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

May 7, 1990

See Ref

Docket 50-255

MEMORANDUM FOR: Dominic D. DiIanni, Acting Director
Project Directorate III-1
Division of Reactor Projects - III,
IV, V & Special Projects

FROM: Albert W. De Agazio, Sr. Project Manager
Project Directorate III-1
Division of Reactor Projects - III,
IV, V & Special Projects

SUBJECT: SUMMARY OF MEETING WITH CONSUMERS POWER COMPANY -
PALISADES STEAM GENERATOR REPLACEMENT PROJECT (TAC 76069)

A meeting was held in Gaithersburg, Maryland on April 12, 1990, at the offices of Bechtel Power Corporation to discuss certain aspects of the planned replacement of the Palisades Plant steam generators. Specifically, the meeting focused upon the construction opening in the concrete, post-tensioned containment building. Enclosure 1 is the list of attendees at the meeting.

The Palisades Plant steam generator replacement project (SGRP) will be the first such replacement for a Combustion Engineering (C-E) designed plant. Palisades was the first large C-E unit and initially used coordinated phosphate secondary side chemistry. In 1975, the chemistry was changed to all volatile treatment (AVT), but by then the early chemistry along with carbon steel tube sheets and drilled tube supports led to severe tube denting and corrosion. The incidence of tube leaks was significantly reduced following the change to AVT.

The replacement steam generators were built in the late 1970s and are essentially the System-80 design except the feedwater does not enter at the bottom.

The containment opening will involve the detensioning and removal of 130 tendons. Mockups of the containment wall will be used for development and training for cutting the opening, however the actual method to be used for concrete cutting has not yet been selected. The opening will be about 28-ft by 26-ft and will be above the original construction opening that was about 40-ft square. It is expected that the opening will exist for 35 - 40 days.

The construction of the retaining wall and roadway for the hoist area was discussed in detail along with the rigging concept for lifting and moving the steam generator both outside and inside the containment.

The results of containment structural analyses completed to date were presented and discussed. The NRC staff expressed a desire to examine in detail the containment stress analytical results in the area of the construction opening at a later date when the analyses are completed. A structural integrity test of the containment will be conducted prior to restart of the unit. This test will be run at 115% of the 55 psig design pressure.

DF01
1/1

The ventilation concept to be used to control dust and contamination was described, however much of the detail of ventilation and radiation control are not scheduled for completion until about June 1990.

Enclosure 2 contains copies of the visual aids used during the meeting. Enclosure 3 identifies the safety evaluations planned to support the determination that the SGRP can be done under 10 CFR 50.59(a)(1).

Enclosure 4 identifies the load combinations considered in the containment structural analyses and identifies the concept for the structural integrity test of the containment.

Albert W. De Agazio

Albert W. De Agazio, Sr. Project Manager
Project Directorate III-1
Division of Reactor Projects - III,
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Office of Nuclear Reactor Regulation

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Original signed by

Albert W. De Agazio, Sr. Project Manager
Project Directorate III-1
Division of Reactor Projects - III,
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Office of Nuclear Reactor Regulation

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ENCLOSURE 1

MEETING ATTENDEES

MEETING ATTENDANCE

DATE: April 12, 1990

PLACE: Bechtel Power Corp., Gaithersburg, Maryland

UTILITY AND DOCKET NO: Consumers Power Co. (Palisades Plant)
Docket No. 50-255

SUBJECT: Containment issues related to the Palisades Steam Generator Replacement Project.

NAME	AFFILIATION
DAVID W. JOOS	CONSUMERS POWER Co.
Tom M. Tai	Bechtel
Alfredo Wycke	Bechtel
ERIC R. SWANSON	USNRC
ALBERT DeAGAZIO	USNRC/NRR/DRSP
BOB PIERSON	USNRC
[illegible]	[illegible]
KEITH WICHMAN	NRC/NRR
Emmett Murphy	NRC/NRR
GOUTAM BAGCHI	NRC/NRR/ESGB
Ken Chao	Consumers Power Co
LARRY MORRIS	BECHTEL CONSTRUCTION
Steve Routh	Bechtel
BERNARD L MEYERS	Bechtel
JIMMY T. WANG	BECHTEL
JOSEPH H. CONNELL	BECHTEL

NAME	AFFILIATION
Jim Whitcraft	Bechtel
Harold Brown	Bechtel
Wm Clark	CPCo
Jim Kuemin	CPCo
James Lewis	CPCo
Stephen T Wawro	CPCo
Prem K Dadlani	Bechtel
DINESH C. KANSAL	BECHTEL
Alan K. Beckman	Bechtel
Winston Liu	NRC - Region III
Norman Wagner	NRC/NRR
K. Lyn Beck	Bechtel
[signature]	Bechtel
Sam Sae-Ung	Bechtel

ENCLOSURE 2

VISUAL AIDS USED WITH DISCUSSIONS

NRC/CPCo/BPC MEETING

PALISADES STEAM GENERATOR REPLACEMENT PROJECT

CONTAINMENT CONSTRUCTION OPENING

GAITHERSBURG, MARYLAND

APRIL 12, 1990

Palisades SGRP

NRC/CPCo/BPC Meeting

9:00 A.M. April 12, 1990

Bechtel Offices, Gaithersburg, Maryland

CONTAINMENT CONSTRUCTION OPENING

Agenda

9:00	Opening Remarks	D. Joos (CPCo)
9:15	SGRP Video Presentation	BPC
9:30	Licensing/Safety Evaluation	T. Tai (BPC)
10:00	Containment Opening Construction - Reinforced Earth Retaining Wall - Containment Wall/Liner Plate Opening - S/G Rigging - Containment Wall/Liner Plate Replacement	L. Morris (BPC)
11:00	Containment Opening Structural Analysis - Design Criteria - Analyses - Structural Integrity Test	E. Thomas (BPC)
Lunch		
1:00	Temporary Ventilation	B. Seam (BPC)
2:00	Summary Safety Evaluation	T. Tai (BPC)
2:30	Schedule	R. Beck (BPC)
3:00	Closing Remarks	D. Joos (CPCo)
	Adjourn	

OUTLINE OF NUCLEAR PRESENTATION

- O CONSTRUCTION OPENING
- O GENERAL WORK ACTIVITIES
- O 50.59 ISSUES
- O PRECAUTIONS TO BE CONSIDERED

CONSTRUCTION OPENING

PURPOSE: EQUIPMENT RIGGING

LOCATION: SE QUADRANT OF CONTAINMENT

HEIGHT: 28 FT (EL. 651'-0" TO 679'-0")

WIDTH: 26 FT

CENTERLINE: 120° AZIMUTH

GENERAL WORK ACTIVITIES

- DETENSION/REMOVE TENDONS AND TENDON GREASE
- CUT/REMOVE CONCRETE WALL
  - CONCRETE
  - REINFORCING STEEL
  - TENDON SHEATHING
  - LINER PLATE
- INSTALL TEMPORARY CLOSURE/VENTILATION SYSTEM
- COMPLETE STEAM GENERATOR REPLACEMENT
- REPLACE CONCRETE WALL
  - LINER PLATE
  - TENDON SHEATHING
  - REINFORCING STEEL
  - CONCRETE
- REINSTALL/RETENSION TENDONS AND TENDON GREASE
- PERFORM SIT

ISSUES TO BE ADDRESSED IN 50.59 EVALUATION

- CONTAINMENT STRUCTURAL ADEQUACY
  - DESIGN PARAMETERS/FSAR COMMITMENTS
  - MATERIALS (CONCRETE, REINFORCING, TENDONS, LINER PLATE)
  - PERFORMANCE TEST (SIT)
- MAINTAIN CORE COOLING CAPABILITY DURING CONSTRUCTION
- PROTECT SAFETY-RELATED EQUIPMENT/ STRUCTURES DURING CONSTRUCTION
- RADIATION PROTECTION/RADIOLOGICAL RELEASE CONTROL
- WASTE DISPOSAL
- VENTILATION CONTROL

ISSUES TO BE ADDRESSED IN 50.59 EVALUATION (CONT)

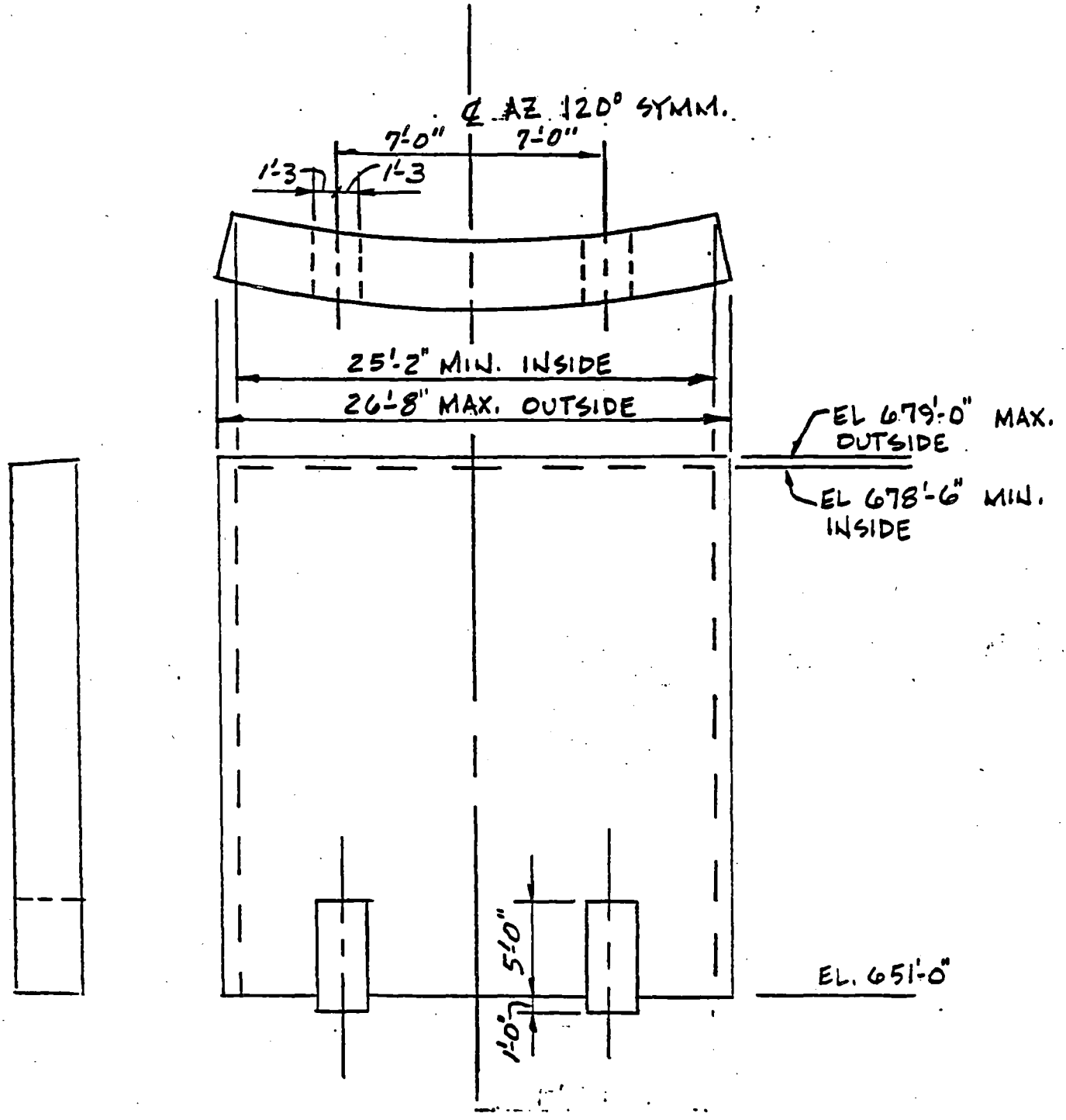
- PROCEDURAL CONTROLS
  - CONTAINMENT ACCESS
  - SECURITY
  - OTHER OPERATIONS
- TECHNICAL SPECIFICATION REQUIREMENTS
- FSAR COMMITMENTS

PRECAUTIONS TO BE CONSIDERED

- DETENSION OF TENDONS WILL NOT START UNTIL AFTER:
  - FULL WATER INVENTORY IN REFUELING POOL
  - PRIMARY SYSTEM TEMPERATURE $\leq$ 120 F, AND
  - PRIMARY SYSTEM BORON CONCENTRATION $\geq$ 1720 PPM
- CONTAINMENT LINER WILL NOT BE BREACHED UNTIL REACTOR IS DEFUELED
- MAINTAIN REQUIREMENTS IN GOP-14, "SHUTDOWN COOLING OPERATIONS"
- INVOKE HEAVY LOAD PROCEDURES FHS-M-23 AND FHS-M-24
- CONCRETE CHIPPING INSIDE LOCAL ENCLOSURES
- MAINTAIN AIR FLOW INTO THE CONTAINMENT

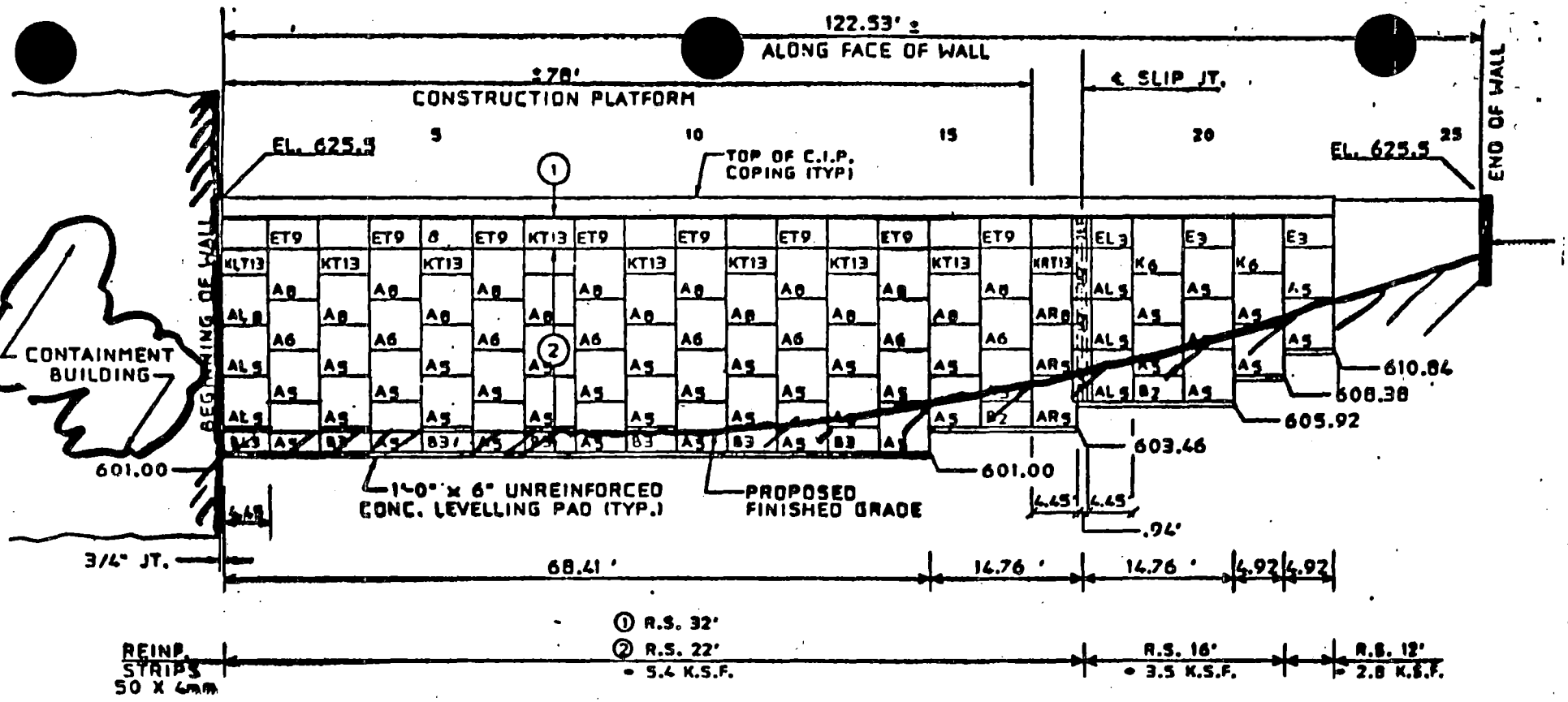
PRECAUTIONS TO BE CONSIDERED (CONT)

- LOCATE RADIATION MONITOR AT THE EXHAUST OF THE TEMPORARY VENTILATION SYSTEM
- TEMPORARY ENCLOSURE FOR CONTAINMENT OPENING
- PERIODIC RADIOLOGICAL SURVEILLANCE OUTSIDE THE CONTAINMENT
- INVOKE ONP-11.2, "FUEL HANDLING ACCIDENT" TO CONTROL EQUIPMENT HATCH



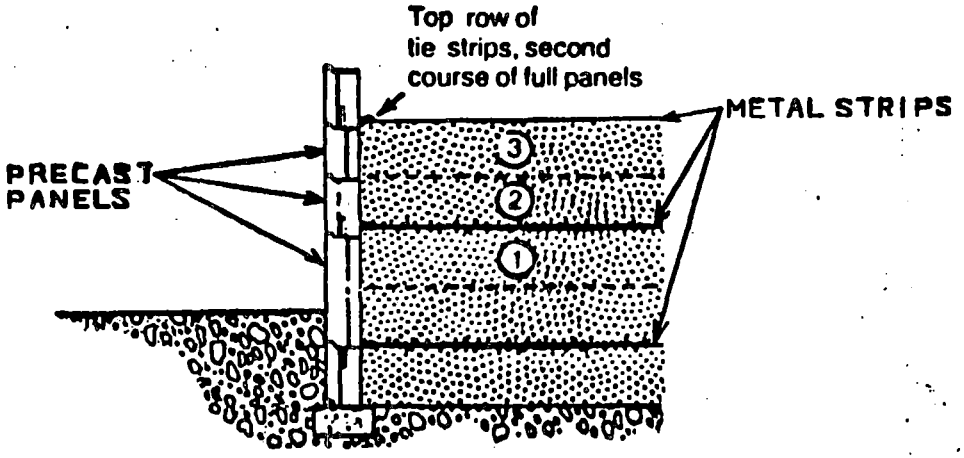
CONSTRUCTION OPENING CONCRETE BLOCK

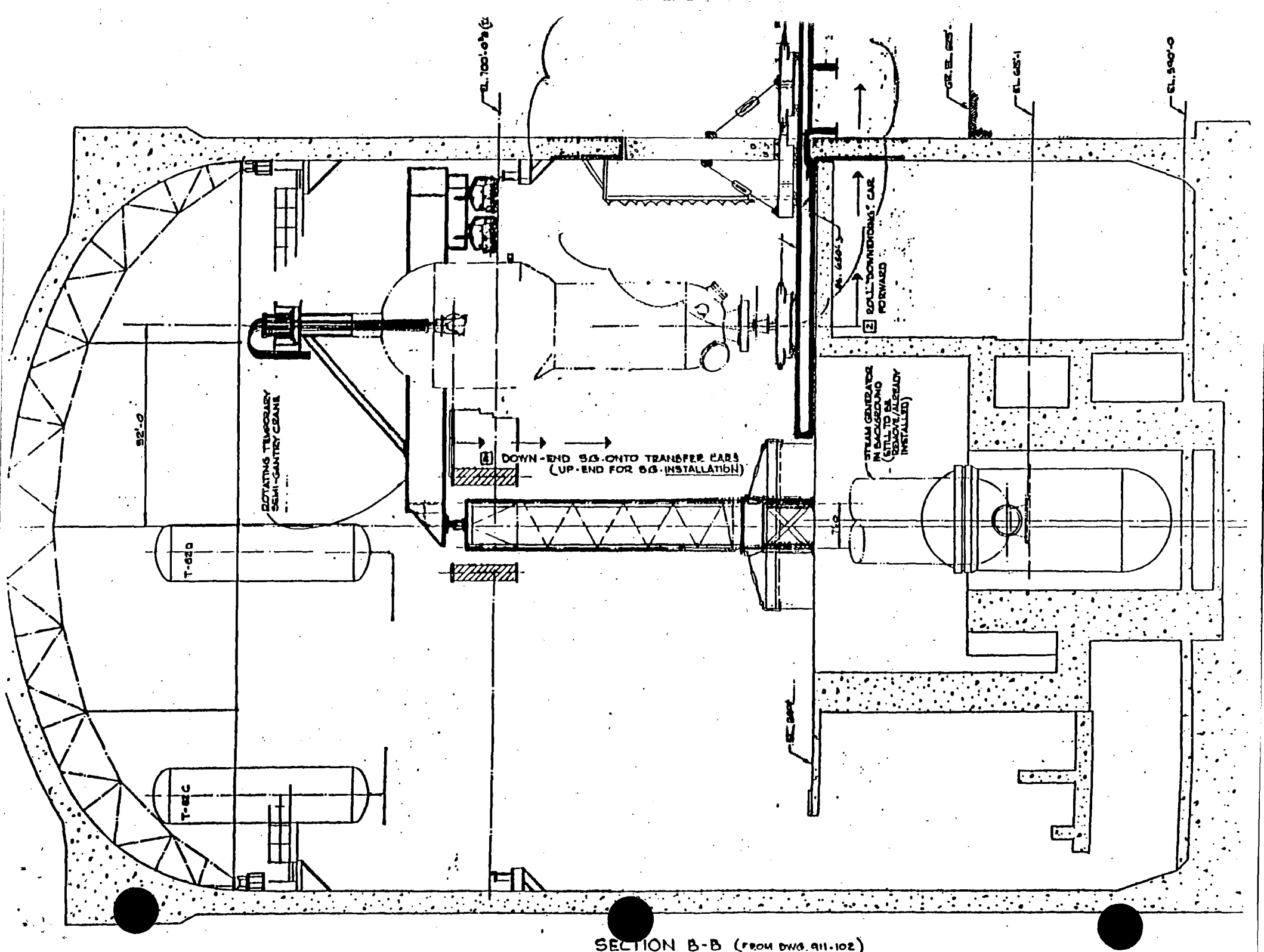
~ 120 Tons



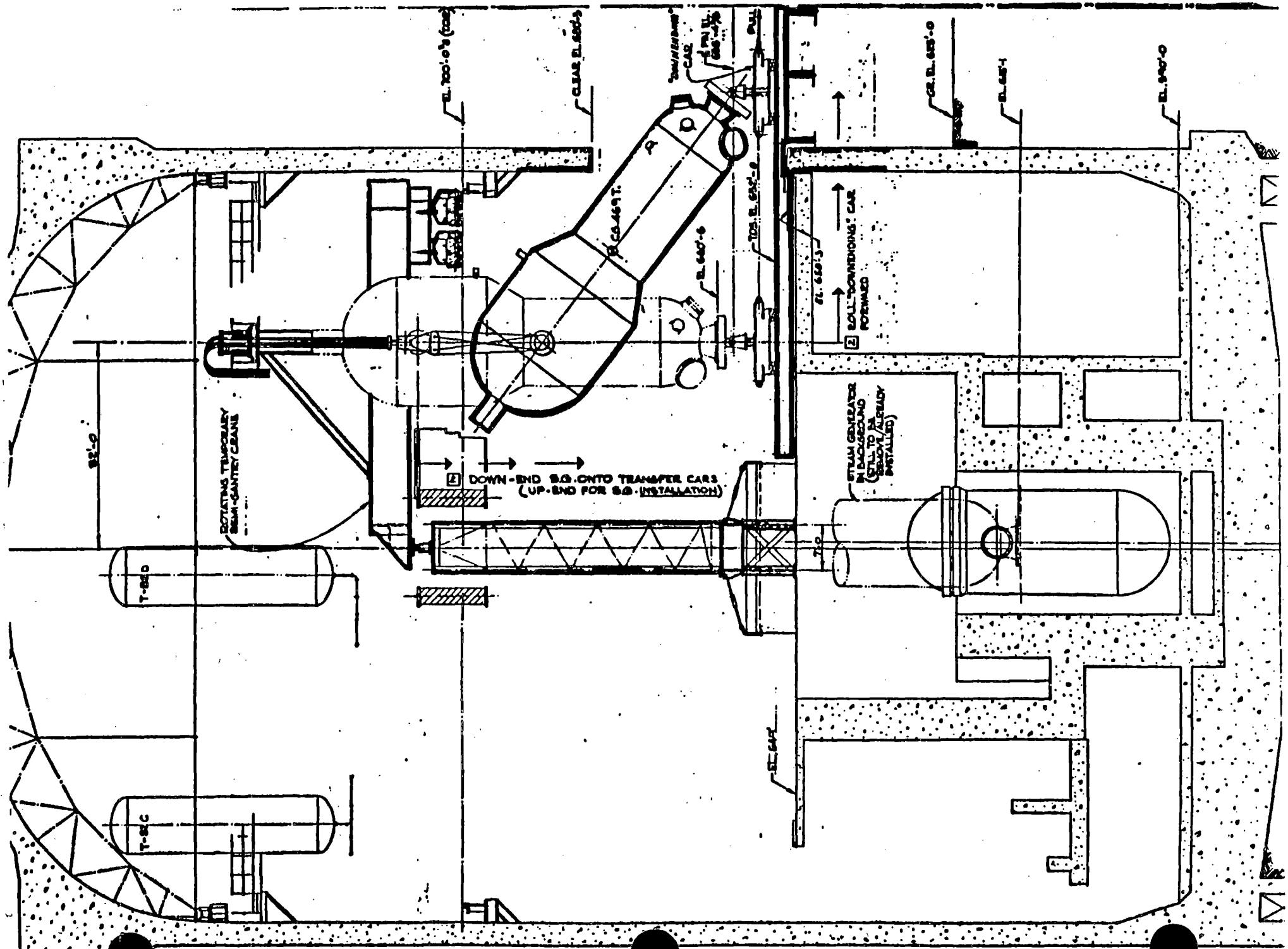
ELEVATION - FRONT FACE

SCALE : 1" = 10'





SECTION B-B (FROM DWG. 911-102)



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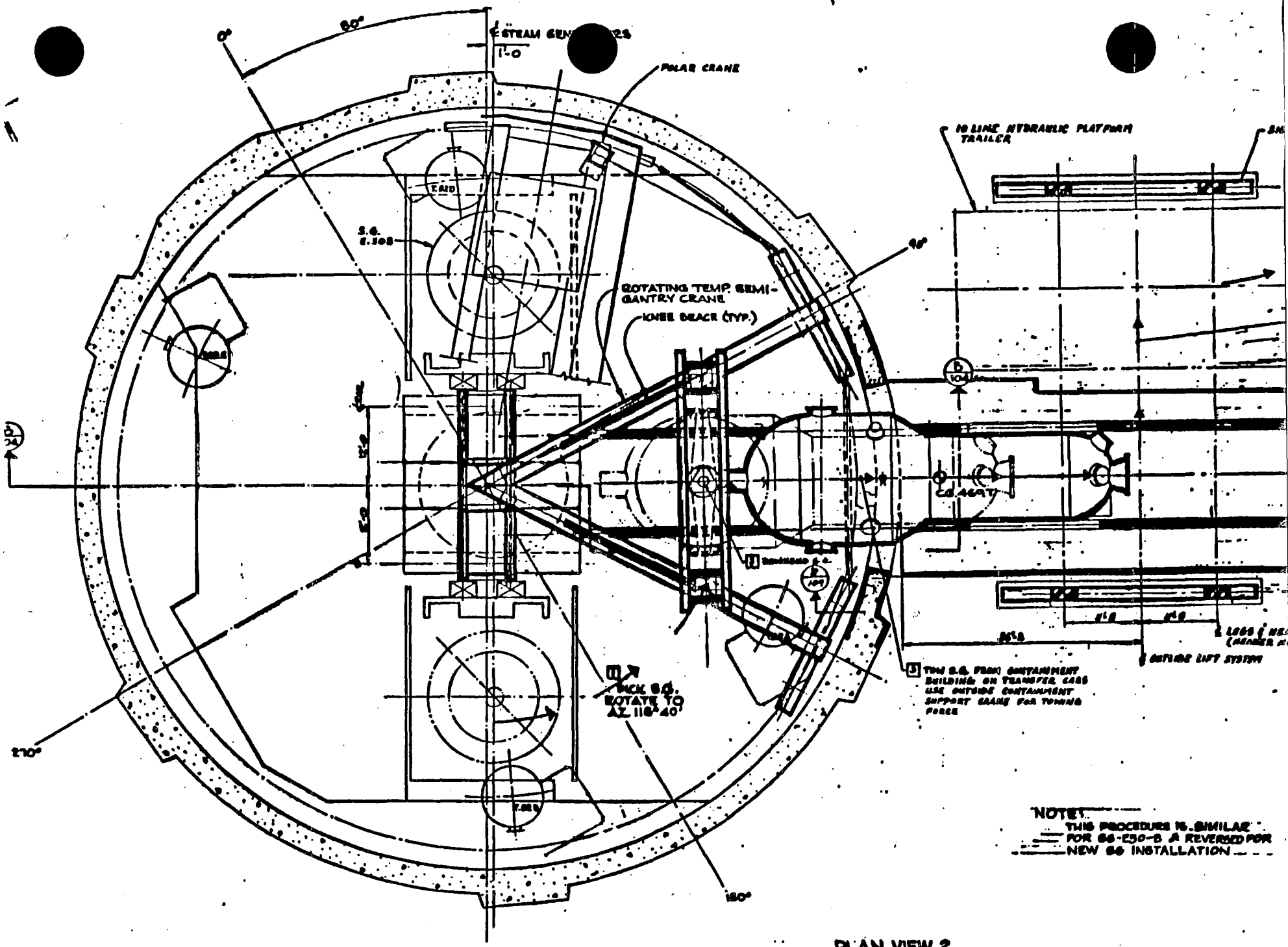


NOTE:
THIS PROCEDURE IS SIMILAR FOR 66-E50-B & REVERSED FOR NEW 66 INSTALLATION

PLAN VIEW 2

BASIS OF THE EVALUATION

** TO SATISFY ALL COMMITMENTS IN THE FSAR*

PRIMARY PARAMETERS

AFFECTING BEHAVIOR OF CONTAINMENT

DUE TO STEAM GENERATOR REPLACEMENT ACTIVITIES

* POTENTIAL DIFFERENCE IN CONCRETE PROPERTIES

  - STRENGTH

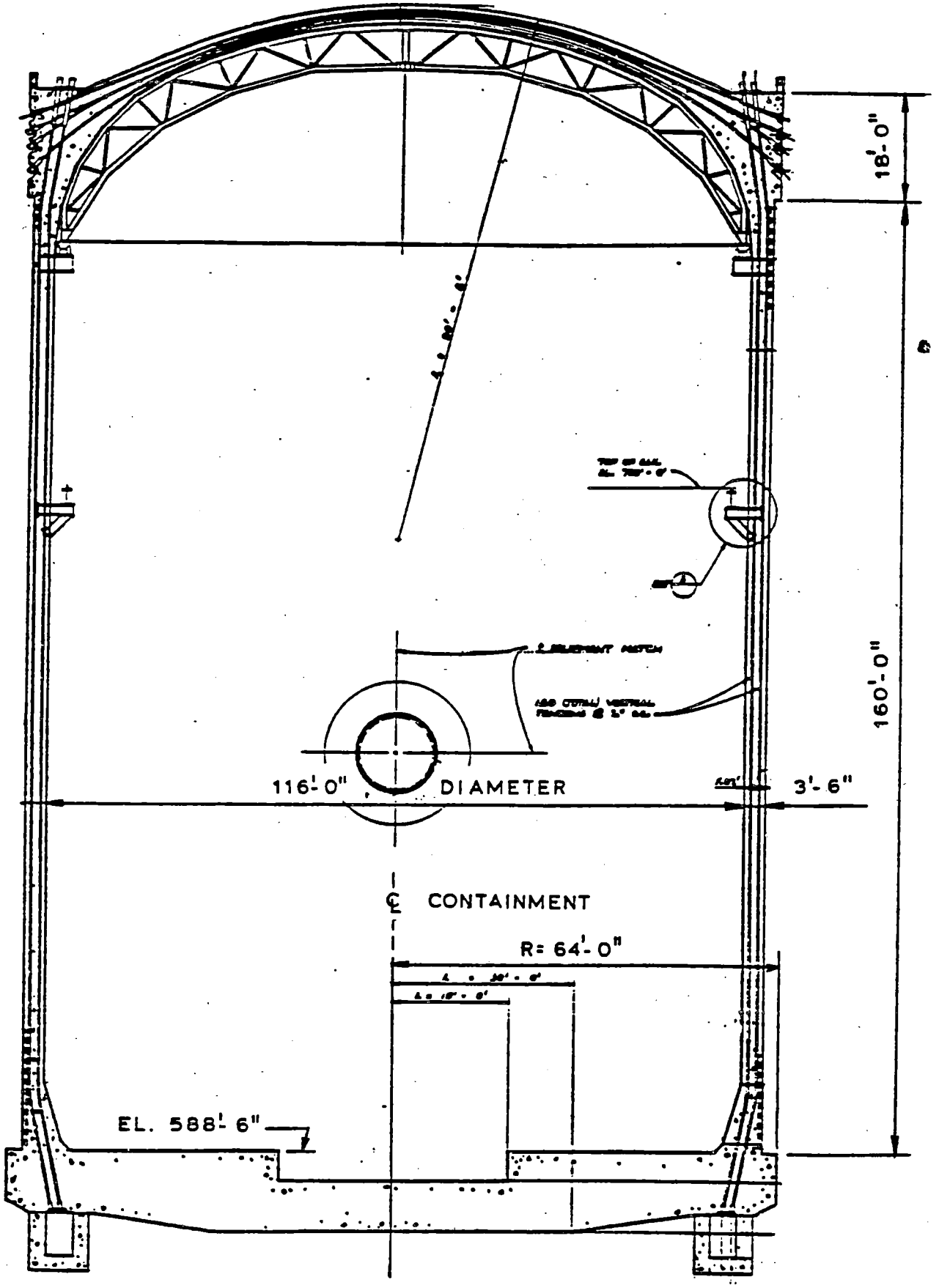
  - LONG TERM CREEP

  - SHRINKAGE

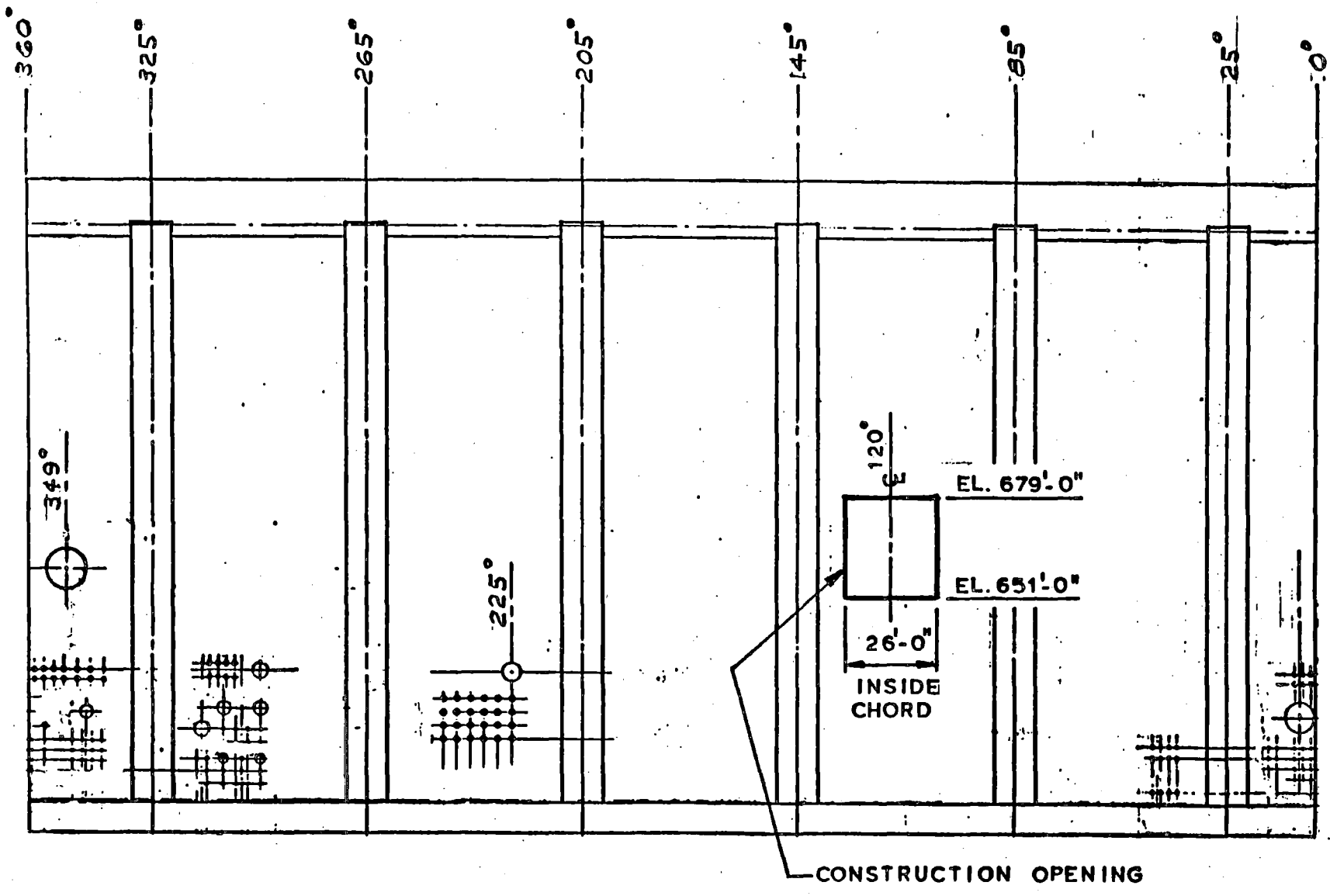
* POTENTIAL DIFFERENCE IN PRESTRESS LEVEL

OUTLINE OF THE PRESENTATION

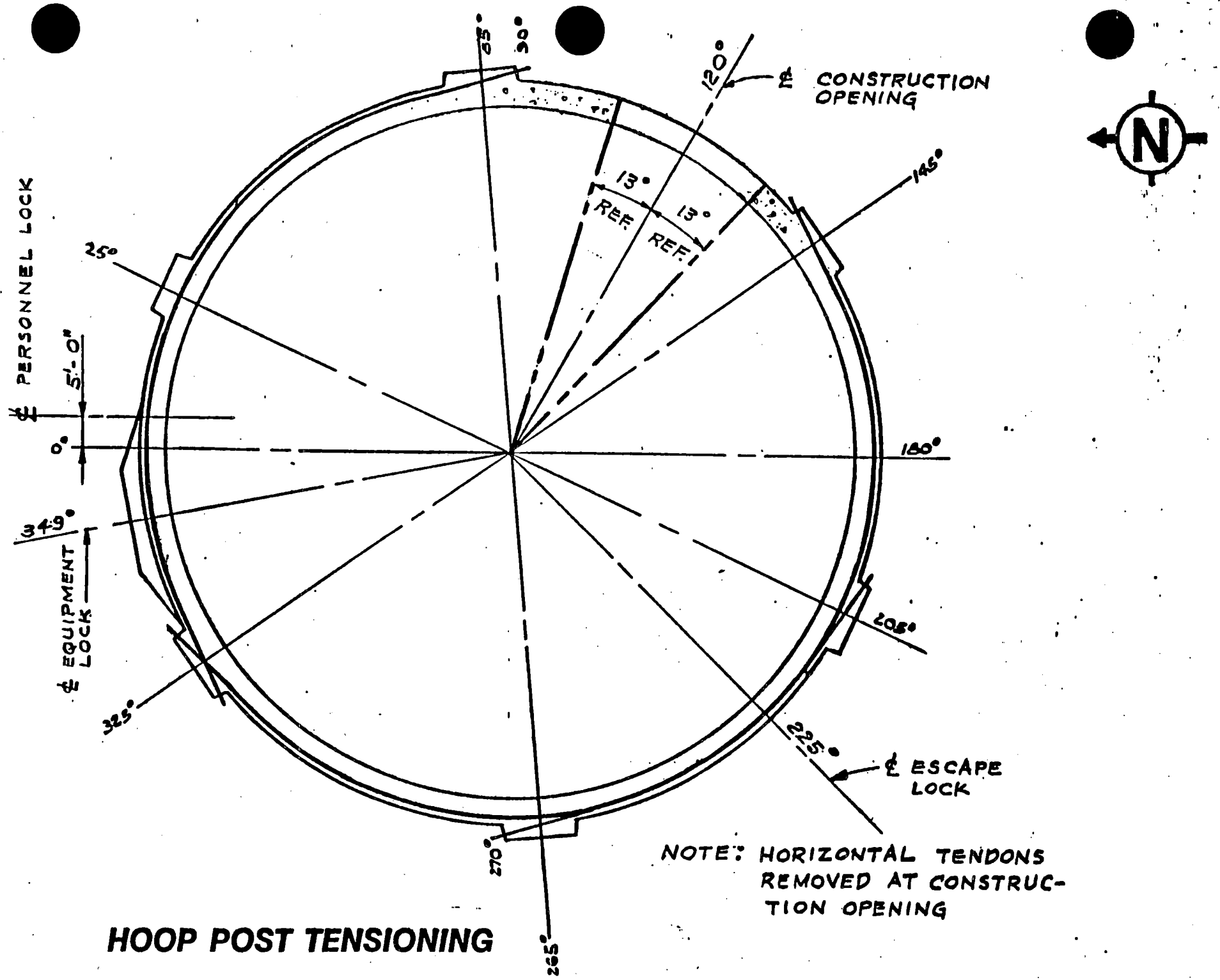
* DESCRIPTION OF PALISADES CONTAINMENT
* DESIGN CRITERIA
* STRUCTURAL (FINITE ELEMENT) MODEL
* ANALYSIS APPROACH
* MATERIAL PROPERTIES
* RESULTS OF THE ANALYSIS
* REPLACEMENT CONCRETE
* STRUCTURAL INTEGRITY TEST



PALISADES CONTAINMENT

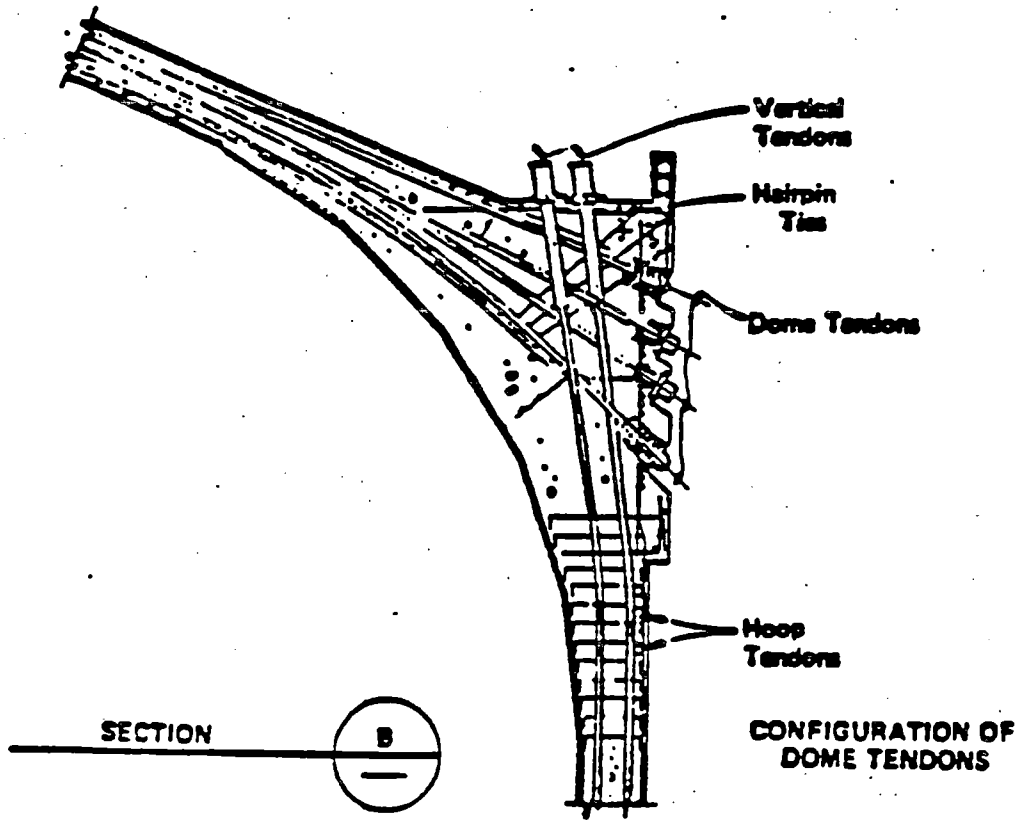


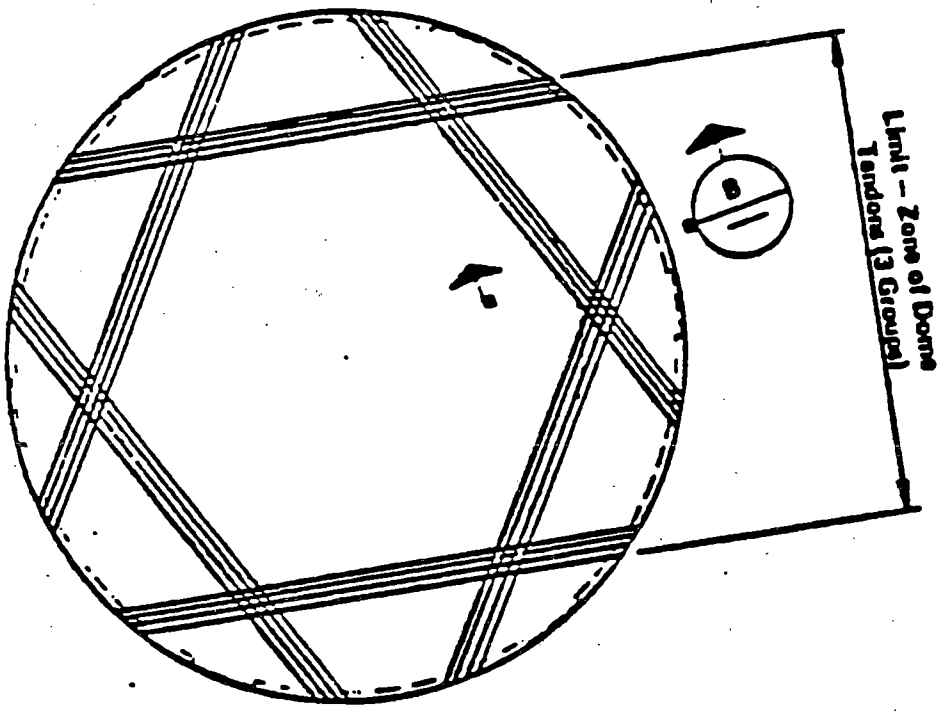
CONSTRUCTION OPENING



NOTE: HORIZONTAL TENDONS REMOVED AT CONSTRUCTION OPENING

HOOP POST TENSIONING





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POST TENSIONING DETAILS

TENDON SYSTEM

NO. OF TENDONS	DESIGN PRESTRESS LEVEL
SHELL:	
552 HOOP TENDONS	665 KIP/FT
180 VERTICAL TENDONS	290 KIP/FT
DOME:	
165 TENDONS (ARRANGED IN THREE SETS)	370 KIP/FT

- TENDONS ARE UNBONDED
  - PROTECTED AGAINST CORROSION BY GREASE FILLER
- LOCAL LOAD VARIATION IN CONTAINMENT HAS INSIGNIFICANT EFFECT ON TENDON PERFORMANCE

BASIC FEATURES OF THE CONTAINMENT

* *POST-TENSIONING IMPOSES A CONSTANT INWARD LOAD ON THE CONTAINMENT*

  - *ACCIDENT PRESSURE RELIEVES THE POST-TENSIONING LOAD AND UNLOADS THE CONTAINMENT*

* *POST TENSIONING SYSTEM IS PASSIVE*

  - *NO CHANGE-OF-STATE REQUIRED TO RESIST ACCIDENT LOADS*

BASIC FEATURES OF THE CONTAINMENT (CONTINUED)

* SUBSTANTIAL MARGINS EXIST IN THE PALISADES DESIGN

- DESIGN PRESSURE: 55 PSI

- TESTED TO: 63 PSI

- POST TENSION PRESS. 78 PSI
(EFFECTIVE PRESTRESS = 1.5 X DESIGN PRESSURE - NOMINAL)

- SURVEILLANCE RESULTS INDICATE THAT POST-TENSIONING MAY BE APPROXIMATELY 5% GREATER THAN DESIGN END-OF-PLANT LIFE PREDICTION

DESIGN CRITERIA

* *EXACTLY THE SAME AS ORIGINAL DESIGN*

* *ACI 318-63 WITH ENHANCEMENTS IDENTIFIED IN FSAR*

* *BOTH <u>WORKING STRESS</u> AND <u>ULTIMATE STRESS</u> ANALYSIS PERFORMED (AS SPECIFIED IN FSAR)*

* *ALL LOAD CASES IDENTIFIED IN FSAR WERE EVALUATED*

ADDITIONAL DESIGN CONSIDERATIONS

** DETENSIONED CONTAINMENT WITH/WITHOUT OPENING*

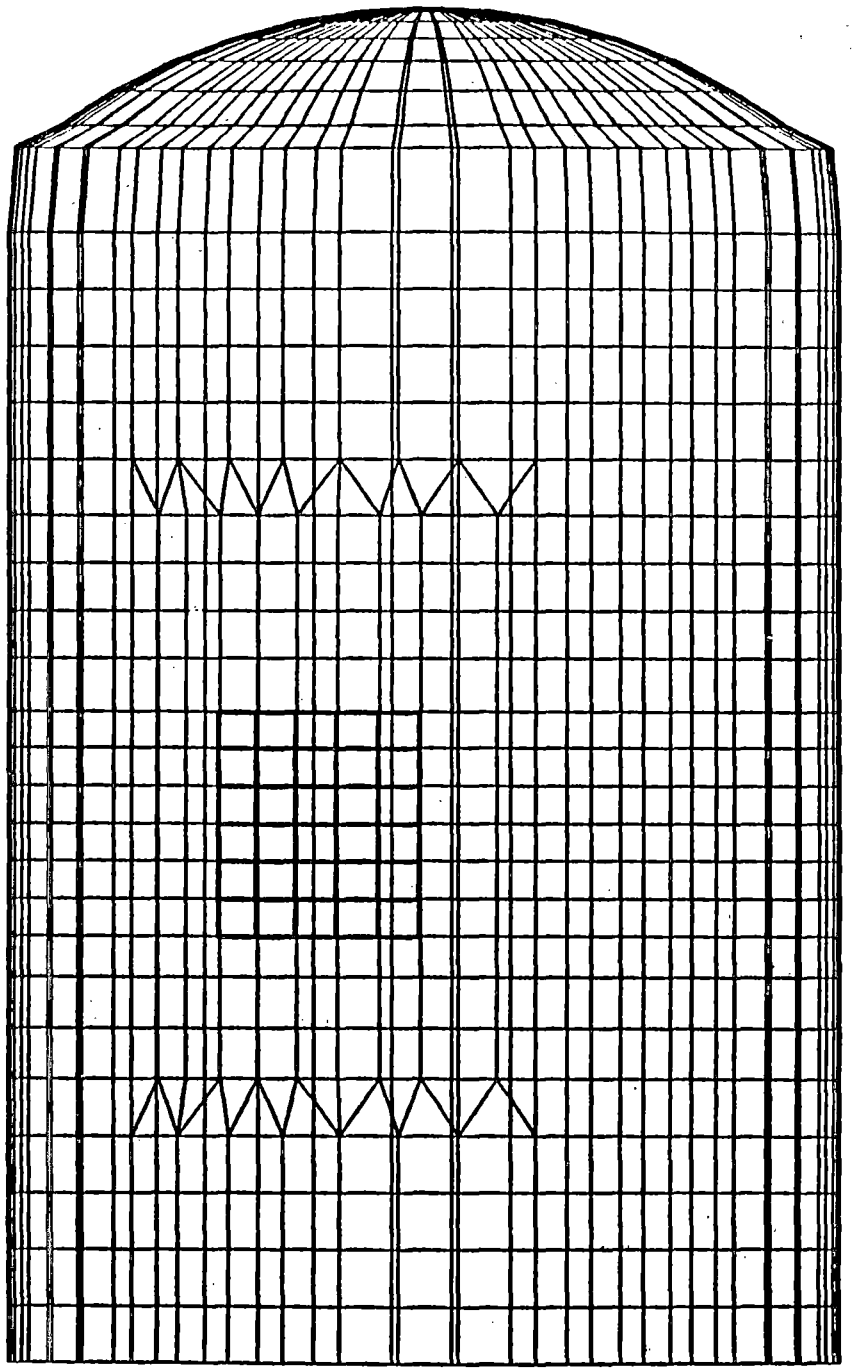
- OBE

- EXTREME WIND

- CRANE LOAD

(PER REQUEST OF REGION III)

FINITE ELEMENT MODEL



VWS\MODEL.3D

FINITE ELEMENT MODEL

* *3D ANALYSIS*

* *REPRESENTS SHELL AND DOME*

  - *FIXED BOUNDARY CONDITION AT BASEMAT*

* *1400 PLATE/SHELL ELEMENTS*

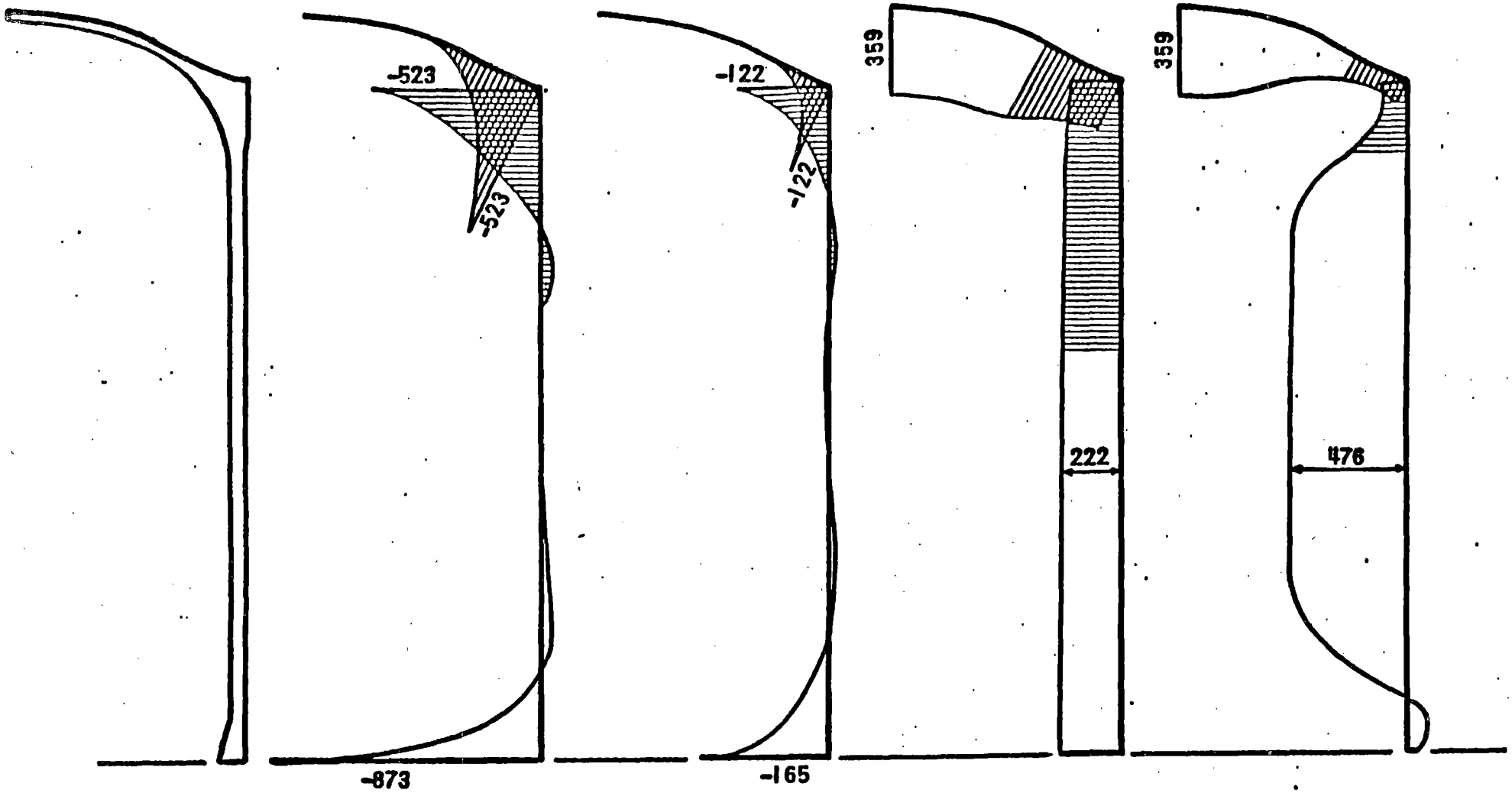
  - *ELEMENT SIZE LESS THAN 2.6 X WALL THICKNESS*

  - *AREA AROUND OPENING; ELEMENT SIZE IS LESS THAN 1.29 X WALL THICKNESS*

* *USED BSAP CODE*

  - *WELL VERIFIED & FAMILIAR TO NRC*

LOADS ON SHELL DUE TO PRESSURE
RESULTS OF ORIGINAL ANALYSIS
(AS SHOWN IN FSAR)



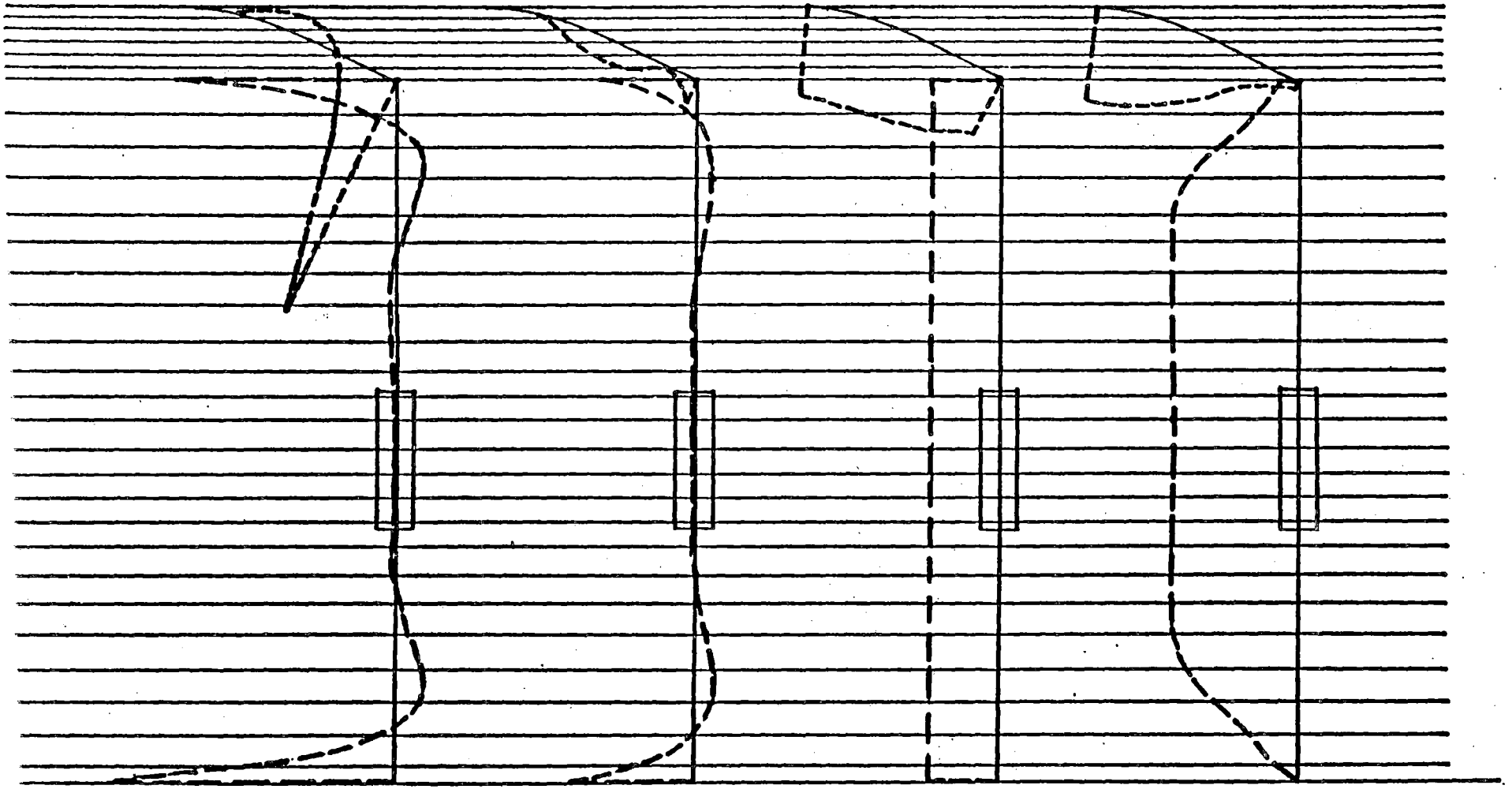
MERIDIONAL MOMENT $\left(\frac{\text{ft-kips}}{\text{ft}}\right)$

HOOP MOMENT $\left(\frac{\text{ft-kips}}{\text{ft}}\right)$

MERIDIONAL FORCE $\left(\frac{\text{kips}}{\text{ft}}\right)$

HOOP FORCE $\left(\frac{\text{kips}}{\text{ft}}\right)$

LOADS ON SHELL DUE TO PRESSURE
RESULTS OF REANALYSIS



MERIDIONAL MOMENT $\left(\frac{\text{ft-kips}}{\text{ft}}\right)$

HOOP MOMENT $\left(\frac{\text{ft-kips}}{\text{ft}}\right)$

MERIDIONAL FORCE $\left(\frac{\text{kips}}{\text{ft}}\right)$

HOOP FORCE $\left(\frac{\text{kips}}{\text{ft}}\right)$

ANALYSIS APPROACH

** CONSIDERED 5 STAGES*

(1) EXISTING STRUCTURE

(2) STRUCTURE DETENSIONED (2 DETENSIONING SCHEMES)

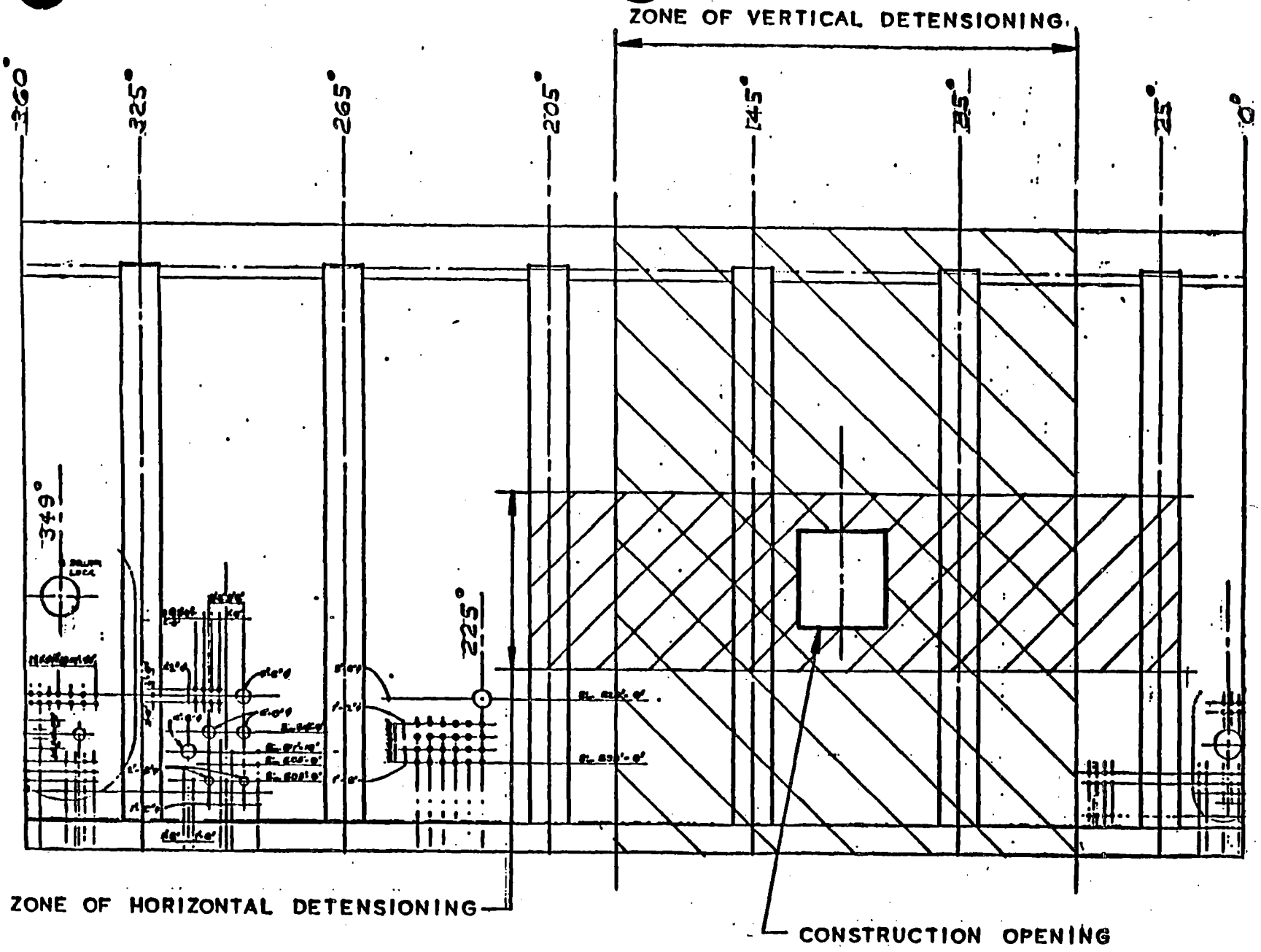
(3) STRUCTURE DETENSIONED, WITH OPENING

*(4) STRUCTURE WITH REPLACED CONCRETE RETENSIONED (IMMEDIATELY AFTER RETENSIONING) **

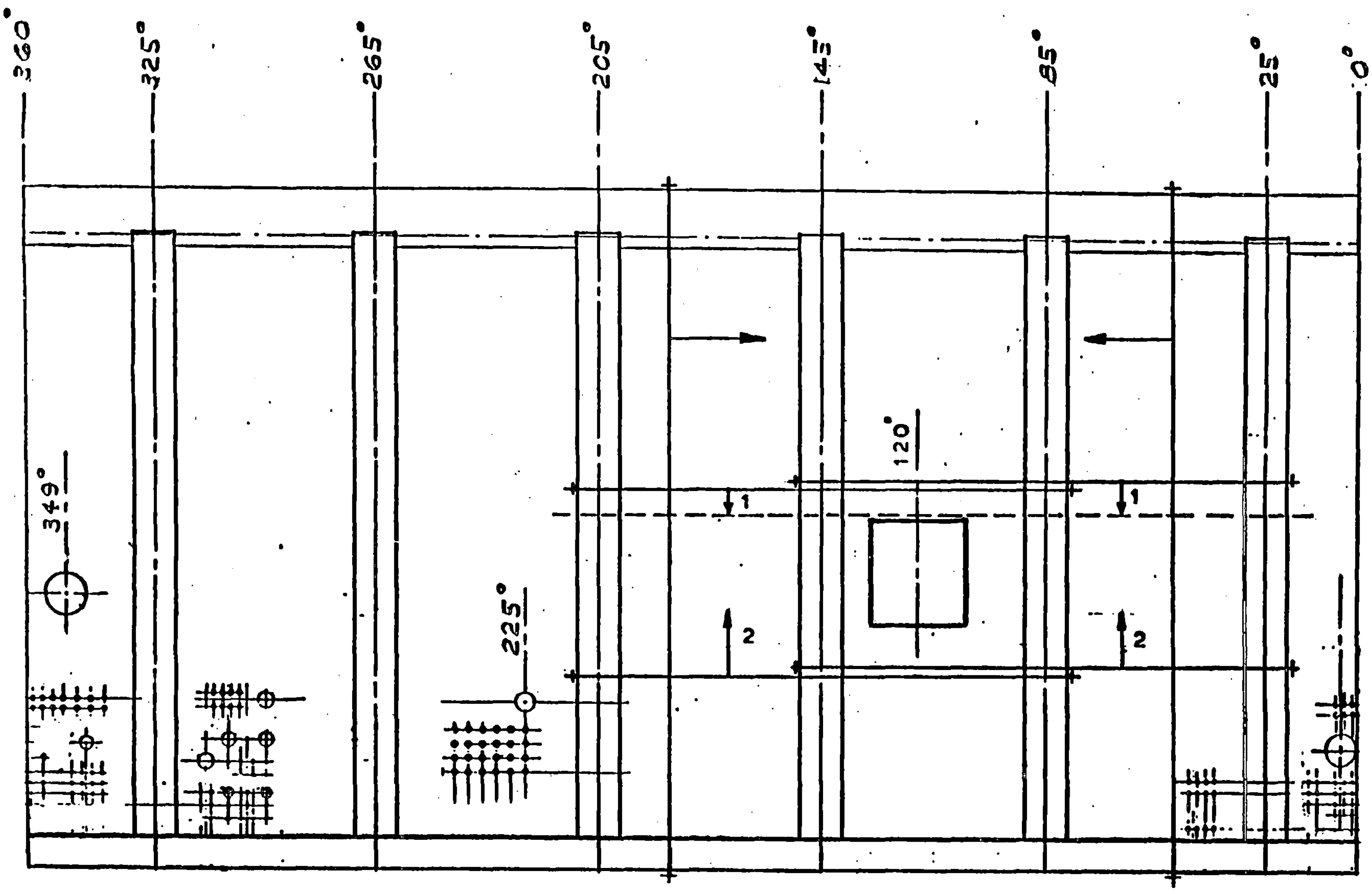
*(5) STRUCTURE WITH REPLACED CONCRETE RETENSIONED (AT END OF LIFE)***

** STRESSES IN RETENSIONED STRUCTURE STAGE (4) IS COMBINATION OF THOSE FROM STAGE (3) + ADDITIONAL STRESSES CREATED BY RETENSIONING AND OPERATING/ACCIDENT LOADS*

*** STRESSES IN STAGE 5 STRUCTURE OBTAINED SIMILAR TO THAT IN STAGE 4 EXCEPT THAT MODULUS WAS CORRECTED IN STAGE 5 ANALYSIS TO ACCOUNT FOR LONG TERM CREEP EFFECTS*



LIMITS OF DETENSIONING



RETENSIONING SEQUENCE

MATERIAL PROPERTIES

* EXISTING CONCRETE

  - USED SAME VALUES AS ORIGINAL ANALYSIS AND AS PRESENTED IN THE FSAR

* REPLACEMENT CONCRETE

  - TO ESTIMATE PROPERTIES OF REPLACEMENT CONCRETE BOTH AT INITIAL PRESTRESSING AND AT END OF PLANT LIFE THE FOLLOWING BASE DATA WAS CONSIDERED:

    - ORIGINAL LABORATORY TEST DATA

    - ORIGINAL ANALYSIS DATA (MORE CONSERVATIVE THAN LAB TEST DATA)

    - ESTIMATE OF OPTIMAL MIX RESULTS

    - ESTIMATE OF STIFFNESS (MODULUS OF ELASTICITY) <u>AT 7 DAYS</u>

    - STIFFNESS: <u>0.78 TO .92</u> X DESIGN VALUE

MATERIAL PROPERTIES (CONTINUED)

- *CREEP EFFECTS WERE ACCOUNTED FOR BY AN EFFECTIVE MODULUS OF ELASTICITY*

  - *ACI 209R (CONSIDERING BYZANT'S AGING FACTOR)*

  - *ACI SP-76 (BASED ON ACTUAL CREEP TESTS RESULTS FOR SEVERAL CONTAINMENTS STRUCTURES)*

- *<u>LONG TERM</u> STRENGTH AND STIFFNESS*

  - *STRENGTH: <u>1.16 TO 1.74</u> X ORIGINAL DESIGN VALUE (ACTUALLY USED 1.0)*

  - *STIFFNESS: <u>.64 TO .78</u> X ORIGINAL DESIGN VALUE (BEST ESTIMATE: .69 ORIGINAL)*

MATERIAL PROPERTIES (CONTINUED)

- *NEW ANALYSIS BASED ON THE FOLLOWING:*

- *CONCRETE STRENGTH OF 5000 PSI (SAME AS ORIGINAL ANALYSIS) FOR BOTH OLD AND REPACEMENT CONCRETE*

- *FOUR DIFFERENT STIFFNESS VALUES (MODULUS OF ELASTICITY) FOR REPLACEMENT CONCRETE (BASED ON LOADING AT AGE OF 7 DAYS)*

  * *1.2 X ORIGINAL DESIGN VALUE*

  * *.77 X ORIGINAL DESIGN VALUE*

  * *.69 X ORIGINAL DESIGN VALUE*

  * *.63 X ORIGINAL DESIGN VALUE*

MATERIAL PROPERTIES (CONTINUED)

* CONCRETE MIX DESIGNED TO MINIMIZE SHRINKAGE

* FOR DESIGN - USE ACI 209R TO DETERMINE AMOUNT OF SHRINKAGE

  - EVALUATE MICROCRACKING

    - SIZE

    - DISTRIBUTION

    - RESULTING STRESS IN CONCRETE APPROXIMATELY 2 1/2 KIP/FT

    - ACCEPTABLE PER ACI 224R-80

RESULTS OF ANALYSIS

* DEPENDENT UPON FOLLOWING TWO PARAMETERS:

  - AMOUNT OF DETENSIONING (PRIMARY)

  - AMOUNT OF LONG TERM CREEP (SECONDARY)

* EFFECTS OF BOTH PARAMATERS OF LIMITED TO THE AREA IMMEDIATELY SURROUNDING THE OPENING

  - HOOP DIRECTION:

    - AVERAGE HOOP PRESTRESS MEETS ORIGINAL DESIGN REQUIREMENT

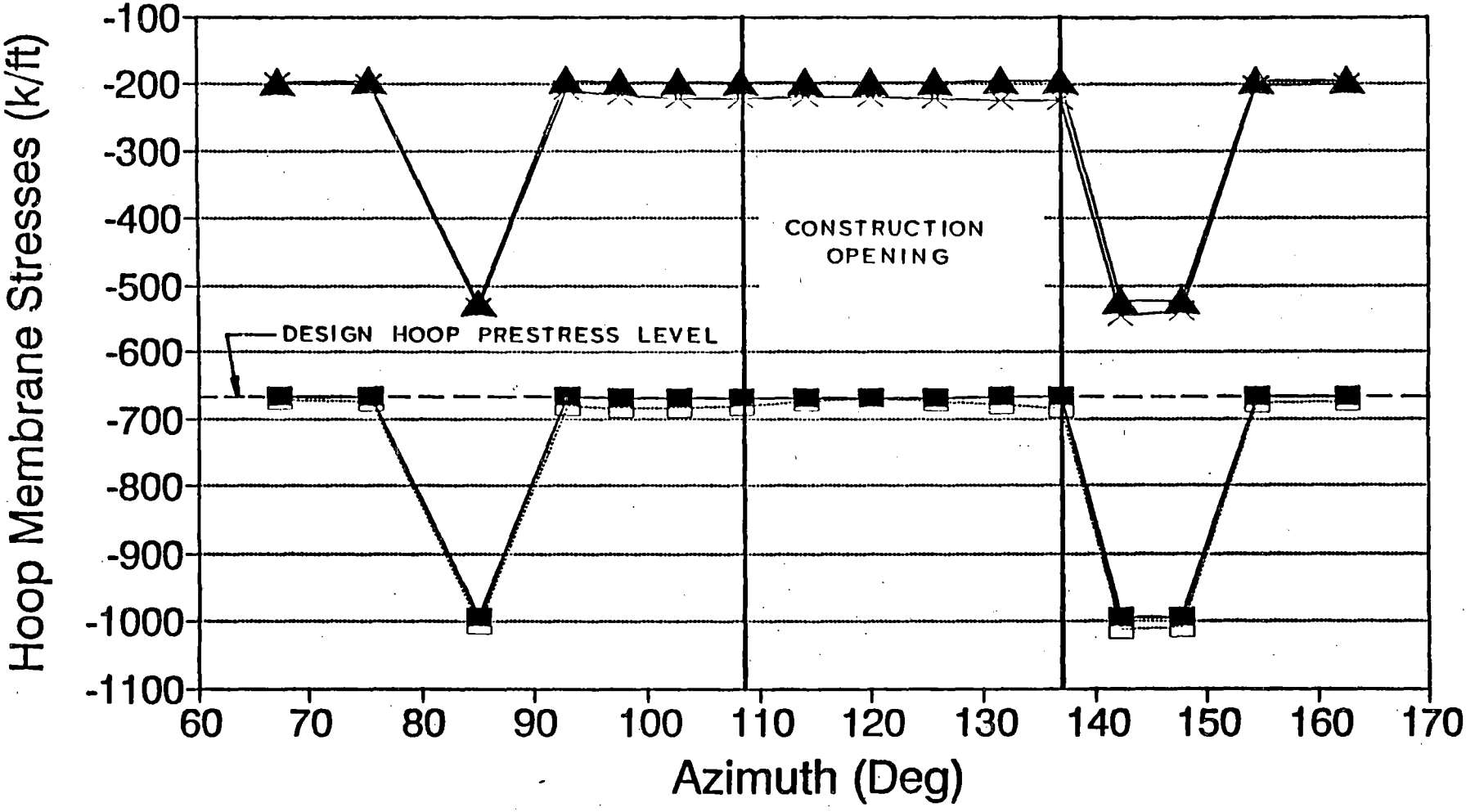
  - VERTICAL DIRECTION

    - AVERAGE VERTICAL PRESTRESS MEETS ORIGINAL DESIGN REQUIREMENT

  - REBAR AND CONCRETE STRESSES STILL UNDER EVALUATION

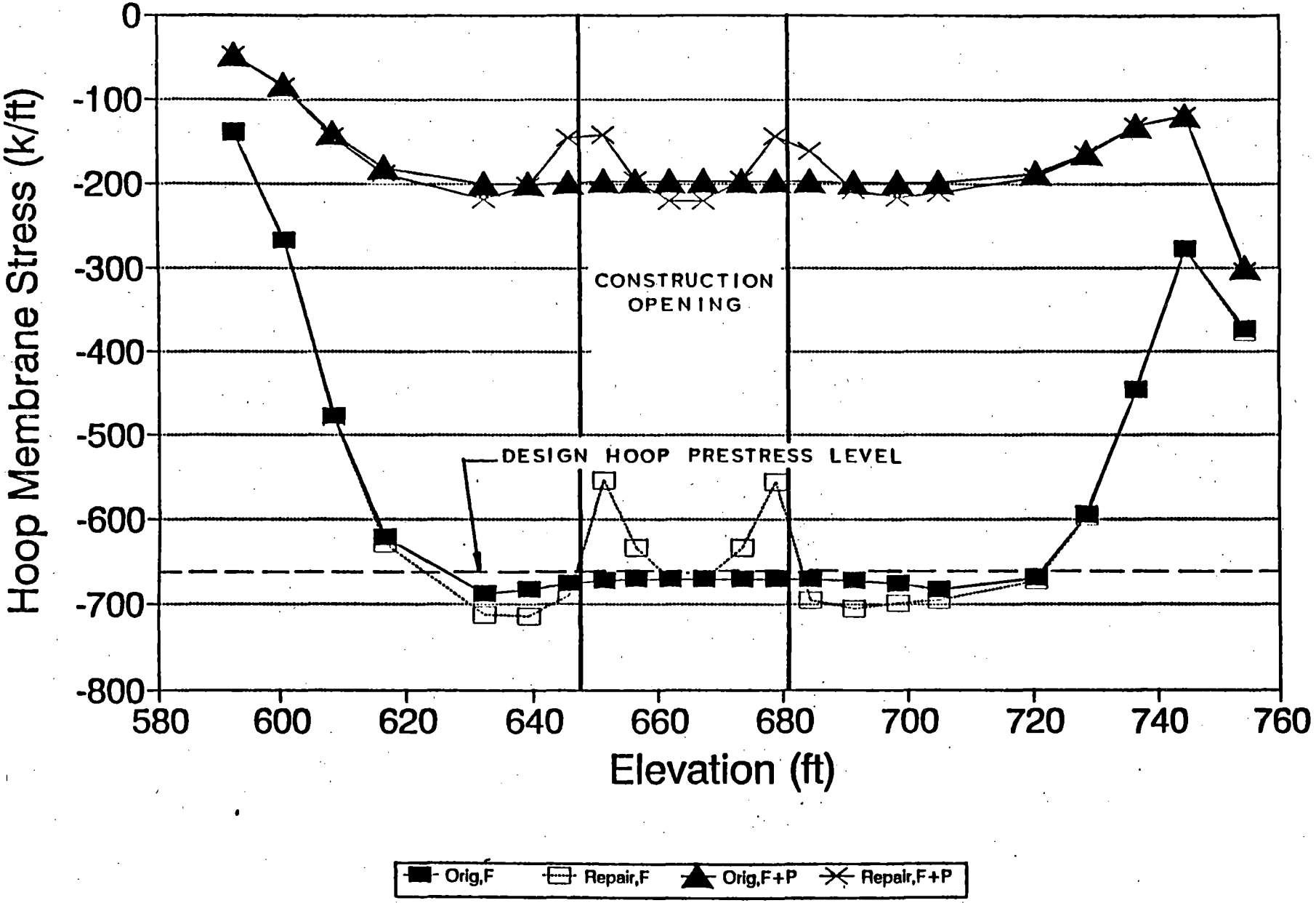
    - RESULTS WILL SHOW THAT ORIGINAL DESIGN CRITERIA IS SATISIFIED

CONTAINMENT WALL
Horizontal Cut

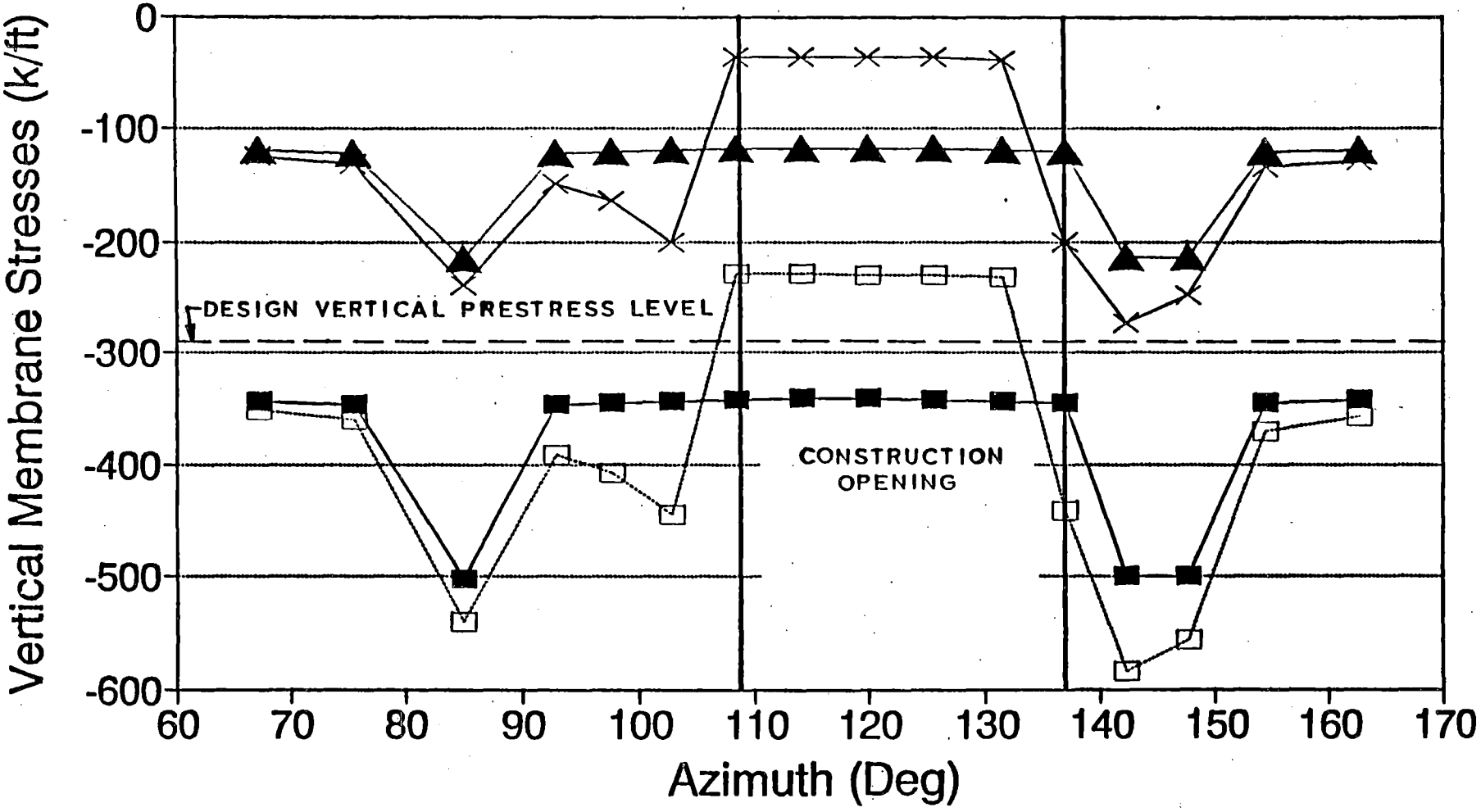


Orig,F Repair,F Orig,F+P Repair,F+P

CONTAINMENT WALL
Vertical Cut



CONTAINMENT WALL
Horizontal Cut



REPLACEMENT CONCRETE

** DESIGN MIX BEING DEVELOPED AT UNIV. OF ILLINOIS*

- OBJECTIVE:

- MAXIMIZE STRENGTH

- MINIMIZE SHRINKAGE & LONG TERM CREEP

- APPROACH

- USE HIGH DENSITY, LOW ABSORPTION AGGREGRATE

- POSSIBLE GAP GRADING OF AGGREGATE

- MIMINIZE MORTAR-TO-AGGREGATE RATIO

- MINIMIZE WATER-TO-CEMENT RATIO

- LOW HEAT OF HYDRATION CEMENT (TYPE II)

- MINIMIZE CEMENT FACTOR

ACTIVITIES AT UNIV. OF ILL.

* PREPARATION OF PRELIMINARY TRIAL BATCHES

* PREPARATION OF FINAL TRIAL BATCHES

* SELECTION OF A FINAL MIX TO OPTIMIZE THE FOLLOWING:

  - LOW MORTAR TO AGGREGATE RATIO
  - LOW WATER-TO-CEMENT RATIO
  - LOW CEMENT FACTOR
  - SUFFICIENT WORKABILITY AND PUMPABILITY
  - MINIMUM DOSAGE OF ADMIXTURES
  - ACHIEVE HIGH EARLY STRENGTH

* PERFORM CREEP TEST

  - TESTS SETS TO BE LOADED AT 7 AND 28 DAYS

  - STORE AT 70 DEGREES AND 110 DEGREES

  - OBTAIN:

    - COMPRESSIVE STRENGTH
    - MODULUS OF ELASTICITY
    - POISSON'S RATIO
    - SPECIFIC CREEP

  - TEST DURATION: 6 MONTHS

STRUCTURAL INTEGRITY TEST (SIT)

* A SIT IS PLANNED

- SUGGESTED TEST PROCEDURE

- PRESSURIZE TO 1.15 X ~~ACCIDENT~~ DESIGN PRESSURE

- MEASURE RADIAL DISPLACEMENT OF SHELL AT OPENING AND IN AN ORTHOGONAL DIRECTION

- MEASURE VERTICAL DISPLACEMENT OF SPRINGLINE DIRECTLY ABOVE OPENING

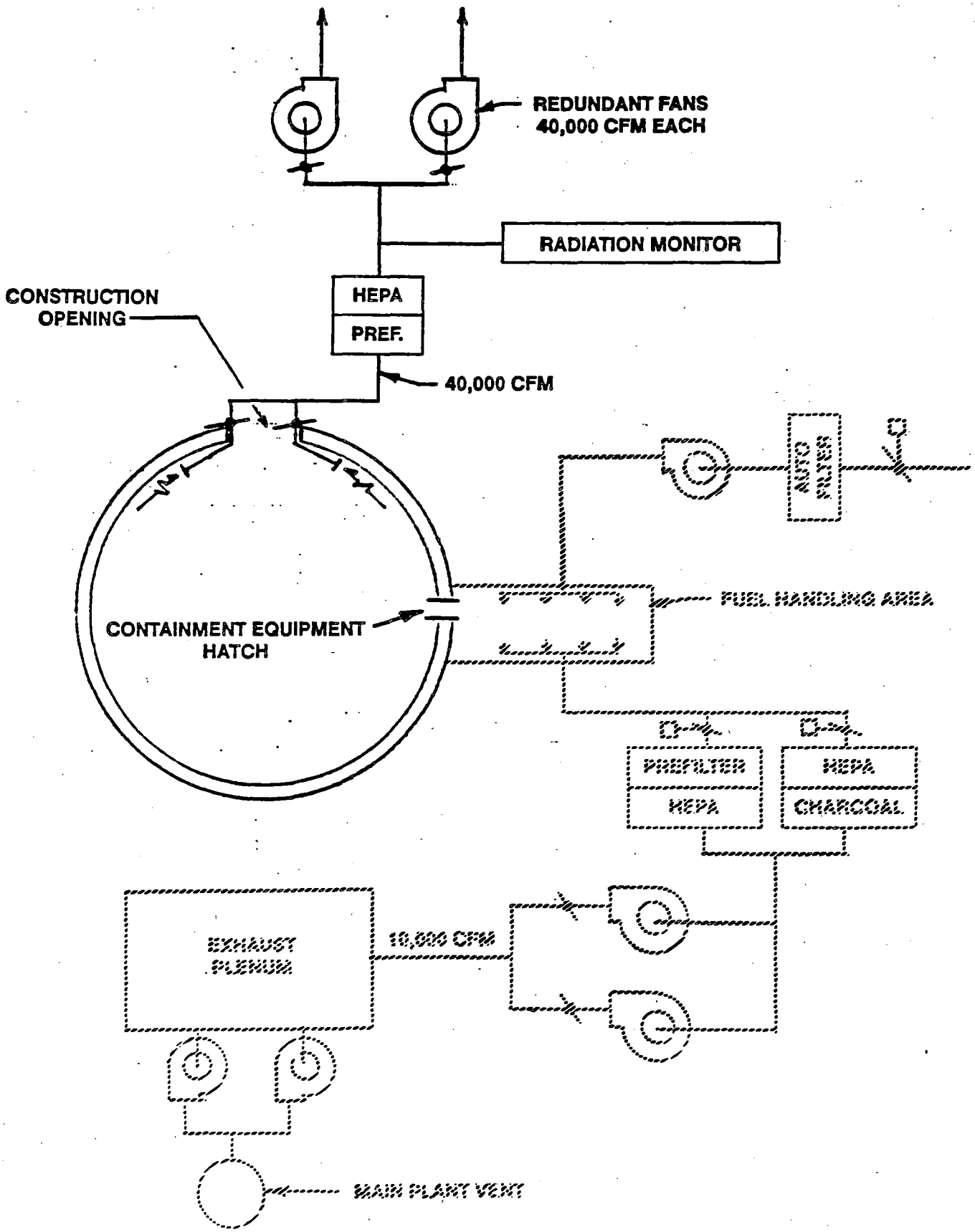
- PERFORM CRACK MAPPING AT CENTER AND AT ONE TOP CORNER OF REPLACED CONCRETE

Objective:

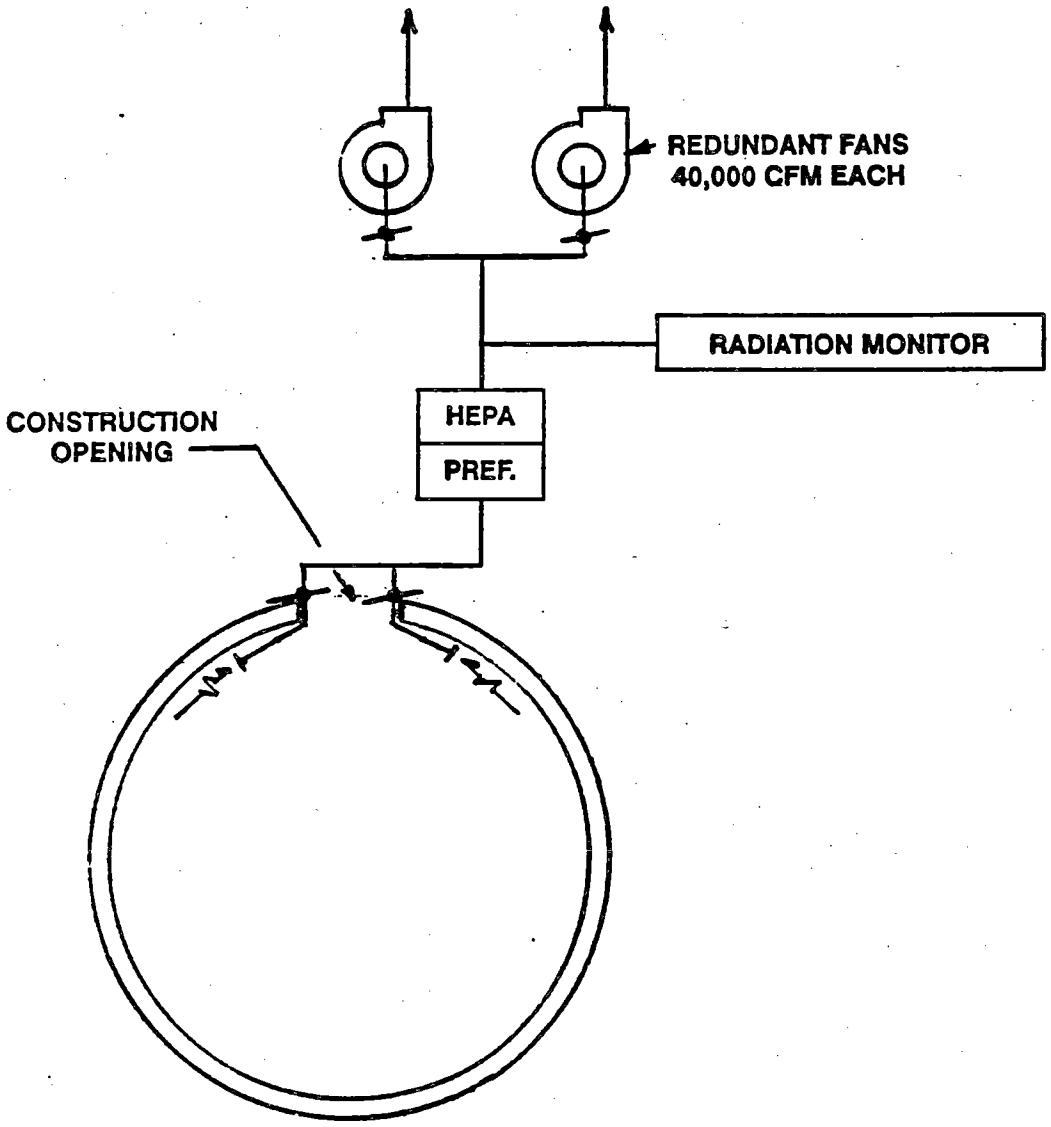
- **Mitigate Potential Airborne Radioactive Particle Release Through Construction Opening**

- **Accomplish By Creating a Negative Pressure Differential Across Construction Opening To Prevent Air From Flowing Out of Containment.**

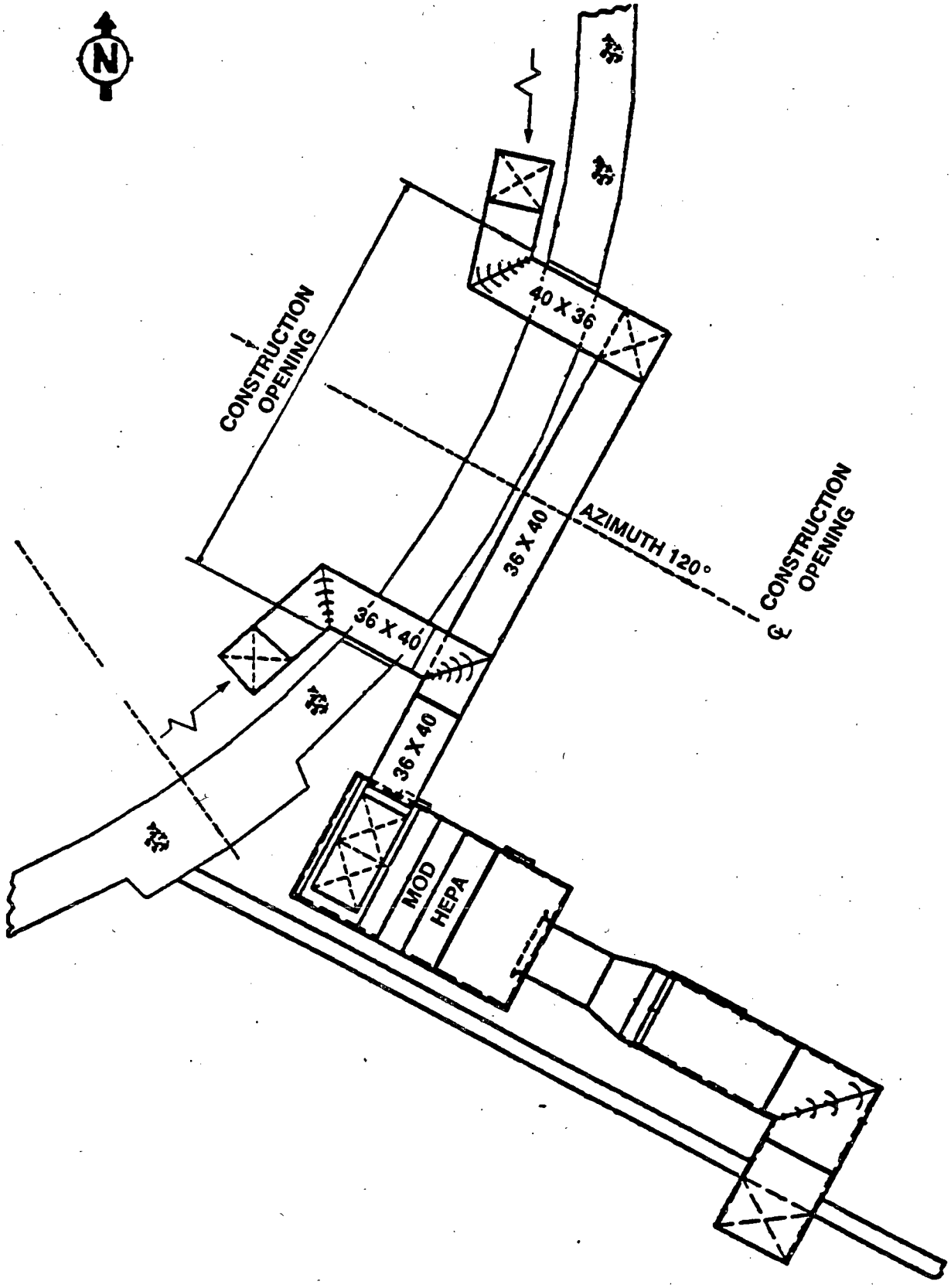
CONTAINMENT VENTILATION SYSTEM

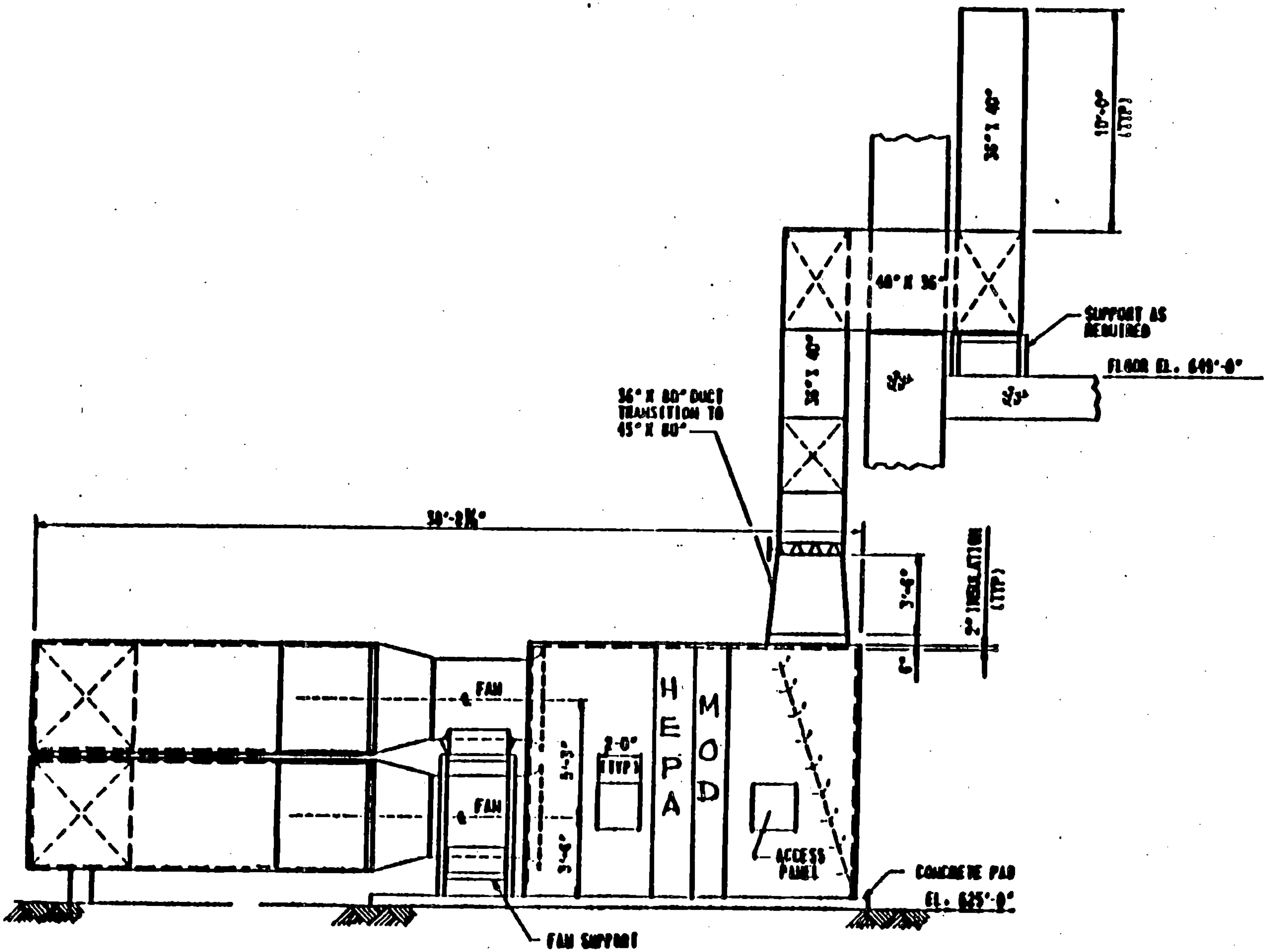


TEMPORARY CONTAINMENT VENTILATION SYSTEM



TEMPORARY CONTAINMENT VENTILATION SYSTEM
PLAN VIEW




36" X 40"
10'-0" (TYP)
40" X 36"
SUPPORT AS REQUIRED
FLOOR EL. 649'-0"
36" X 80" DUCT TRANSITION TO 45" X 80"
30'-8½"
3'-4"
2" INSULATION (TYP)
FAN
HEPA
MOD
2'-0" (TYP)
ACCESS PANEL
CONCRETE PAD
EL. 625'-0"
FAN SUPPORT

SECTION

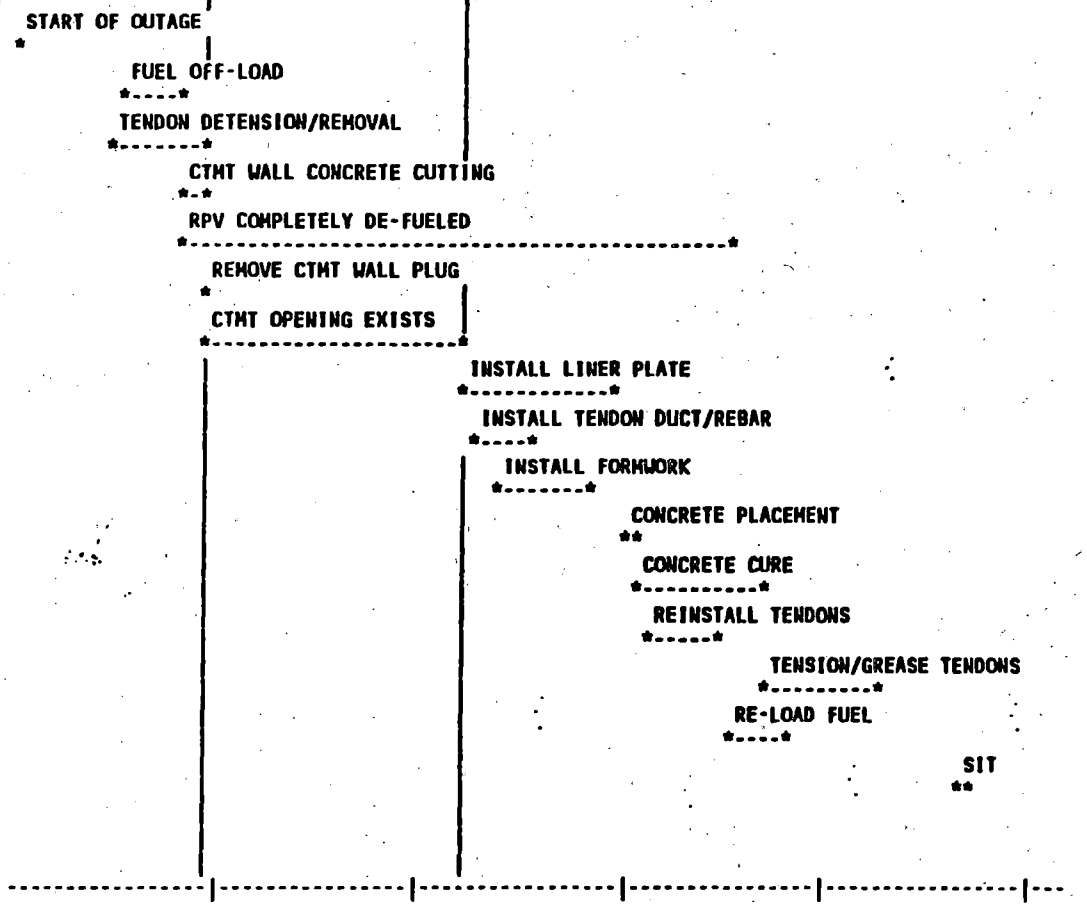
CONSIDERATIONS

- KEEP TEMPORARY CLOSURE DOOR CLOSED EXCEPT DURING RIGGING OPERATION
- DURING RIGGING OPERATION, IN ADDITION TO TEMPORARY VENTILATION SYSTEM, FB EXHAUST SYSTEM WILL INDUCE AIR FLOW FROM CONTAINMENT TO FB
- ABILITY TO CLOSE EQUIPMENT HATCH, AS REQUIRED, IN THE EVENT OF FHA
- FUEL BUILDING EXHAUST SYSTEM THROUGH CHARCOAL ADSORBERS WILL BE OPERABLE AT ALL TIMES
- FAN FAILURE/DIRTY FILTER/RADIATION ANNUNCIATION WILL BE ALARMED IN THE VICINITY OF 24-HOUR MANNED STATION
- CAM WILL BE IN THE VICINITY OF CONSTRUCTION OPENING

PRJ NAME	PALISADES SGR	START 01-Sep-90	DOES SCHEDULE
SUBJECT	CTMT CONSTRUCTION OPENING	WEEKS 22	INCLUDE Y/N
PRJ LOCAT	COVERT, MI	END 02-Feb-91	
RPT DATE	11-Apr-90		SATURDAYS Y
REVISION	0		SUNDAYS Y

RESPONS.	DESCRIPTION	START	DAYS	END
	START OF OUTAGE	01-Sep-90	1	01-Sep-90
	FUEL OFF-LOAD	18-Sep-90	9	26-Sep-90
	TENDON DETENSION/REMOVAL	16-Sep-90	15	30-Sep-90
	CTMT WALL CONCRETE CUTTING	26-Sep-90	5	30-Sep-90
	RPV COMPLETELY DE-FUELED	26-Sep-90	83	17-Dec-90
	REMOVE CTMT WALL PLUG	30-Sep-90	1	30-Sep-90
	CTMT OPENING EXISTS	30-Sep-90	39	07-Nov-90
	INSTALL LINER PLATE	07-Nov-90	24	30-Nov-90
	INSTALL TENDON DUCT/REBAR	09-Nov-90	9	17-Nov-90
	INSTALL FORMWORK	13-Nov-90	15	27-Nov-90
	CONCRETE PLACEMENT	01-Dec-90	3	03-Dec-90
	CONCRETE CURE	03-Dec-90	21	23-Dec-90
	REINSTALL TENDONS	06-Dec-90	10	15-Dec-90
	TENSION/GREASE TENDONS	23-Dec-90	18	09-Jan-91
	RE-LOAD FUEL	17-Dec-90	10	26-Dec-90
	SIT	22-Jan-91	3	24-Jan-91

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23
90	90	90	90	90	90	90	90	90	90	90	90	90	90	90	90	90	91	91	91	91	91	91
SEP	SEP	SEP	SEP	OCT	OCT	OCT	OCT	NOV	NOV	NOV	NOV	NOV	DEC	DEC	DEC	DEC	JAN	JAN	JAN	JAN	FEB	FEB
7	14	21	28	5	12	19	26	2	9	16	23	30	7	14	21	28	4	11	18	25	1	8



PRELIMINARY

ENCLOSURE 3

PLANNED SAFETY EVALUATIONS TO SUPPORT

NO UNREVIEWED SAFETY QUESTIONS DETERMINATIONS

FC Interim Old SG Storage Facility

FC Containment Construction Opening

FC Rigging Installation in Spring Outage

Rigging

Haul Routes and Transportation

FC Retaining Wall Outside Containment

FC Steam Generator Replacement

FC PCS Piping

FC Main Steam Piping

FC Emergency Feedwater Piping

FC SG Blowdown Piping - Spring Outage

FC SG Blowdown Piping

FC SG Recirculation Piping - Spring Outage

FC SG Recirculation Piping

FC SG Sample System

FC Wide Range Level Instrumentation

Temporary Removal of Commodities

PRELIMINARY

Safety Evaluations to be performed

ENCLOSURE 4

CONTAINMENT LOAD COMBINATIONS

STRUCTURAL INTEGRITY TEST

LOAD COMBINATIONS CONSIDERED IN THE ANALYSIS

- SAME AS IDENTIFIED IN THE FSAR

- WORKING STRESS CONDITION

1. D + Ff + L + To

2. D + Ff + L + P + Ta

3. D + Ff + L + P'

WHERE D = DEAD LOADS
L = LIVE LOADS
Ff = FINAL PRESTRESS LOADS
To = THERMAL LOADS DUE TO OPERATING TEMPERATURE
Ta = THERMAL LOADS DUE TO DBA TEMPERATURE
P = DESIGN PRESSURE
P' = TEST PRESSURE (1.15 X DBA PRESSURE)

LOAD COMBINATIONS (CONTINUED)

- YIELD STRENGTH CONDITION

1. $Y = 1/\phi(1.05D + 1.5P + 1.0Ta + 1.0\ Ff)$

2. $Y = 1/\phi(1.05D + 1.25P + 1.0Ta + 1.25H + 1.25E + 1.0\ Ff)$

5. $Y = 1/\phi\ (1.0D + 1.0P + 1.0\ Ta + 1.0E' + 1.0\ Ff)$

WHERE: Y = REQUIRED YIELD STRENGTH OF THE STRUCTURE
ϕ = YIELD CAPACITY REDUCTION FACTOR
D = DEAD LOAD
P = DBA PRESSURE LOAD
Ff = FINAL PRESTRESS
H = FORCE ON STRUCTURE DUE TO THERMAL EXPANSION OF PIPES
To = THERMAL LOADS DUE TO OPERATING TEMPERATURE
Ta = THERMAL LOADS DUE TO DBA TEMPERATURE
E = OBE LOADS FOR GROUND ACCELERATION OF 0.1g
E' = SSE LOADS FOR GROUND ACCELERATION OF 0.2g

STRUCTURAL INTEGRITY TEST (SIT)

* A SIT IS PLANNED

- SUGGESTED TEST PROCEDURE

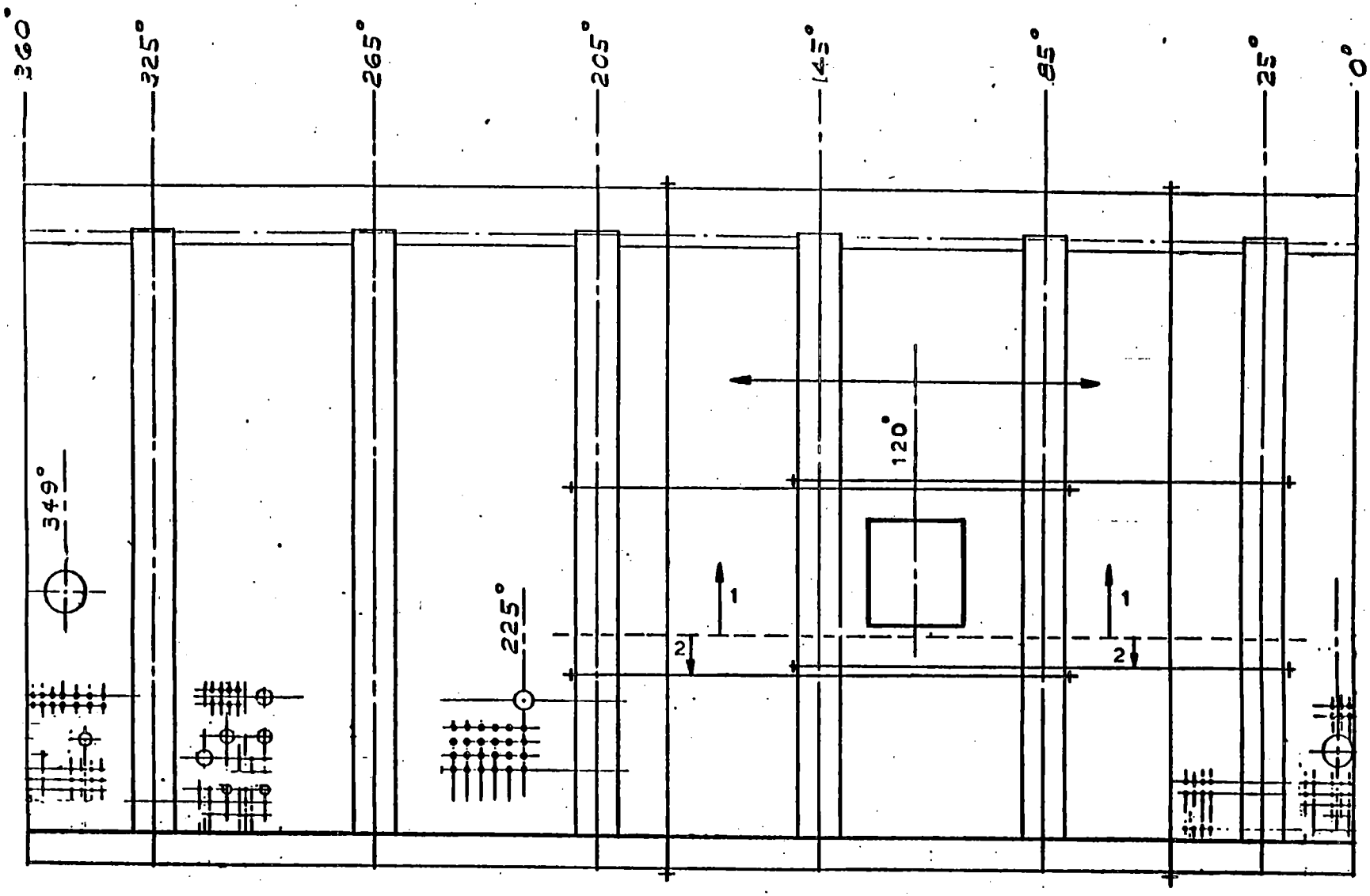
- PRESSURIZE TO 1.15 X DESIGN PRESSURE

- MEASURE RADIAL DISPLACEMENT OF SHELL AT OPENING AND IN AN ORTHOGONAL DIRECTION

- MEASURE VERTICAL DISPLACEMENT OF SPRINGLINE DIRECTLY ABOVE OPENING

- PERFORM CRACK MAPPING AT CENTER AND AT ONE TOP CORNER OF REPLACED CONCRETE

- AN ILRT WILL ALSO BE PERFORMED



DETENSIONING SEQUENCE