIDLAND UNITS 1 AND 2
AUXILIARY BUILDING UNDERPINNING 1/20/82

G-1555-07

AUXILIARY BUILDING UNDERPINNING CONSTRUCTION CONDITION ANALYSIS

- EXISTING STRESS DETERMINATION
- TWO MODELS USED TO REPRESENT CONSTRUCTION PROGRESS
  - LOADING CONDITION - EL 659' AND ABOVE
  - LOADING BELOW EL 659'
- REDUCED MODULUS OF CONCRETE = $\frac{Ec}{1.8}$

  IN ACCORDANCE WITH ARTICLE 9.5.2.3 (ACI 318-71) TO ACCOUNT FOR CREEP AND SHRINKAGE IN CONCRETE

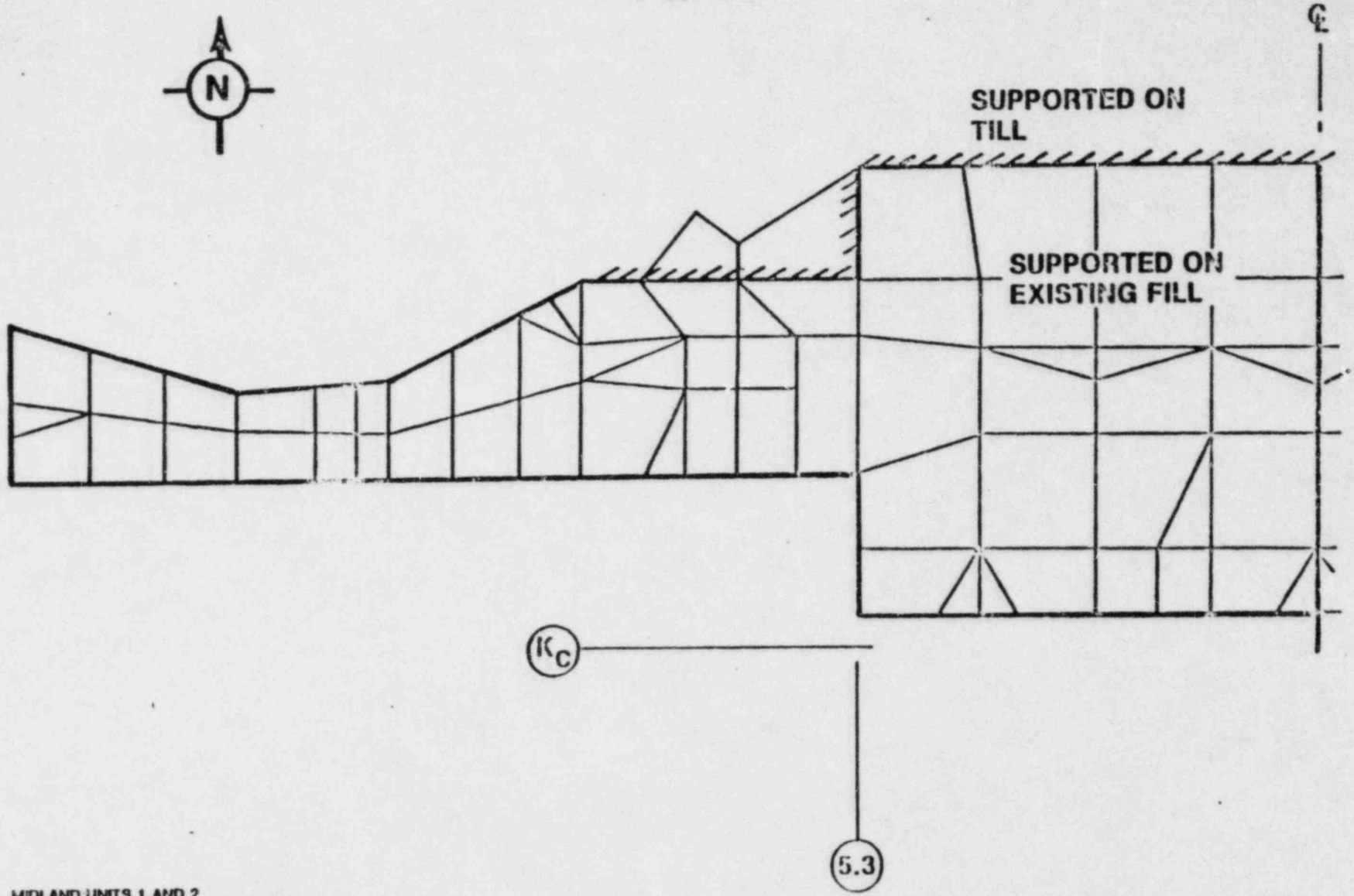
AUXILIARY BUILDING UNDERPINNING
CONSTRUCTION CONDITION ANALYSIS

- EXISTING STRESS VALUES
  MAXIMUM TENSION = 30 K/FT

AUXILIARY BUILDING UNDERPINNING CONSTRUCTION CONDITION ANALYSIS

- TEMPORARY CONDITION
- Ec VALUE IN ACCORDANCE WITH ARTICLE 8.3.1 OF ACI 318-71

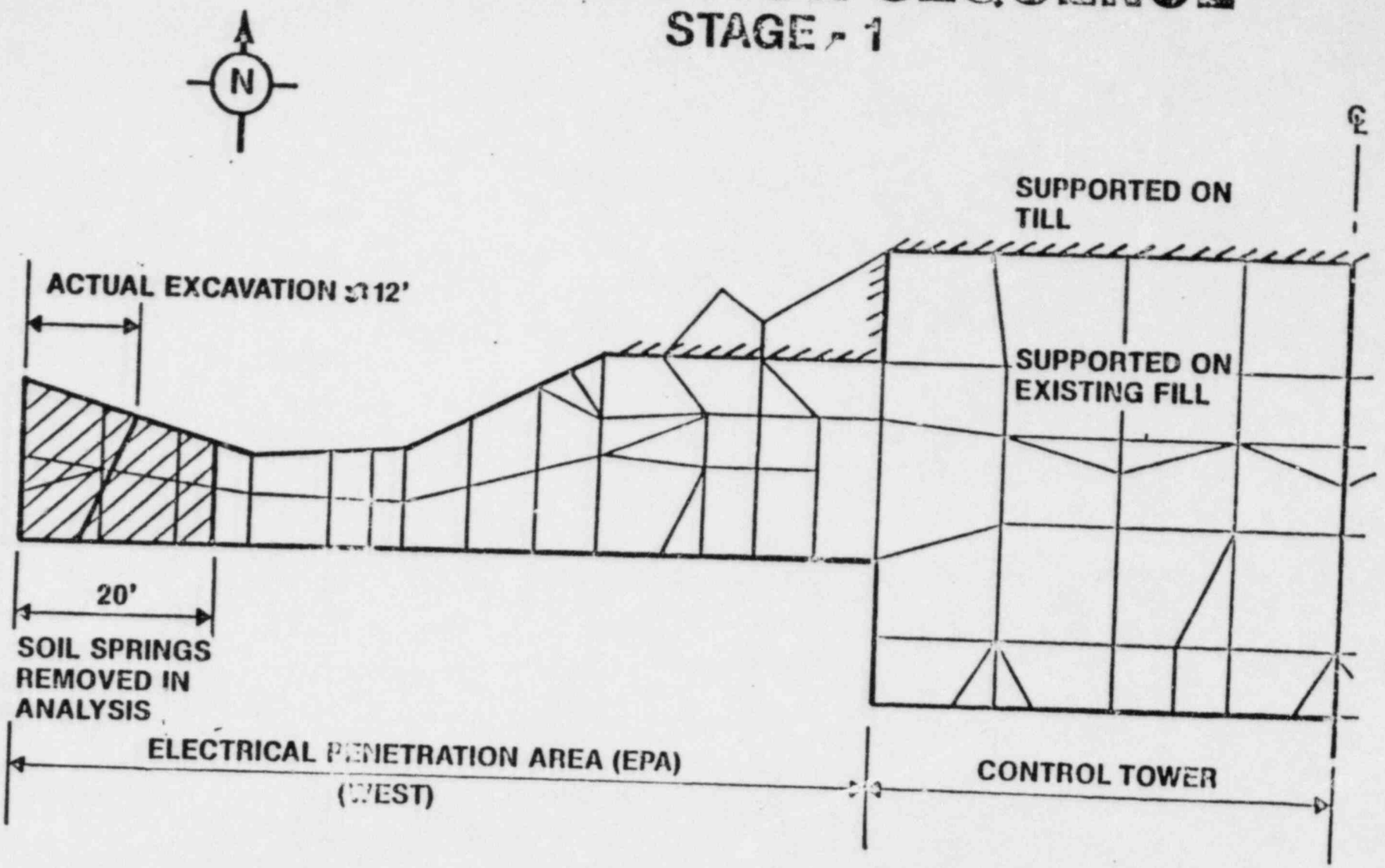
AUXILIARY BUILDING UNDERPINNING
CONSTRUCTION AREA
PLAN



MIDLAND UNITS 1 AND 2
AUXILIARY BUILDING UNDERPINNING 1/20/83

G-1802-16

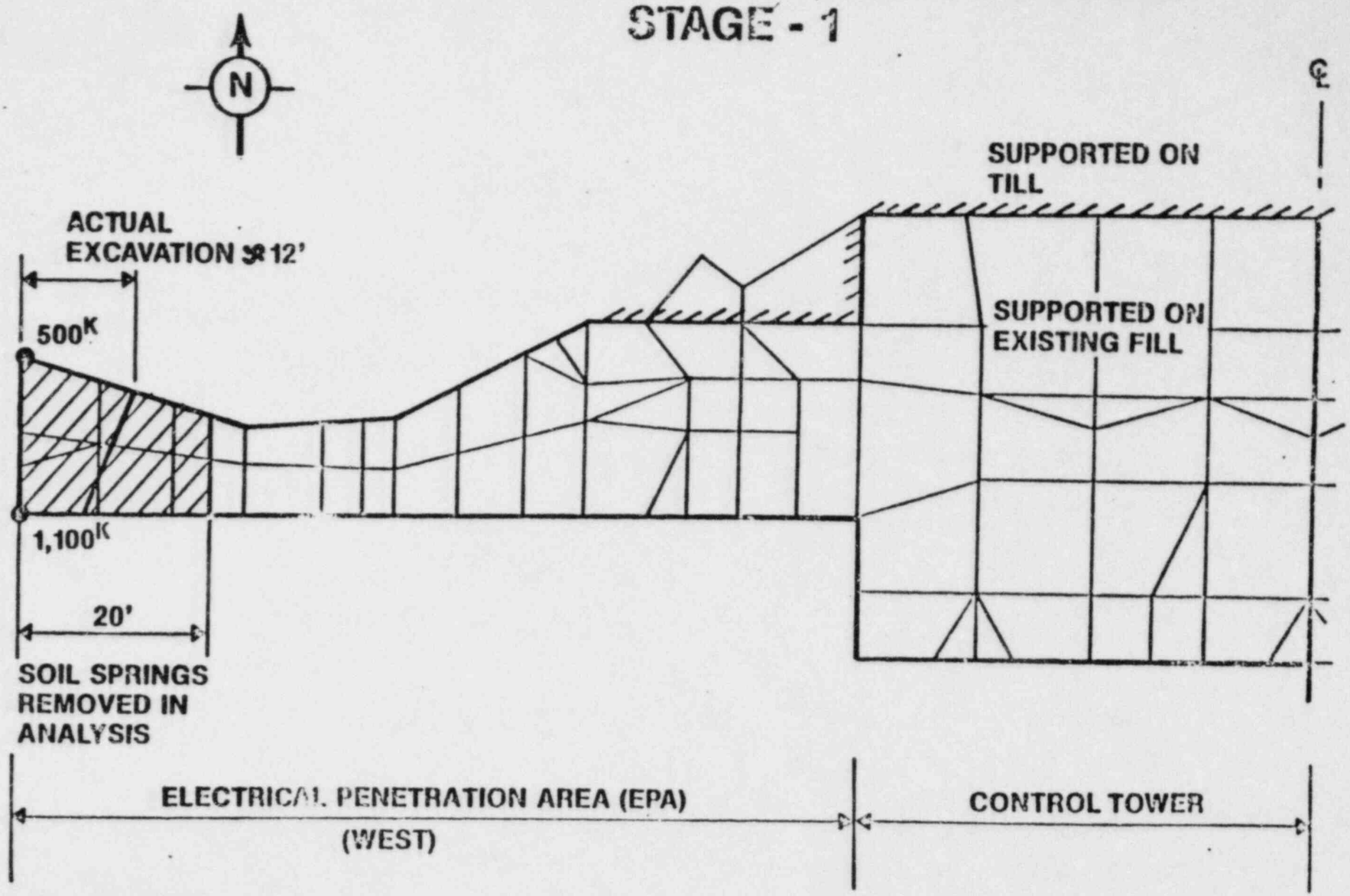
AUXILIARY BUILDING UNDERPINNING
CONSTRUCTION SEQUENCE
STAGE - 1



MIDLAND UNITS 1 AND 2
AUXILIARY BUILDING UNDERPINNING [illegible]/82

G-1802-21

AUXILIARY BUILDING UNDERPINNING
CONSTRUCTION SEQUENCE
STAGE - 1



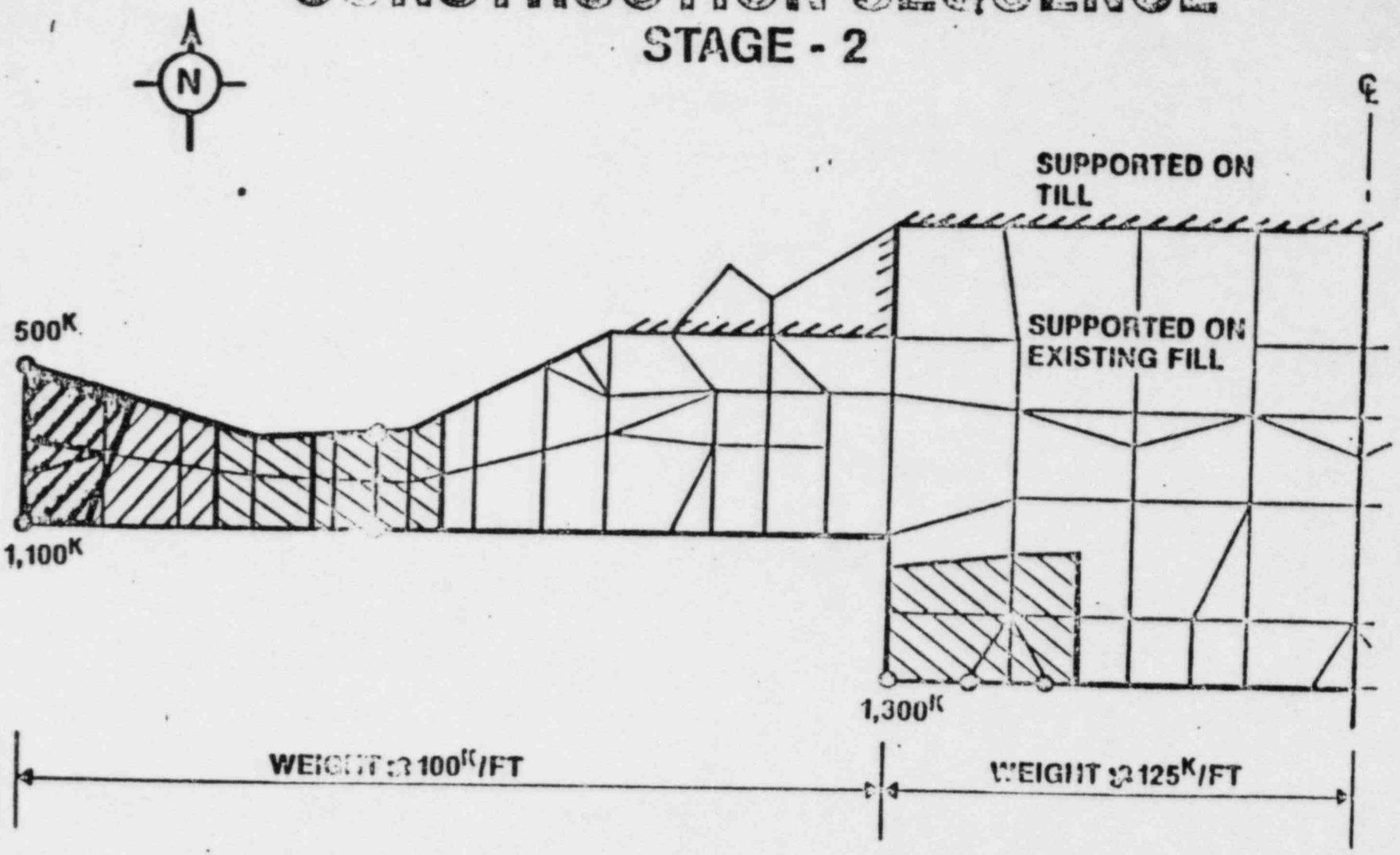
MIDLAND UNITS 1 AND 2
AUXILIARY BUILDING UNDERPINNING 1/28/82

G-1802-22

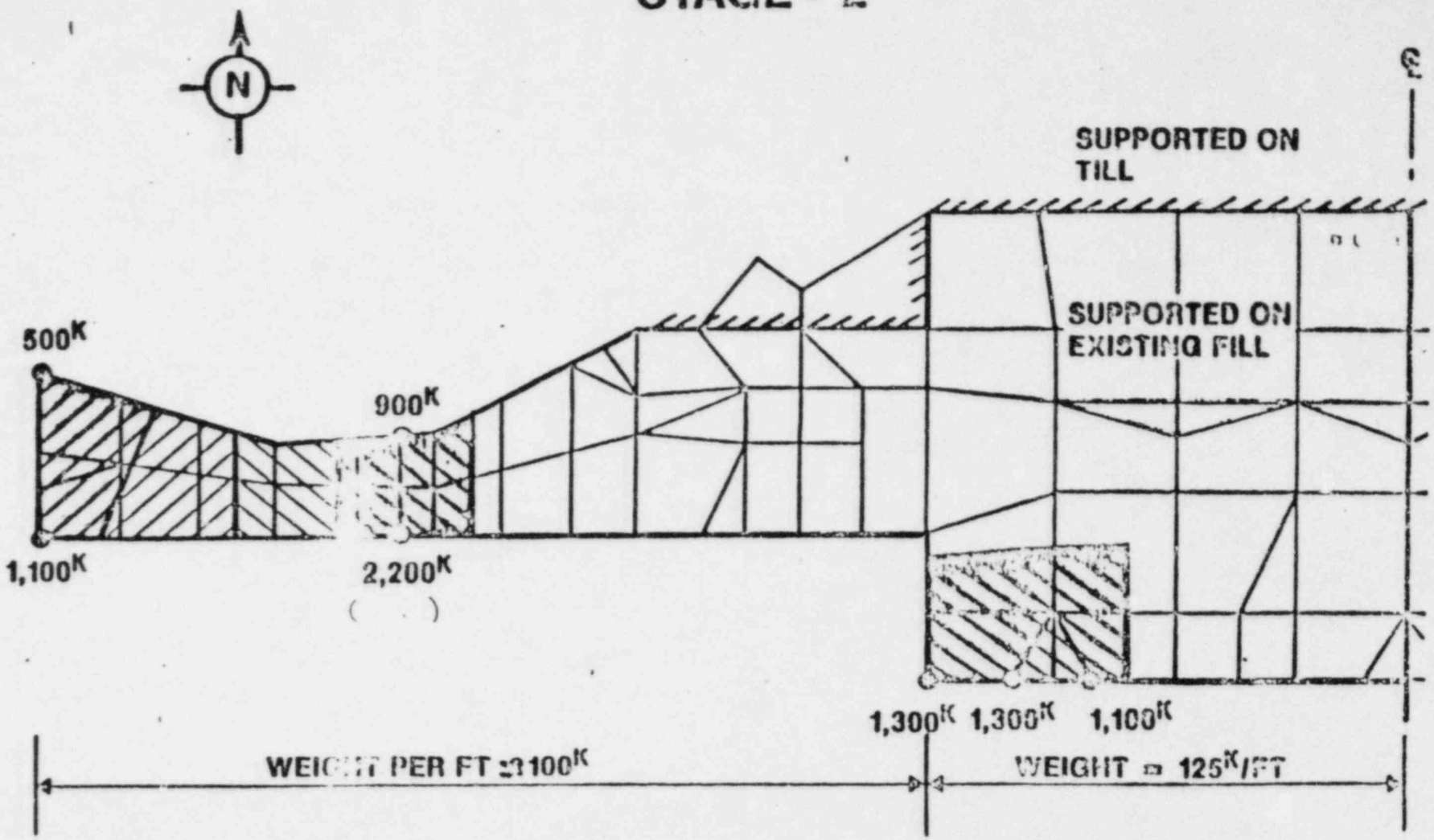
AUXILIARY BUILDING UNDERPINNING CONSTRUCTION CONDITION ANALYSIS MAXIMUM STRESS (Tension) CONSTRUCTION STAGE 1

	Existing Stress	Change in Stress	Total Stress
• DUE TO SOIL REMOVAL	30 K/FT	7 K/FT	37 K/FT
• DUE TO SOIL REMOVAL AND JACKING	30 K/FT	-2 K/FT	28 K/FT

AUXILIARY BUILDING UNDERPINNING
CONSTRUCTION SEQUENCE
STAGE - 2



AUXILIARY BUILDING UNDERPINNING
CONSTRUCTION SEQUENCE
STAGE - 2

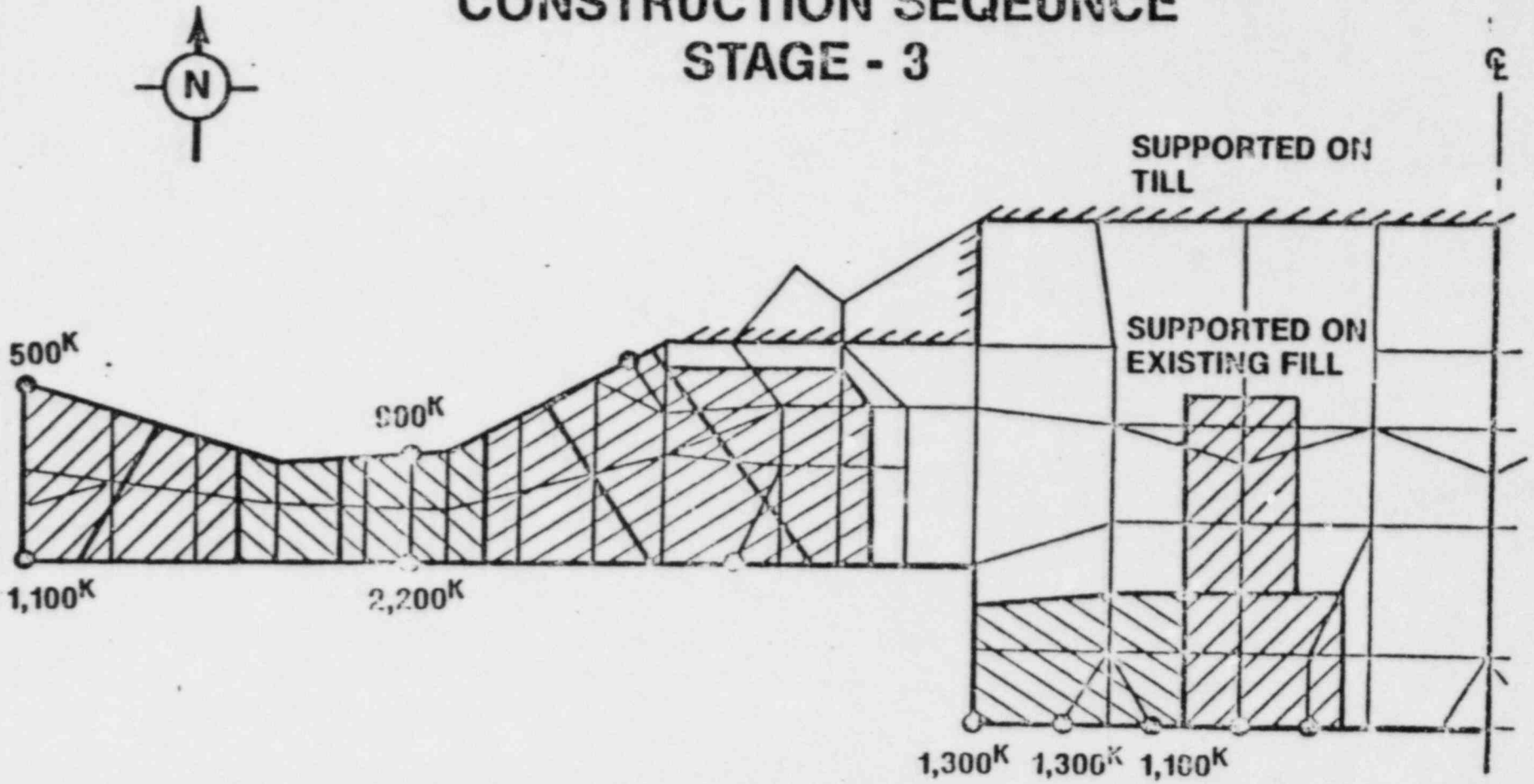


MIDLAND UNITS 1 AND 2

AUXILIARY BUILDING UNDERPINNING
CONSTRUCTION CONDITION ANALYSIS
MAXIMUM STRESS (Tension)
CONSTRUCTION STAGE 2

	Existing Stress	Change in Stress	Total Stress
o DUE TO SOIL REMOVAL	30 K/FT	1 K/FT	31 K/FT
o DUE TO SOIL REMOVAL AND JACKING	30 K/FT	-65 K/FT	-35 K/FT

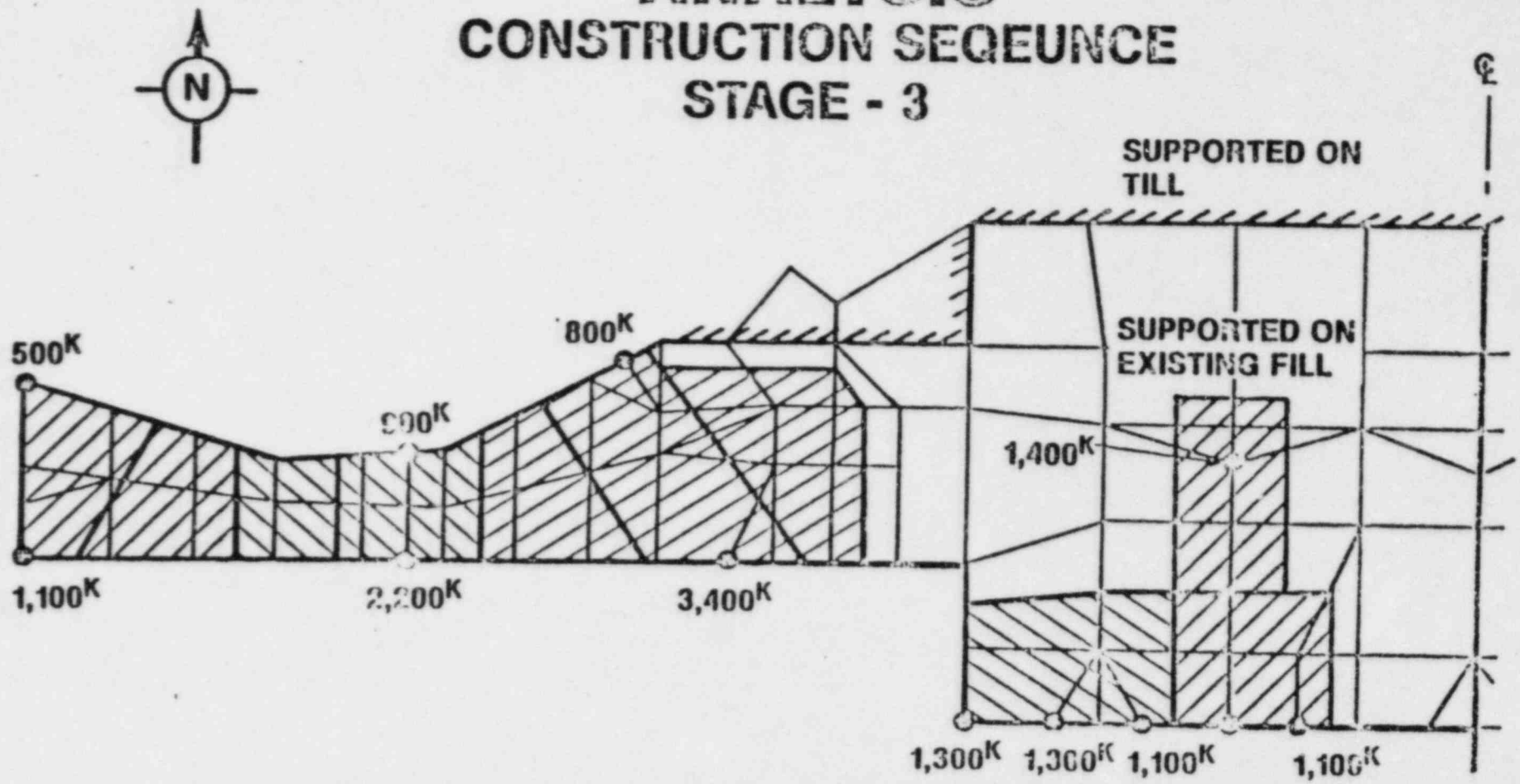
AUXILIARY BUILDING UNDERPINNING
CONSTRUCTION CONDITION ANALYSIS
CONSTRUCTION SEQEUNCE
STAGE - 3



MIDLAND UNITS 1 AND 2
AUXILIARY BUILDING UNDERPINNING

G-1862-18

AUXILIARY BUILDING UNDERPINNING
CONSTRUCTION CONDITION
ANALYSIS
CONSTRUCTION SEQEUNCE
STAGE - 3



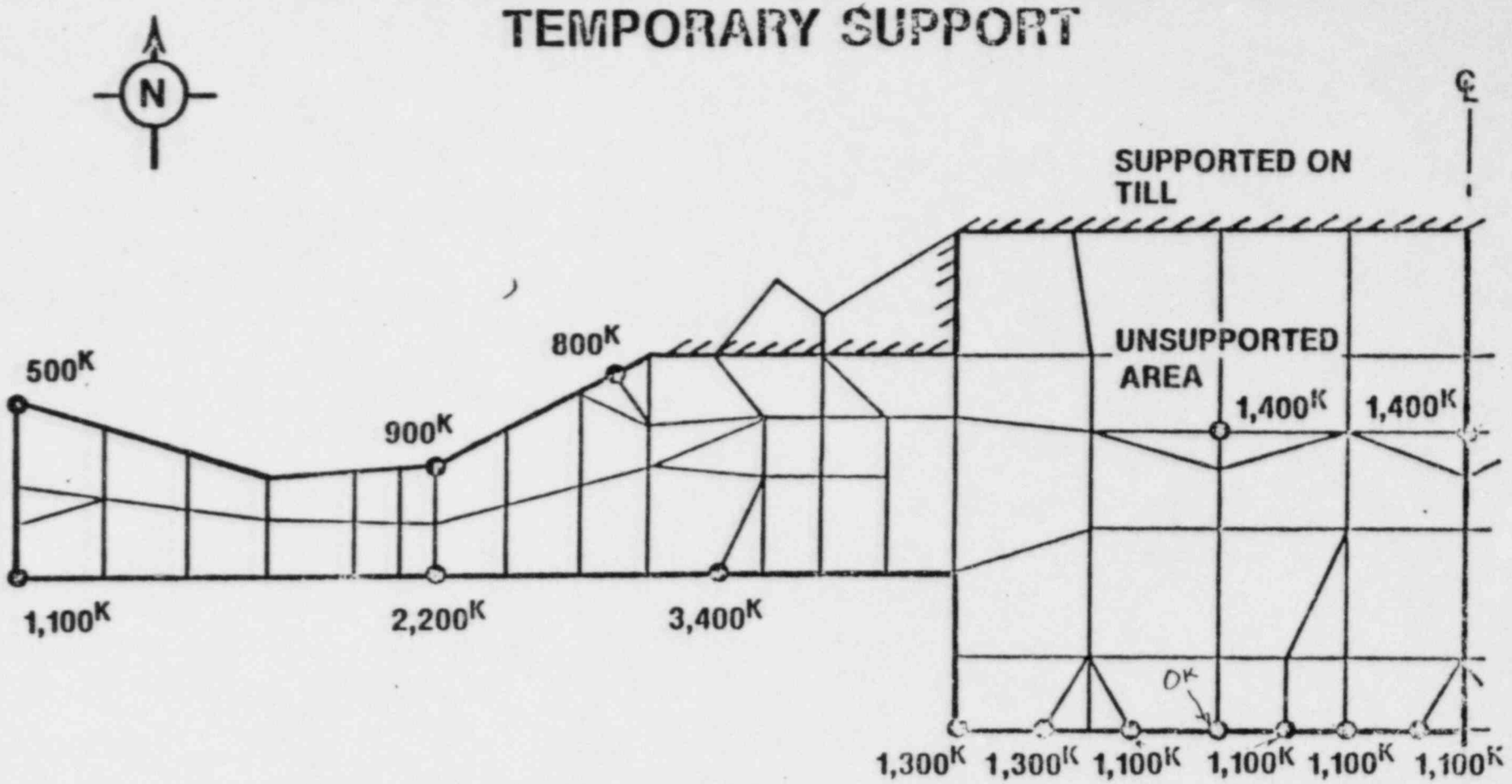
MIDLAND UNITS 1 AND 2
AUXILIARY BUILDING UNDERPINNING

G-1832-18

AUXILIARY BUILDING UNDERPINNING
CONSTRUCTION CONDITION ANALYSIS
MAXIMUM STRESS (Tension)
CONSTRUCTION STAGE 3

	Existing Stress	Change in Stress	Total Stress
• DUE TO SOIL REMOVAL	30 K/FT	-20 K/FT	10 K/FT
• DUE TO SOIL REMOVAL AND JACKING	30 K/FT	-95 K/FT	-65 K/FT

AUXILIARY BUILDING UNDERPINNING
CONSTRUCTION SEQUENCE
TEMPORARY SUPPORT



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

8-1602-17

AUXILIARY BUILDING UNDERPINNING
CONSTRUCTION CONDITION ANALYSIS
FINAL CONSTRUCTION STAGE

EXISTING STRESS = 30 K/FT

CHANGE IN STRESS = -65 K/FT

TOTAL STRESS = -35 K/FT

AUXILIARY BUILDING UNDERPINNING CONSTRUCTION CONDITION ANALYSIS MAXIMUM LOADS IN HIGHLY STRESSED AREAS

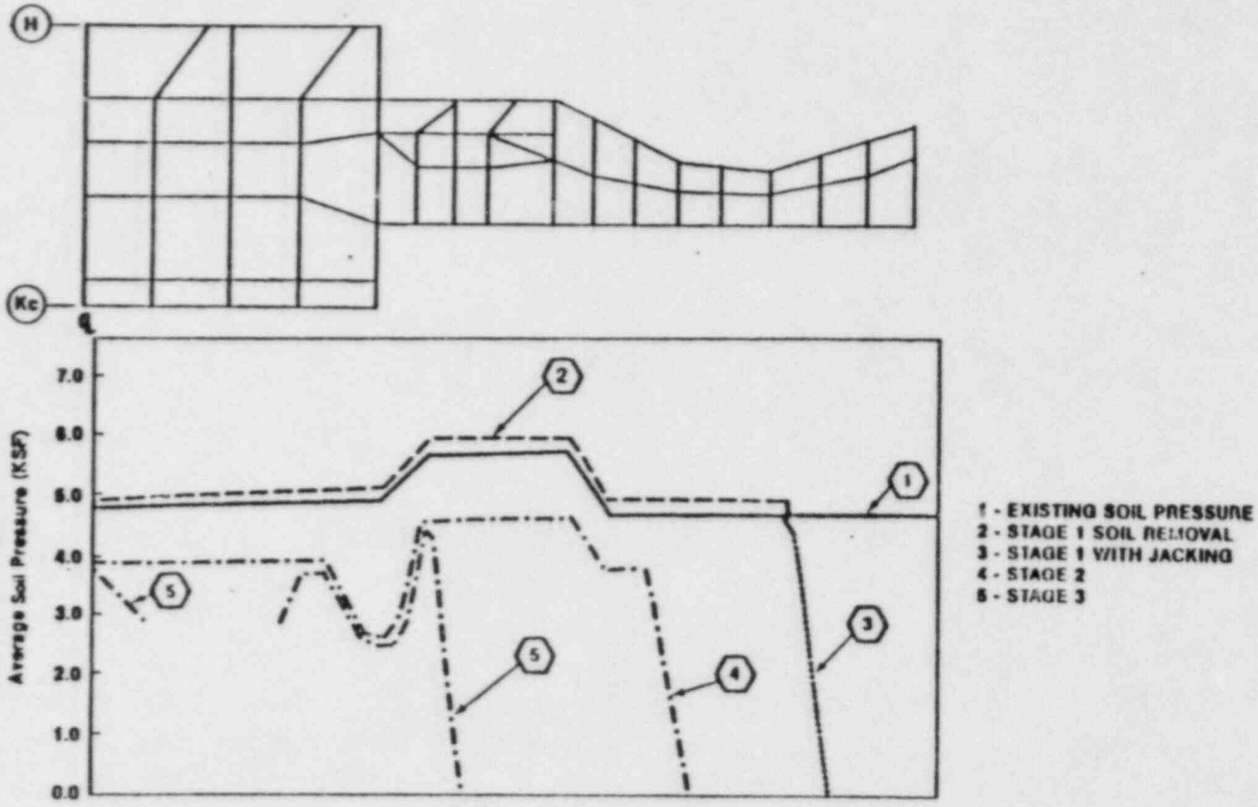
MAXIMUM TENSION

Location	Capacity	Existing Load	Stage 1 Constr	Stage2 Constr	Stage 3 Constr	Final Constr
Slab At El 659' (local area)	321K	258K	318K	260K	86K	Comp-pression
Wall Below El 659' Between G and H	830K	333K	411K	351K	147K	Comp-pression

MAXIMUM SHEAR

Location	Capacity	Existing Load	Stage 1 Constr	Stage2 Constr	Stage 3 Constr	Final Constr
Wall Below El 659' Between G and H	290K	38K	76K	63K	98K	132K

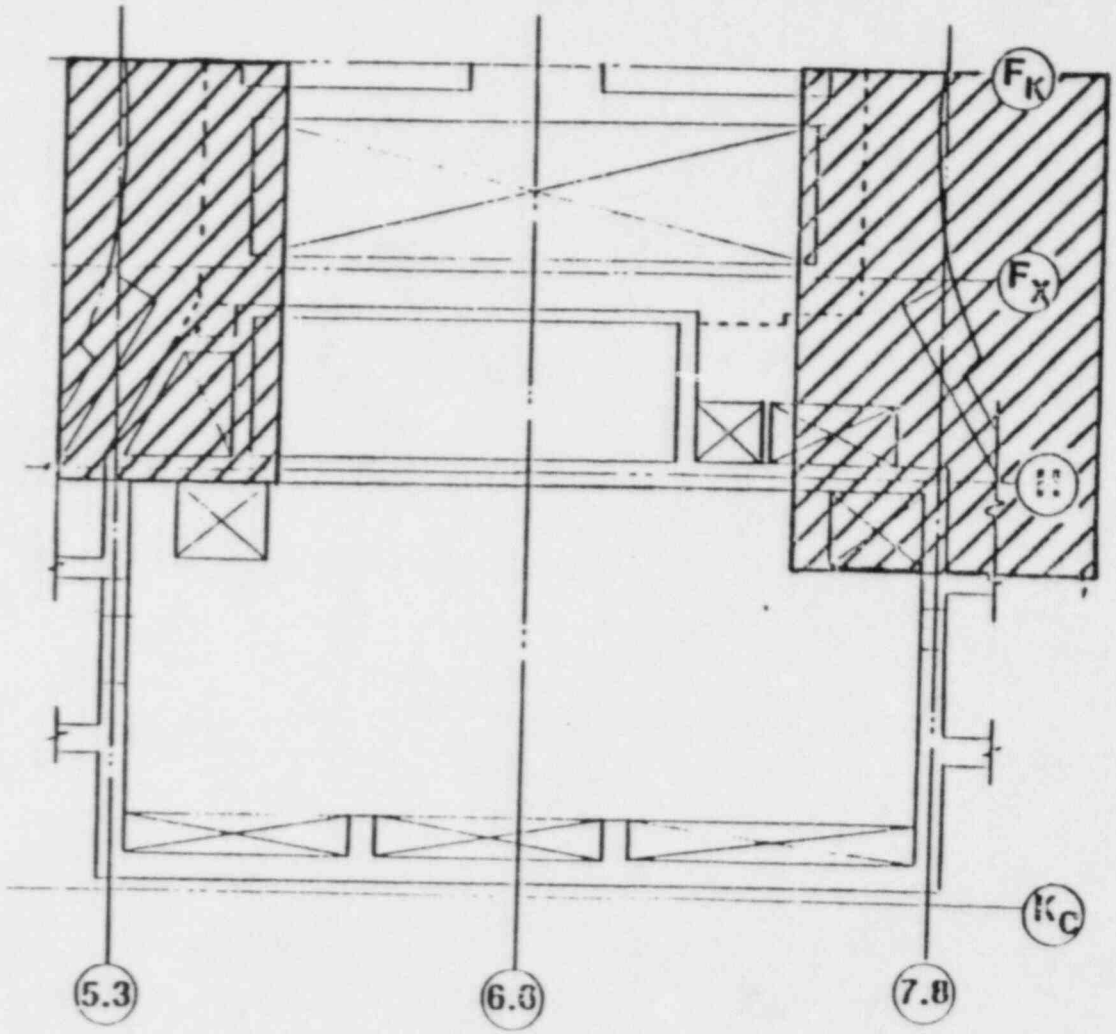
AUXILIARY BUILDING UNDERPINNING
CONSTRUCTION CONDITION ANALYSIS
SOIL PRESSURES (KSF)



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

G-1979-47

AUXILIARY BUILDING UNDERPINNING
CONSTRUCTION CONDITION ANALYSIS
AREAS FOR CRACK MONITORING

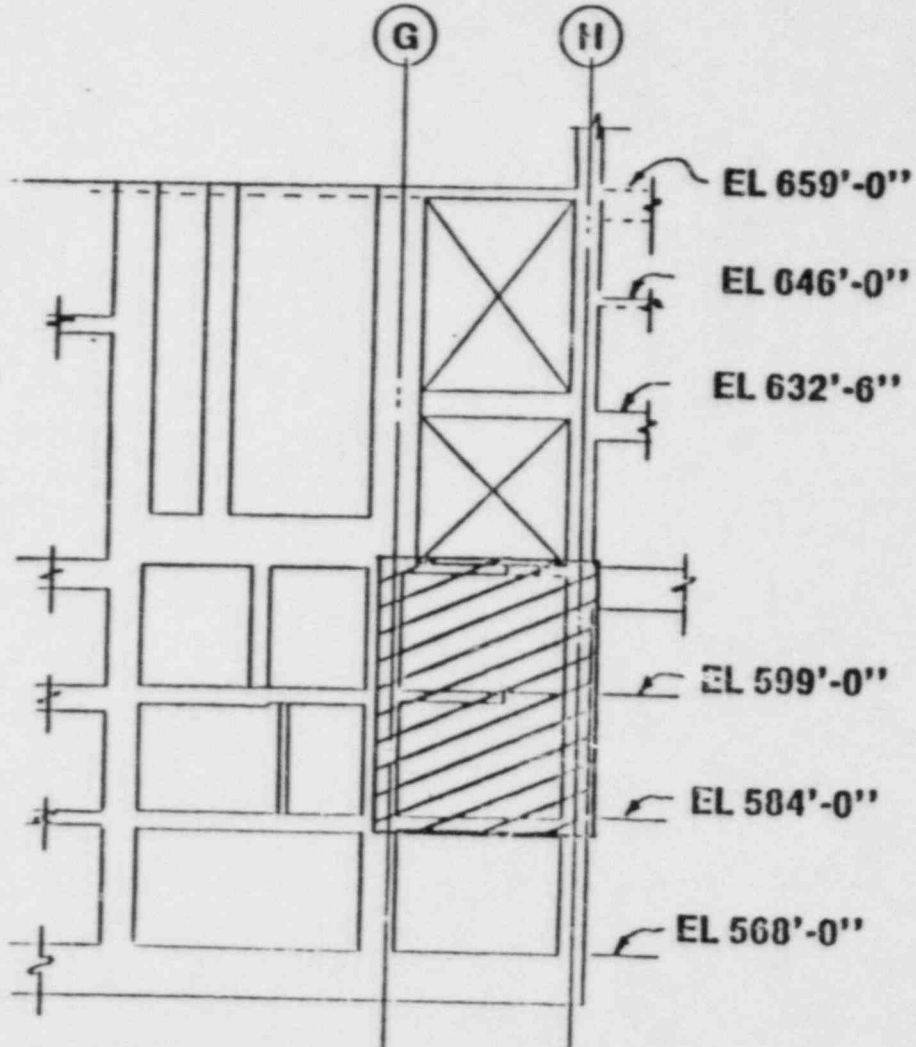


PLAN AT EL (+) 9'-0"

MIDLAND UNITS 1 AND 2
AUXILIARY BUILDING UNDERPINNING

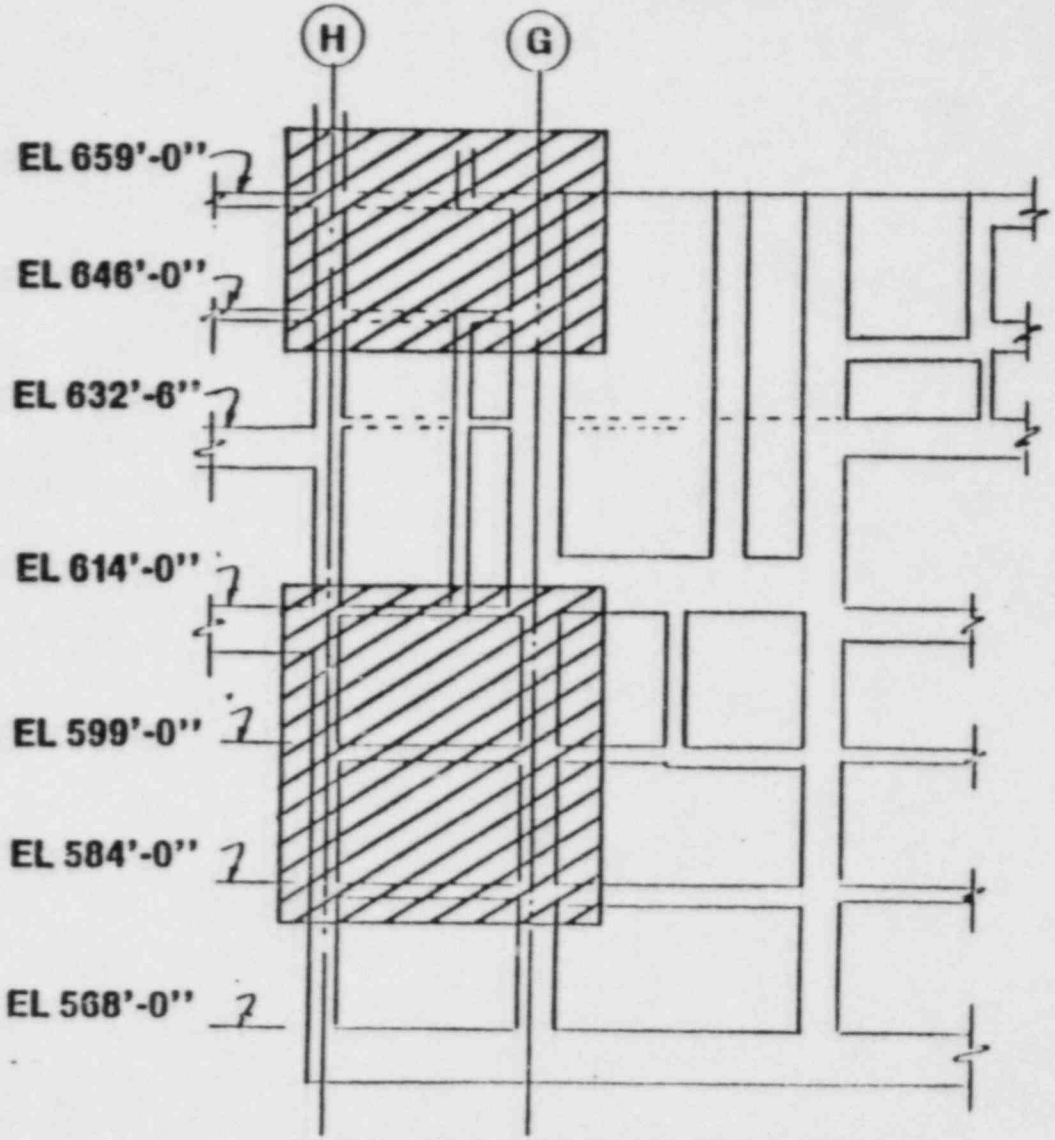
G-1929-35

AUXILIARY BUILDING UNDERPINNING
CONSTRUCTION CONDITION ANALYSIS
AREAS FOR CRACK MONITORING



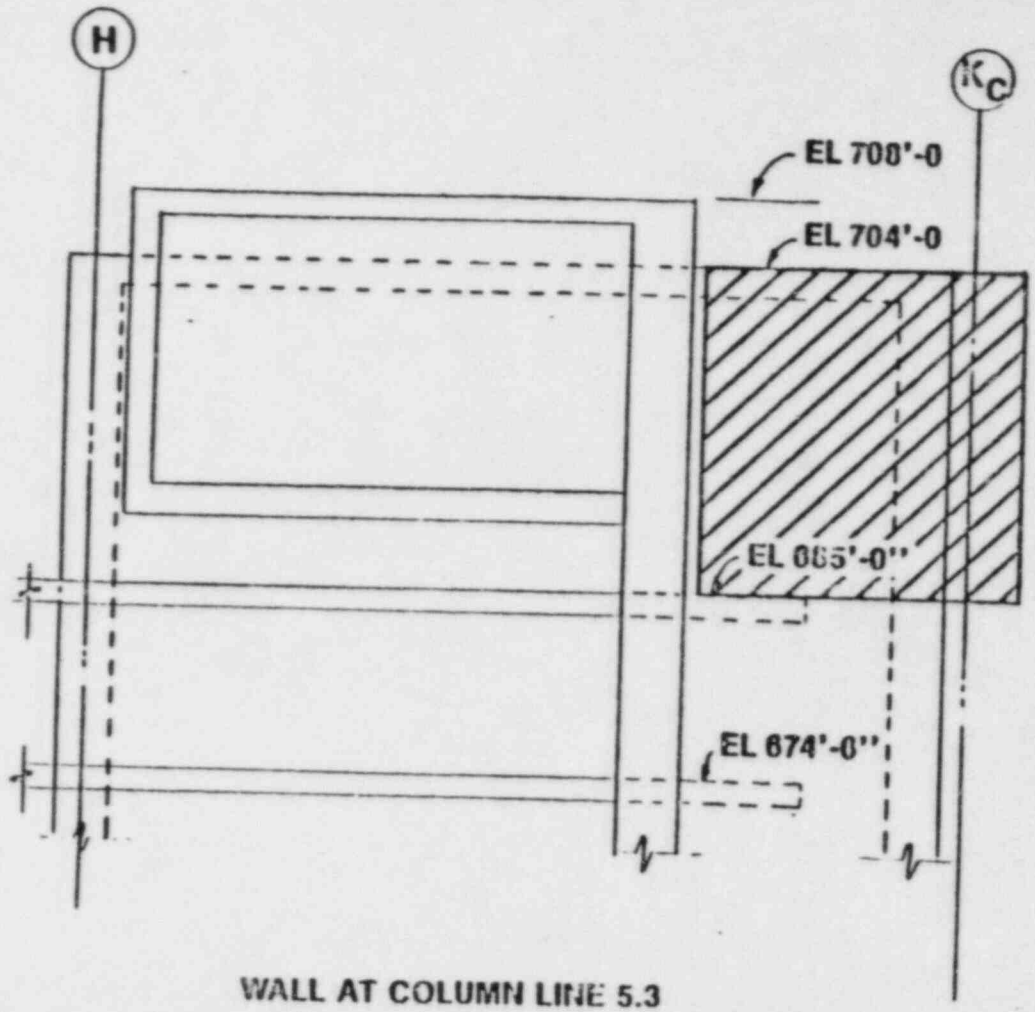
WALL AT COLUMN LINE 7.4 AND 7.8

AUXILIARY BUILDING UNDERPINNING
CONSTRUCTION CONDITION ANALYSIS
AREAS FOR CRACK MONITORING



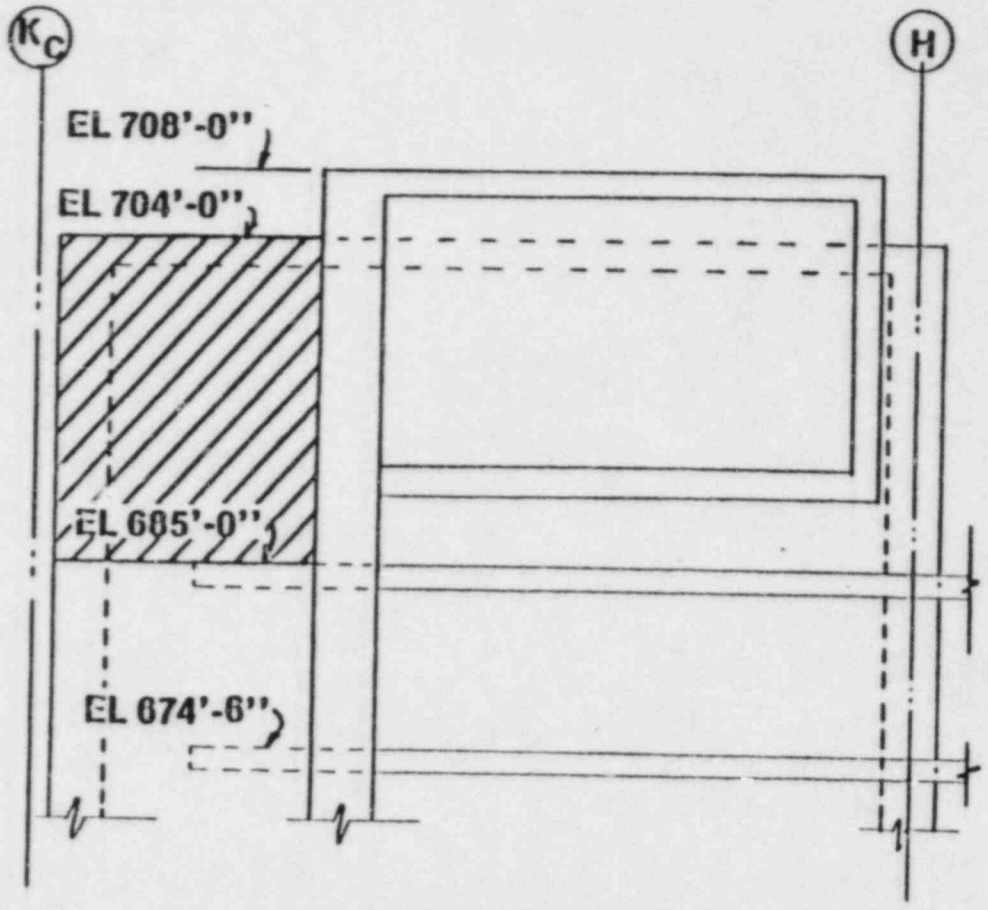
WALL AT COLUMN LINE 5.3 AND 5.6

AUXILIARY BUILDING UNDERPINNING
CONSTRUCTION CONDITION
ANALYSIS
AREAS FOR CRACK MONITORING



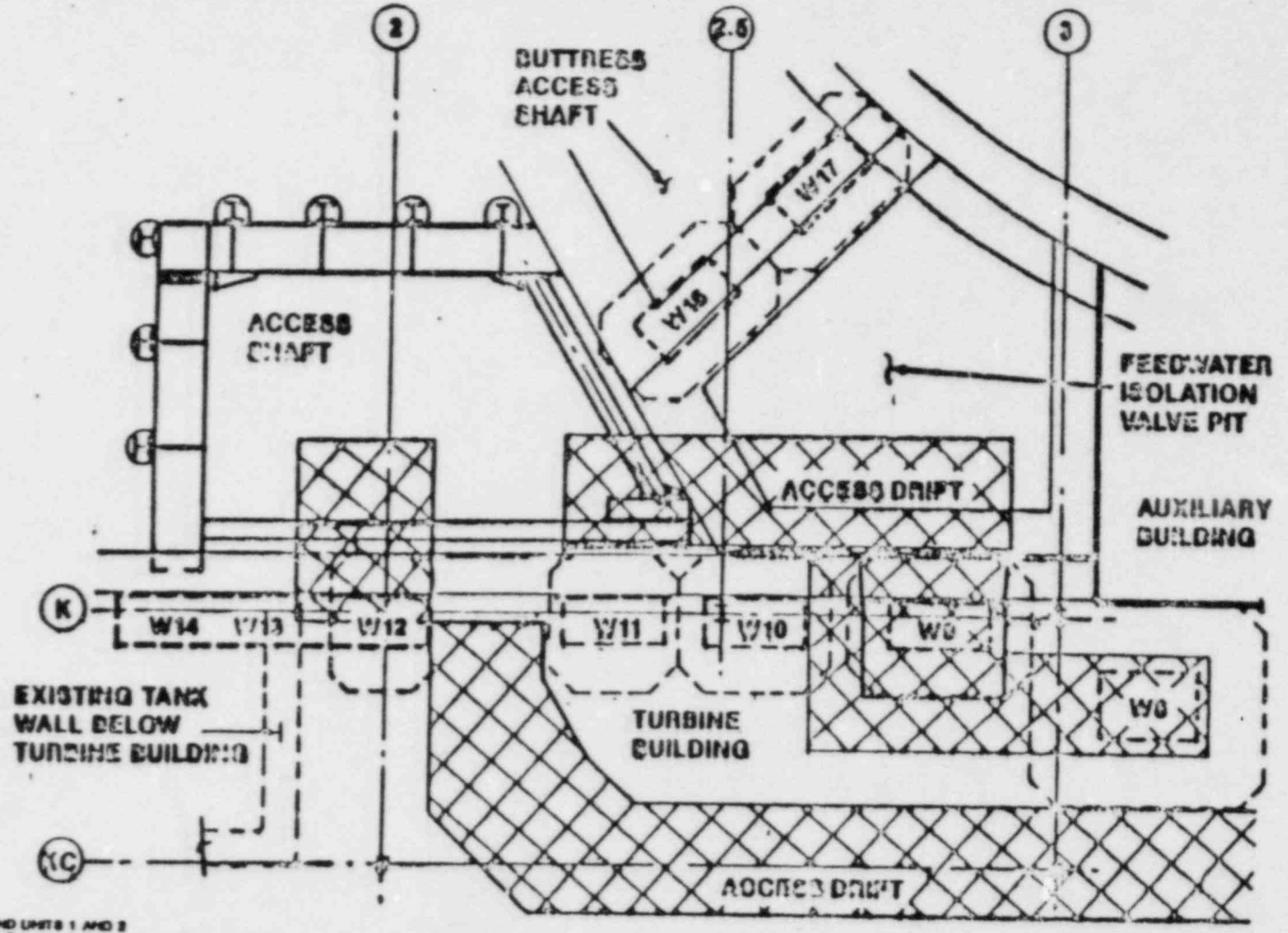
WALL AT COLUMN LINE 5.3

AUXILIARY BUILDING UNDERPINNING
CONSTRUCTION CONDITION ANALYSIS
AREAS FOR CRACK MONITORING



WALL AT COLUMN LINE 7.8

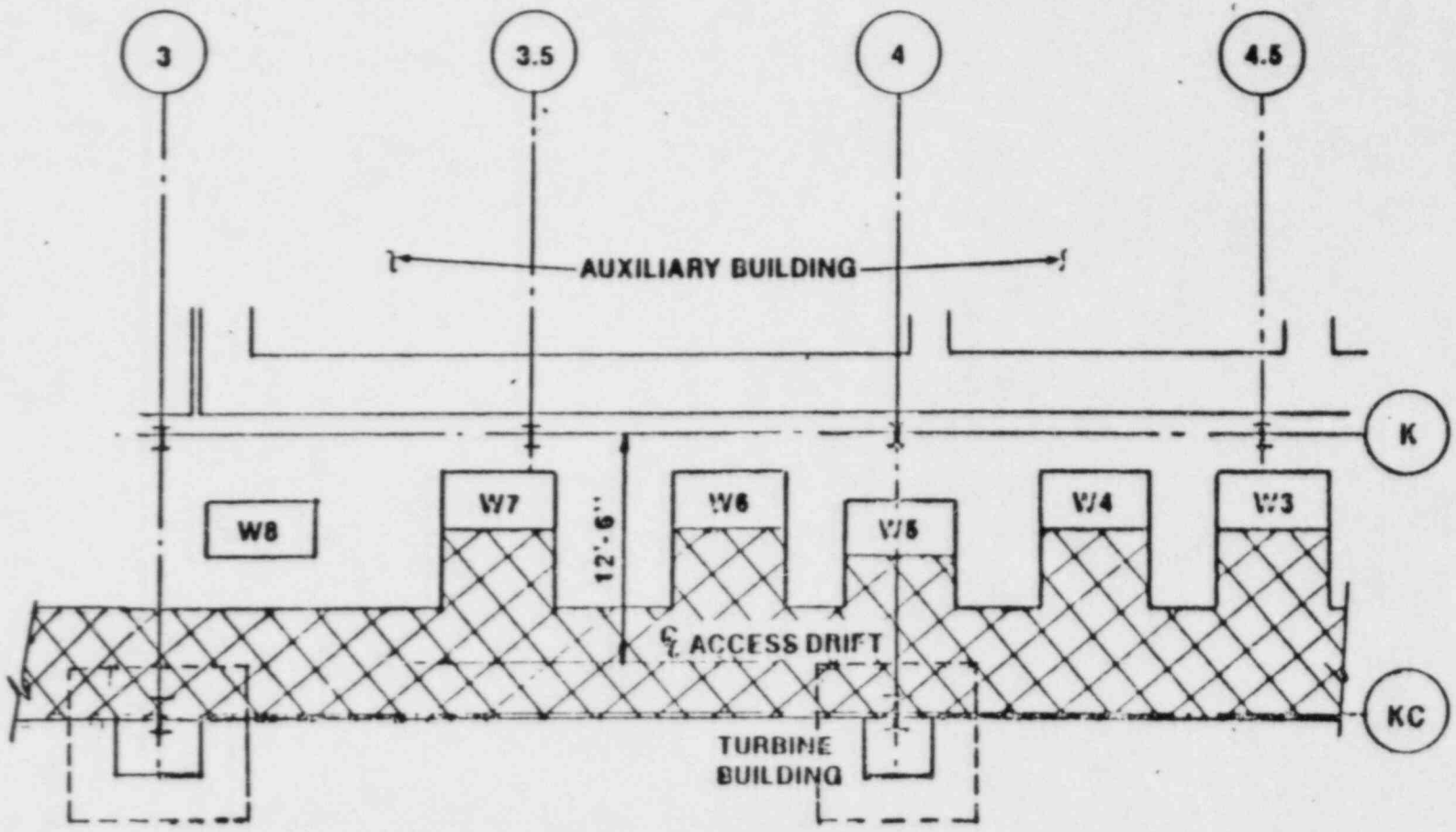
PLAN - ACCESS SHAFT AND ACCESS DRIFT



MIDLAND UNITS 1 AND 2
AUXILIARY BUILDING ACCESS

1639-C8

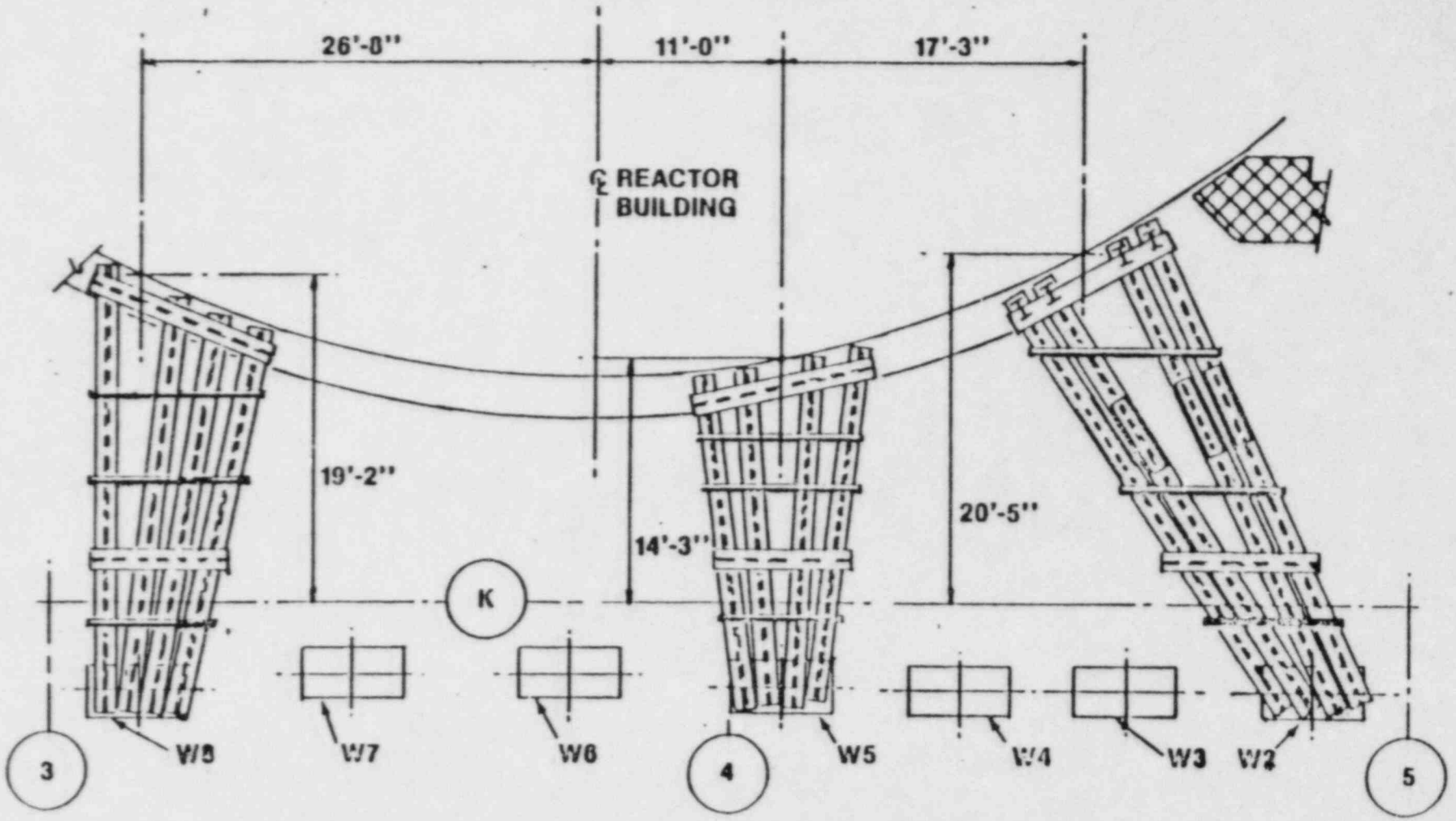
PARTIAL PLAN OF ACCESS DRIFT



MEIL AND UNITS 1 AND 2
AUXILIARY BUILDING UNDERPINNING 1 12 82

G 1929 12

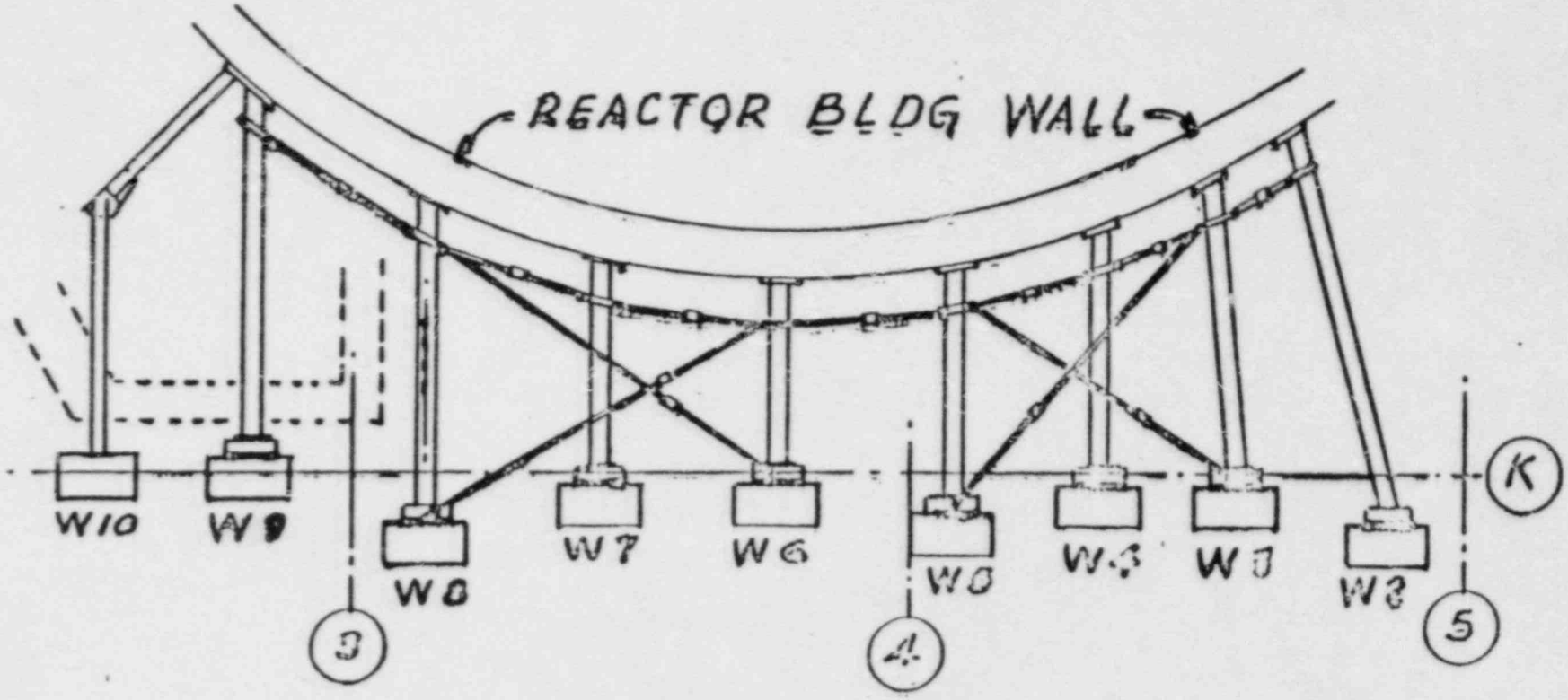
PLAN - UNDERPINNING
GRILLAGE



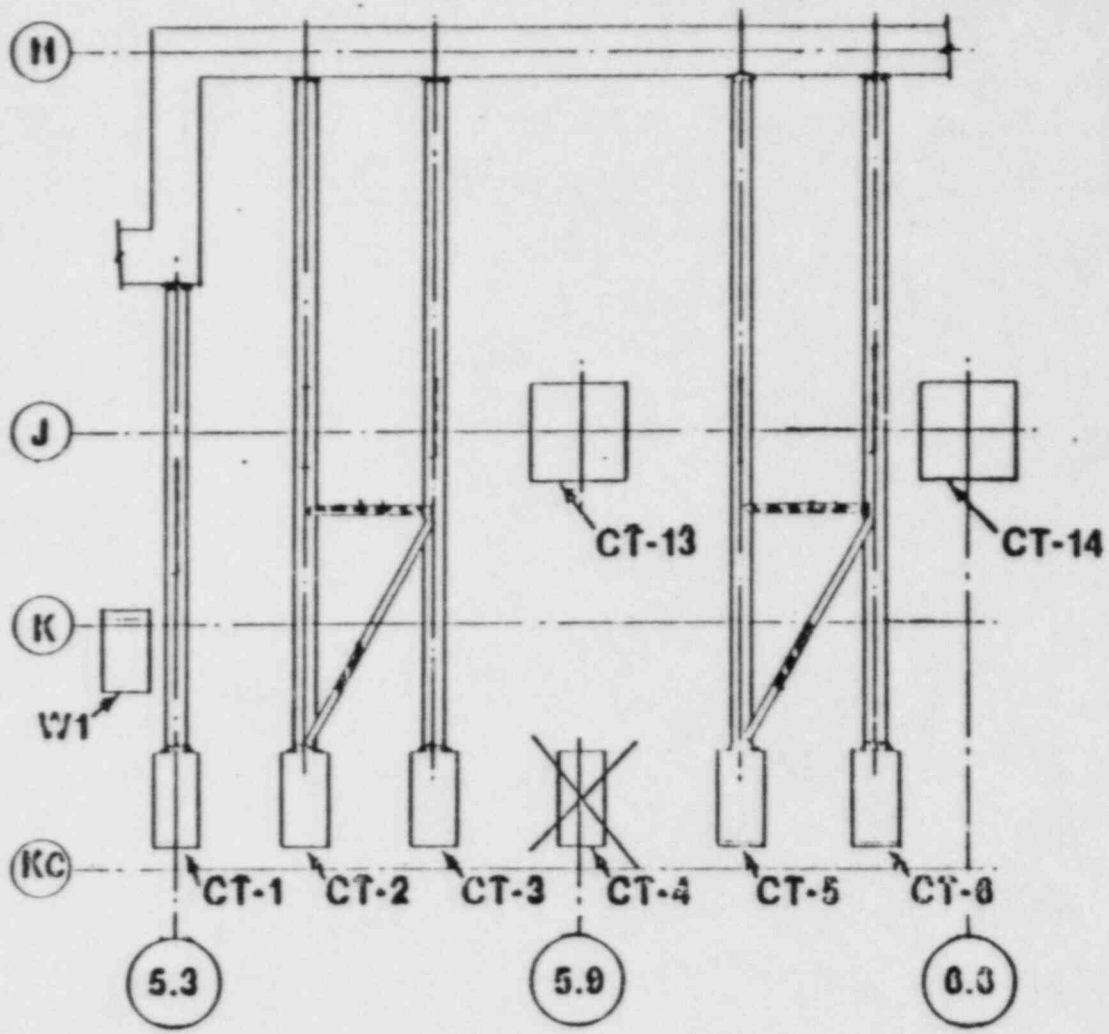
MIDLAND UNITS 1 AND 2
AUXILIARY B[illegible] UNDERPINNING [illegible]/82

G 1020 17

PLAN- STRUT BRACING



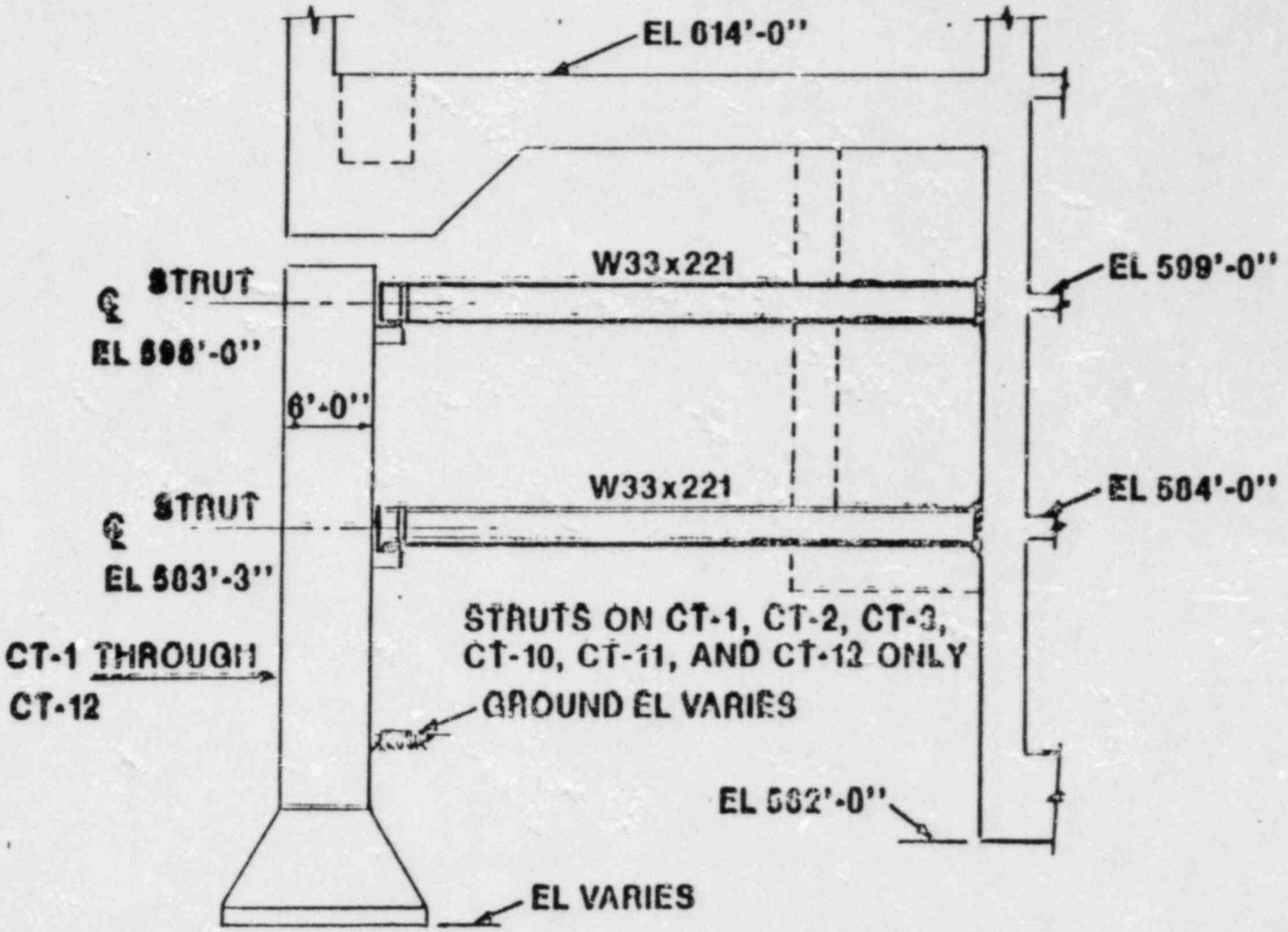
PLAN - CONTROL TOWER
PIERS AND STRUTS
(CT-4 & CT-9 DELETED)



MIDLAND UNITS 1 AND 2
AUXILIARY BUILDING UNDERPINNING 1/27/82

G-1929 21

SECTION - CONTROL TOWER
PIERS AND STRUTS



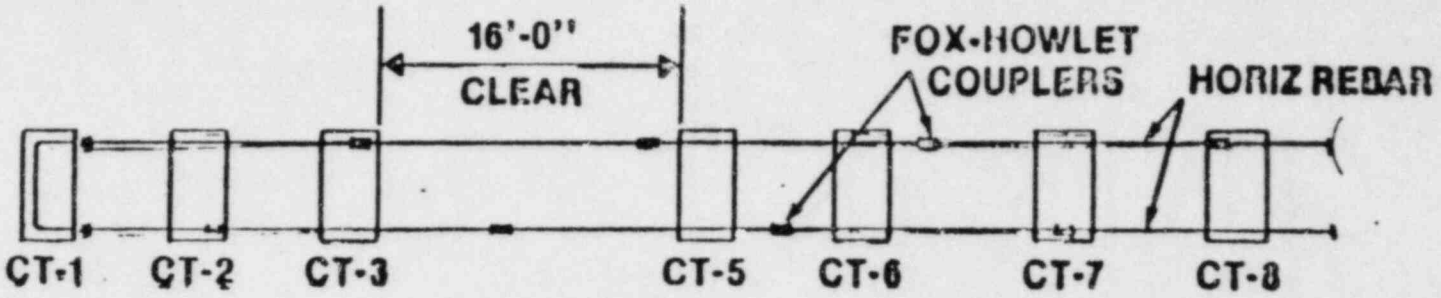
SECTION R-R

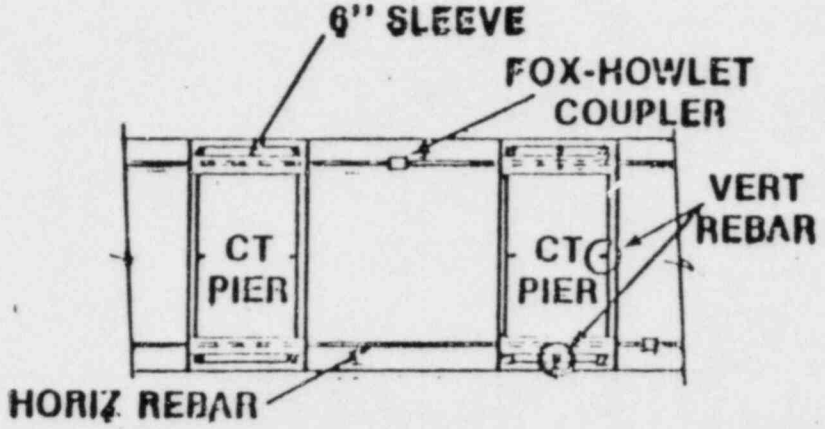
MIDLAND UNITS 1 AND 2
AUXILIARY BUILDING UNDERPINNING 1/27/82

G-1929 20

6

PLAN - CONTROL TOWER
METHOD TO INSTALL
HORIZONTAL REINFORCEMENT

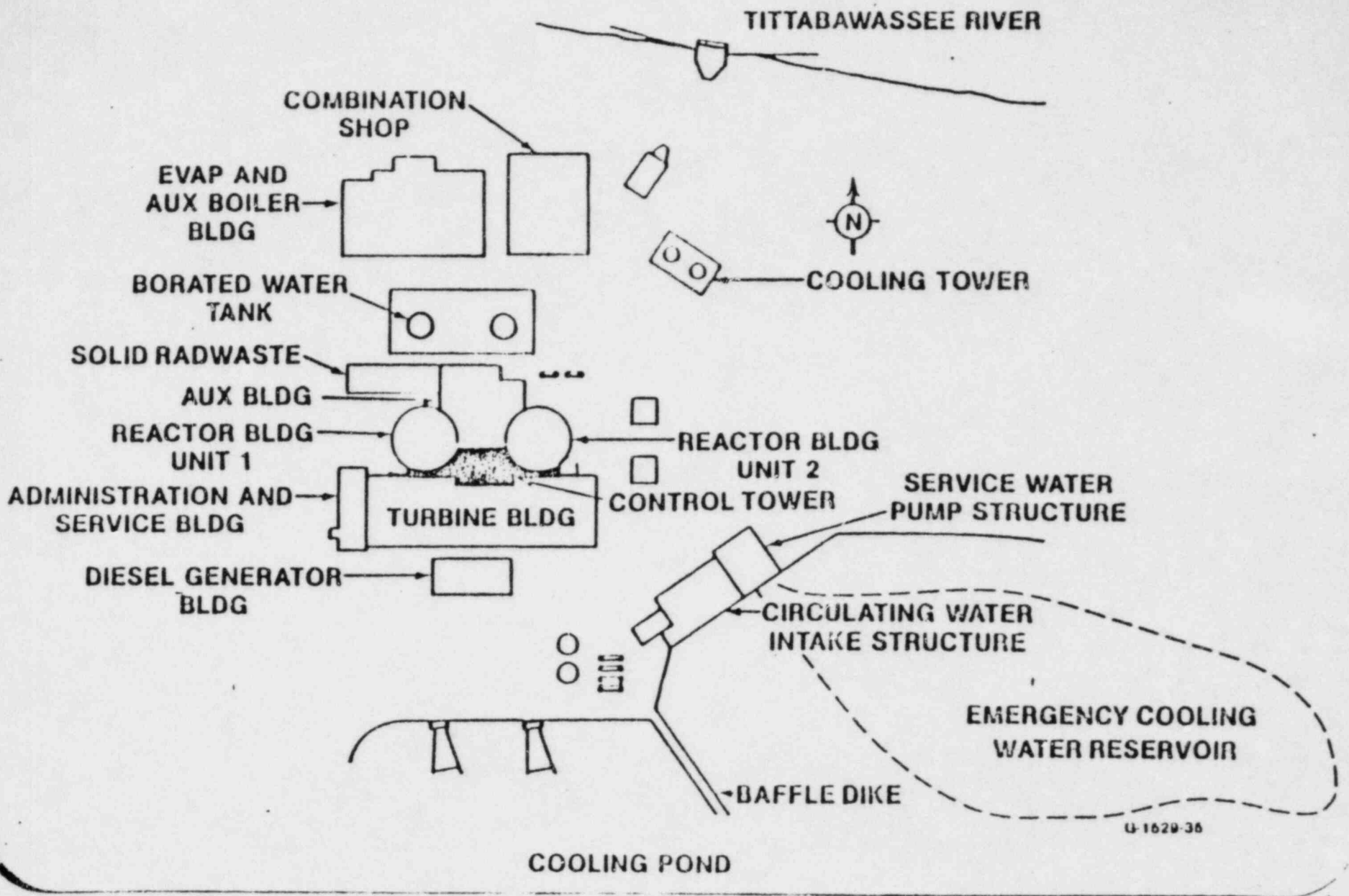




ENLARGED PLAN VIEW

NOTE:
REINFORCING BARS
INSTALLED IN 15'-0" LENGTHS
WITH FOX-HOWLETT COUPLERS
AT STAGGERED LOCATIONS

...DLAND SITE PLAN



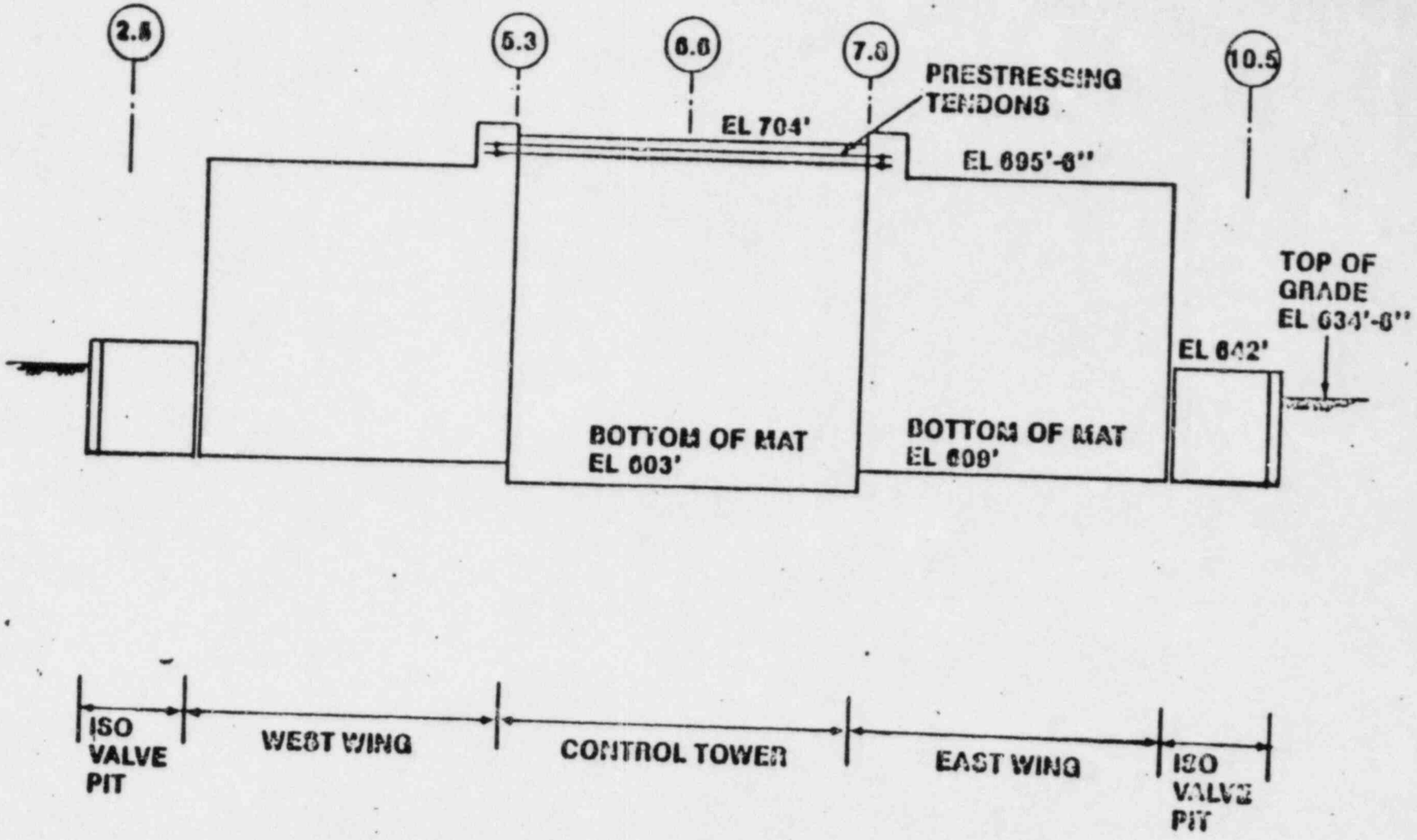
COOLING POND

AUXILIARY BUILDING PRESTRESSING TENDON

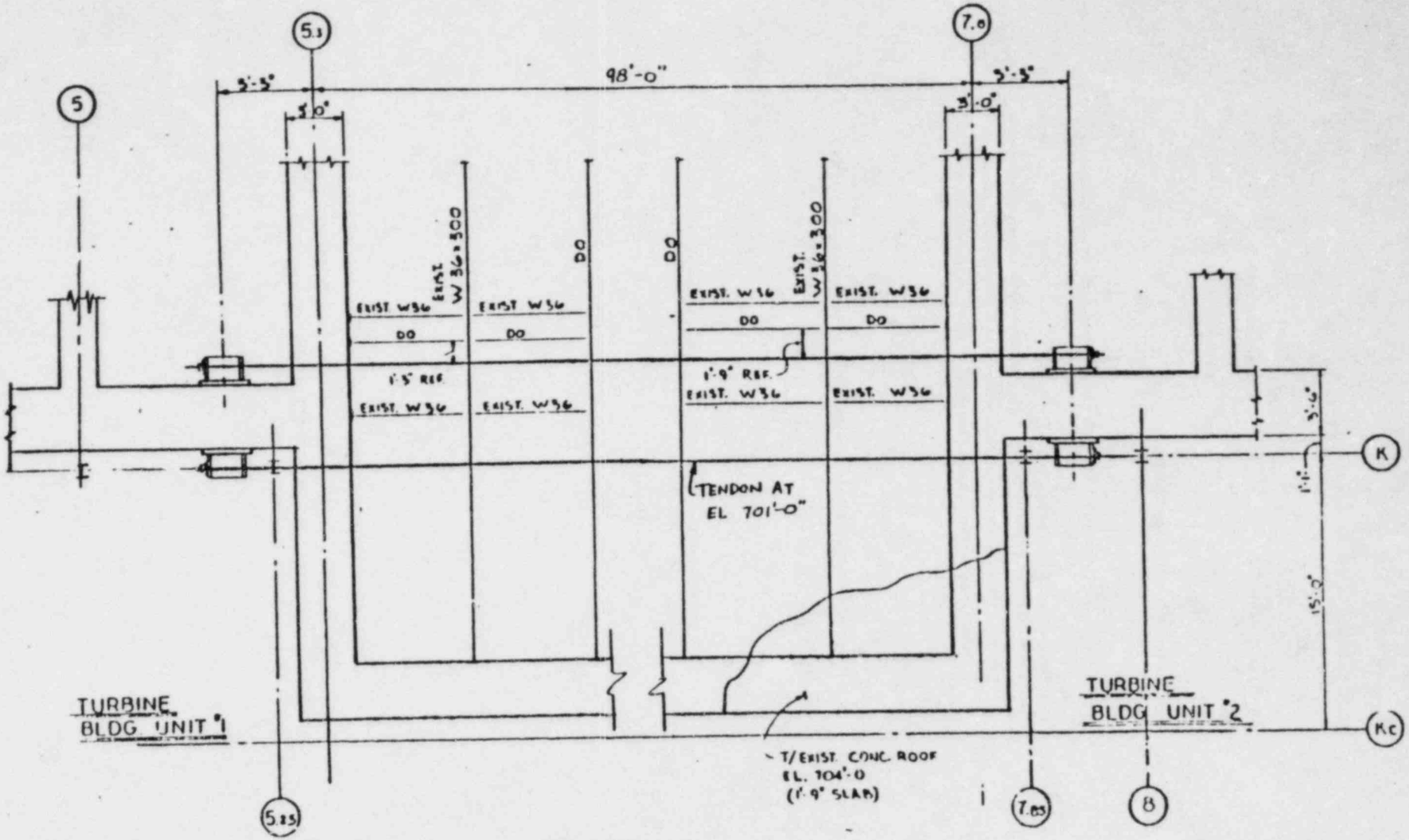
FUNCTION

- TO PROVIDE RESERVE CAPACITY FOR EPA AND CONTROL TOWER CONNECTION AT EL. 704

AUXILIARY BUILDING UNDERPINNING
ELEVATION VIEW AT K_c LINE



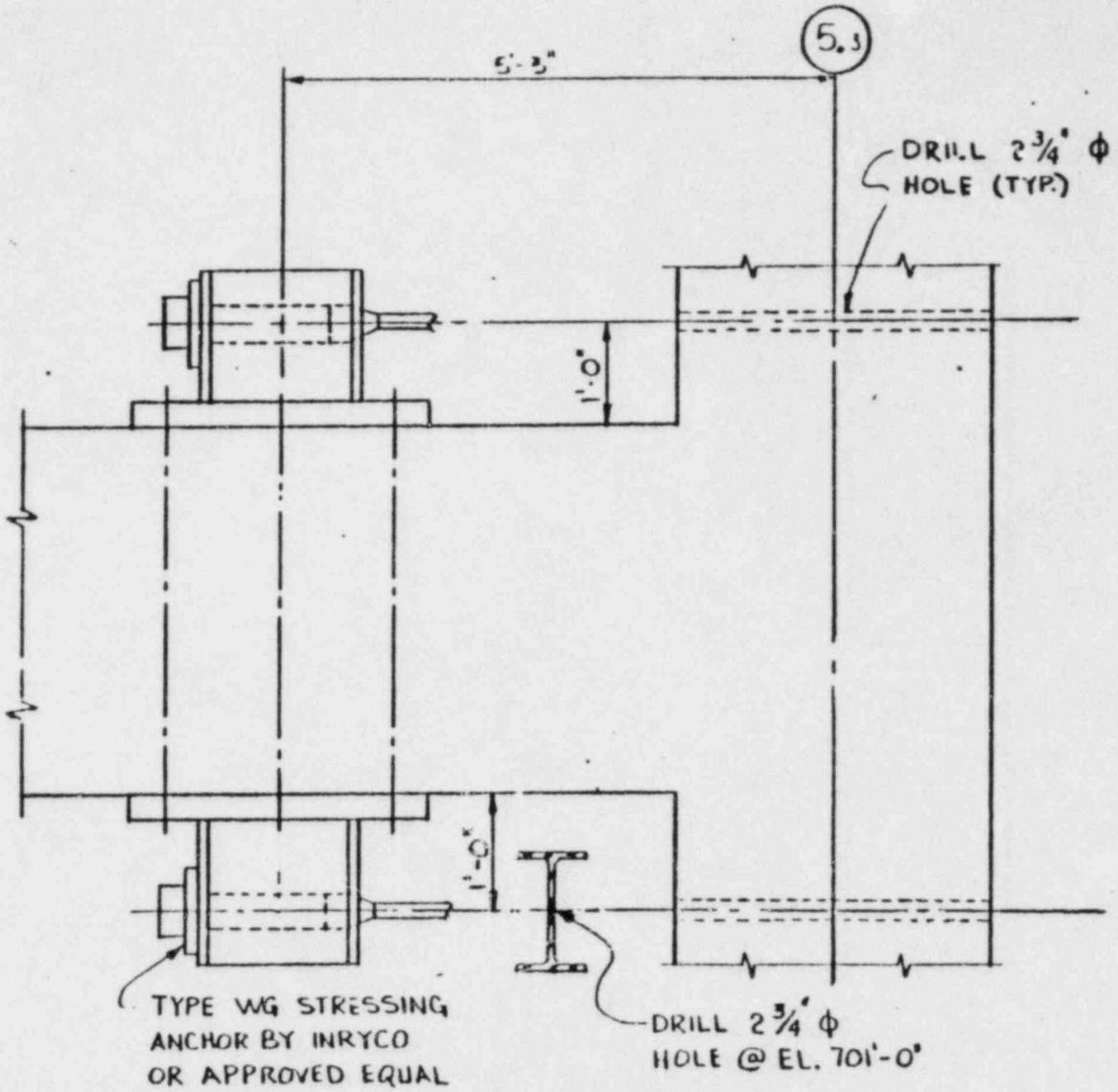
AUXILIARY BUILDING PRESTRESSING TENDON



LOCATION PLAN

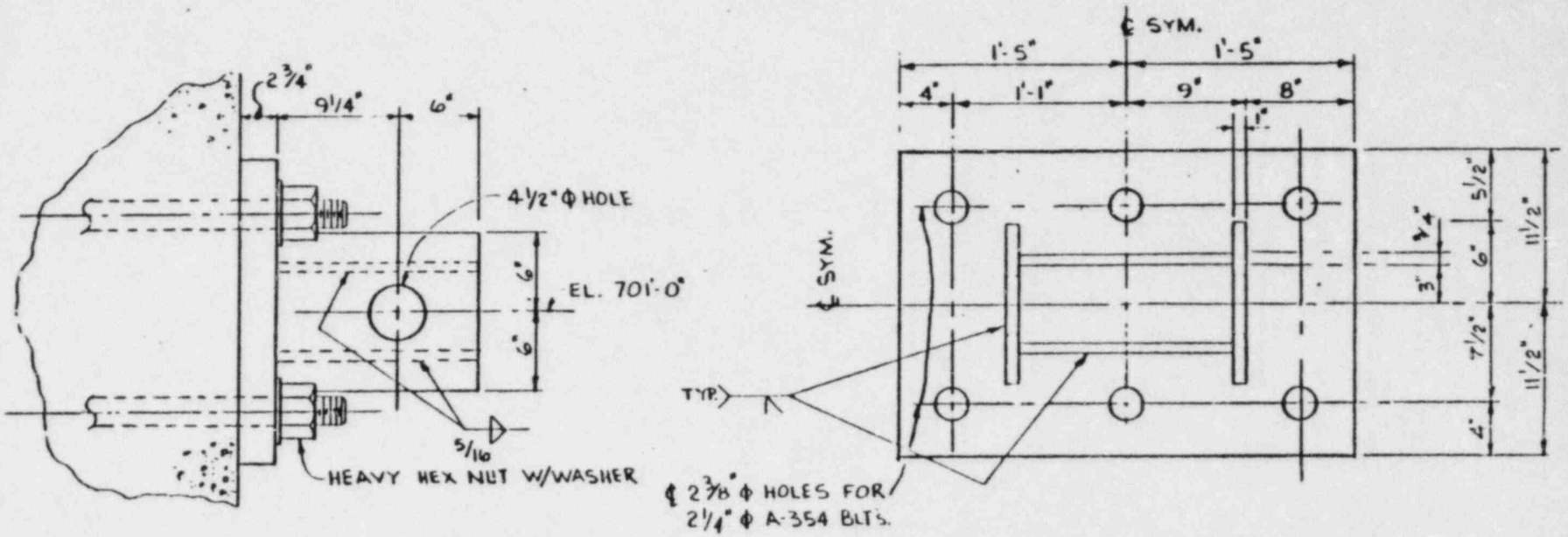
4

AUXILIARY BUILDING PRESTRESSING TENDON



CONNECTION DETAIL

AUXILIARY BUILDING PRESTRESSING TENDON



SUPPORT BRACKET DETAIL

AUXILIARY BUILDING PRESTRESSING TENDON

MATERIAL

- CONA MULTISTRAND SYSTEM MANUFACTURED BY INRYCO
- 2 TENDONS OF 10-½" DIAMETER STRANDS EACH
- ULTIMATE STRENGTH OF 270 Ksi

AUXILIARY BUILDING PRESTRESSING TENDON

DESIGN CONDITION

- BASED ON PRELIMINARY ANALYSIS OF EPA ONLY
- EPA TREATED AS A CANTILEVER WITH LIMITED SOIL SUPPORT OF 3 Ksf
  (CURRENT ANALYSIS INDICATED SOIL PRESSURE OF 5 Ksf UNDER EPA)
- TO PROVIDE TENSILE CAPACITY OF 616 Kips FOR CONTROL TOWER ROOF

AUXILIARY BUILDING PRESTRESSING TENDON

INSTALLATION PROCEDURE

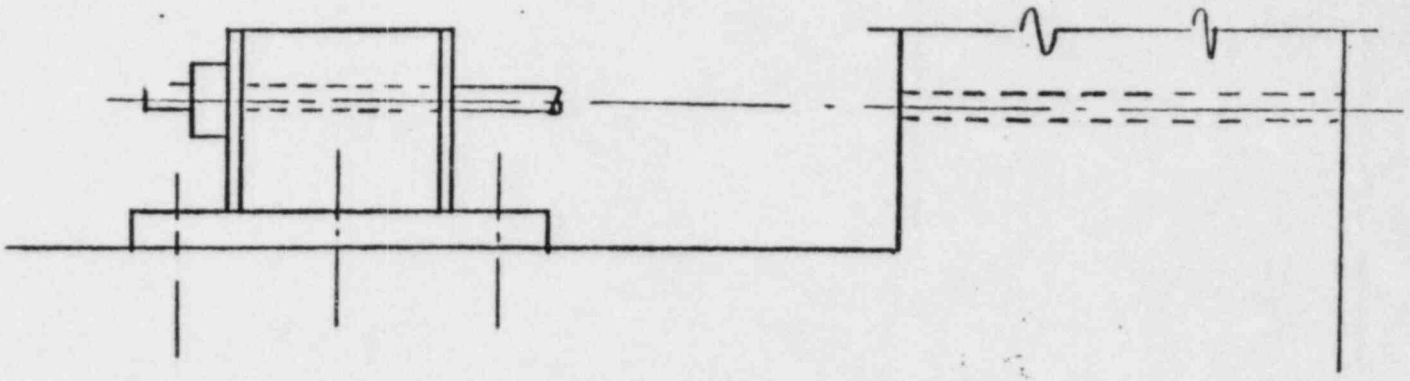
- SINGLE END STRESSING SIMULTANEOUSLY FOR BOTH TENDONS FROM UNIT 1 SIDE

- STRANDS STRESSED INDIVIDUALLY FOR EACH TENDON

- LOCKED OFF EACH STRAND AT 189 Ksi

- RECHECK AND ADJUST LOCKED OFF STRESS AFTER ALL STRANDS ARE TENSIONED

AUXILIARY BUILDING PRESTRESSING TENDON



EXISTING BRACKET CONDITION

AUXILIARY BUILDING PRESTRESSING TENDON

AS BUILT CONDITION

- BEARING PLATE UNDER ANCHOR HEAD OMITTED
- NO UNUSUAL DISTORSION OF BRACKET OBSERVED
- CAPACITY OF BRACKET IS 470 Kips BASED ON LIMIT ANALYSIS
- FACTOR OF SAFETY AGAINST BRACKET FAILURE IS 1.5

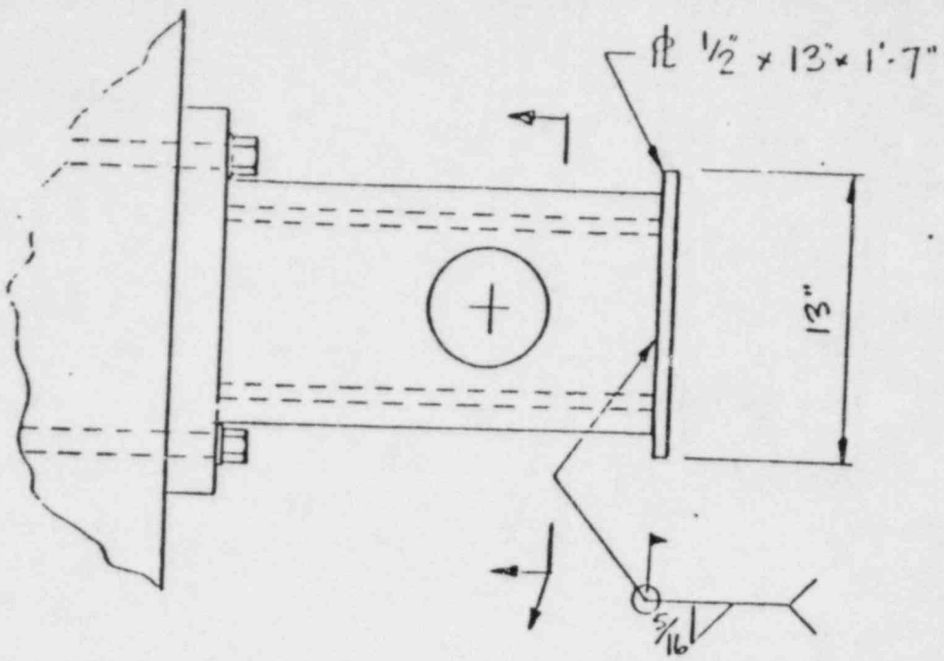
//

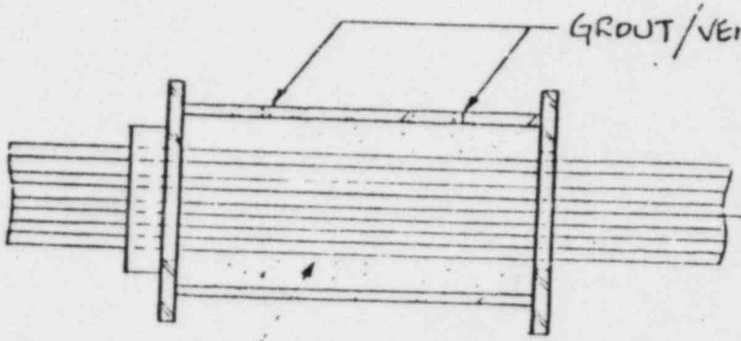
AUXILIARY BUILDING PRESTRESSING TENDON

FUTURE ACTIONS

- GROUT SPACE IN BRACKET BETWEEN WEB PLATES AND FLANGE PLATES BEFORE UNDERMINING AUXILIARY BUILDING EPA

- CHECK TENDON LOAD BY LIFT OFF


℄ ½" x 13" x 1'-7"
13"
5/16


GROUT/VENT HOLES AS REQ'D
℄ TENDON STRANDS - FIELD TO GREASE AND COAT WITH ETHAFOAM 220 OR EQUIVALENT.
GROUT PER SPEC. C-231(Q)

13'

ENCLOSURE 2

J. Kane
HGEB

Subject: Design Issues to be Audited by HGEB at February 3-5, 1982 Audit in Ann Arbor, Michigan

License Condition No.	Review Issue	Documentation Anticipated to be Presented to HGEB	Design Audit Feb. 3-5, 1982
5a	Auxiliary Building Temporary Support System During Underpinning (EPA and Control Tower)	Plan and sectional views showing the locations in the structures and on the foundation bearing layer where temporary underpinning loads have resulted in the largest stresses. Drawings should indicate assumed exc. conditions at the various stages of construction.	Information was provided in Dasgupta presentation and handouts, but results are impacted by the requested sensitivity study on soil spring constant variations.
		Calculations that provide the magnitude of the above stresses.	Checked by SEB
		Calculations providing the factors of safety against bearing failure.	Provided in Dasgupta Presentation
5b	Auxiliary Building Temporary Support System During Underpinning (EPA & Control Tower)	Sketches showing deformation measuring instruments attached at top of pier at the selected locations.	Provided by Bob Adler. NRC needs to review
		Description of frequency of readings to be required.	Provided on drawing entitled "Instrumentation Matrix"
		Identification of the ALLOWABLE movements, strains or stresses at the selected monitoring locations and CALCULATIONS which are the basis for those allowable movements. What are crack monitoring plans?	Criteria given for FIVP piping. Tolerance criteria on movements is still required for both Phase II and Phase III instrumentation.
		Criteria to be followed for READJUSTING jacking load (?Settlement).	Criteria on jacking is controlled by both settlement and stress considerations CPC to provide drawings, procedures and criteria to NRC on Feb. 26, 1982.

Encl 2

License Condition No.	Review Issue	Documentation Anticipated to be Presented to HGEB	Design Audit Feb. 3-5, 1982
5b (continued)		This is ALLOWABLE movements. What valves (limiting) of movement or cracking or stress will require re-evaluation and stopping of underpinning? How established? Provide the time interval (maximum) between observing limiting movement or stress and time for action (re-evaluation or stopping).	Tolerance criteria will identify both an action level and a stopping level. CPC still needs to address crack propagation. NRC needs to review criteria on cracking provided in Auxil. Bldg. report and be prepared to discuss at Feb. 25, 1982.
5c	NRC Testimony (11/20/81) Attachment 21, Q.6	Previous discussions have resolved this issue.	Previously resolved.
5c	Attachment 21, Q.7	Provide explanation on how measured jacking load and pier settlement will be used in NAV-FAC DM-7, Fig. 11-9 to establish equivalent soil modulus.	By knowing the shape, embedment, deflection — Fig. 11-9 is used to establish coefficient which permits modulus to be computed. Issue is resolved.
5c	Attachment 21, Q.17	Provide CALCULATIONS which determined the magnitude of the test load for temporary support pier. What part of this load is due to Turbine Bldg. and what part is due to EPA? (Is this a location of large stress which has been covered in Lic. Cond. 5a?)	@ Pier W5, the Turbine Bldg load is 878^{k}. Total load is 2513^{k} (maximum).
5c	Attachment 21, Q.18	Does previous discussion under license condition 5b on ALLOWABLE movements cover Q.18?	Refer to status of 5b.
5c	Attachment 21, Q.19	Question has been adequately addressed including discussions at last audit of Jan. 18-20, 1982.	Previously Resolved.

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

FEB 22 1984

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

APPLICANT: Consumers Power Company

FACILITY: Midland Plant, Units 1 and 2

SUBJECT: SUMMARY OF MARCH 16-19, 1982 MEETING AND AUDIT ON SOILS REMEDIAL ACTIONS

On March 16-19, 1982, the NRC Staff and its consultants met in Ann Arbor, Michigan with Consumers Power Company, Bechtel and their consultants to discuss and audit preparations for proposed underpinning of the Service Water Pump Structure (SWPS). The meeting also reviewed the status of remedial plans for other seismic Category I structures (auxiliary building, diesel generator building, and borated water storage tank foundations) on plant fill.

Enclosure 1 is a listing of design issues that were to be audited for the SWPS by the NRC's Hydraulic and Geotechnical Engineering Branch. Enclosure 1 was provided at the start of the audit on March 16,1982.

Enclosure 2 is a summary of this meeting and audit.

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

Enclosure:
As stated

cc: See next page

8402280618

MIDLAND

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

ENCLOSURE 1

Subject: Design Issues To Be Audited on Service Water Structure by HGEB
March 16-19, 1982, Ann Arbor, Michigan

Review Issue	Previous Question	Documentation Anticipated to be Presented to HGEB
Bearing Capacity	GEI 4.1, 4.2	Method to be used for demonstrating adequacy of clay or alluvium bearing stratum in the field.
		Construction controls to be employed in establishing maximum thickness of lean concrete to be placed under piers.
	COE Q.4, Q.18, Q.19	NRC needs to respond to CPC testimony (Pg. 47) on bearing capacity analysis, appropriateness of adopted shear strengths and factor of safety against bearing type failure.
	GEI 4.3	Results of CPC study on subsurface information to establish bottom elevation of piers. Construction controls to be required in the field that will establish the maximum ELEVATION DIFFERENCES to be permitted in the field.
	GEI 5.2	Description of pier load test and identification of test pier.
	COE Q.22	Provide calculations showing how effects of post tensioning have been addressed in bearing capacity analysis.
Static Spring Constants	GEI 1.1 COE Q.5, Q.15	NRC needs to respond to spring constant calculations provided by CPC on February 23, 1982 (By F. Lam) and Table 1 (C. Dirnbauer handout of February 23, 1982).
Settlement	GEI 1.2 COE Q.8, Q.11, Q.13	NRC needs to respond to CPC testimony on predicted settlements and controls on settlement identified by CPC during jacking.
Dewatering	GEI 2.1 COE Q.14	NRC needs to determine if Draft copy of spec on temporary dewatering (Provided Mar. 10, 1982 by A. Boos) adequately describes system (location, depths, type of piezometers for monitoring) and if system will be installed well ahead of draft excavation.

Review Issue	Previous Question	Documentation Anticipated tp be Presented to HGEB
Miscellaneous	GEI 1.3	Identify maximum load differences between adjacent piers in order to avoid breaking shear keys. Provide calculations.
	GEI 1.4	Provide pressure diagrams and computations for out of plane forces (lateral earth, seismic, hydrostatic) for which the underpinning wall has been designed.
	GEI 1.5, 1.6 COE Q.25	Provide calculations for estimating shear load in bolts. What are the existing maximum stresses and the locations where they occur?
	GEI 1.7	Provide results of calculations that indicate that the SWS can be supported between corner piers.
	COE Q.24	Clarify past misunderstanding on term P_L in loading equations (Nov. 6, 1981 Report, pg. 5 & 6).
	GEI 6.1	Provide discussion on present construction schedule.

Review Issue	Previous Question	Documentation Anticipated to be Presented to HGEB
Monitoring Instrumentation	GEI 3.1, 3.2, 3.3, 3.4, 3.6 COE Q.1, Q.2, Q.3, Q.6	Describe the plans for monitoring. This should include plan showing location of instruments, typical installation details and sectional views. Anticipate discussion on monitoring for cracking, pier loads, vertical and lateral movements and concrete stress changes. Identify critical stages of underpinning and critical measurements. Discuss how the identified critical measurements will be used to control construction. Identify limiting criterion on movements and stresses and basis for their establishment. Discuss remedial measures which are available at the various stages of construction if limiting measurements are reached. Identify the time which will be permitted to elapse if limiting valves are reached before taking the remedial measures. Provide table with frequency of readings and time of instrument installation.
Jacking	GEI 3.6, 5.5 COE Q.9, Q.10	NRC needs to respond to CPC testimony that provides basis for selecting jacking load and time interval to be held. CPC is requested to discuss the underpinning operations to be Q-listed. Discuss frequency that jacking loads will be checked during underpinning.

ENCLOUSRE 2

Bechtel Associates Professional Corporation

777 East Eisenhower Parkway
Ann Arbor, Michigan

Mail Address: P.O. Box 1000, Ann Arbor, Michigan 48106

MEETING NOTES NO. 1572

MIDLAND PLANT UNITS 1 AND 2

CONSUMERS POWER COMPANY

BECHTEL JOB 7220

DATE: March 16 through 19, 1982

PLACE: Bechtel Ann Arbor Office

SUBJECT: Nuclear Regulatory Commission Audit of the Midland Service Water Pump Structure Underpinning

ATTENDEES:

Nuclear Regulatory Commission

D. Hood
J. Kane
F. Rinaldi
H. Singh

Consumers Power Company

J. Meisenheimer
J. Mooney*
N. Ramanugam
K. Razdan
J. Schaub
R. Teuteberg*

Consultants

D. Bartlett*
E. Burke
C. Gould*
G. Harstead
S. Poulos
R. Samuels*
M. Sozen*

Bechtel

S. Afifi*
J.E. Anderson
A. Boos*
D. Bradford*
M. DasGupta*
B. Dhar
C. Dirnbauer*
F. Lam*
L. McElwee
J. Rotz*
N. Swanberg
T. Tseng
G. Tuveson
V. Verma*

*Part-time

Bechtel Associates Professional Corporation

PURPOSES:

1) To perform an NRC audit of the design and calculations for the underpinning of the service water pump structure (SWPS)

2) To provide information for input to the NRC testimony

3) To permit release of the underpinning for construction

4) To discuss items related to the auxiliary building and borated water storage tank foundation construction

PRINCIPAL AGREEMENTS:

1) L. McElwee presented a general description, construction sequence, structural analysis, and proposed monitoring for the SWPS underpinning. Viewgraphs for this presentation are included as Attachment 1. It was agreed that post-tensioning will be left in place during construction, Carlson stress meters will be provided in the three piers at each corner, and jacking capacity will be provided in the three corner piers to support the entire overhang section.

2) J.E. Anderson presented the design for a dynamic cone penetrometer for use in evaluating alluvial sands. Details of this penetrometer are included as Attachment 2. Other tests to be performed on alluvium include in situ density and compaction. Compaction testing will be performed at several moisture contents. If more than 10 to 15% gravel is encountered, a small plate load test will be used instead of the penetrometer.

3) Following discussion and audit of calculations, the NRC provided items still requiring resolution. These are included as Attachments 3 and 4. Attachment 7 lists calculations made available for audit.

4) On March 18, 1982, a site tour was conducted which included the SWPS, auxiliary building, and observation of crack patterns on the diesel generator building.

5) NRC concurrence was provided to proceed with crack repair for the borated water storage tank foundation.

6) The auxiliary building parametric analysis using a subgrade modulus of 70 kcf for the till under the main auxiliary building was discussed. The approach for this analysis is summarized in Attachment 5. Items to be resolved prior to start of temporary support of the auxiliary building are included as Attachment 6.

067486

Bechtel Associates Professional Corporation

ACTION ITEMS:

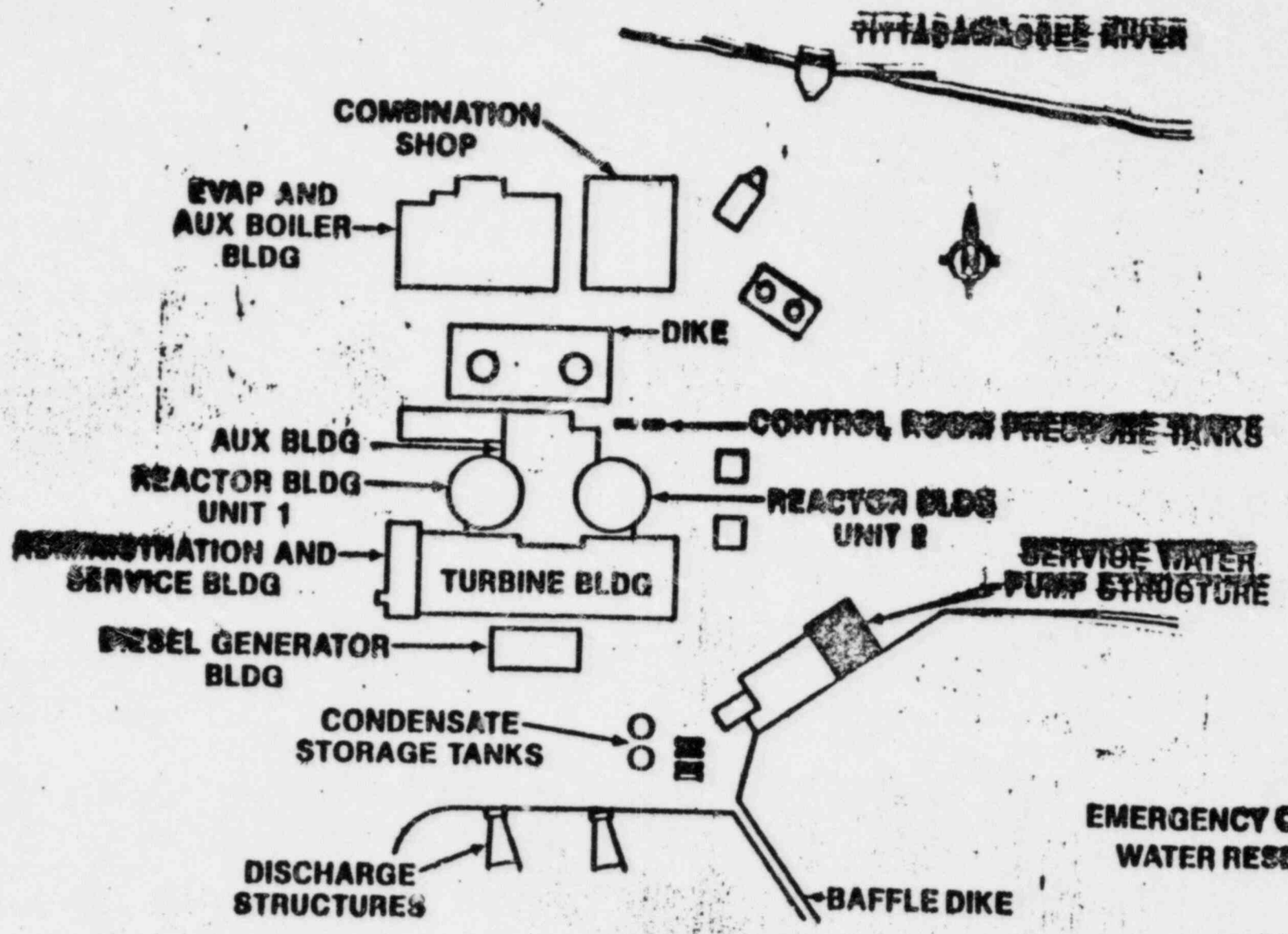
The action items resulting from this meeting are outlined in Attachments 3, 4, and 5.

Prepared by: Neal Swanberg
N. Swanberg
Assistant Project Engineer

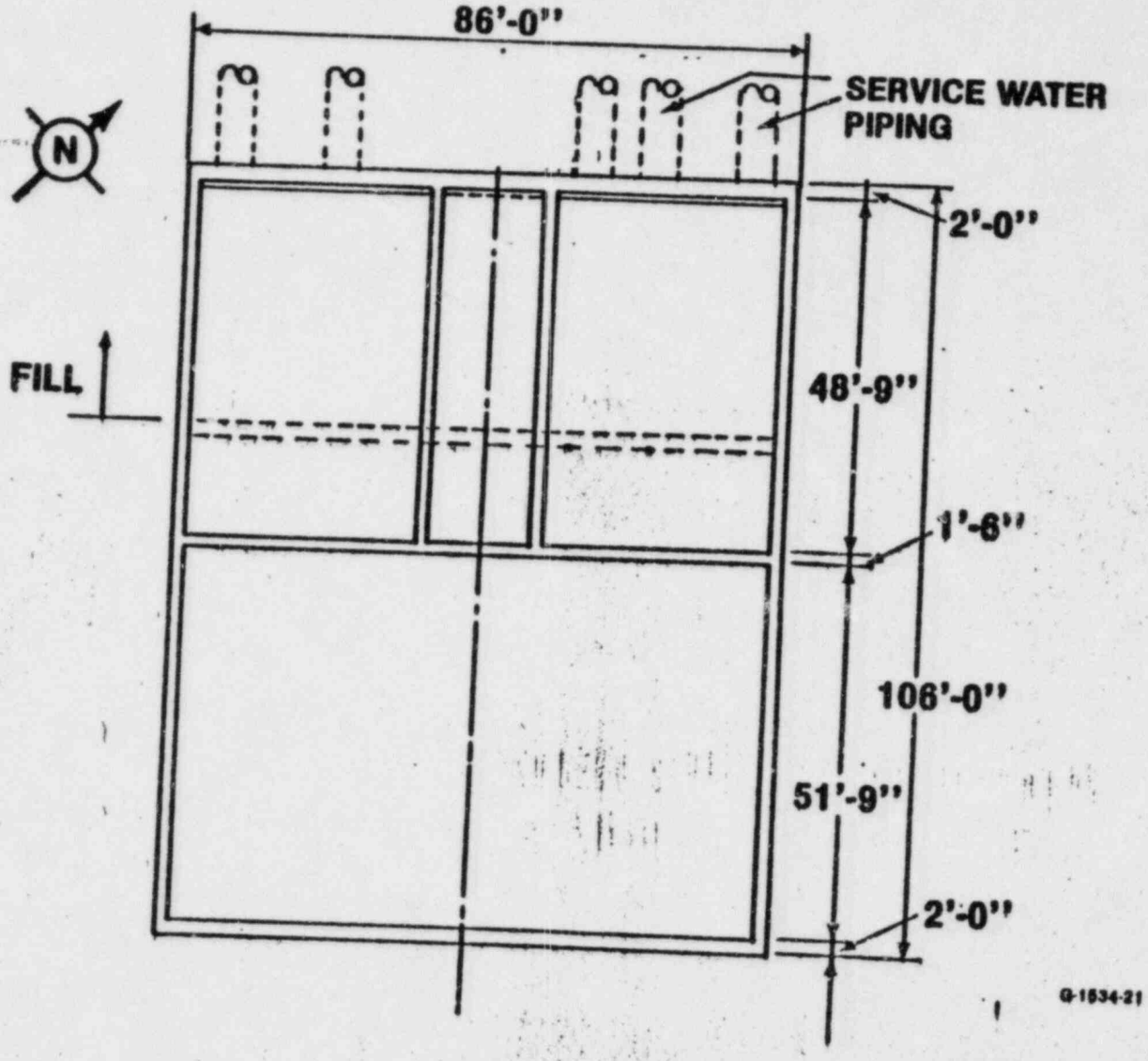
NS/jsn
3/25/12

Attachments:
1. Viewgraphs
2. Dynamic Cone Penetrometer
3. Service Water Pump Structure (SWPS) - Items to be Resolved
4. Structural Engineering Items to be Resolved
5. Parametric Auxiliary Building Analysis
6. Auxiliary Building Items to be Resolved
7. Table of Calculations - SWPS

MIDLAND SITE PLAN

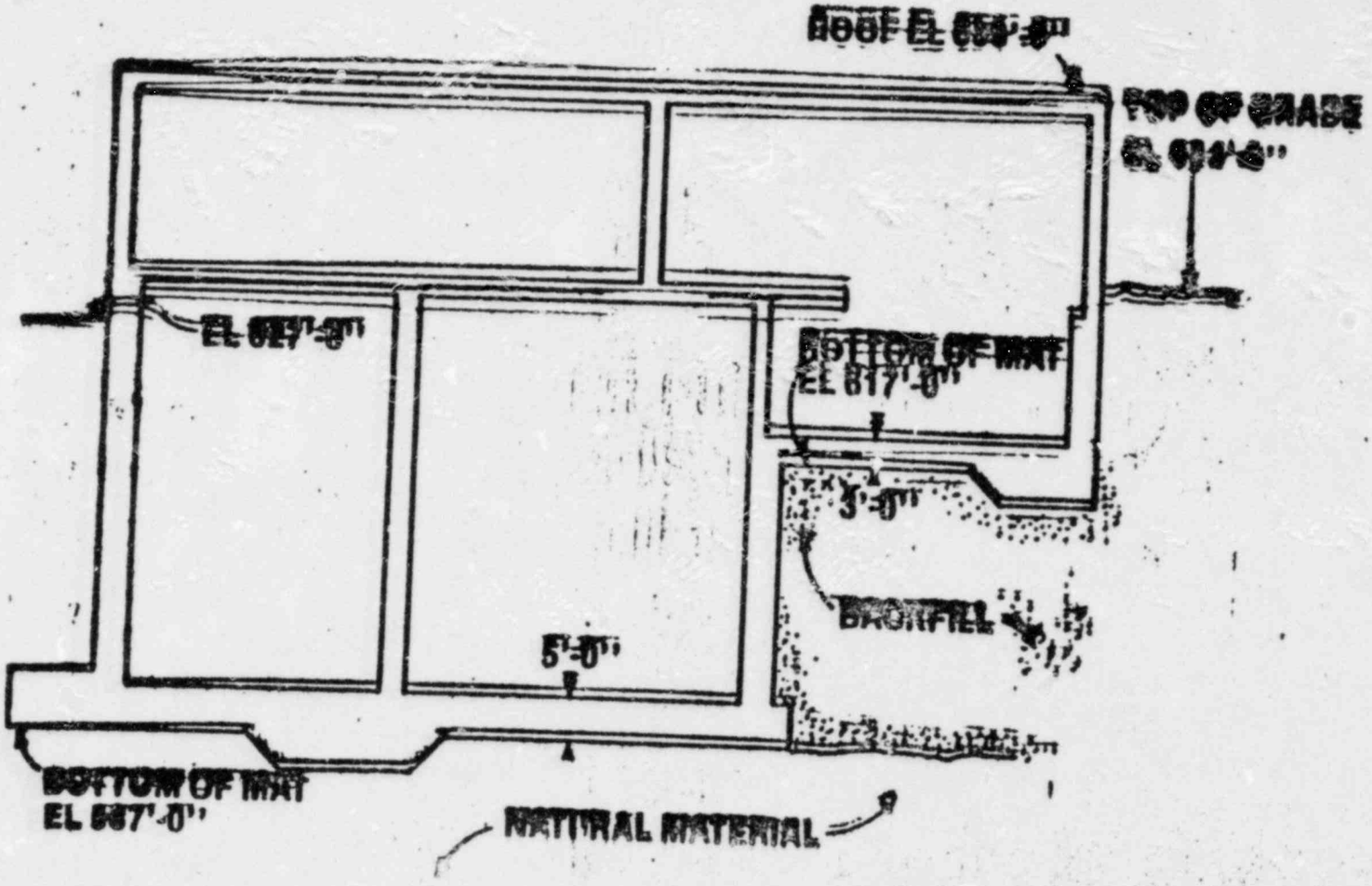


SERVICE WATER PUMP STRUCTURE
PLAN AT EL 634'-6"



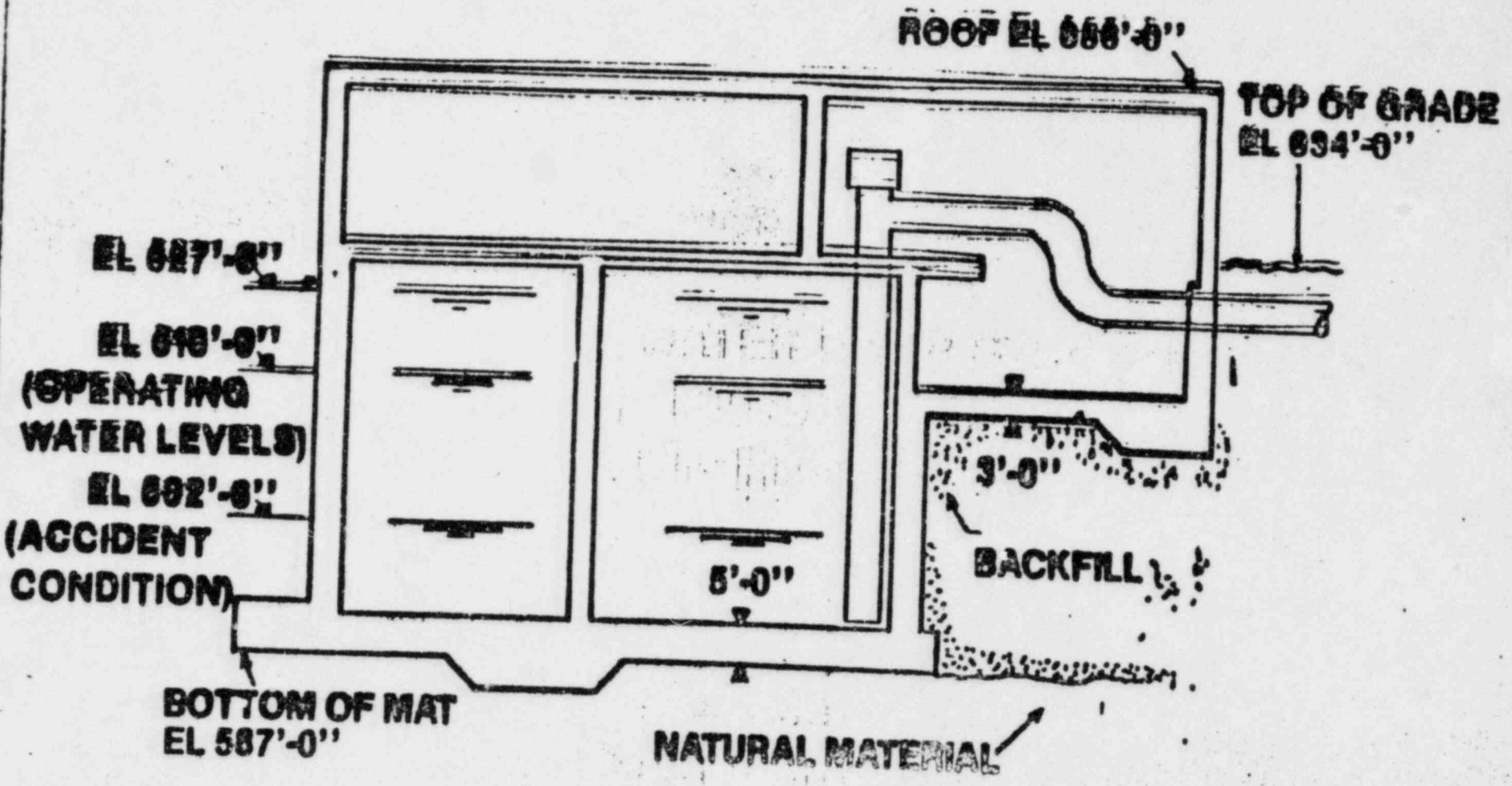
2

SERVICE WATER PUMP STRUCTURE
TYPICAL SECTION
(Looking West)

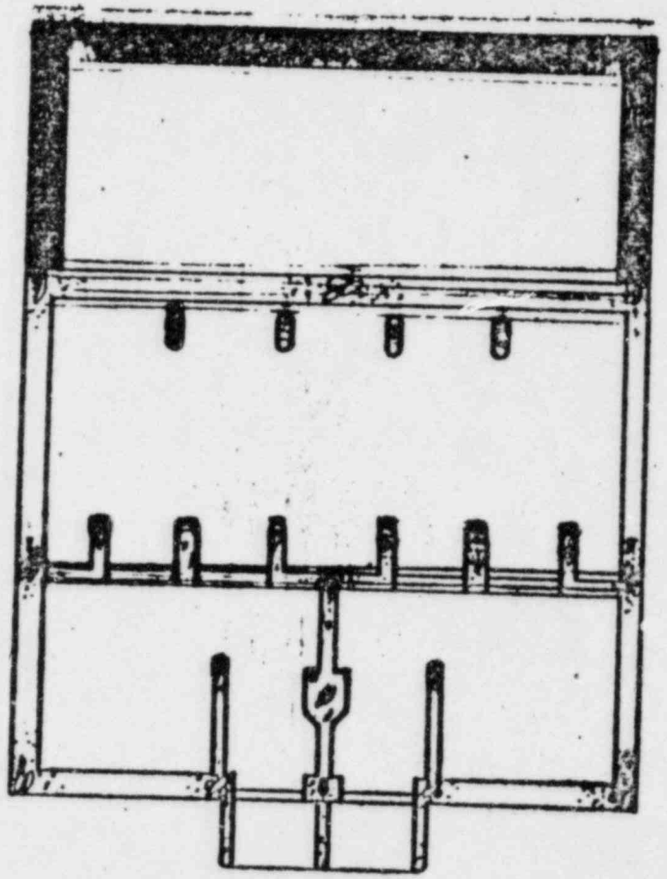


SERVICE WATER PUMP STRUCTURE

RANGE OF PUMPING LEVELS

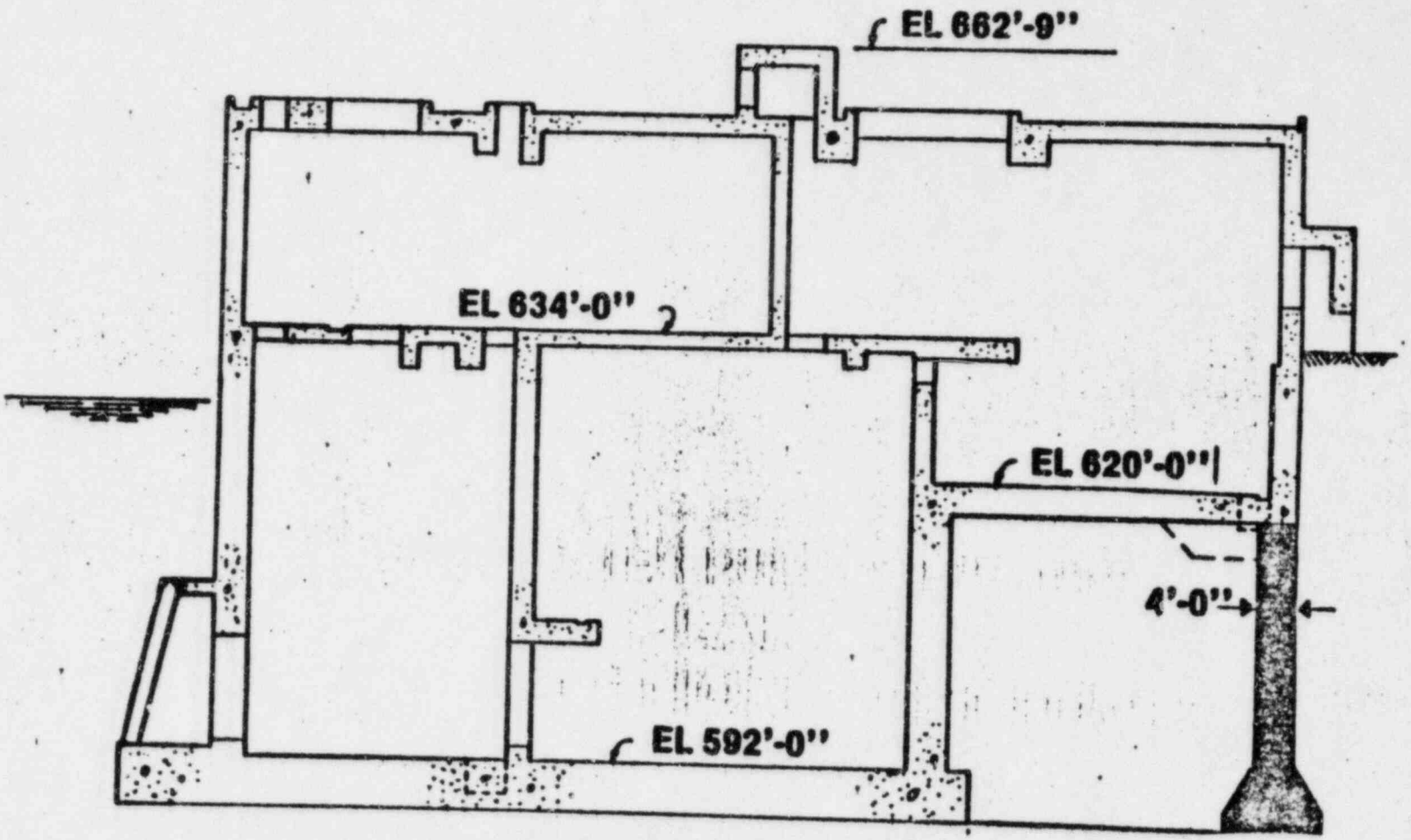


SERVICE WATER PUMP STRUCTURE
PLAN AT EL 502'-0"



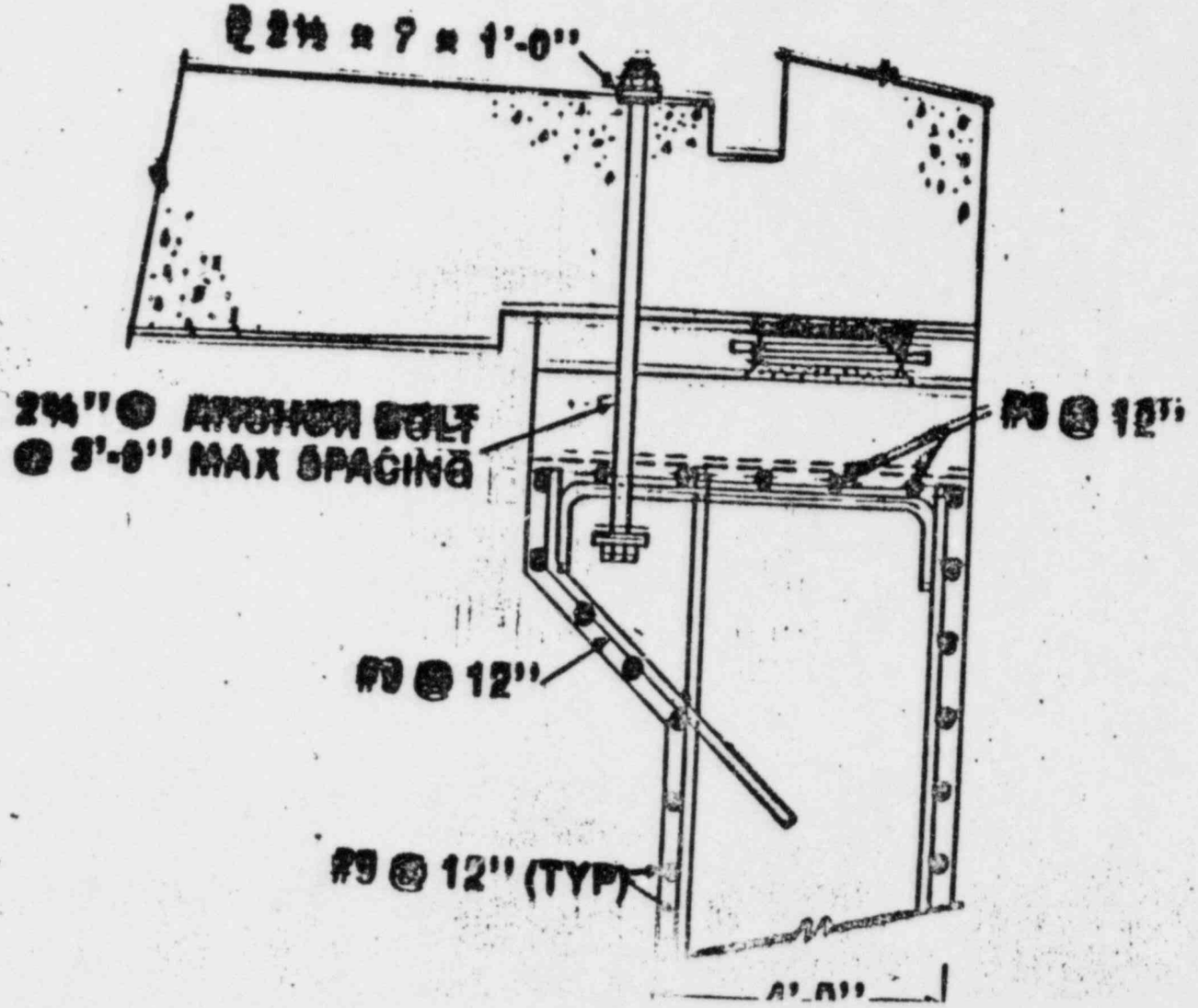
G-1834-20

SERVICE WATER PUMP STRUCTURE

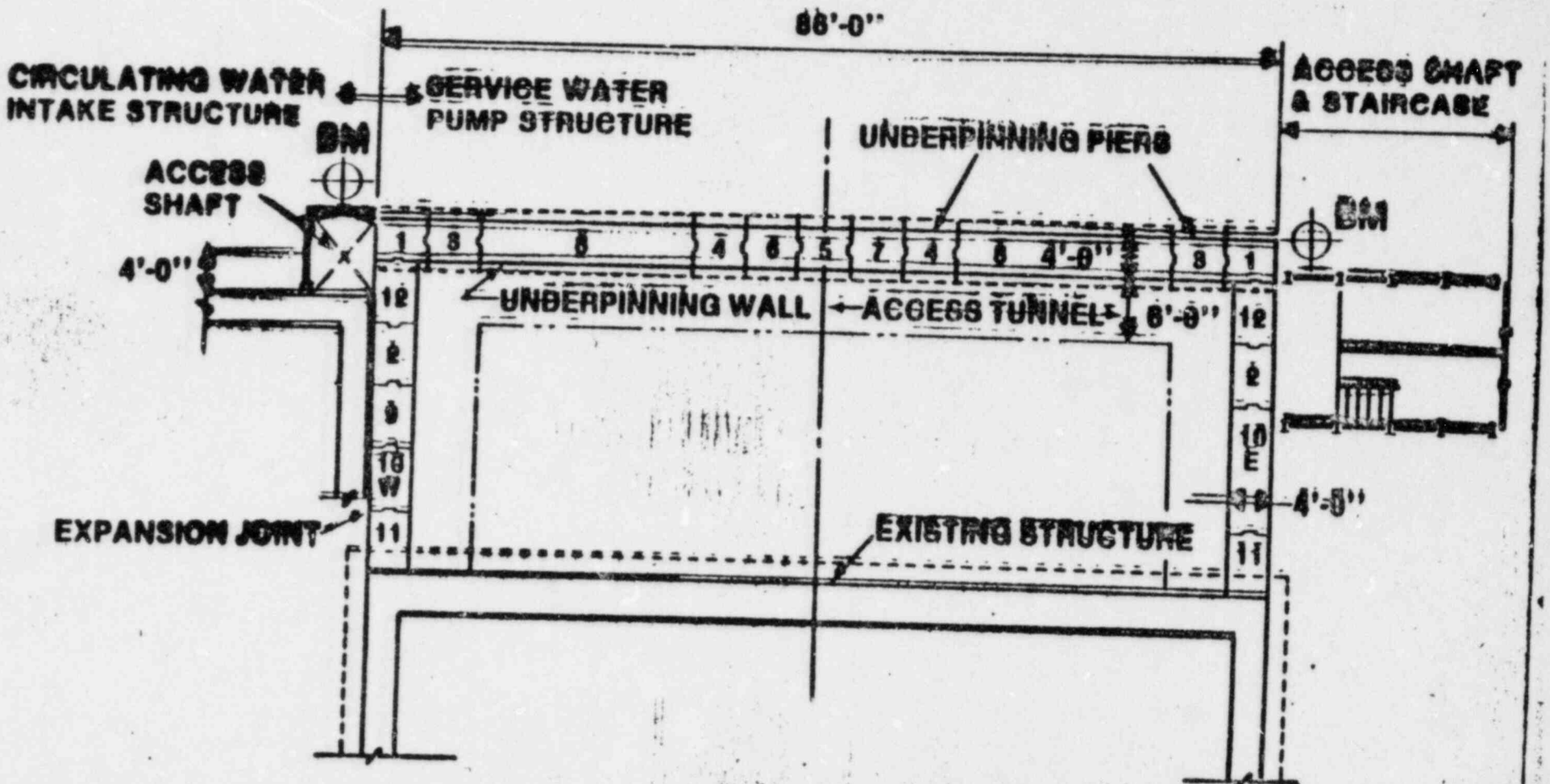


8-1834-18

SERVICE WATER PUMP STRUCTURE
TOP OF UNDERPINNING WALL
DETAIL



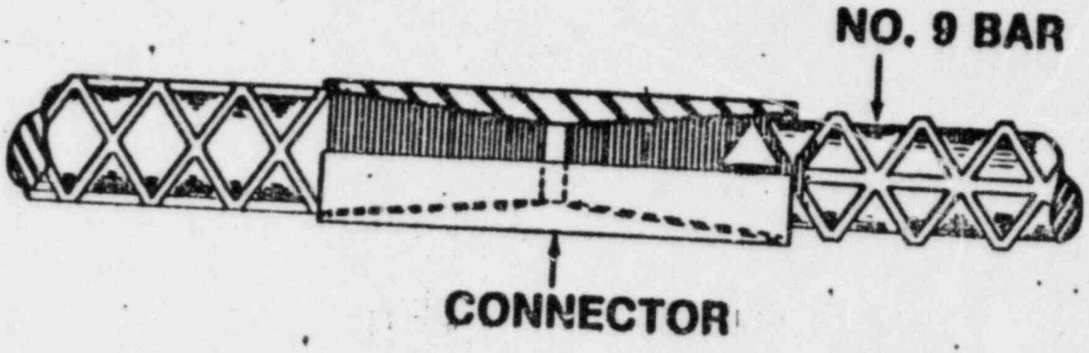
SERVICE WATER PUMP STRUCTURE
PLAN



MIDLAND UNITS 1 AND 2
SWPS 9 11/81

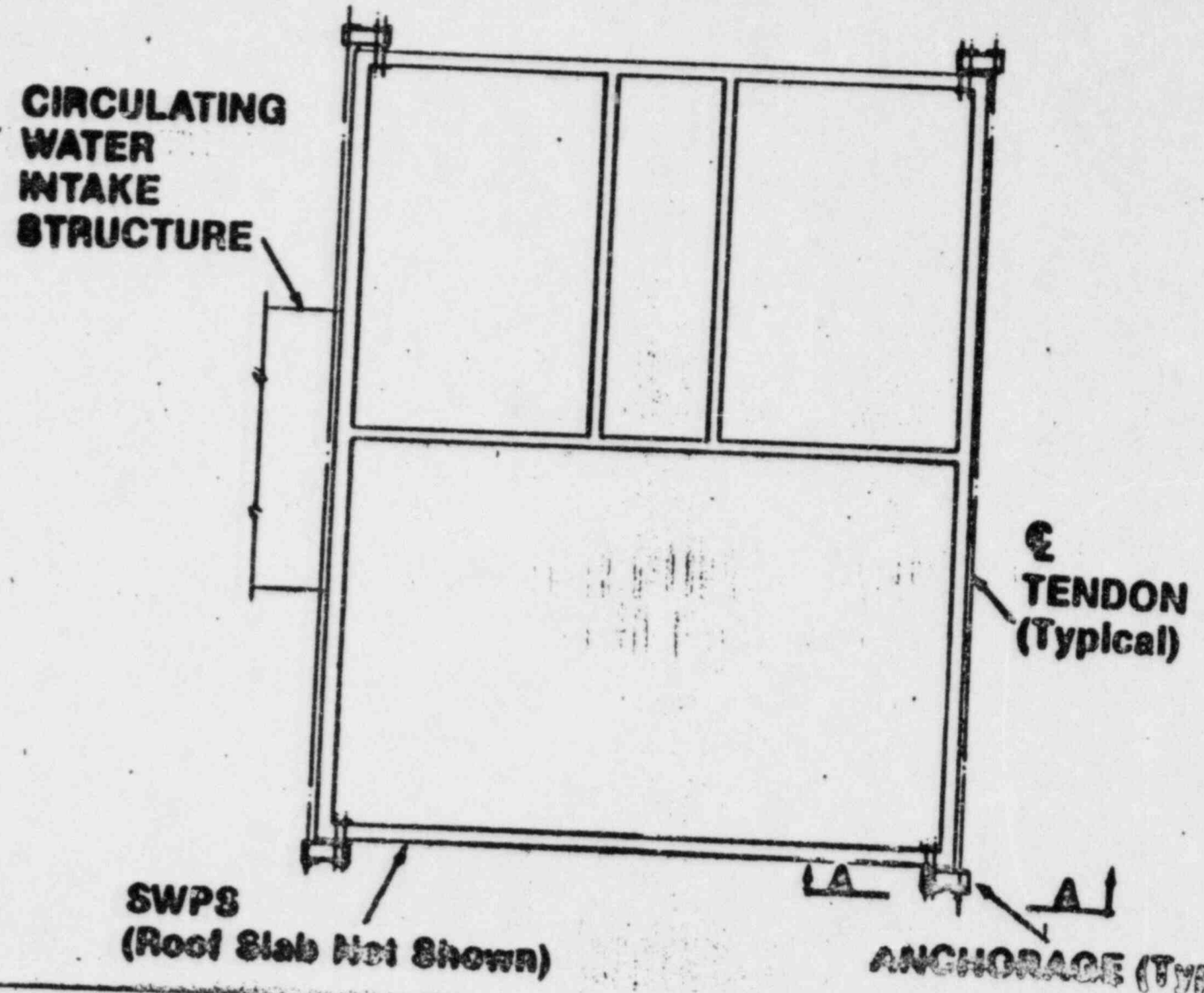
G-1854-03

SERVICE WATER PUMP STRUCTURE
TAPER THREADED CONNECTOR



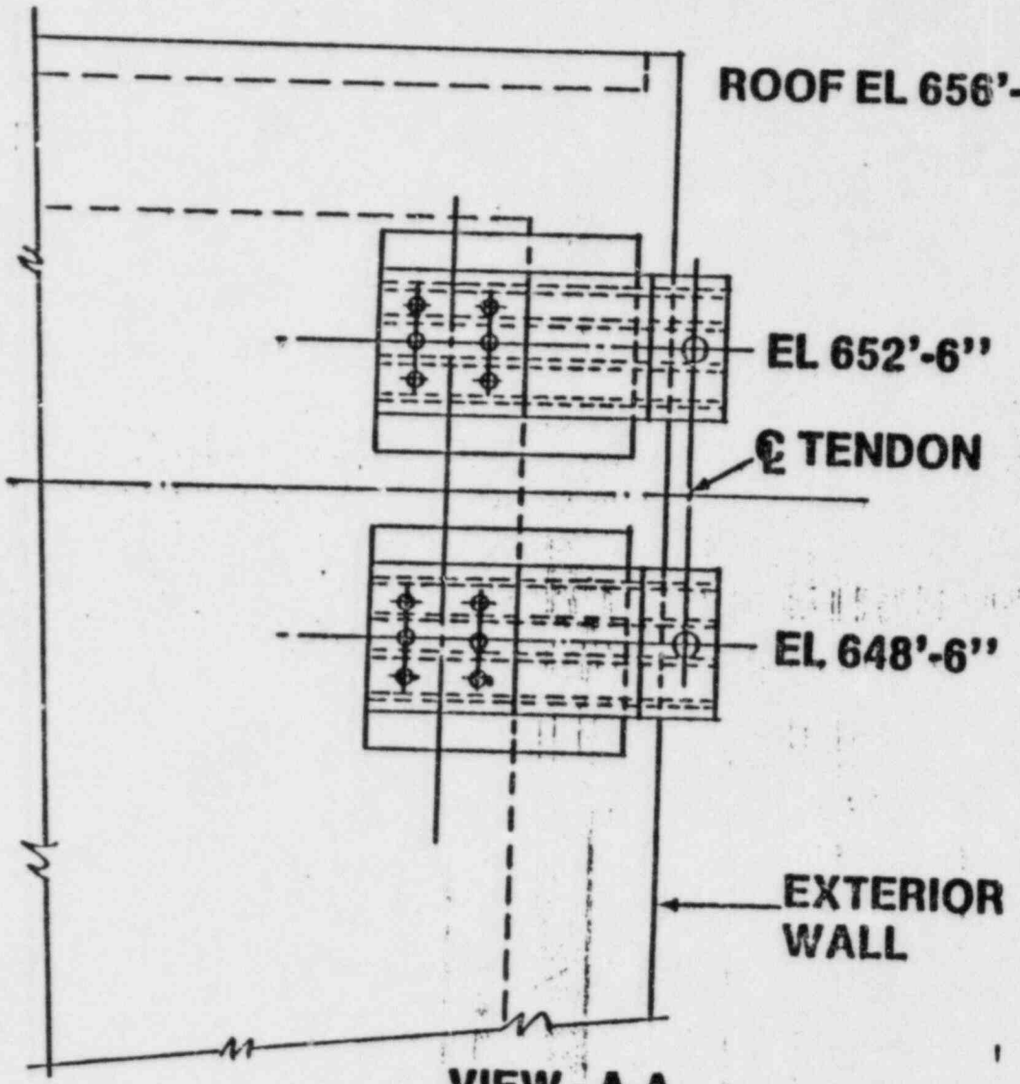
G-1554-18

SERVICE WATER PUMP STRUCTURE
DETAILS OF POST-TENSIONING TIES



9847907

SERVICE WATER PUMP STRUCTURE
VIEW OF POST-TENSIONING ANCHORAGES

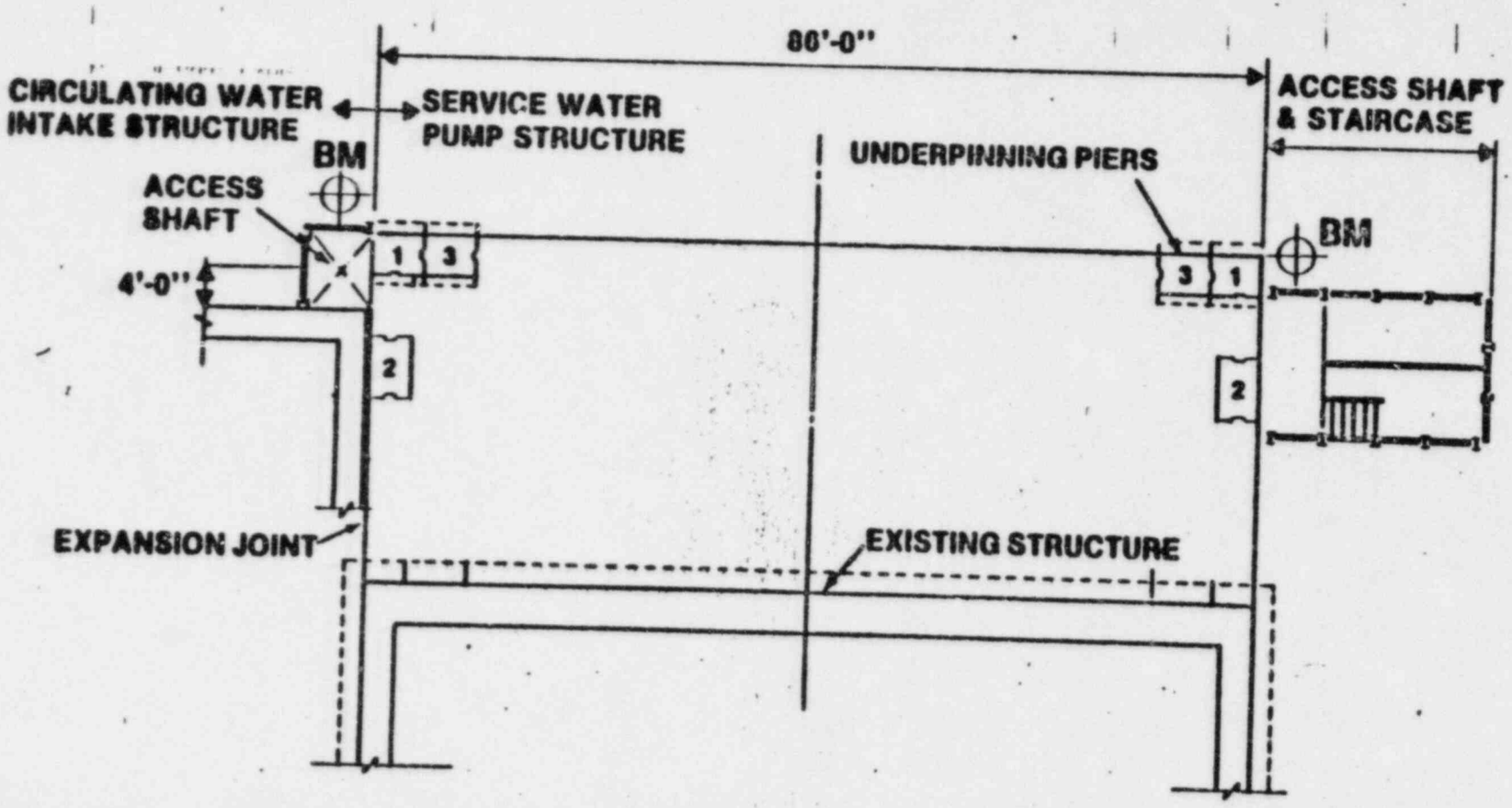


VIEW - A-A

SERVICE LOAD
(AFTER LOSSES)
243 KIPS/TENDON

G-1554-08

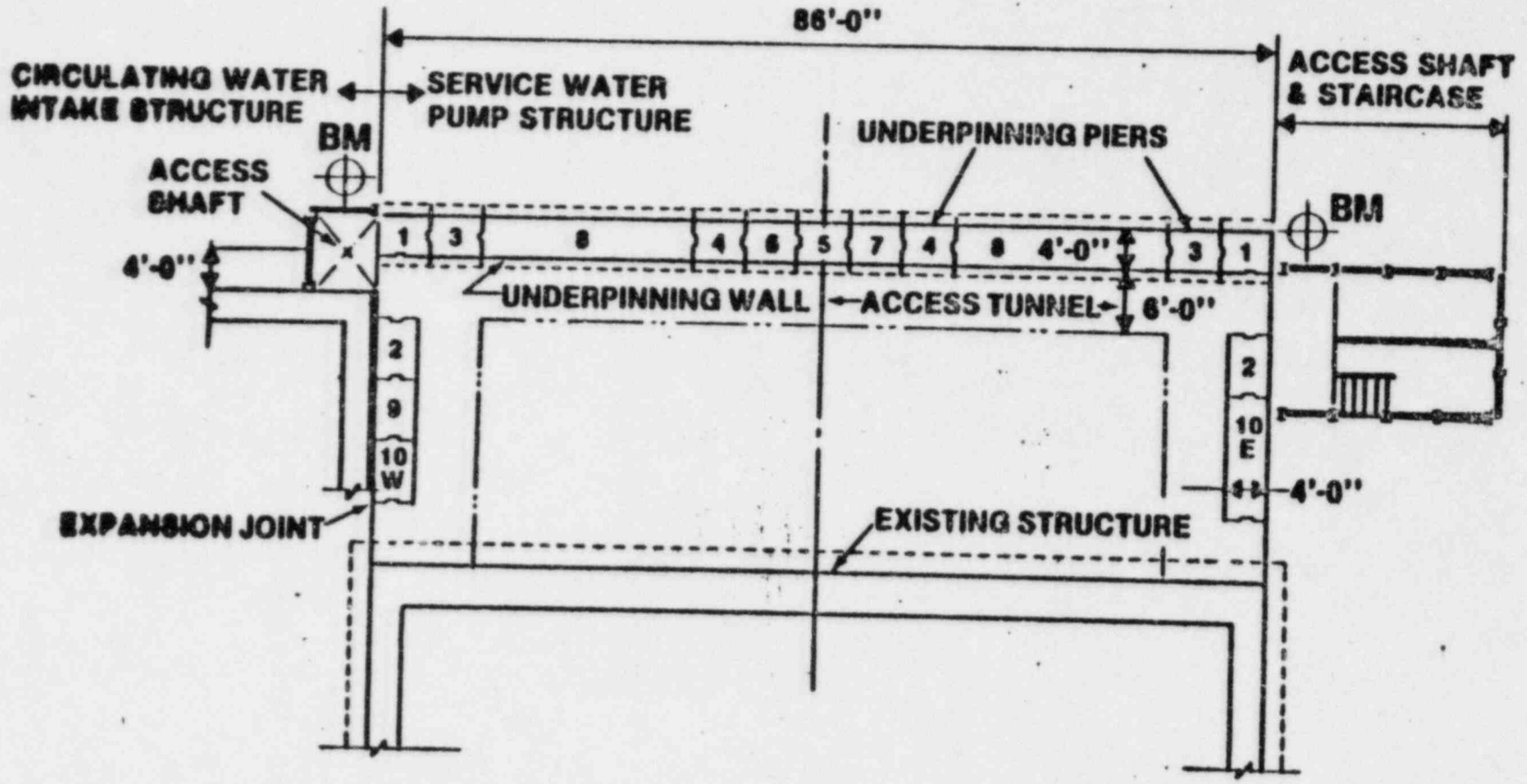
SERVICE WATER PUMP STRUCTURE
PLAN
CONSTRUCTION CONDITION I



MIDLAND UNITS 1 AND 2
SWPS 9/11/81

G-1854-03

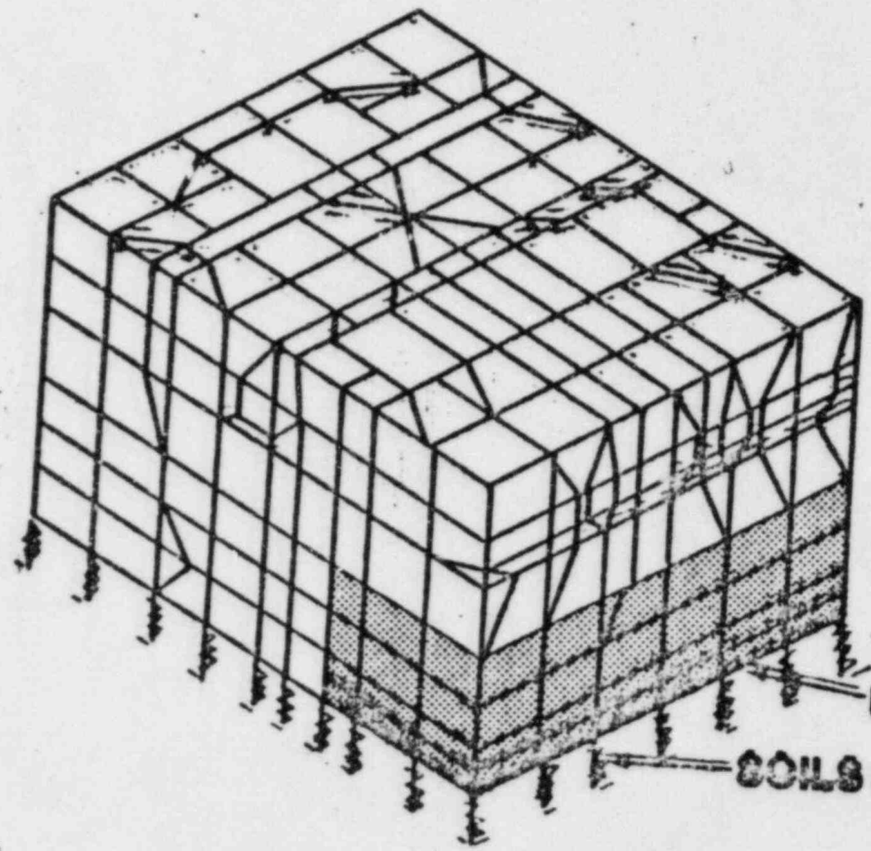
SERVICE WATER PUMP STRUCTURE
PLAN
CONSTRUCTION CONDITION II



MIDLAND UNITS 1 AND 2
SWPS 9/11/81

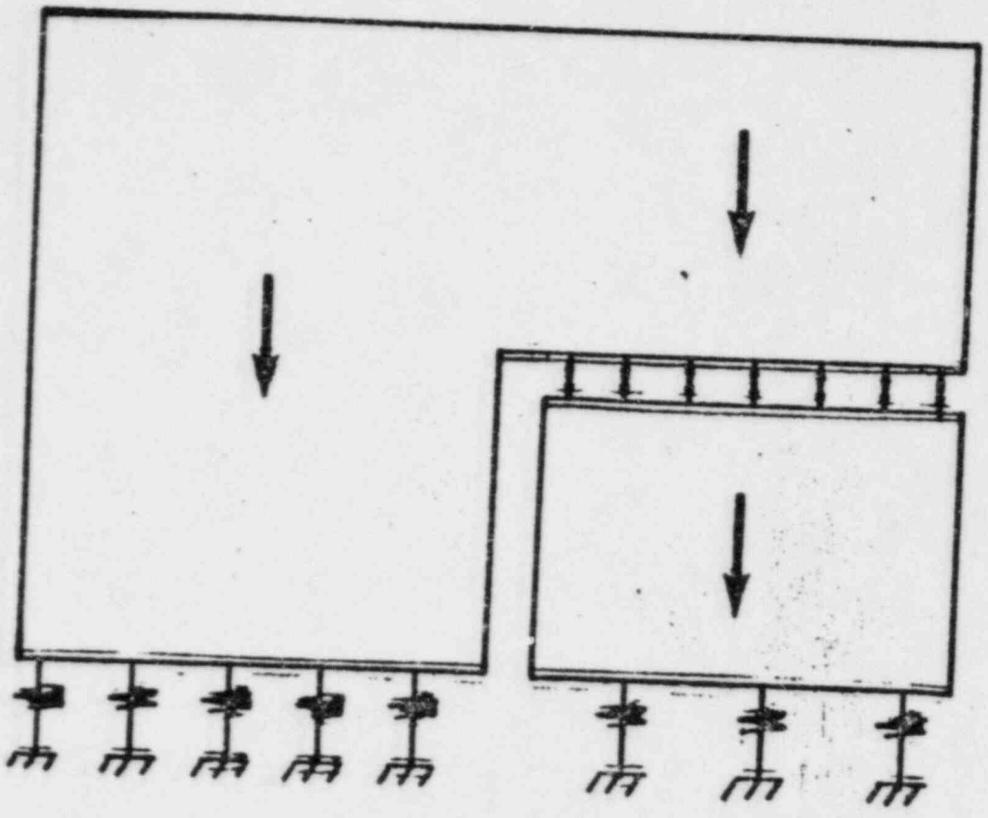
G-1854-03

SERVICE WATER PUMP STRUCTURE
ISOMETRIC VIEW OF FINITE ELEMENT MODEL



MIDLAND UNITS 1 AND 2
SWPS 9/11/81

SERVICE WATER PUMP STRUCTURE
PRELOAD



SYSTEM 1

LOADING
D + 25%L + JACKING LOAD

DISCONNECTED MODEL

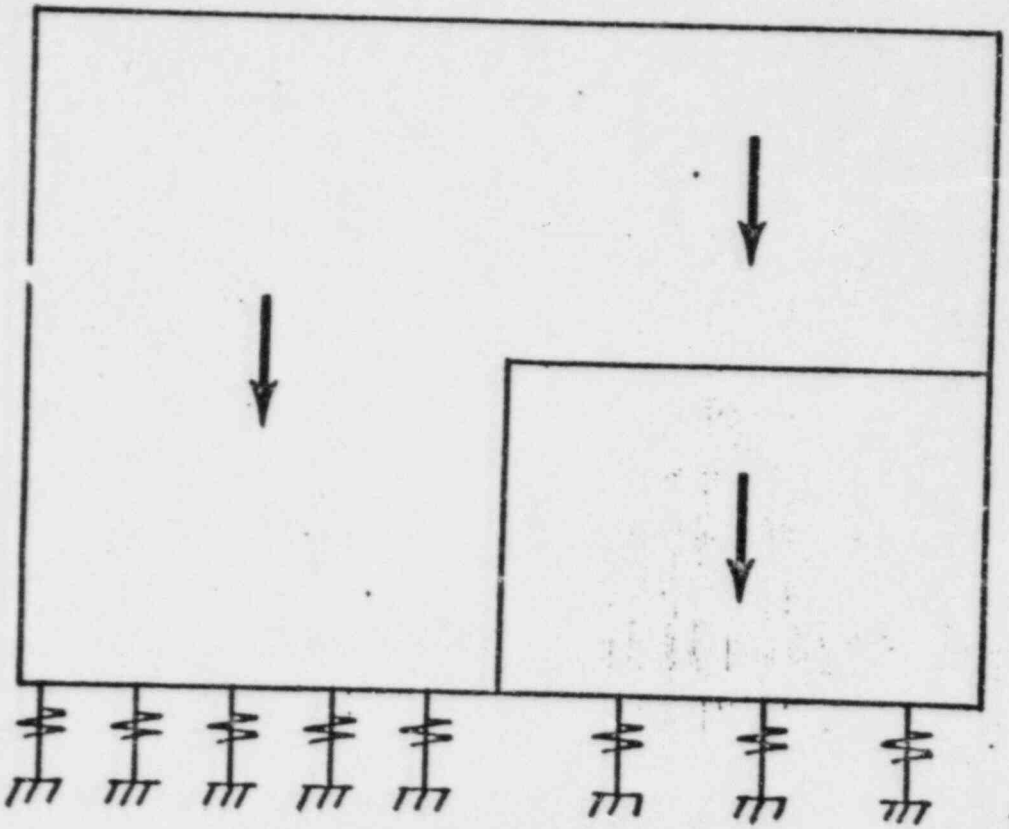
MIDLAND UNITS 1 AND 2
NRC PRESENTATION 3/18/80

8-1634-180

SERVICE WATER PUMP STRUCTURE
PRELOAD (cont'd)

16

9847990



CONNECTED MODEL

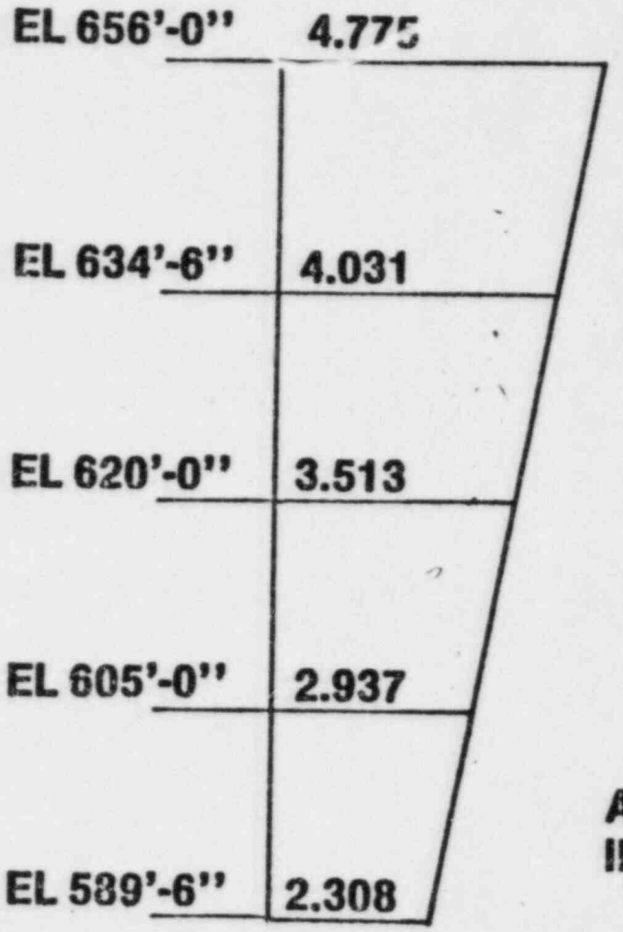
SYSTEM 2

LOADING
D + 25%L

SPRINGS FOR SYSTEMS 1 AND 2 ARE BASED ON SUBGRADE MODULUS OF 4,000 KCF

PRELOAD EFFECT = SYSTEM 1 LOADS – SYSTEM 2 LOADS

SERVICE WATER PUMP STRUCTURE
OBE ACCELERATIONS



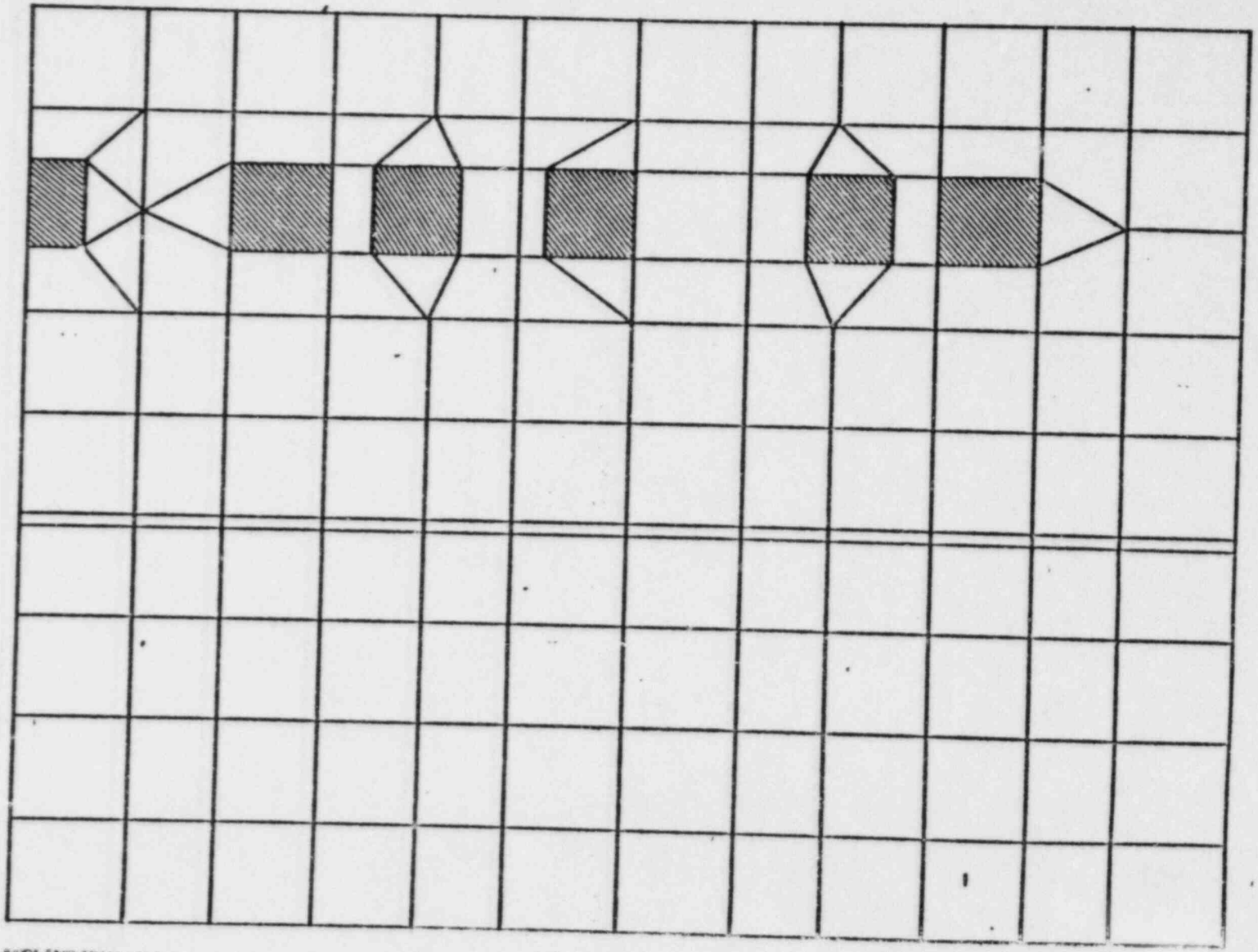
N-S EARTHQUAKE
MODE NO. 2
-50% MEAN SOIL
MODULUS

ACCELERATIONS ARE
IN FT/SEC^2

G-1584-161

SERVICE WATER PUMP STRUCTURE
FINITE ELEMENT MODEL
NORTH WALL

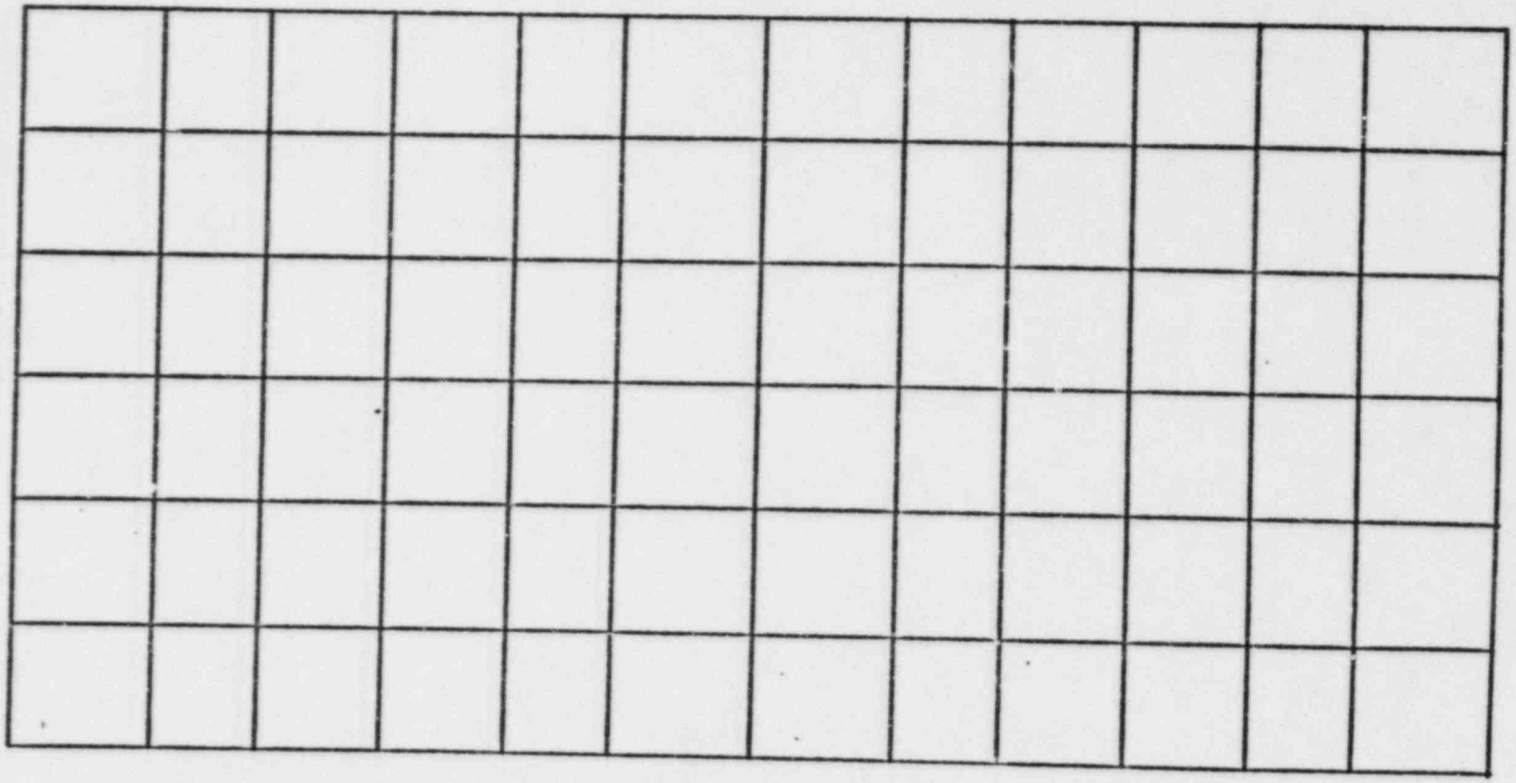
18



MIDLAND UNITS 1 AND 2
NRC PRESENTATION '82

0-1584-180

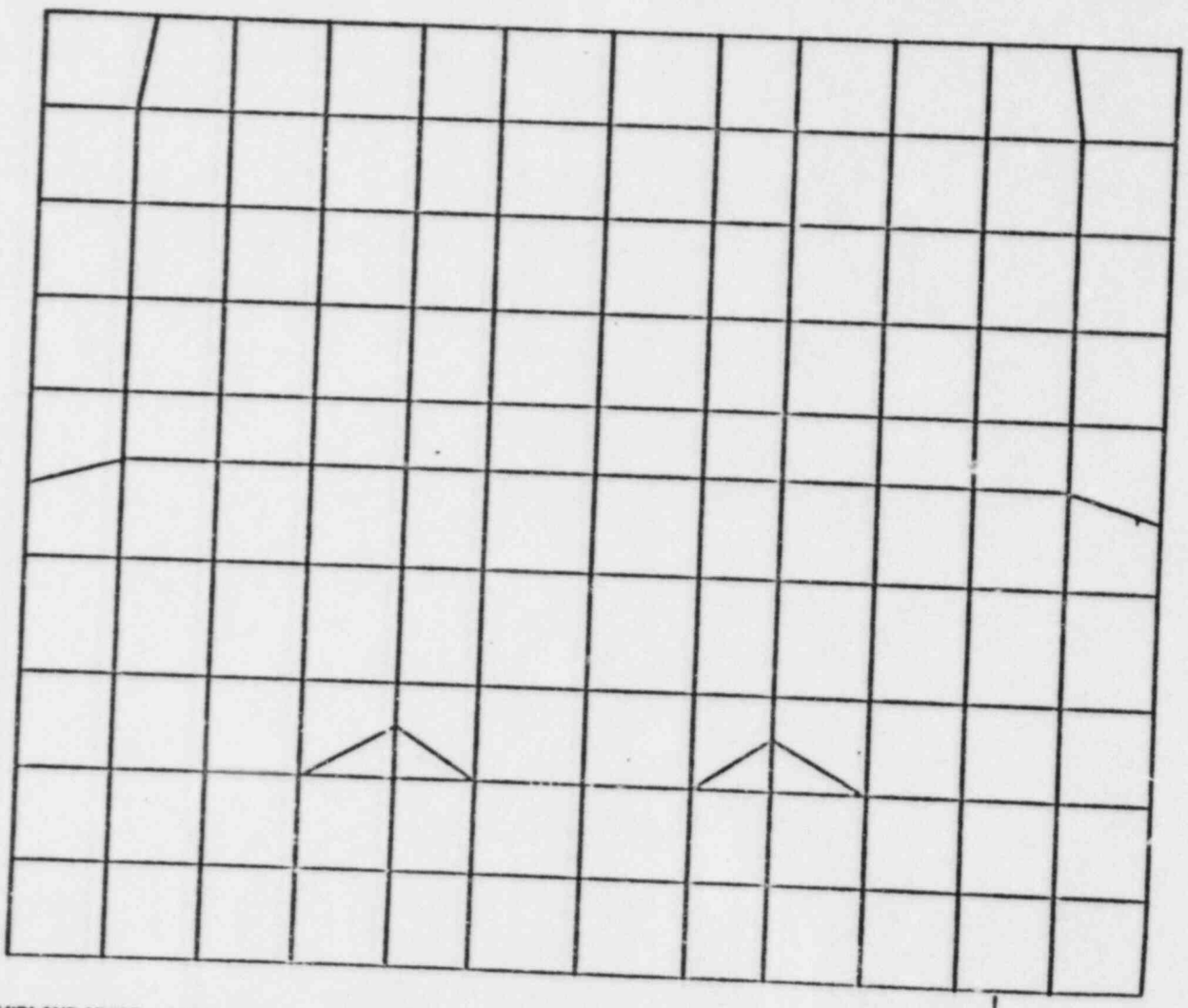
SERVICE WATER PUMP STRUCTURE
FINITE ELEMENT MODEL
NORTH WALL (MAIN STRUCTURE)



MIDLAND UNITS 1 AND 2
NRC PRESENTATION 3/15/82

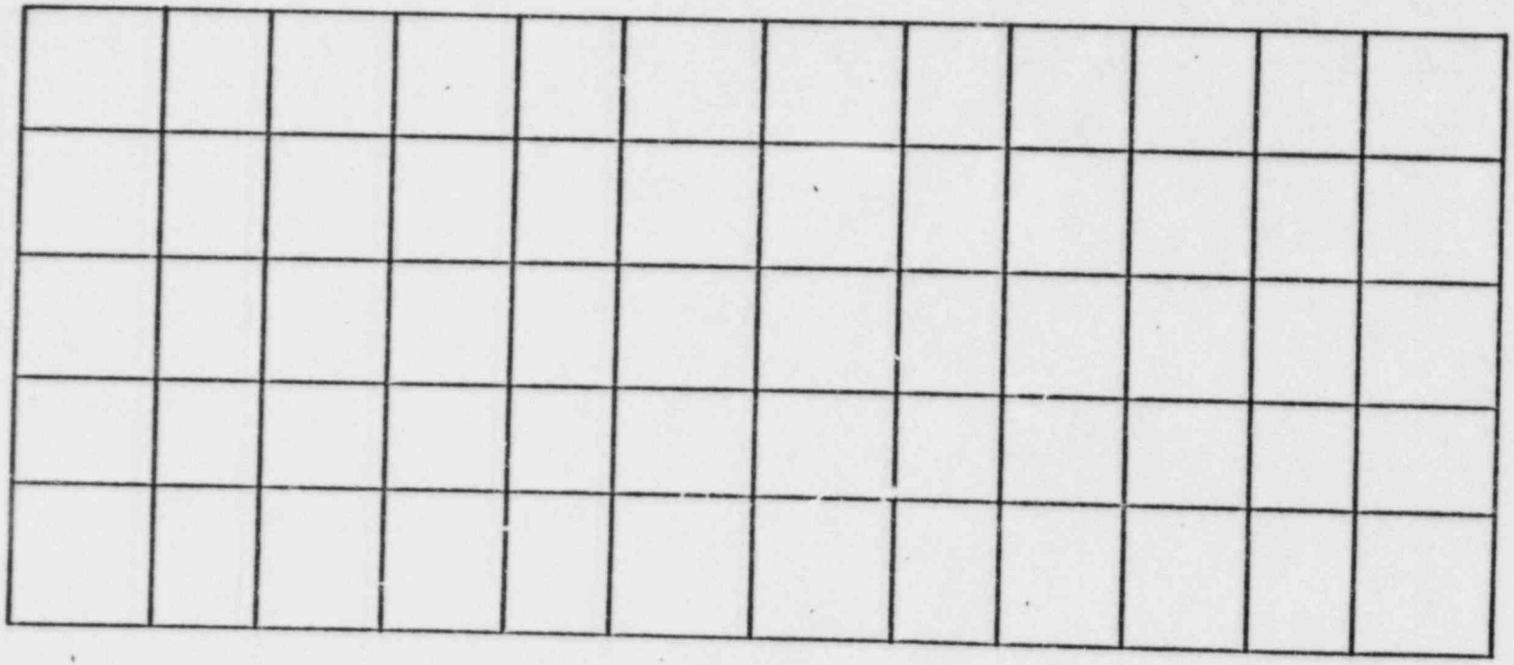
G-1584-158

SERVICE WATER PUMP STRUCTURE
FINITE ELEMENT MODEL
5'-0" MAT - EL 592'-0"



MIDLAND UNITS 1 AND 2
NRC PRESENTATION 3/15/82

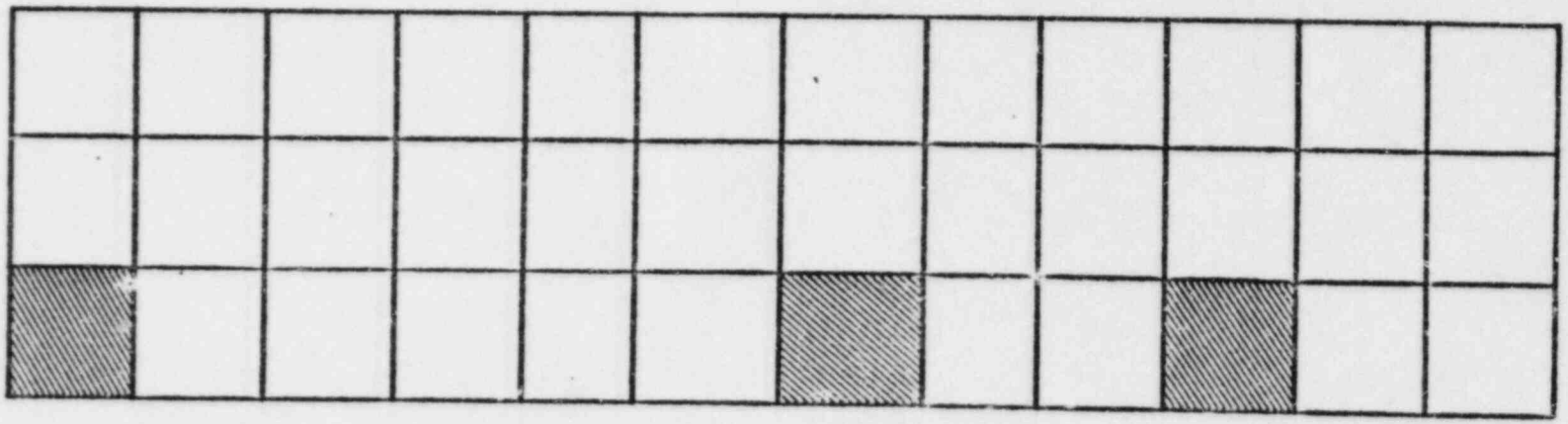
SERVICE WATER PUMP STRUCTURE
FINITE ELEMENT MODEL
3'-0" SLAB - EL 620'-0"



MIDLAND UNITS 1 AND 2
NRC PRESENTATION 3/15/82

G-1584-154

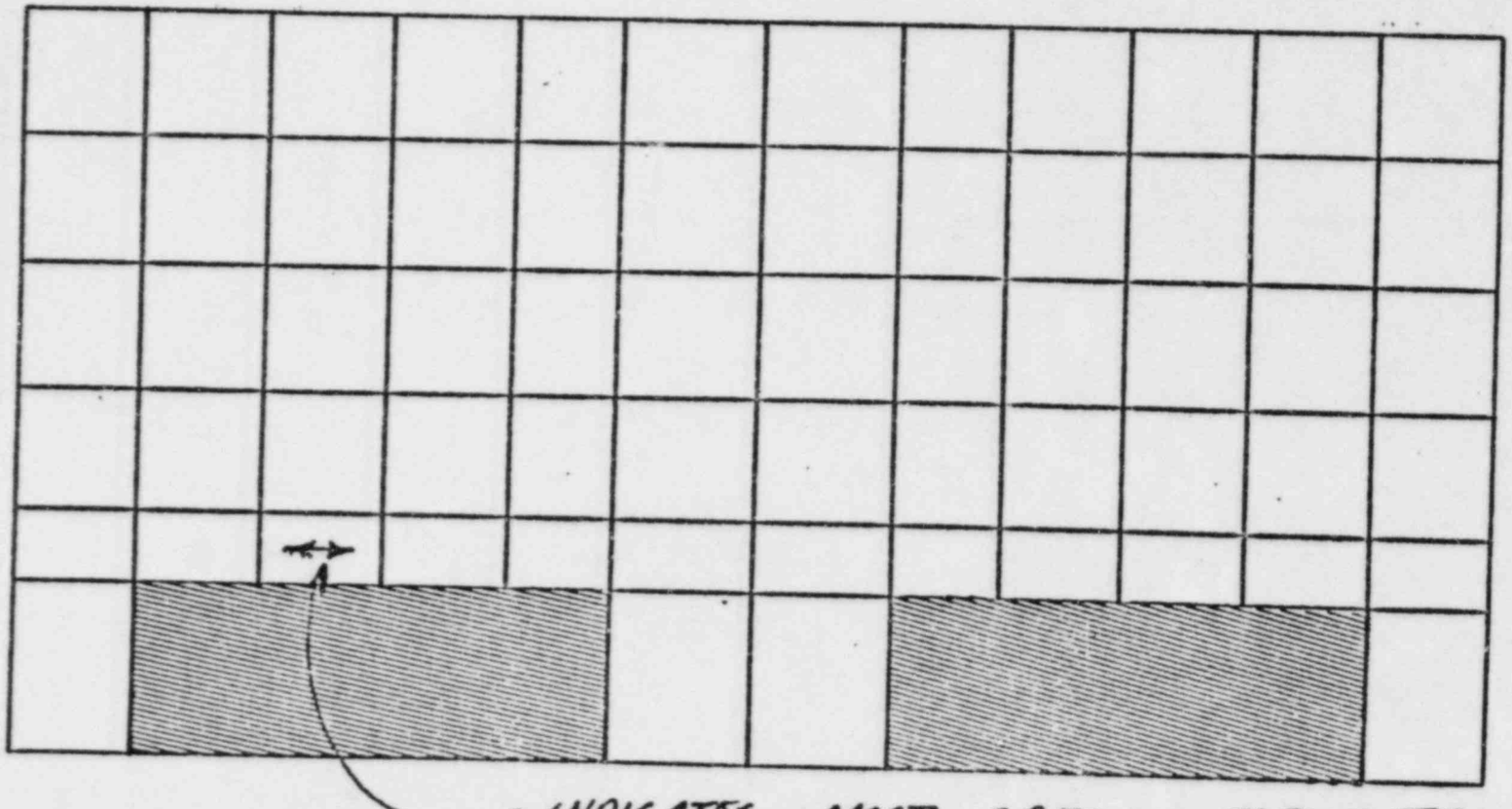
SERVICE WATER PUMP STRUCTURE
FINITE ELEMENT MODEL
TRANSVERSE WALL - OPERATING ROOM LEVEL



30

SERVICE WATER PUMP STRUCTURE
FINITE ELEMENT MODEL
PUMPING BAY WALL

CONSTRUCTION CONDITION

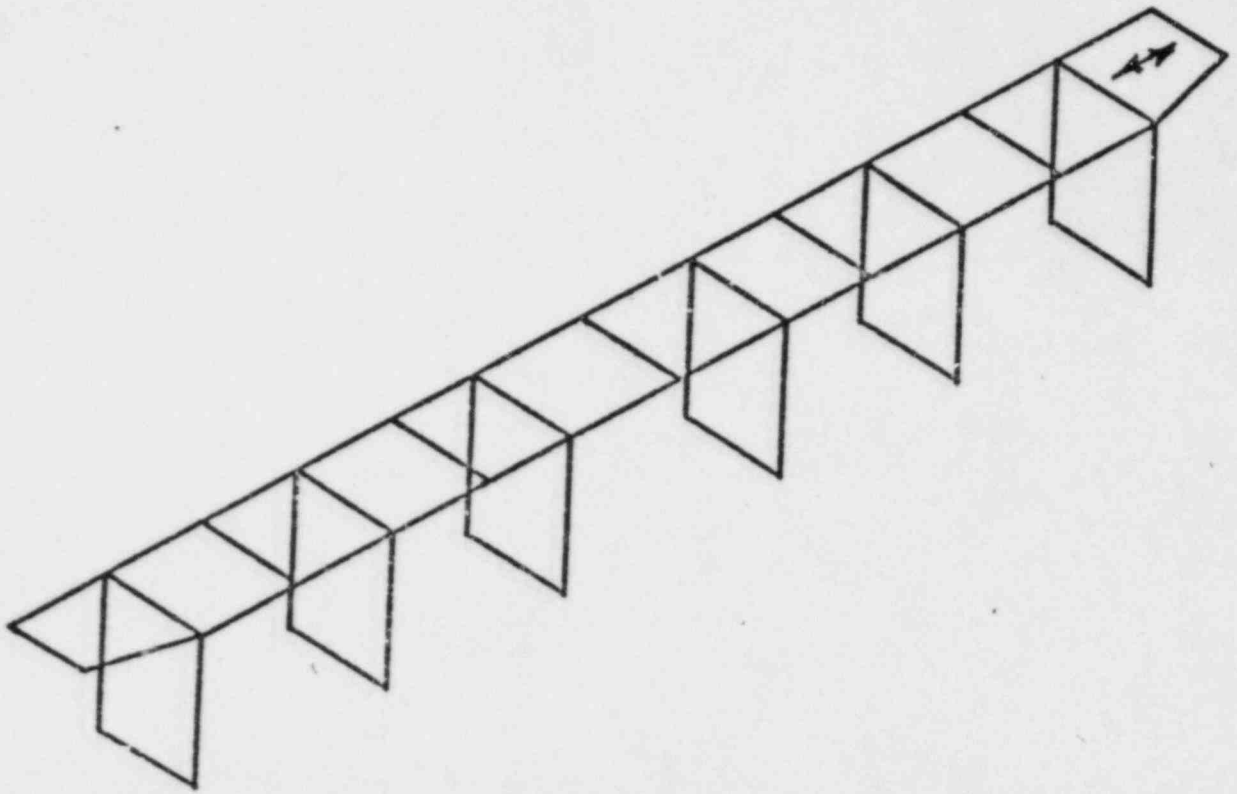


MIDLAND UNITS 1 AND 2
NRC PRESENTATION 3/15/82

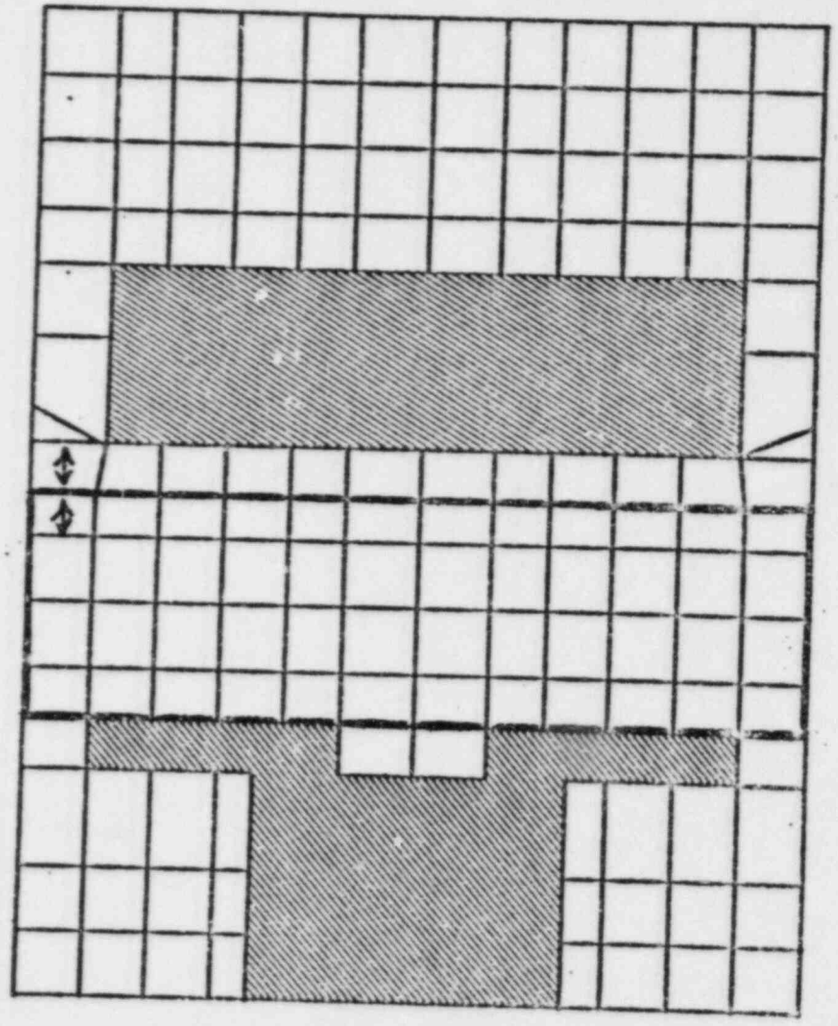
G-1684-164

SERVICE WATER PUMP STRUCTURE
FINITE ELEMENT MODEL PIPE SUPPORT

CONSTRUCTION CONDITION



SERVICE WATER PUMP STRUCTURE
FINITE ELEMENT MODEL
ROOF SLAB - EL 656'-0"

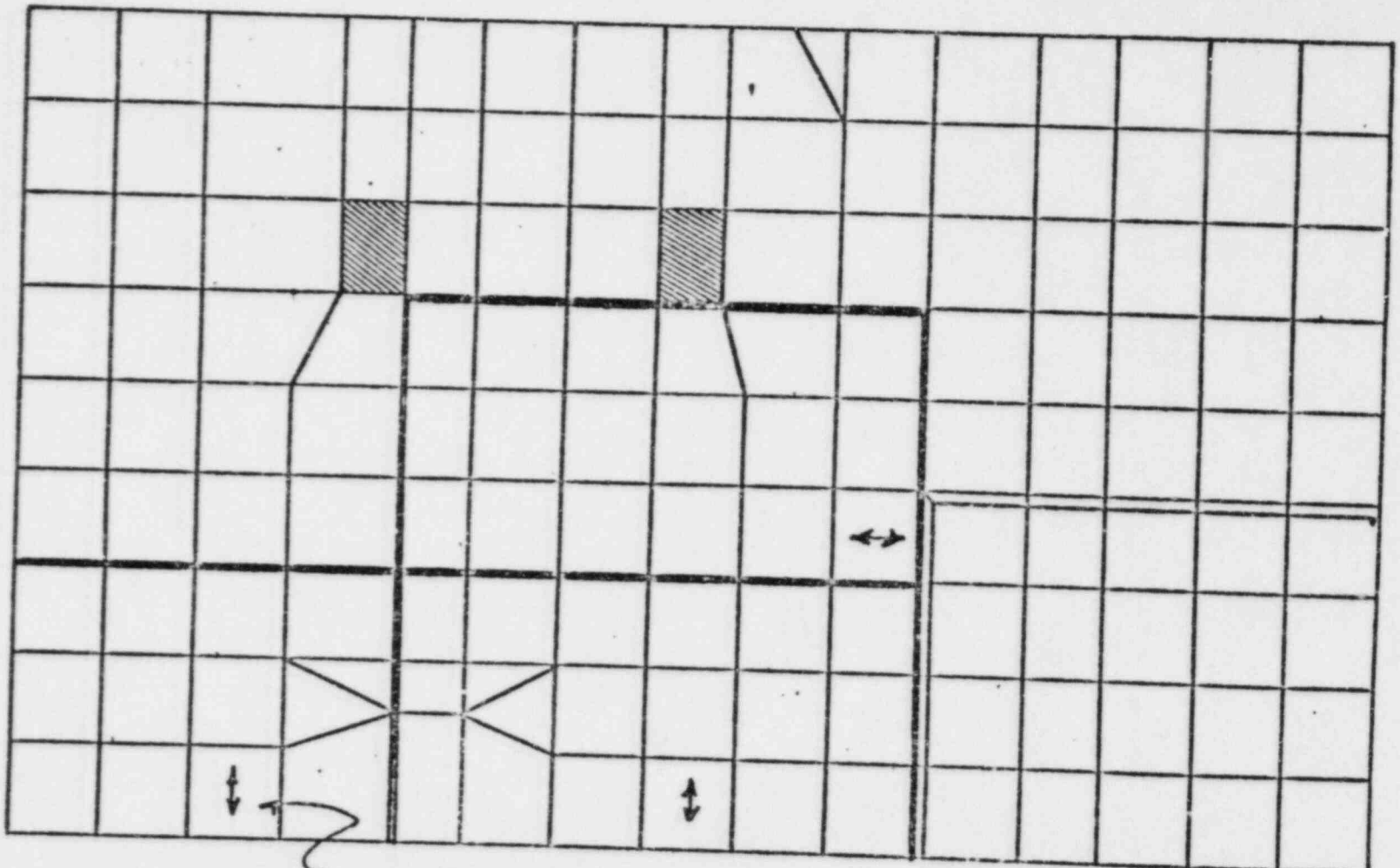


CONSTRUCTION CONDITION

MIDLAND UNITS 1 AND 2
NRC PRESENTATION 3/15/82

SERVICE WATER PUMP STRUCTURE
FINITE ELEMENT MODEL
EAST WALL

FSAR LOAD COMBINATIONS



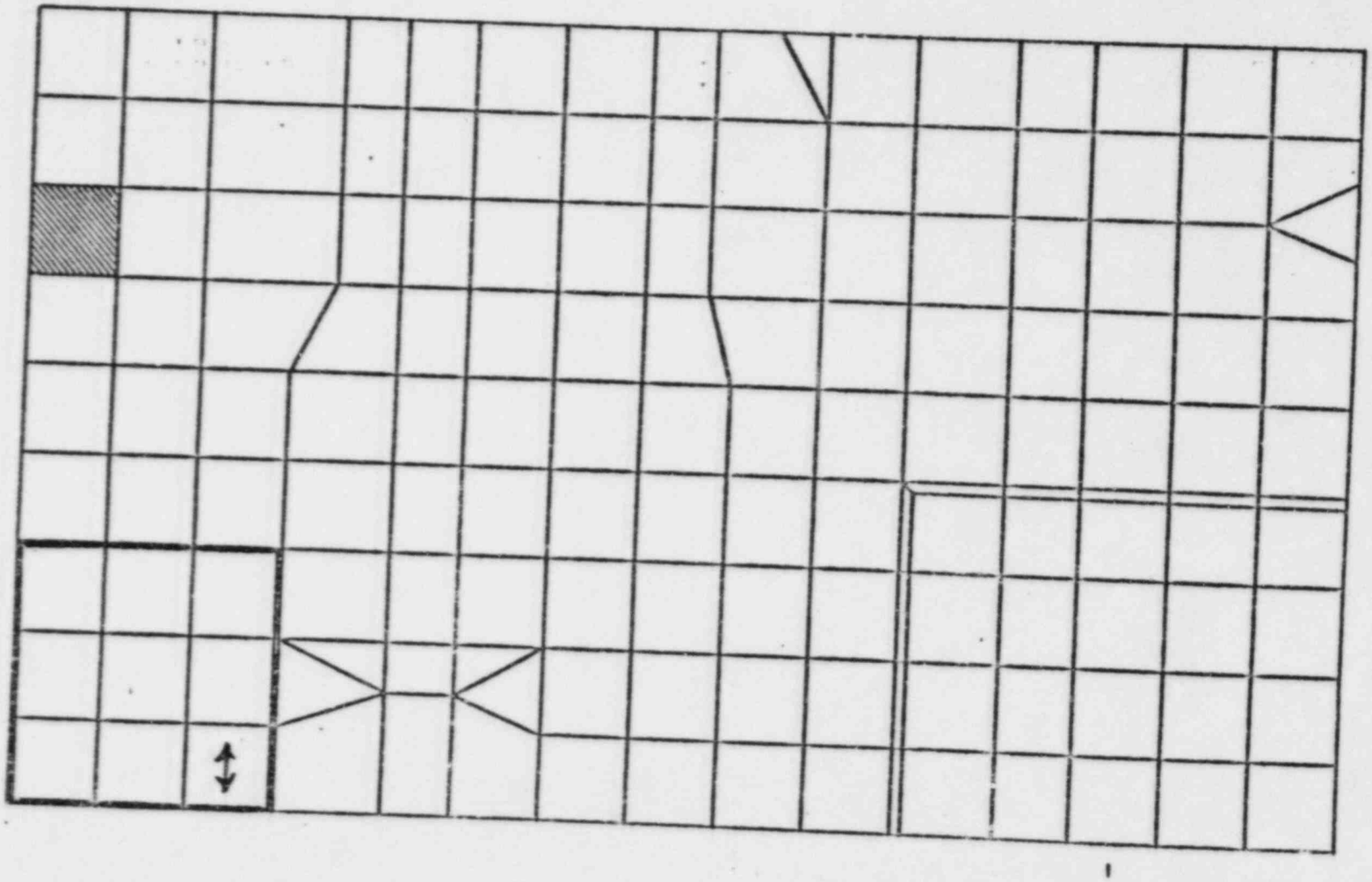
INDICATES MOST CRITICAL ELEMENTS AND DIRECTION OF OVERSTRESSED REINFORCEMENT (TYPICAL)

MIDLAND UNITS 1 AND 2
NRC PRESENTATION 3/15/82

G-1684-108

SERVICE WATER PUMP STRUCTURE
FINITE ELEMENT MODEL
WEST WALL

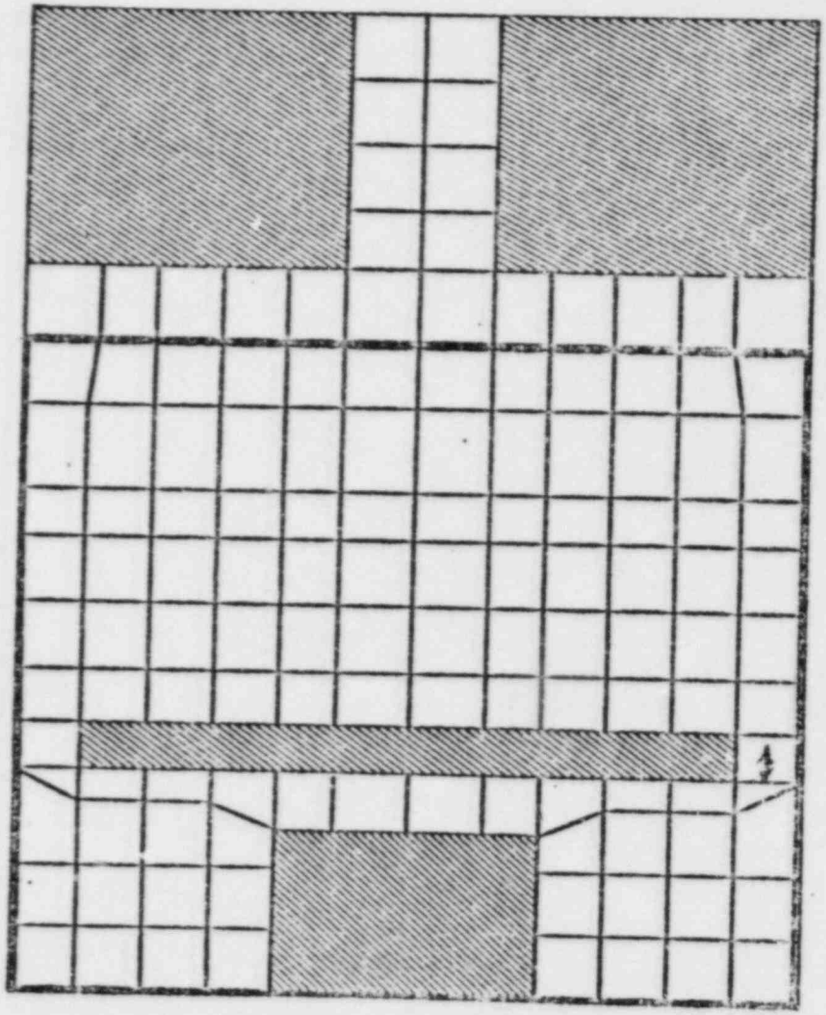
FSAR LOAD COMBINATION



MIDLAND UNITS 1 AND 2
NRC PRESENTATION 3/15/82

35

SERVICE WATER PUMP STRUCTURE
FINITE ELEMENT MODEL
OPERATING FLOOR - EL 634'-6"



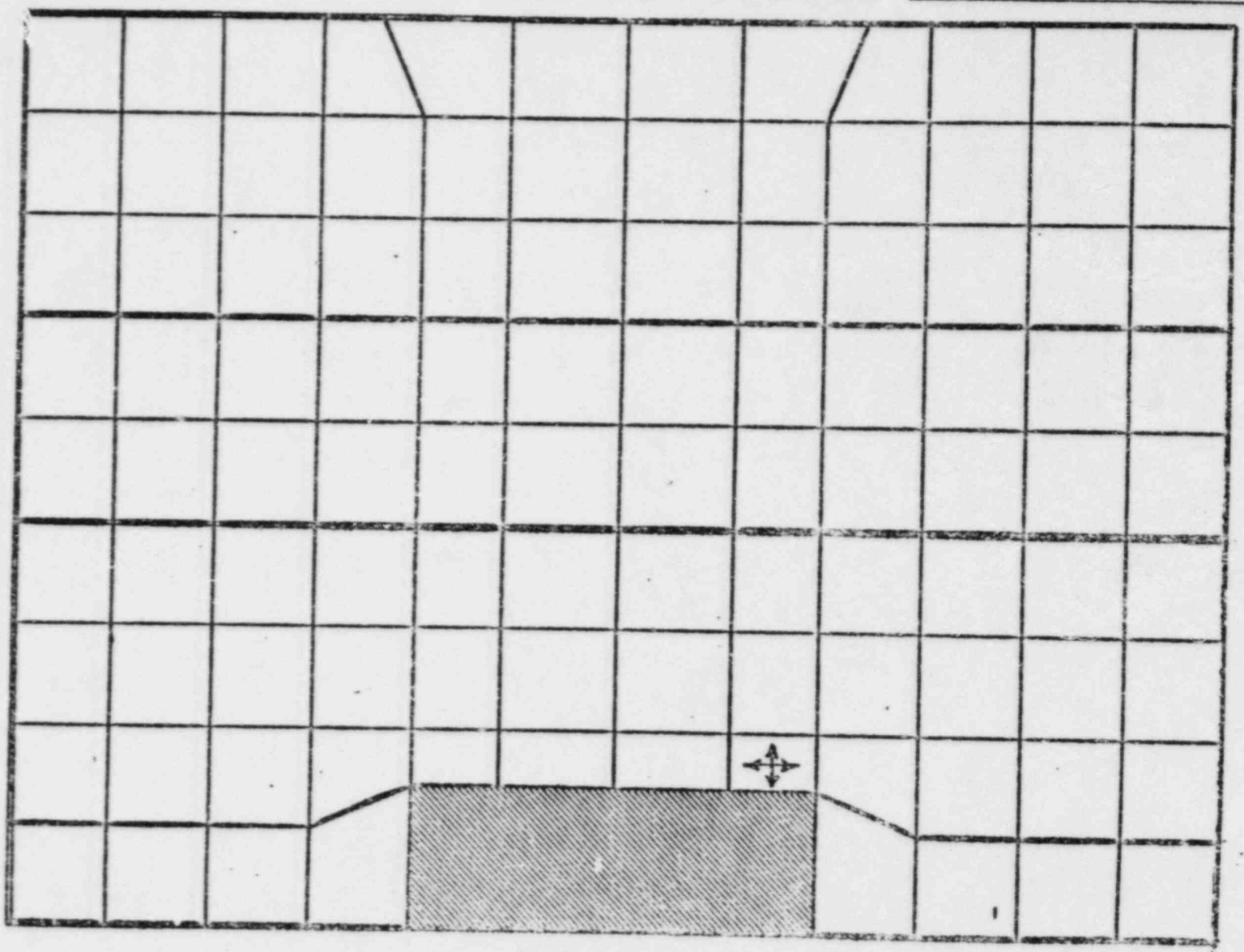
FSAR LOAD COMBINATIONS

MIDLAND UNITS 1 AND 2
NRC PRESENTATION 3/15/82

G-1584-169

8704080

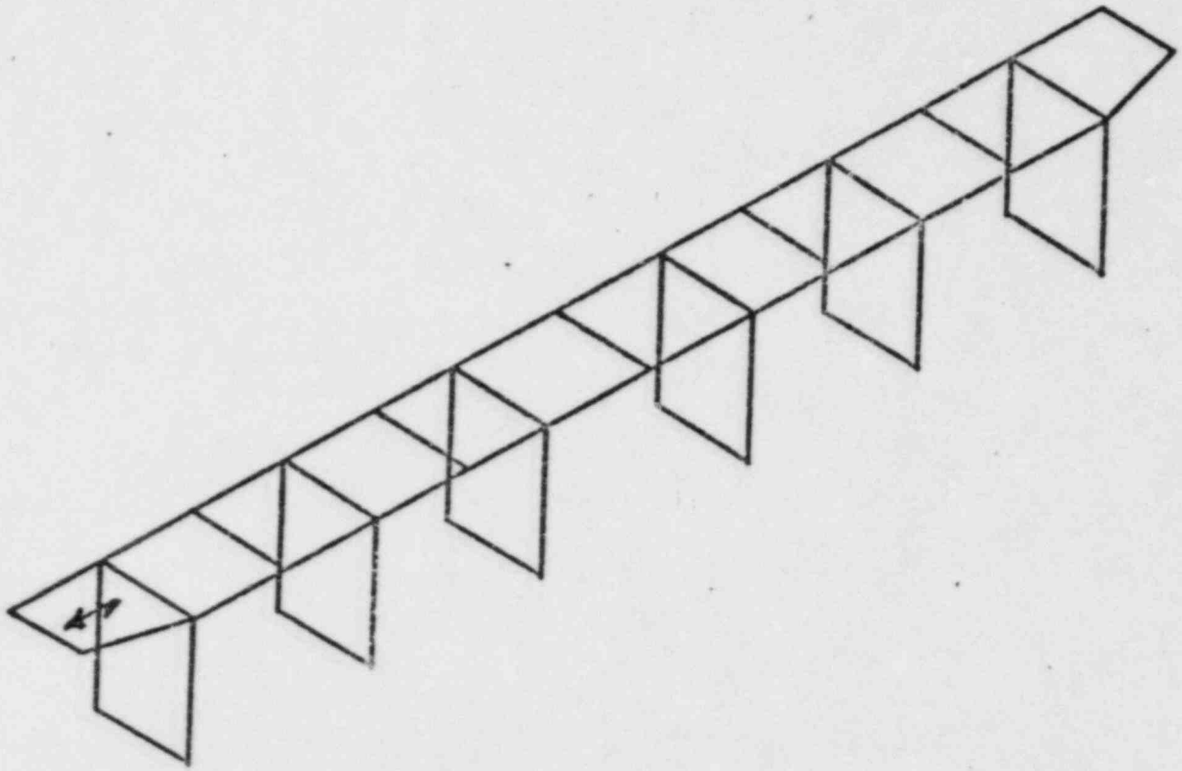
SERVICE WATER PUMP STRUCTURE
FINITE ELEMENT MODEL
SOUTH WALL FSAR LOAD COMBINATION



MIDLAND UNITS 1 AND 2
NRC PRESENTATION 3/15/82

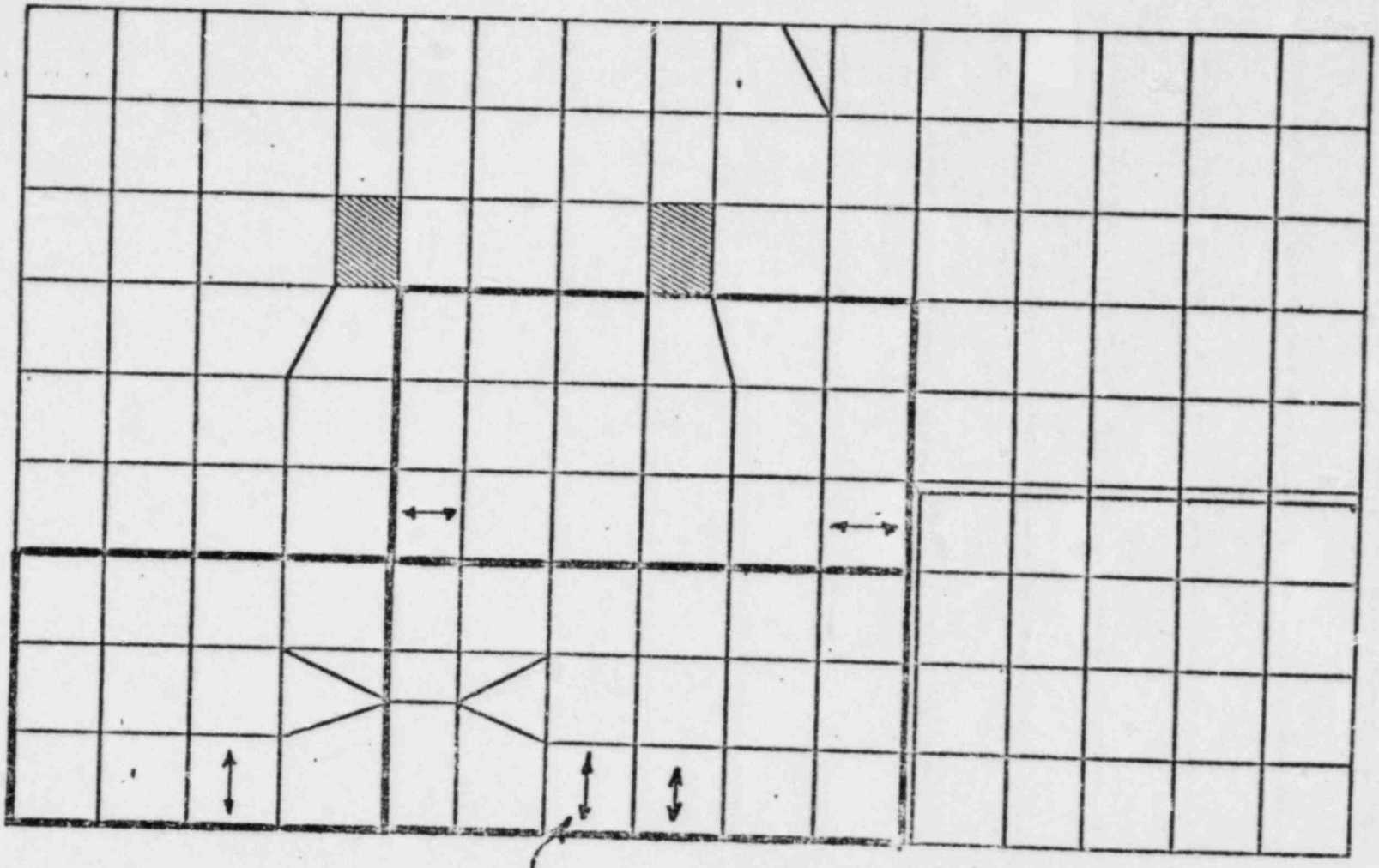
SERVICE WATER PUMP STRUCTURE
FINITE ELEMENT MODEL PIPE SUPPORT

FSAR LOAD COMBINATIONS



SERVICE WATER PUMP STRUCTURE
FINITE ELEMENT MODEL
EAST WALL

ACI 349 LOAD COMBINATIO



MIDLAND UNITS 1 AND 2
NRC PRESENTATION 3/15/82

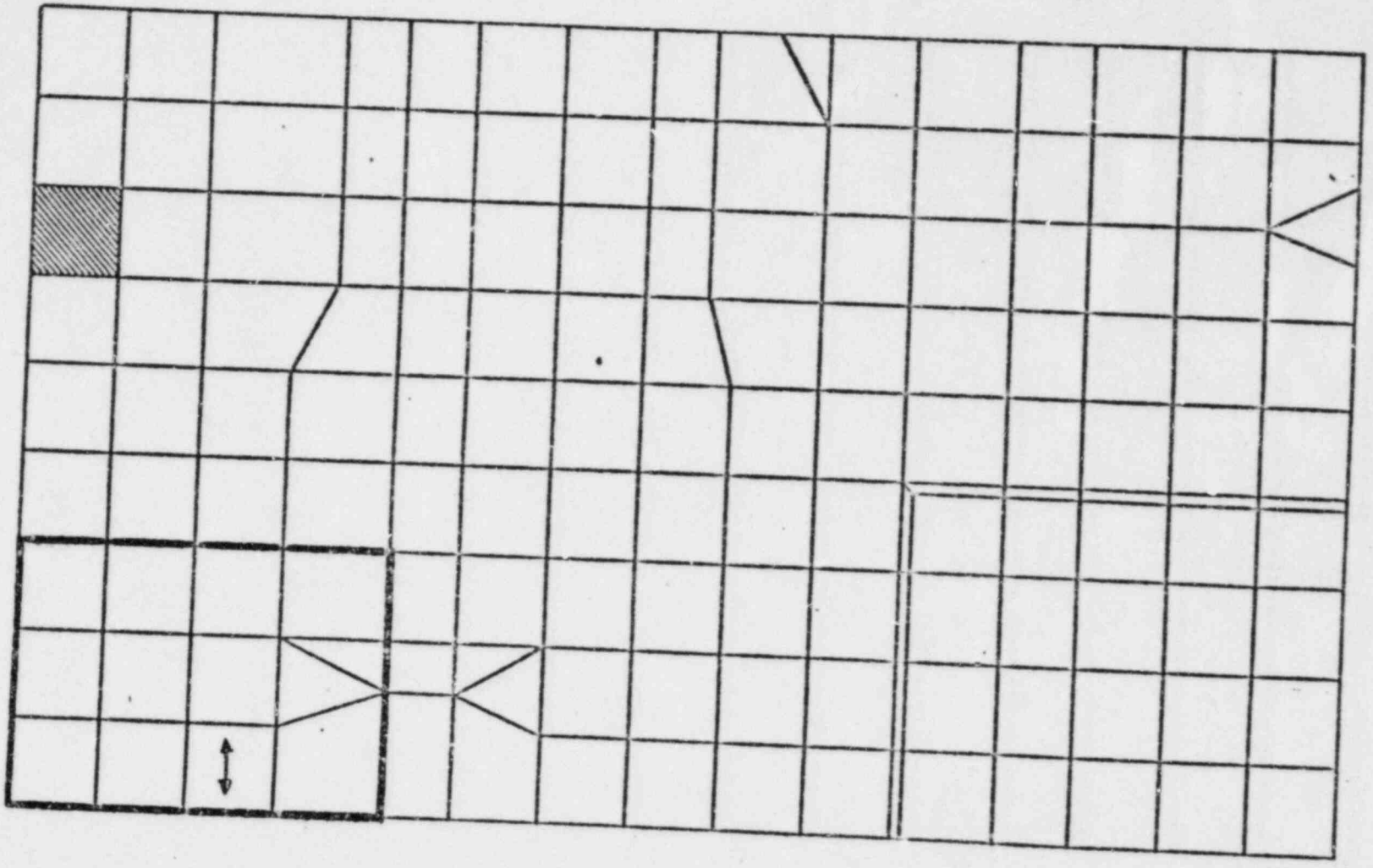
INDICATES MOST CRITICAL ELEMENTS
AND DIRECTION OF OVER STRESS

SERVICE WATER PUMP STRUCTURE
FINITE ELEMENT MODEL
WEST WALL

ACI 349

39

9847/90

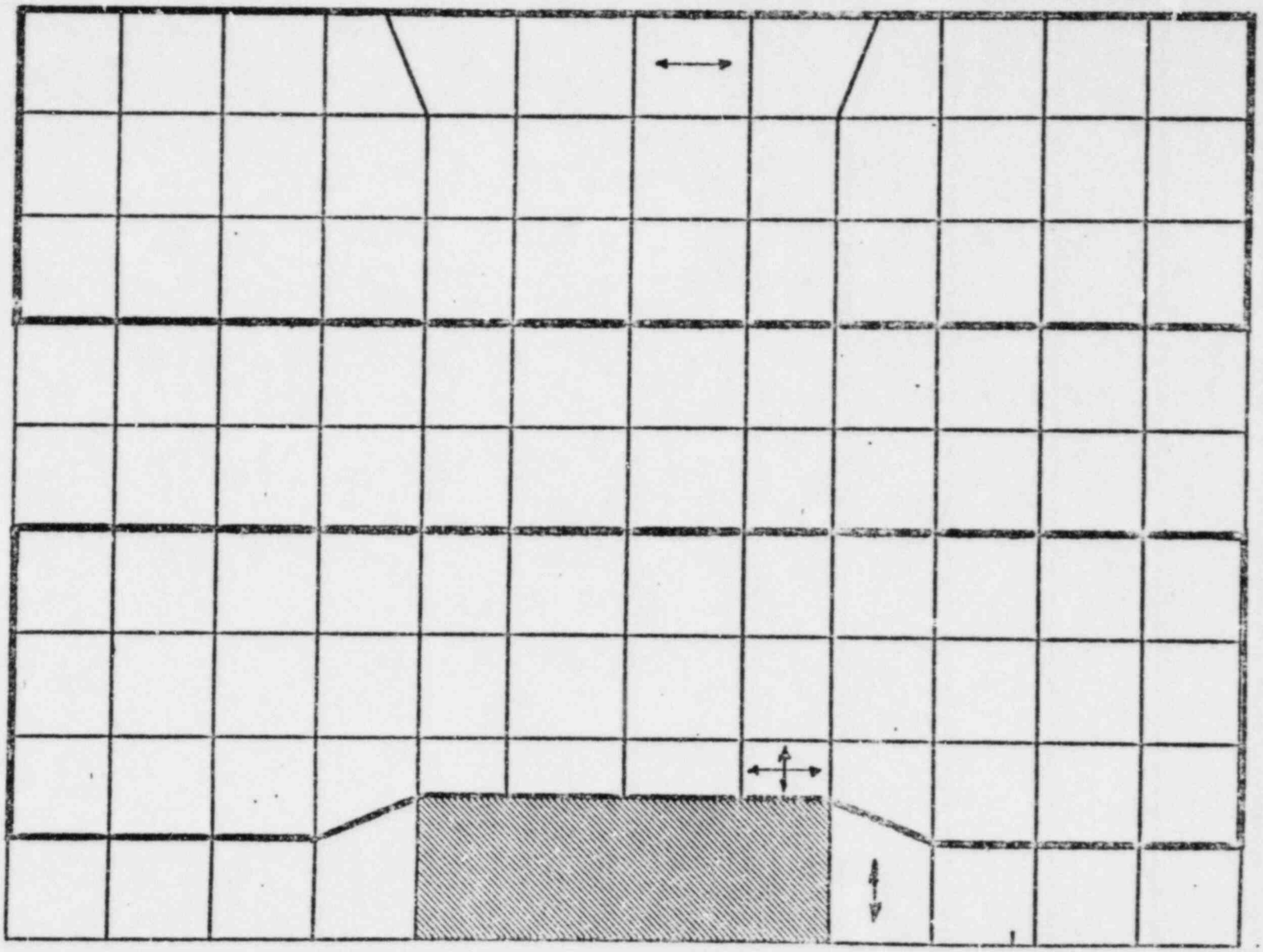


MIDLAND UNITS 1 AND 2
NRC PRESENTATION 3/16/92

G-1554-166

SERVICE WATER PUMP STRUCTURE
FINITE ELEMENT MODEL
SOUTH WALL

ACI 349



MIDLAND UNITS 1 AND 2
NRC PRESENTATION 3/15/82

C-1554-181

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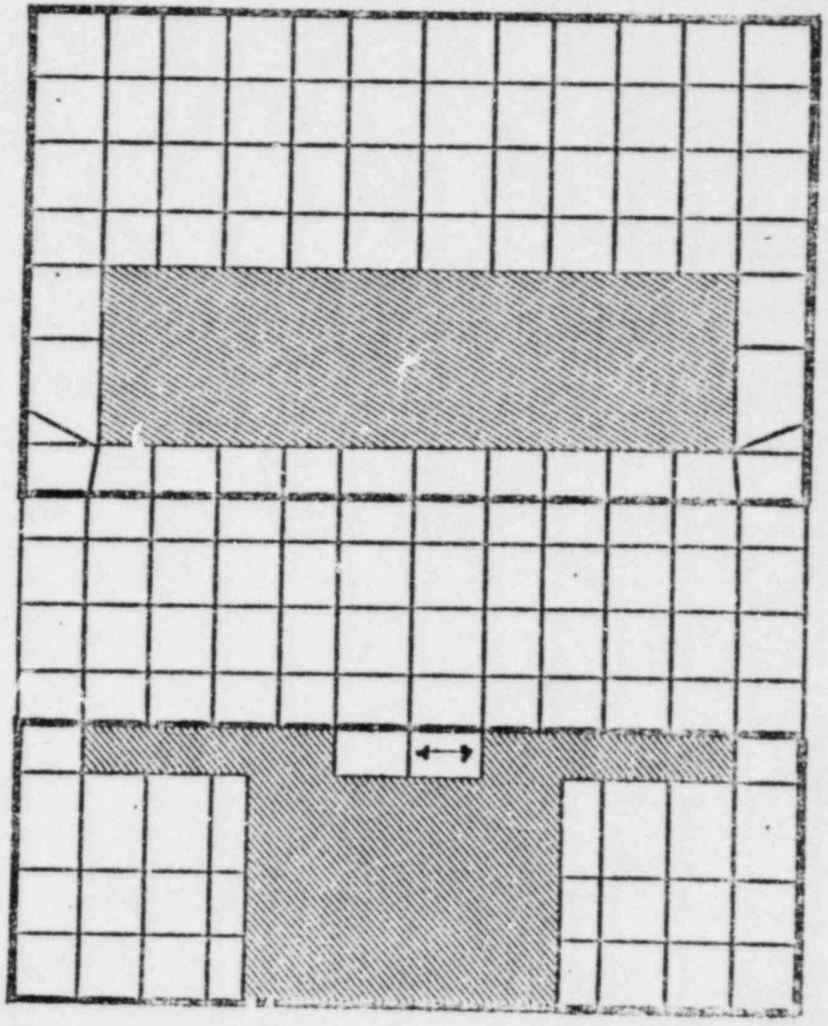
9847486

41

SERVICE WATER PUMP STRUCTURE
FINITE ELEMENT MODEL
ROOF SLAB - EL 656'-0"

ACI 349



MIDLAND UNITS 1 AND 2
NRC PRESENTATION 3/15/82

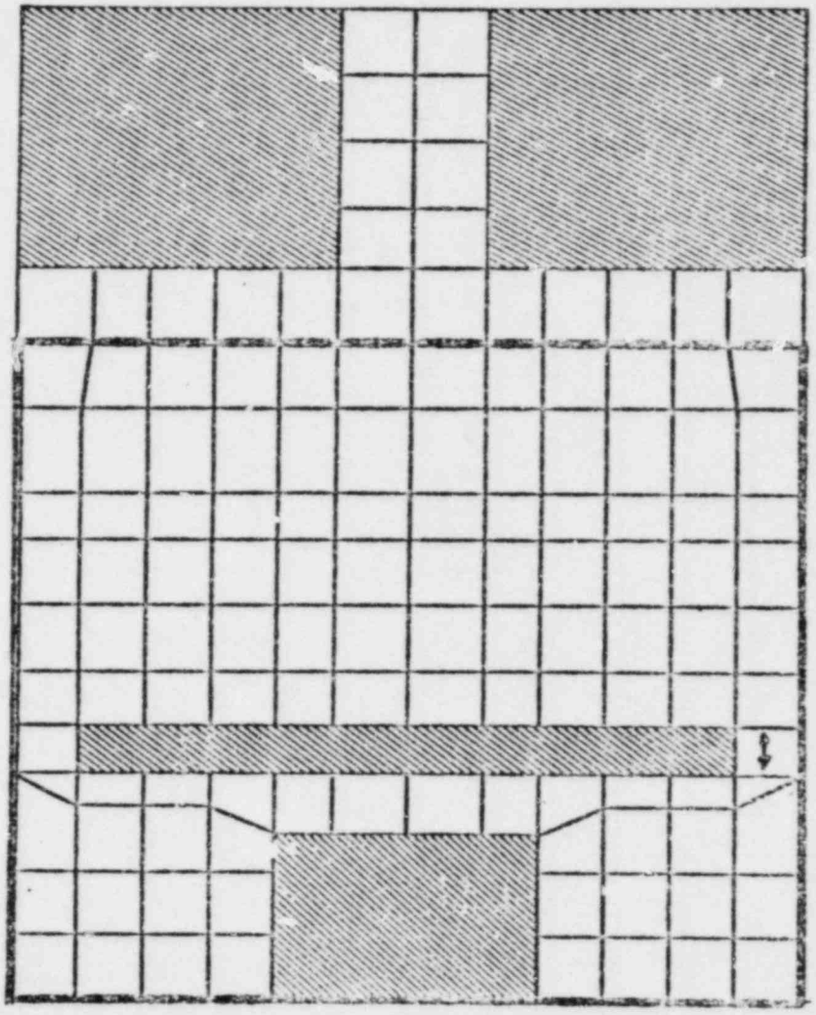
G-1684-162

42

SERVICE WATER PUMP STRUCTURE
FINITE ELEMENT MODEL
OPERATING FLOOR - EL 634'-6"

ACI 349

8804070486



MIDLAND UNITS 1 AND 2
NRC PRESENTATION 3/15/82

G-1584-163

43

SERVICE WATER PUMP STRUCTURE
FINITE ELEMENT MODEL PIPE SUPPORT

ACI 349

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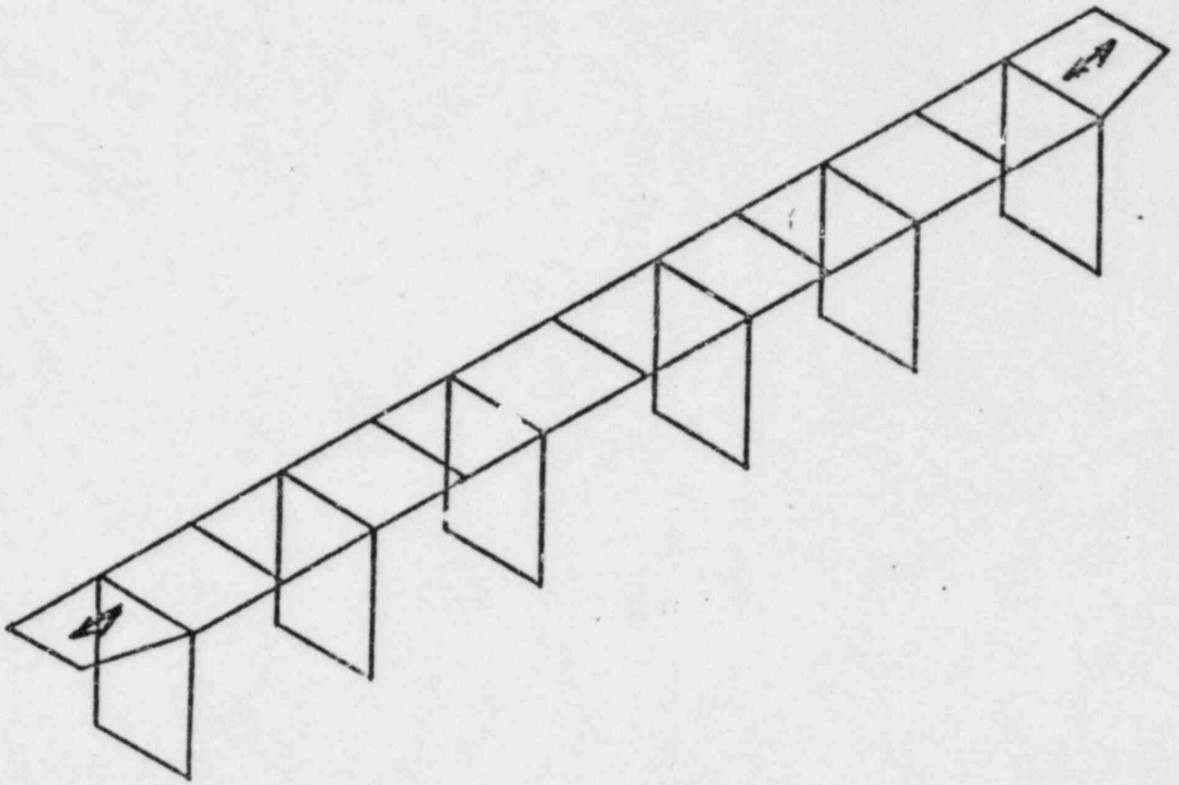
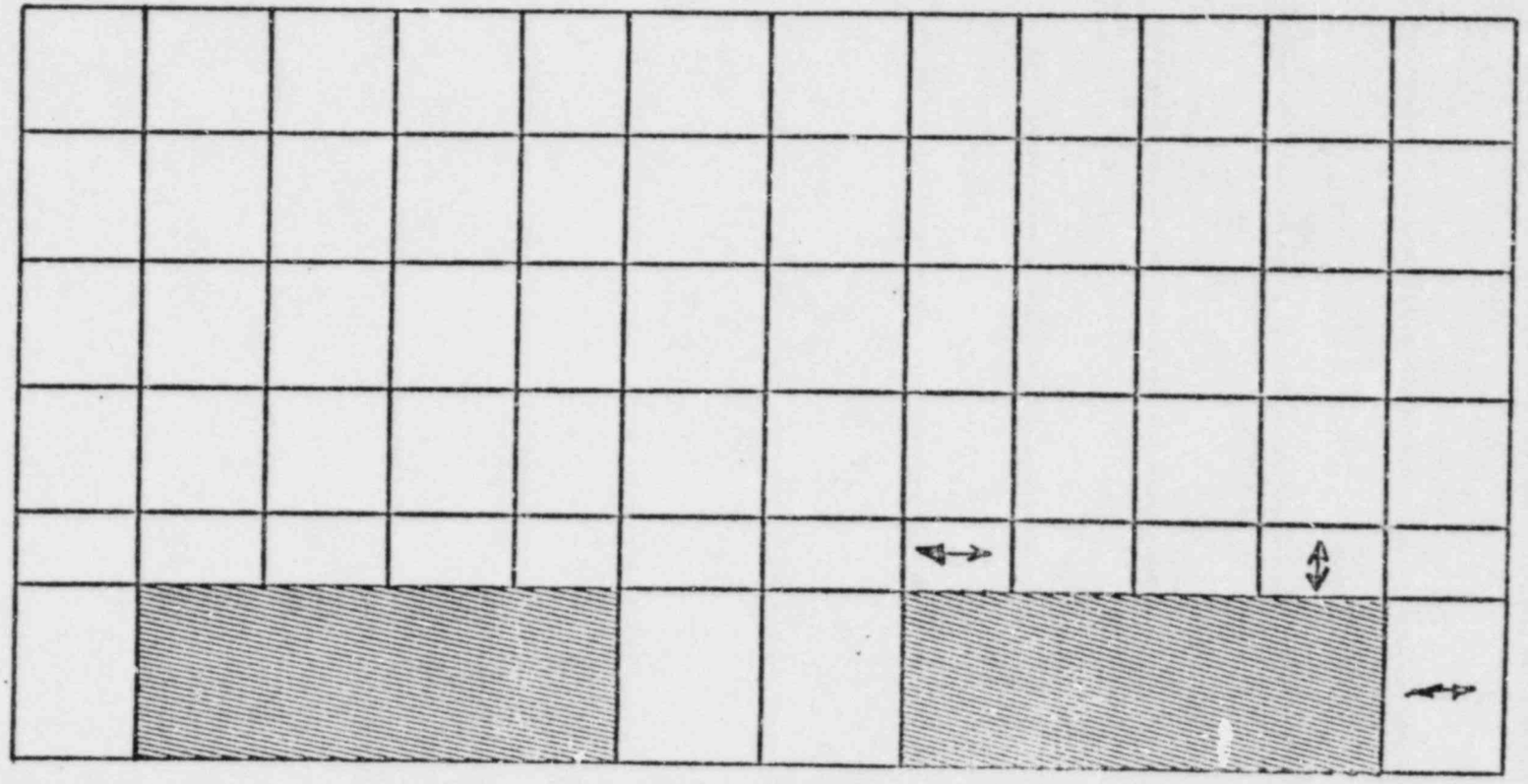


MIDLAND UNITS 1 AND 2
NRC PRESENTATION 3/16/82

G-1584-162

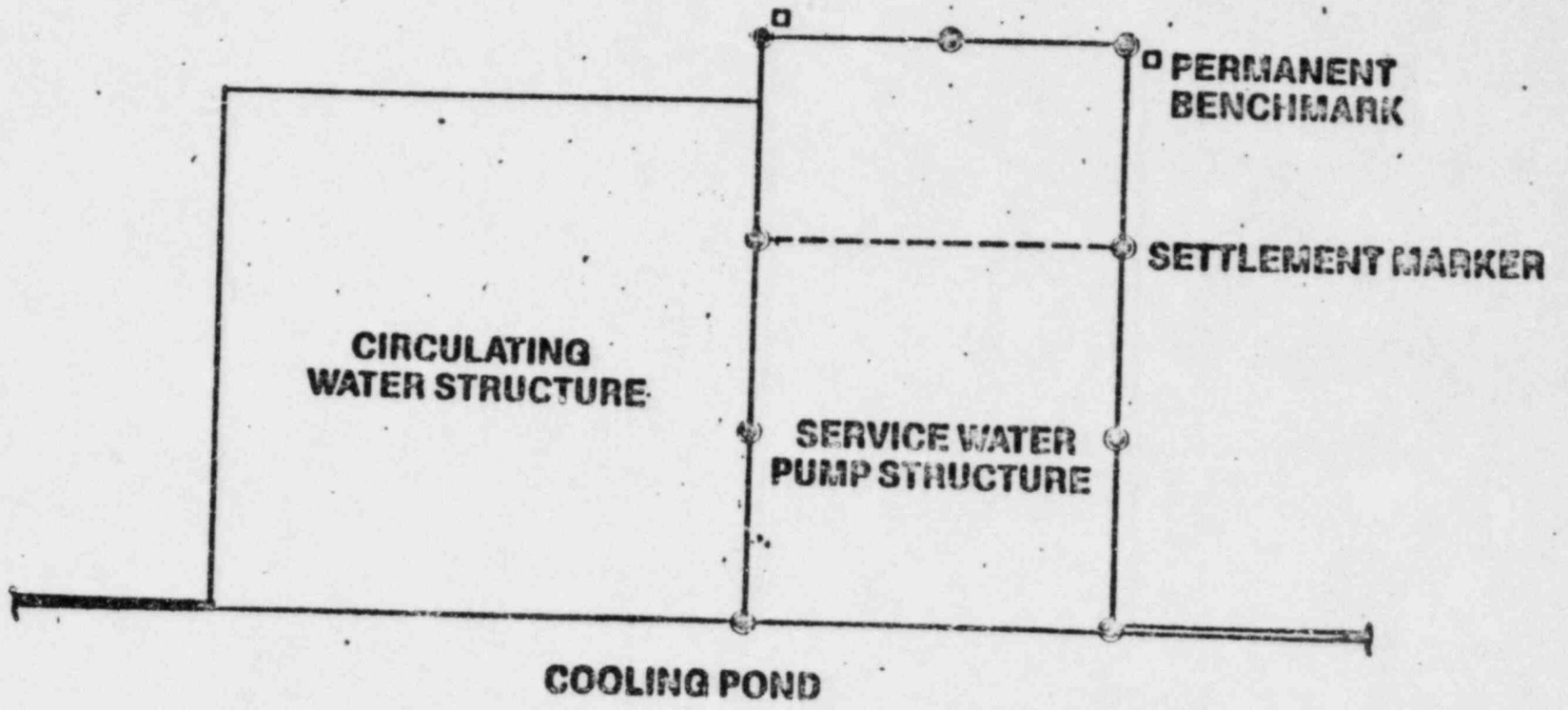
SERVICE WATER PUMP STRUCTURE
FINITE ELEMENT MODEL
PUMPING BAY WALL

ACI 349



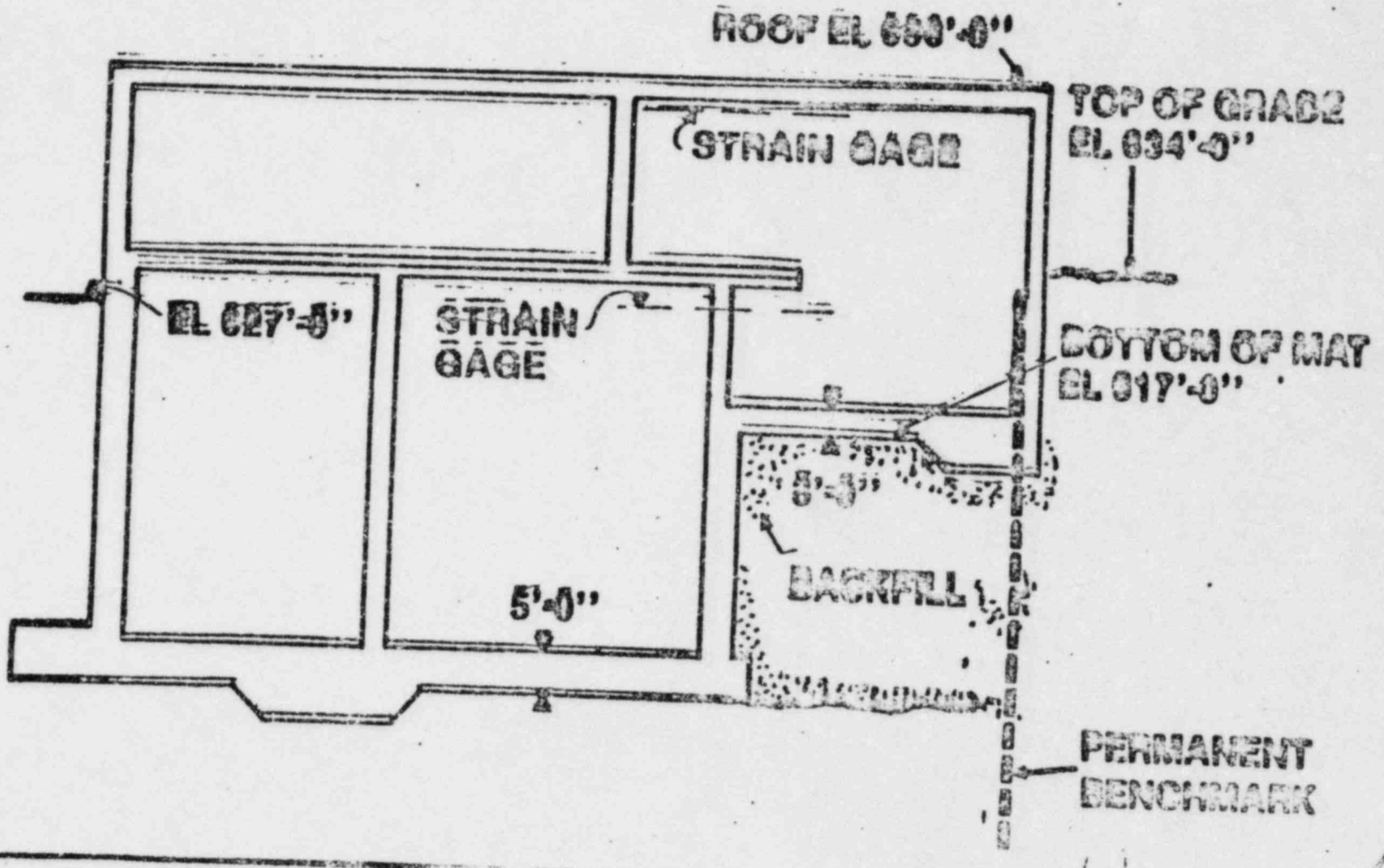
SERVICE WATER STRUCTURE SETTLEMENT MARKER LOCATIONS

45



SERVICE WATER PUMP STRUCTURE
TYPICAL SECTION

46



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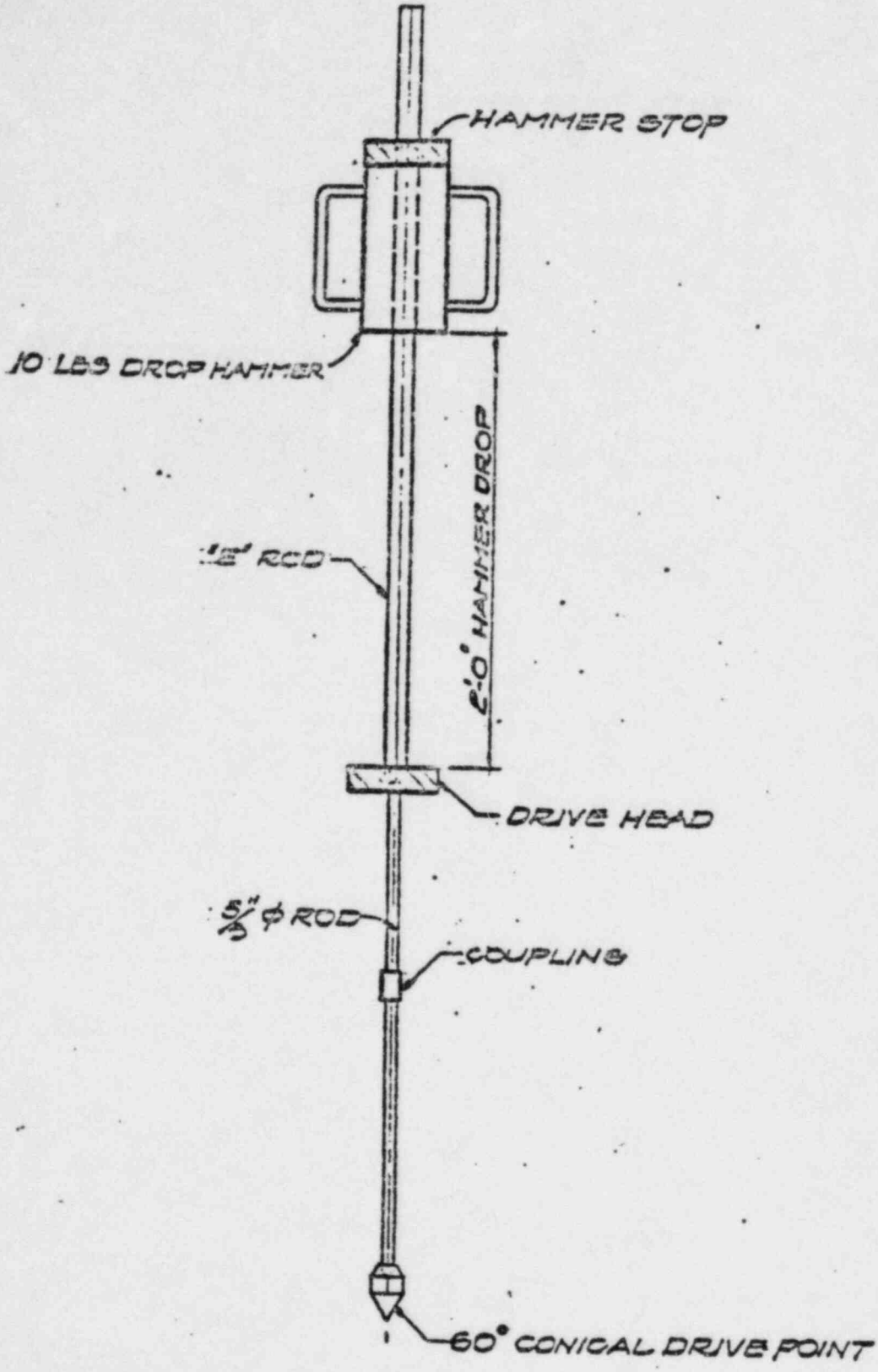

— SKETCH OF —
DYNAMIC CONE PENETROMETER

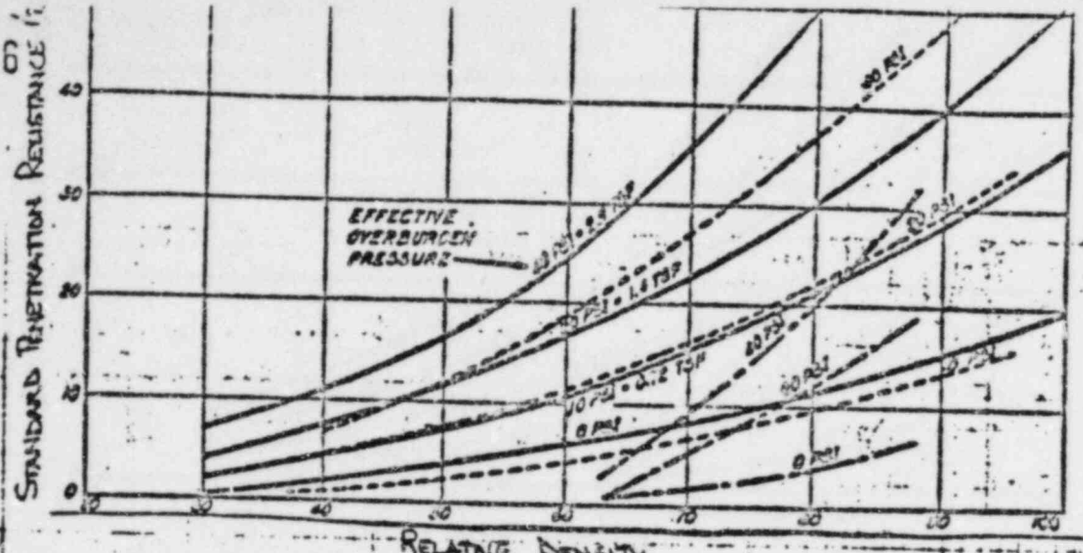

FIGURE 9.2 FROM VAN DOCKS. DM-7, CORRELATION OF STANDARD PENETRATION RESISTANCE TO RELATIVE DENSITY (FROM GIBBS + HOLTZ, 1957)

STANDARD PENETRATION RESISTANCE N (BLOWS/FT)

0 5 10 15 20 25

0 10 20 30 40 50

CRANE PENETROMETER N (BLOWS/FT)

THE DYNAMIC CONE PENETROMETER

A penetrometer is a device forced into the soil to measure its resistance to vertical penetration. In a dynamic penetration test, the penetrometer is driven into the soil by a hammer or falling weight. Soil penetrometers are used for qualitative measurements of relative density of cohesionless soils or consistency of cohesive soils. Penetrometers have been designed to give qualitative measurements of soil penetration resistance for correlation with soil physical properties such as relative density, unconfined compressive strength or shear strength, bearing value, or safe soil pressure.

Dynamic Resistance - The oldest and simplest form of soil penetrometers consists of driving a rod into the ground by repeated blows of a hammer. The penetration of the rod for a given number of blows with a hammer of constant weight and drop, or the number of blows required per foot penetration of a rod, may be used as an index of penetration resistance and correlated directly with local foundation experience. The numerical value of this index depends not only on the nature of the soil but also on the diameter, length, and weight of the rod in relation to the weight and drop of the hammer.

Cone penetration tests were developed as an easy and quick method for determining the approximate shearing resistance of noncohesive soils. The dynamic cone penetrometer consists of a 60-degree cone of steel attached to a section of rod. The rod is driven into the ground with a 10-pound drop hammer. The hammer is raised and allowed to fall a distance of 24 inches. The 60-degree cone is 1-1/8 inch in diameter. The diameter of the rod is smaller than that of the conical drive point, and short sections of rods are joined by couplings. This arrangement helps to reduce friction and permits use of a drive point and rod of smaller dimensions. When representative samples are desired of a certain strata, the drive point can be replaced with a small drive sampler. The weight of the entire equipment is about 25 pounds. The soil around and below the cone is slightly disturbed as the test progresses; therefore, the penetration does not correspond directly to the shearing resistance of the undisturbed soil. The penetration will also depend to some extent on the speed with which the cone is pushed into the soil. Despite these shortcomings, the cone penetrometer may be used advantageously in many soil investigations and is easier to perform than other more complicated field tests.

Variations in cone penetrometer resistance may indicate dissimilar soil layers and the numerical values of these resistances permit an estimation of some of the physical properties of the strata. The penetrometer can therefore be considered a method of both exploration and field testing. The advantages and limitations of this method may be summarized as follows.

When the resistance to penetration is properly determined, the profiles obtained generally furnish consistent data on the depths of the different soil strata, but misleading results can also be obtained when the soil contains gravel and boulders. Profiles of continuous penetration resistance may indicate the presence of a thin layer which often remains unobserved in boring operations, but the strata encountered cannot be definitely identified by resistance to penetration alone. The cone penetrometer method is generally faster and less expensive than other more complicated methods.

Resistance to penetration profiles also indicates the consistency of cohesive soils and the compactness or relative density of cohesionless soils in situ. This information is valuable when undisturbed samples are difficult to obtain, as in saturated cohesionless soils, when many tests are required, or testing time is a factor. Generally, small and large areas can be explored rapidly and economically by penetrometer methods, especially when the depth of exploration is moderate and the soils are noncohesive.

The results of the cone penetrometer test should be used as indicators only. In comparing allowable bearing pressure with penetration resistance, the depth of confinement is critical in granular soil. Thus, correlations should be developed for each specific project. This correlation can be developed by using the pressure meter, field density tests (sand cone or nuclear), or other methods so that a given blow count can be related to a specific soil property, such as density or modulus.

SERVICE WATER PUMP STRUCTURE
ITEMS TO BE RESOLVED

Hydraulic and Geotechnical Engineering Branch

	Items to be Resolved	Date Due
1.	Bearing stratum summary of procedures	
	a. Maximum thickness of lean concrete	04/15/82
	b. Maximum elevation differential for pit of piers	
2.	Pier or plate load test procedure	04/01/82
3.	NRC action - soil spring constants (discussion held by telephone)	03/26/82
4.	Strain monitoring criteria - matrix	04/15/82
5.	NRC action - respond on construction dewatering (concurrence received)	03/26/82
6.	Drawings on strain monitoring and Carlson meters, including locations and details	04/15/82
7.	NRC action - drawing on settlement monitoring plans (discussion held by telephone)	03/26/82
8.	Monitoring matrix	04/15/82
9.	Discussion of critical construction stages and critical measurements	04/15/82
10.	Submittal of contingency plan and discussion of possible remedial actions	04/08/82
11.	Submittal of Q-listed operations (general statement of philosophy)	04/15/82
12.	Summary submittal of specification or drawing notes to cover frequency for checking and adjusting jacking loads	04/08/82
13.	Submittal of method to be followed for transfer of jacking load into permanent wall	04/15/82
14.	Provide decision on tunnel location prior to hearing	04/15/82
15.	Add deep-seated benchmarks on south side of SWPS	04/15/82
16.	Provide Calculations DQ-32.8(Q) and DQ-53(Q) (sliding and lateral dynamic loading)	04/15/82

3/25/12

Attachment 4 to Meeting Notes No. 1572

STRUCTURAL ENGINEERING BRANCH ITEMS TO BE RESOLVED*

1. Recheck tendon anchor analysis for shear at plate and wall.

2. Reevaluate use of drilled-in dowels regarding embedment or use of rock bolts.

3. Refine sliding calculation to meet acceptance criteria using site-specific response spectra (SSRS) seismic loads.

4. Complete the calculation for an empty forebay cell.

5. Determine maximum rebar stress in all elements of the base slab at el 620'.

6. Determine maximum rebar stress in elements adjacent to identified critical elements and other areas of potential high stress.

7. Complete calculations for out-of-plane shear.

8. Provide more information as to stress condition for existing parts of structure.

   a. Maximum stresses

   b. Critical combinations

   c. Identify true critical elements based on actual rebar.

9. Evaluate interaction of the SWPS with the circulating water pump structure and retaining wall.

10. Provide a comparison of loads due to the SSRS with loads due to 1.5 times the safe shutdown earthquake.

11. Items 1 through 10 will be resolved by submittal of corrected calculations.

*Due 4/15/82

3/25/12

Attachment 5 to Meeting Notes No. 1572

PARAMETRIC AUXILIARY BUILDING ANALYSIS

1. Ec value - Same as ACI 318 (no reduction)

2. Steel in the slab - Restricted to the beams with shear studs

3. Reduced stiffness - Reduction of stiffness based on rebar and steel based on stud flexibility (use conservative estimate) in cracked area.

   Initial crack:
   Based on 2 $\sqrt{f_c'}$ to 3 $\sqrt{f_c'}$ in shear, and

   4 $\sqrt{f_c'}$ in tension

4. Total load - Live load need not be considered (whatever exists must be included).

5. Redistribution - Accounted for by the cracking of elements. Only if necessary, local yielding may be considered, provided there is a valid mechanism to transfer load.

6. Acceptance criteria - Based on stress in rebar and effective steel section.

7. Refinement of analysis - More than two construction stages may be considered in the analysis.

3/25/12

067486

Attachment 6 to Meeting Notes No. 1572

AUXILIARY BUILDING - ITEMS TO BE RESOLVED*

Phase 2A - Auxiliary Building

1. Submit construction sequence and procedures

2. Delineate Phase 2A and 2B (by letter)

3. Update drawing of monitoring matrix

4. Consumers Power Company commitment for nine deep-seated benchmarks plus two relative monitoring points

5. Install strain monitoring; monitor for Phase 2A and 2B; tolerance provided for Phase III

6. Commit to load test pier for 1.3 times design load on an installed pier or plate load test; identify pier

7. Submit measures for preventive action

8. Submit plans for localized dewatering, including zone of influence of drawings, and summary of dewatering concept

Phase 2B

1. Provide horizontal movement monitoring for Phase 2, and acceptance criterion before Phase 3

2. Complete parametric analysis of auxiliary building before Phase 3

3. Install all remaining instruments for Phase 2B

4. Install strain gages at el 659' slab, shear wall at el 614', electrical penetration area wall connection to the control tower roof, and steel beam at el 659'

5. Increase frequency of readings for critical measurements for Phase 2B

6. Provide criteria for allowable differential settlement for the 2-inch pipe in the feedwater isolation valve pit if installation is intended during underpinning

7. Provide a general statement on Quality Assurance philosophy

8. Analyze electrical penetration area assuming it loses support for part of width for entire length while E-8 is in place

9. Develop contingency plan for grouting of voids beneath turbine building mat

*Due date was discussed in a letter (Serial 16597, from J.W. Cook to H.R. Denton, 3/31/82)

3/25/12

TABLE OF CALCULATIONS - SWPS

FINAL DESIGN - STRUCTURAL

NUMBER	DESCRIPTION
DQ4(Q)	Post Tensioning Ties
DQ32(Q)	Finite Element Model of the Underpinned SWPS
DQ32.1(Q)	Model Geometry
DQ32.2(Q)	Element Properties
DQ32.3(Q)	Normal Springs (FSAR Loading)
DQ32.4(Q)	Long Term Loading Springs (Settlement)
DQ32.4A(Q)	Springs for Preload
DQ32.5(Q)	Short Term Loading Springs (Seismic)
DQ32.6(Q)	Load Combinations
DQ32.7(Q)	Static Loadings
DQ32.7A(Q)	Construction Stage Loadings
DQ32.7B(Q)	Maintenance Condition Loading
DQ32.8Q	Dynamic Loading - Lateral Pressure
DQ32.8A(Q)	Revision of Mass Matrix Format - Verification
DQ32.8B(Q)	Conversion of Additional Dead and Live Load to Mass (Verification)
DQ32.8C(Q)	Adds Dead Load and Live Load to Mass Matrix - Verification
DQ32.8D(Q)	Evaluation of Rotational Sesimic Moments
DQ32.8E(Q)	Distribute Enclosed Water Mass to Structure - Verification
DQ32.8F(Q)	Add Water Mass to Mass Matrix - Verification

TABLE OF CALCULATIONS - SWPS

FINAL DESIGN (CONT.)

067486

NUMBER	DESCRIPTION
DQ32.8G(Q)	Application of Seismic Accelerations to the Mass Matrix - Verification
DQ32.9(Q)	Thermal Gradients
DQ32.10(Q)	Input for Critical Element Screening Program
DQ32.11(Q)	Comparison of Two Sets of Seismic Data
DQ32.12(Q)	ACI 349 Load Combinatins and Preliminary Screening (Verification)
DQ32.13(Q)	Response to Q.15 Load Combinations and Preliminary Screening (Verification)
DQ32.14(Q)	FSAR Load Combinations and Prelimniary Screening (Verification)
DQ32.15(Q)	Final Screening - Verification
DQ53(Q)	Sliding Calculation (Final Seismic Forces)
DQ54(Q)	Analysis of Lower Base Slab
DQ55(Q)	Design of Underpinning Wall
DQ56(Q)	Analysis of Columns and Beams
	GEOTECHNICAL CALCULATIONS
DQ32.3A(Q)	Subgrade Modulus (Normal Springs)

MEETING SUMMARY DISTRIBUTION

Docket No(s): 50-329/330 OM, OL
NRC/PDR
Local PDR
TIC/NSIC/TERA
LB #4 r/f
Attorney, OELD
OIE
E. Adensam
Project Manager D. Hood
Licensing Assistant M. Duncan
R. Hernan
W. Paton
NRC Participants:

D. Hood
J. Kane
F. Rinaldi
H. Singh

bcc: Applicant & Service List

Consumers Power Company

Dean L Quamme
Site Manager
Midland Project

Midland Project PO Box 1963, Midland, MI 48640 • (517) 631-8650

February 15, 1984

Mr John J Harrison, Chief
Midland Section, Region III
Nuclear Regulatory Commission
799 Roosevelt Road
Glen Ellyn, IL 60137

MIDLAND ENERGY CENTER
CONSTRUCTION COMPLETION PROGRAM IMPLEMENTATION
SUPPORT OF TURBINE ROLL MILESTONE
File: 0655 UFI: 99*08 Serial: CSM-0734

This is to advise you of Consumers Power Company desire and intent to proceed with that work necessary to support a Turbine Roll Test in mid-1984 and to reques your concurrence to same.

Paragraph 4.5.4 (Special Procedures) of the Construction Completion Program (CCP) recognizes the desirability of allowing installation of specific items to support the turnover schedule prior to full release of an area for Phase 2 work. This paragraph further identifies in general those requirements that must be met to allow that work to proceed. It is clearly the intent of Consumers Power Company to rigidly control this work to assure absolute compliance to the requirements of the CCP.

During the week of February 6, 1984, Consumers Power Company representatives met with you and Mr Gardner, and separately with the Site Resident Inspectors to explain the details of the work to be done. The package of information attach to this letter was used as the basis of those explanations. In summary, the package contains the following information:

1. General identification of plant systems involved.

2. Brief description of the turbine roll activity.

3. Scope of work described in level of effort, i.e., non-manual manhours for status assessment and QVP and craft manhours for Q and non-Q work.

4. Prerequisites to initiation of the work and control systems for execution of the work.

5. Identification of modules in which affected systems are located.

8402220179

6. Commodity lists identifying the detailed portions of each affected system that requires status assessment and/or QVP.

7. Marked-up system P&IDs identifying exact portion of each system required.

As has been identified to you in our meeting on this subject, portions of Q systems are required that are not located in modules currently released to Consumer by the NRC. As indicated above, the attachment clearly identifies these modules.

Considering the above, Consumers Power Company requests your concurrence to pursue the turbine roll milestone as described herein and requests the release of those portions of required systems contained in modules not currently released that are required to support this milestone.

CC: DSHood, Project Manager-Midland w/out attachment
RJCook, Midland Resident Inspector w/out attachment
JGKeppler, Regional Administrator, Region III w/out attachment

BCC: SHHowell, M-1180
JWCook, P26-336B
TABuczwinski, Midland
JNLeech, P24-507
DFLewis, Bechtel
DJVandeWalle, P24-614B
[redacted]
FCWilliams, IL&B, Washington, DC
GALow, P12-237A
NRC Correspondence File, P24-517
UFI, P24-517
BJWalraven, P24-517
Hearings File, P24-517
CMS, Midland
RAWells, Midland
Al Graber, LIS
Reading Copy:(P24-505, Rotha Boroff)
DMBudzik
RJErhardt
LSGibson
DTPerry

UNIT 2 TURBINE ROLL MILESTONE

CONSUMERS POWER COMPANY

February, 1984

TABLE OF CONTENTS

I. Introduction

1. Goals

Consumers Power Company has established a goal of completing the Unit 2 Turbine Roll milestone in mid-1984, which would allow the following:

A. Permit early identification and resolution of secondary plant problems. This activity will allow us to demonstrate the operability of a significant portion of secondary systems that normally would not be addressed until Hot Functional Testing.

B. Complete a significant portion of Midland Plant testing activities during 1984. This will leave a smaller portion of the work for 1985 and 1986 and allow resources to be levelized. A significant portion of Non-Q work can be completed, with a small amount of Q work.

C. Provide positive impact on people towards achieving plant completion.

2. Key Systems Involved

A. Main Steam

B. Turbine & Auxiliaries

Control & Stop Valves

Lube Oil, EHC, H_2 Seal Oil & Gas, Stator Water Cooling, Steam Seals

C. Condenser & Auxiliaries

Air Ejectors

D. Circulating Water & Auxiliaries

E. Service Water for Secondary Plant Systems

F. Feed Pump Turbines - No load test-uncoupled

G. Condensate Demineralizers

H. Miscellaneous Plant Systems

Plant Air, LP Boilers & Steam Distribution, Plant Demineralized Water, etc.

3. Brief Description of Turbine Roll

The Turbine Roll of Midland Unit 2 is an event which will identify problems prior to Plant Hot Functional Tests (HFT). It will use temporary High Pressure Auxiliary Boilers to supply steam via the permanent plant piping. The goal of the Turbine Roll is to balance the turbine, perform pre-synchronization checkout (including Main Turbine Generator Initial Roll Procedure. 2 TP-TGS.02), and then synchronize with a 20 to 30 MW_e load for a short time.

The method to accomplish the actual Turbine Roll itself will almost exclusively use permanent in-plant equipment, with the exception of the steam supply. The Temporary High Pressure Boilers (OE-150A,B,C) will supply approximately 525,000 lbm/hr of steam at 900 psig and 570 F° (35 F° superheat). This steam is supplied to OEBD-3 (Main Steam to PSS) and will flow back to OEBD-53 and 54. The line will be pressurized up to the Main Steam Isolation Valves (MSIV) on Unit 2 and up to the Main Steam Transfer Valves (MSTV) on Unit 1.

From this point through to the condenser, all equipment will be expected to function as it would during HFT. The flowpath is through the control and stop valves, the High Pressure Turbine, the Moisture Separator-Reheater, and to the Low Pressure Turbine(s). The turbine

exhaust will then proceed through LP feedwater heaters, through the drain cooler, and into the condenser. Finally, condensate is returned to the HP boilers by the condensate pumps using temporary jumpers into the PSS HP Condensate Return Line.

In addition to this main flowpath, a considerable amount of other equipment must also be available. The full condenser and vacuum systems are needed for support, as is the circulating water system. The LP Auxiliary Boilers will be needed to supply about 120,000 lbm/hr to various plant loads and about 100,000 lbm/hr to the HP Boiler Deaerator. Turbine Auxiliary Systems such as EHC, Lube Oil, Stator Water Cooling, H_2 Seal and Gas, and Steam Sealing must all be fully operable.

The actual process of initially rolling the turbine will involve tests at 100, 800, 1500 and 1800 rpm. The turbine will be tripped from 100, 800 and 1800 rpm, and the potential for a trip exists at any speed. While at 1800 rpm, the generator and exciter will be energized and synchronized, picking up a load of up to 20-30- MW_e for a short time (provided other plant conditions allow) and then tripped.

The two Feed Pump Turbines will be tested in an uncoupled mode as a part of the Turbine Roll evolution, but separately from the Main Turbine Unit. These tests will utilize many of the same systems utilized by the Main Turbine.

II. Scope of Work

1. Status Assessment / QVP Manhours

Status assessment and Quality Verification Program (QVP) work will be required in portions of seven modules to support the Unit 2 Turbine

Roll milestone. For status assessment, only 6% of the estimated manhours are required for Turbine Roll; similarly, for QVP, only 3% of the estimated manhours are required for Turbine Roll.

		STATUS ASSESSMENT	QVP
A.	TOTAL ESTIMATE FOR SEVEN MODULES	12,800 MH	58,000 MH
B.	TURBINE ROLL PORTIONS ONLY	750 MH	1,740 MH
	$\% \frac{B}{A}$	6%	3%

2. Construction Manhours

The scope of work for the Unit 2 Turbine Roll milestone involves approximately 60,000 manhours to go of direct craft construction work, and is expected to take about three months to complete. Approximately 10-15% of this work will be on portions of the following "Q"-listed systems:

NOT TURNED OVER

- 1ABA-4 - PTL Main Steam Pipe and Hangers
- 2ABA-1 - Main Steam Supply and Drains
- 2ABA-2 - Main Steam Supply and Drains (Main Steam Transfer Valves to Process Steam System)
- 2ABA-3 - Steam Line to MSIV to Turbine Stops
- 2ABB-3 - Main Steam Isolation Condenser and Atmospheric Dump

TURNED OVER

- ODEC - Cooling Pond - Emergency Pond
- OEAA - Service Water Supply System

Systems ODEC and OEAA have been turned over. The detailed scoping requirements for each of these systems is provided on drawings

listed in Attachment #1. These seven "Q"-listed systems are located in seven plant modules as shown on Attachment #2.

III. Prerequisites and Controls

1. Training

Bechtel Power Corporation has sufficient number of non-manual employees trained prior to beginning of "Q" status assessment and manual employees prior to the start of "Q" work. Consumers Power Company has sufficient number of certified Quality Control engineers to perform the Quality Verification Program (QVP).

2. Release of STOP-WORK Order

Consumers Power Company considers the current mechanical stop-work order as a restraint to start of mechanical status assessment and QVP as outlined in this request.

3. Method to Control the Work

A. All "Q" work will be status assessed per FPG 7.500 and FPG 9.910 and quality verified per existing procedures. Commodity lists, CWPs, CWRs and punchlists will be developed to reflect quality and construction status. The results of these actions will be subject to CIO and management review and approvals.

B. All work will be controlled by Construction Work Plan (CWP) for the pre-turnover work or Contractors Work Request (CWR) for post-turnover work, see Attachments #4 and #5, as described in existing Procedures FPG 7.300, FPG 7.500, FPG 9.900, FPG 9.910 and FIT 1.100.[1]

[1] FPG 7.300 - Construction Work Plan
FPG 7.500 - Area Release for Construction
FPG 9.900 - Punchlist Development
FPG 9.910 - Area Status Assessment
FIT 1.100 - Contractor Work Request

The Construction Work Plan (CWP), Section 4B, and the Construction General Services Organization (CGSO) Work Control Form per FPO 2.102[2], Section 3, identify rendering or not rendering "Q" items inaccessable. It is the intent that no future "Q" items will be rendered inaccessable for status assessment or Quality Verification.

C. Quality Work Plan (QWP)

Inspections and hold points will be controlled by the applicable Project Quality Control Instruction, as well as the Quality Work Package (QWP), for pre-turnover work and CWR, for post-turnover work. Use of QWPs and CWRs is described in Procedures T-3 and M-3.[3]

[2] FPO 2.102 - CGSO Work Control Form

[3] T-3 - Control, Release and Handling for Construction Work Plans (CWP) and Quality Work Packages (QWP)

M-3 - Processing of Corrective Action Requests and Contractors Work Requests

IV. Construction Completion Program (CCP) Activities

All aspects of work will be performed in accordance with the CCP. Consumers Power Complany is, however, requesting the ability to utilize the system priority release provisions of the existing CCP related procedures.

1. Status Assessment

All "Q" commodities as indicated in Attachments #3 and #3A will be status assessed by field engineers per FPG 7.500 and FPG 9.910.[4] As a result of status assessment, all work to go will be punchlisted. CWPs or CWRs will be written in accordance with field procedures, FPG 7.300 and FIT 1.100.[5] NCRs will be written as required.

2. Quality Verification Program (QVP)

MPQAD will determine the status of all open and closed IRs and perform reinspection as required.

Quality Verification Program is required in Module 800 (Service Water Structure) on turned over Systems OEAA (Service Water Supply) and ODEC (Cooling Pond - Emergency Pond) prior to flooding of the bays. The commodity list in Attachment #3A indicates those portions of the systems that will be under water after flooding the bays to support Technical Department Testing in March, 1984.

[4] FPG 7.500 - Area Release for Construction
FPG 9.910 - Area Status Assessment

[5] FPG 7.300 - Construction Work Plan
FIT 1.100 - Contractors Work Request

ATTACHMENT 1

LIST OF DRAWINGS

1.	M 418-A	Service Water Cooling Tower and Pump Structure
2.	M 418-B	Service Water Cooling Tower and Pump Structure U1 & 2
3.	H 660-1	High Steam to Evaporator Building
4.	H 631-2	Main Steam & Turbine Steam Aux. & Turbine Building U1
5.	H 631-3	Main Steam & Turbine Steam Aux. & Turbine Building U1
6.	H 632-2	Main Steam Turbine Steam Aux. & Turbine Building U2
7.	H 632-3	Main Steam Turbine Steam Aux. & Turbine Building U2

ATTACHMENT 2

SYSTEM MODULE REFERENCE

SYSTEM / MODULE	1ABA-4	2ABA-1	2ABA-2	2ABA-3	2ABB-3	ODEC	OEAA
180		X	X	X	X		
200	X			X			
420				X			
430				X			
620	X						
630	X						
800						X	X

NOT TURNED OVER

MODULE LOCATIONS

180 - Turbine Building - Elev. 704' and above

200 - Control Tower and Electrical Penetrations

420 - Turbine Building - Elev. 634'6"

430 - Turbine Building Unit 2 - Elev. 659'

620 - Turbine Building - Elev. 634'6"

630 - Turbine Building Unit 1 - Elev. 659'

800 - Service Water Pump House

SYSTEM 1ABA-4
STATUS ASSESSMENT AND QVP

	MODULE		
COMMODITY	200	620	630
WHIP RESTRAINT	2	6	4

SYSTEM 2ABA-1
STATUS ASSESSMENT AND QVP

COMMODITY			MODULE
6 RELIEF VALVES	2PSV3209 A & B		180
	2PSV3208 A & B		180
	2PSV3207 A & B		180
8 HANGERS	2-632-2-12	2-632-3-11	180
	2-632-2-13	2-632-3-12	180
	2-632-2-15	2-632-3-14	180
	2-632-2-30	2-632-3-16	180

SYSTEM 2ABA-2
STATUS ASSESSMENT & QVP

	MODULE
COMMODITY	180
WHIP RESTRAINTS	3

SYSTEM 2ABA-3
STATUS ASSESSMENT AND QVP

COMMODITY	MODULES			
MECH	180	200	420	430
LG PIPE L/F	64	6		
SM PIPE L/F	4			
LG HANGER	1			
SM HANGER	0			
LG VALVE	2			
SM VALVE	4			
LG WELDS	27	2		
WHIP RESTRAINTS		4	4	4
ANCHORS		2		

SYSTEM 2ABB-3
STATUS ASSESSMENT AND QVP

COMMODITY	MODULE
2 VALVES 2XV3211 A & B	180

SYSTEM ODEC
STATUS ASSESSMENT AND QVP

COMMODITY	MODULE
4 HANGERS	800
30-OHBC-34-H-1	800
30-OHBC-16-H-19	800
30-OHBC-33-H-3	800
30-OHBC-20-H-20	800

SYSTEM OEAA
QVP ONLY

COMMODITY	QUANTITY	MODULE
LG PIPE L/F	72	800
SM PIPE L/F	10	800
PUMPS	5	800
HANGERS	8	800
DIP TUBES	6	800
SLUICE GATE	6	800
LEVEL ELEMENT	4	800
TEMP. ELEMENT	1	800
CABLES	4	800

ATTACHMENT B
REV. 3
Page 1 of

CONSTRUCTION WORK PLAN

CIVIL	ELECT.	MECH.	INSTR.	TEAM	SYS/AREA	DISC	PLAN NO.
(1) ☐	☐	☒	☐	(2) 18	- OHBE2	- M	- 1563

(3) Q ☐, NON-Q ☒, Q-INTERFACE ☐ (4) AREA RELEASED/REL NO. _____

(4a) ☒ WORK WILL NOT RENDER ANY Q ITEMS INACCESSIBLE (4b) ☐ WORK MAY RENDER Q ITEMS INACCESSIBLE-SEE ATTACHMENT E

(5) LOCATION: BLDG. Aux. ELEV. 629'-3" ROOM 139

(6) PUNCHLIST ITEM NO.(S) 487

(7) MLCS IDENTITY NO.'S 0607-15-027H027

(8) DESCRIPTION Hanger sketch # 0-607-15-27 Call for 1/16" clearance between pipe and riser clamp...

Adjust the clamp to hold the 1/16" clearance as shown in the hanger sketch

(9) WELD PAPERS REQ'D./TYPE NA

(10) PACKAGE DOC.: 0-607-15-27

(11) DRILL PERMITS NA

(12) UNIQUE MATERIAL LOCATION OR P.O. NA

(13) MLCS STATUS UP-DATE
DESTATUS REQUIRED? YES __ NO __
STATUS UP-DATE COMPLETE YES __ NO __

(14) CWR NO. N/A

Authorization

(15) _____ FIELD ENGINEER DATE

(16) _____ TEAM QUALITY REP. DATE

(17) _____ TEAM SUPV./LD. DISC. SUPT. DATE

(17a) _____ CPCO DATE

(18) CWP Accepted by: _____ DATE

(20) CWP Returned/Reason _____

Sample

Verification

(21) _____ FOREMAN DATE

(24) _____ WELDING ENGINEER DATE

(22) _____ GENERAL FOREMAN DATE

(25) _____ FIELD ENGINEER DATE

(23) _____ SUPERINTENDENT DATE

(26) _____ TEAM QUALITY REP. DATE

(27) Remarks/Reasons for Rejection: _____

Q/M-0807-1

Attachment 5

CONTRACTORS WORK REQUEST

JOB 7220

MIDLAND UNIT 1 & 2

CATEGORY	UNIT	SYSTEM	DISC	SERIAL NO.	*DATE
	O	HEC	M	N/A	1-30-84

*SECTION I - DESCRIPTION OF WORK *CPCo Reference

Rework existing gang hanger (Field Std.) 2" OHCD-167, OHCD-612 and OHCD 331. Hanger supports 2" OHCD-331 ~~which~~ is Turnedover. (OHEC) Work is required to Complete Non Turnendover System OHEF.

*Required Isolation (Note applicable valves and/or breaker nos. and position) References

ORIGINATOR		Q PROGRAM		CATEGORY		MILESTONE		OUTAGE REQUIRED		RETEST REQUIRED	
CPCo	BECHTEL	Q-LIST	NON-Q			2	D	YES	NO	YES	NO
	X		X						X		X

*Originator Lou Glatz Ex 7436 Date 1-30-84 *CWR Due Date 2-9-84

*TE/FE _____ Disc. Supv. _____ Date _____ *PS/PTS _____ Date _____

SECTION II - ACCEPTANCE OF WORK Bechtel "Q" Program

Q-LIST ☐ NON-Q ☑

Work Request Accepted By [signature] Date 2-1-84

Work Assigned To Lou Glatz TM#8 BPC QC Engineer _____

If Not Accepted, Reason _____

Work Scheduled To Start, Date 2-10-84 Finish 2-17-84 E.C. Estimated (16) manhours.

☑ In-Scope ☐ Out-of-scope Cost Code _____

SECTION III - AUTHORIZATION TO START WORK

1. Permission to start limited work _____

CPCo Representative _____ Date _____

2. Safety Tags Placed System out-of-service

CPCo Representative Date #Tag/Clearance Order

SAMPLE

SECTION IV - CONSTRUCTION Safety Tags Installed _____ Date _____

Construction QC Complete _____ Date _____ Attachments

Construction Complete _____ Date _____

Construction Complete _____ Date _____

Safety Tags Removed _____ Date _____

CGSO - CWR Coordinator _____ Date _____

*SECTION V - COMPLETION REVIEW Work completed satisfactorily and accepted/safety tags cleared DISC. SUPV.

Retest Complete TE: _____ Date _____ Completion Review Signature

Procedure No. & Steps: _____ TE/FE: _____ Date _____

PS/PTS _____ Date _____

NOTE: For Category 1 - Originating organization shall fill in only items designated by an asterisk (*).

QRP FORM #9595 R-11

Attachment 5A

FPO - 2.102
Rev 1

CGSO WORK CONTROL

CWR_____ S/U SYSTEM_____ BLDG._____

Work on the above CWR may proceed. In approving this work, the following points have been taken into consideration:

Originator

1. Total scope of work is: a) B & W ___ b) Zack ___ c) Field Soils ___ d) Other ___
   (If answer is a, b or c, disregard questions 2, and 4 through 10.)

2. Does this work involve a DCP in one of the following buildings: [YES] [NO]
   a. Auxiliary Building c. Service Water Building
   b. Containment Buildings d. Diesel Generator Building

GSO

3. a.___ Implementation of CWR will not render any Q items inaccessible.
   b.___ Work may render Q items inaccessible (refer to CWR Accessibility Notification Sheet)

Originator

4. Is there any possible Q interface? This includes such items as: [YES] [NO]
   a.___Non-Q terminations in a Q cabinet.
   b.___Attaching a Non-Q hanger to a Q wall or Q steel.
   c.___Pressure testing against a Q valve.
   d.___Temporary support from an existing Q installation.
   e.___Covering of an existing Q component.
   f.___Removing coating from an existing Q component.
   g.___Other_____.

5. Is the actual component to be worked on Q? [YES] [NO]

Following analysis, including questions 6 and 7, is required for Q components only:

Req'd Drawings	S/U System T/O Date	Dwg. Rev. at T/O	Current Dwg. Rev.
	SAMPLE		

6. Is the current drawing rev. different than the drawing rev. at turnover? [YES] [NO]

7. Does the current drawing rev. change the design configuration from the drawing rev. at turnover for the specific commodity being worked? [YES] [NO]

Following analysis is to be performed by CPCo Test Engineer:

CPCo T/E

8. By review of the Master Punchlist, does this work impact an open NCR or QC Inspection Record? [YES] [NO]
   - If all of the above answers are NO, work may proceed without comment or restriction.
   - If the answers to questions 2 and 5 are YES, work may proceed if required to support B&W, Zack or Field Soils work.
   - Work may only proceed after careful review, and is subject to the comments and restrictions, as follows:

Comments and Restrictions:

_____

_____

_____

GSO

9. Welding documentation required? PW-100, WR-22, WR-4, PIW-100 [YES] [NO]

10. Does this CWR affect preparation of ASME Section III N-5 Code Data Reports? (FPM 5.000) [YES] [NO]

Originator_____Date_____ Lead CGSO Supv._____Date_____

CPCo TE _____Date_____ CPCo Tech.Supt._____Date_____
(or CPCo Section Head)

If work is Q or Non-Q with a Q interface, MPQAD preinspection determination is required.
Pre-inspection completed/not required (circle one). _____ _____
MPQAD Rep. Date

(F1-SB) Rev. 7 (10-17-83)

CWR ACCESSIBILITY NOTIFICATION SHEET

CWR _____

A. Description of Q commodities that may be rendered inaccessible as a result of this CWR work:

COMMODITY	QCIR STATUS OPEN/CLOSED

B. Sketch

Sample

C. NCR's initiated as a result of verification inspection on above commodities

_____ _____ _____

_____ _____ _____

_____ _____ _____