J. A. JONES CONSTRUCTION COMPANY

CORPORATE STANDARD

NUCLEAR PROJECT OPERATING PROCEDURE

Modified to Fit Waterford Unit #3

Concrete Phase I Construction

Contract No. W3-NY-4

POP-N-713
USE OF DISCREPANCY REPORTS

NUCLEAR PROJECT OPERATING PROCEDURE	PROCEDURE NO. POP-N-713
TITLE OF PROCEDURE: USE OF DISCREPANCY REPORTS	Issue Date: 3/22/76
PROJECT TITLE: WATERFORD SES UNIT #3, PHASE I CONCRETE CONSTRUCTION	Rev. No. & Date: Rev. 3

PREPARED BY:	DATE	APPROVED BY		DATE
T. N. McAllister	2/3/78	R. F. Schumacher	PROJ. MGR.	3-7-78
		T. N. McAllister	QA MGR	2-28-78

1.0 PURPOSE

This procedure governs the initiating, processing and closure of J. A. Jones Discrepancy Reports.

2.0 SCOPE

This procedure shall govern the documentation of all discrepancies concerning non-safety related items and all discrepancies of Class I items which can be reworked. All other discrepancies shall be documented in accordance with J. A. Jones Project Operating Procedure POP-N-703, "Nonconformance Reporting and Corrective Action".

3.0 DEFINITIONS

3.1 Rework - The process by which a nonconforming item is made to conform to a prior specified requirement by completion, remachining, reassembling or other corrective means.

3.2 Discrepancy - A deviation from specified requirements (including procedures) that can be readily corrected in accordance with standard approved operating procedures or specifications based on good engineering practice. Discrepancies do not require an elaborate engineering evaluation or disposition for correction. They are deviations from good engineering practice and procedures. A few examples of discrepancies are:

a. Bent reinforcing steel bars.

b. Materials received at the site with documentation deficiencies such as the Ebasco VQA release for shipment, minor errors on mill test reports and unsigned test reports.

c. Welds rejected on visual inspection.

d. Concrete honeycomb

e. Materials lacking identification resulting, for example, from loss of previously applied identification markings.

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f. Incomplete operations which can be completed with approved operating procedures.

g. Replacing missing components.

3.3 Quality Verification Inspection Supervisor - For the purpose of this procedure, the Q. V. Inspection Supervisor shall be defined as one of the following persons: (1) Quality Verification Inspection Supervisor; (2) Quality Assurance Engineer; or (3) Project Quality Assurance Manager.

3.4 J. A. Jones Project Engineer - For the purpose of this procedure, the J. A. Jones Project Engineer shall be defined as the Project Engineer or his designee.

3.5 Nonconformance - A condition in characteristic, documentation or procedure which renders the quality of an item or service unacceptable or indeterminate. Examples of nonconformances include: physical defects, test failures, incorrect or inadequate documentation, or deviation from prescribed inspection or test procedures.

The following are some examples of deviations from the applicable specifications codes and standards that must be classified as nonconformances:

a. Deviations that affect the structural integrity of the item such as deviation in materials; deviation in nondestructive testing requirements; deviations in welding; heat treating/stress relieving requirements; deviations from parameters of stress reports; deviations in testing requirements and undersized steel reinforcing bars.

b. Deviations that are likely to result in failure or reduce materially, the usability of the item, such as deterioration resulting from inadequate storage; use of welding filler metal other than those specified by the specification; surface irregularities exceeding code requirements; severe localized corrosions and pipe bending radius smaller than that specified by the specification.

R 3

NUCLEAR PROJECT OPERATING PROCEDURE	PROCEDURE NO. POP-N
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4.0 REFERENCE

4.1 J. A. Jones Project Operating Procedure POP-N-703, "Nonconformance Reporting and Corrective Action".

4.2 J. A. Jones Project Operating Procedure POP-N-709, "Permanent Project Records".

5.0 GENERAL

5.1 Any J. A. Jones personnel detecting a discrepancy is responsible for reporting said discrepancy to Quality Assurance/Quality Verification.

5.2 The Quality Assurance Department is responsible for the preparation, issuance, distribution and control of Discrepancy Reports.

5.3 Rework or processing shall not be effected on a discrepant item until a written disposition is obtained from the Project Engineer. Quality Assurance approval is required prior to the start of any work. R 3

5.4 Discrepancy Reports may be either typed or handwritten legibly using Black Ink.

6.0 PROCEDURE

6.1 Whenever a discrepancy covered by this procedure is identified, Quality Assurance/Quality Verification shall complete items 1-8 of the Discrepancy Report. The Discrepancy Report Number (item 1) will be assigned by the Quality Assurance Records Clerk.

6.2 A Discrepancy Report Log (Attachment B) shall be maintained by the Quality Assurance Department.

6.3 After completion of items 1-8 and logging, the Discrepancy Report will be forwarded to the Project Engineer for his disposition and completion of items 9 and 10.

6.3.1 The disposition shall include reference to approved rework procedures. (Item 9). R 3

NUCLEAR PROJECT OPERATING PROCEDURE	PROCEDURE NO. POP-N
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6.4 After disposition by the Project Engineer, the Discrepancy Report will be assigned to the appropriate Construction Supervisor, (item 12) and the original Discrepancy Report be returned to Quality Assurance.

6.5 The Quality Assurance Records Clerk shall log the Discrepancy Report on the Discrepancy Report Log (Attachment B). R 3

6.6 The Quality Assurance Clerk will issue a copy of the Discrepancy Report to the assigned Construction Supervisor. This copy will constitute authorization to proceed with the work. An information copy will be to the Chief Engineer and the Area Engineer. The original will be retained by Quality Assurance Records.

6.6.1 The responsible Construction Supervisor shall notify the Quality Verification Supervisor or assigned inspector prior to the start of any work.

6.7 The party responsible for the action shall notify the Quality Verification Supervisor, or his designee, who shall assign a Quality Verification Inspector to inspect the discrepant area prior to the start of any work.

6.8 The party responsible for the action shall notify Quality Assurance when the action is completed and will sign and date the original Discrepancy Report (item 12).

6.9 Upon notification of completion of the required action, Quality Assurance/Quality Verification will reinspect the discrepant area or item and complete items 13-16, as applicable, on the Discrepancy Report.

6.9.1 If item 14 is marked as "Accept", the Discrepancy Report will be deemed closed upon the affixing of the signature of the inspector accepting the item.

6.9.2 If item 14 is marked as "Reject", a new Discrepancy Report will be issued and the new Discrepancy Report Number entered in item 16. The old report will be deemed closed upon the issuance of the new Discrepancy Report.

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6.10 Where practicable, a "Hold" tag, Attachment C, shall be placed on or near to discrepant item or area.

6.11 When necessary, Quality Verification personnel shall conduct surveillance inspection of the rework in process as well as reinspection after completion of the rework and, where applicable, shall complete reinspection reports required by the rework procedures.

7.0 QUALITY ASSURANCE

Project Quality Assurance Auditor shall periodically audit inspection, engineering and construction activities for compliance with this procedure.

8.0 RECORDS AND REPORTS

8.1 Discrepancy Report (Attachment A)

8.2 Discrepancy Report Log (Attachment B)

8.3 Hold Tag (Attachment C)

Attachment A

J. A. JONES CONSTRUCTION COMPANY
WATERFORD SES UNIT NO. 3
CONTRACT NO. W3-NY-4

D. R. Number (1)

Date of Report (2)

DISCREPANCY REPORT

Item Description (3)

Location (4)

Dwg./Spec. No. (5)

Discrepancy Description:

(6)

Q. V. Inspector (7)

Q. V. Supervisor (8)

Disposition:

(9)

J. A. Jones Project Engineer (10) Date

Q. A. Approval (11) Date

Assigned to: (12)

Action Completed: Signature (13) Date

Re-inspection:

Remarks: (14)

Accept ☐ (15) Reject ☐ (15) Q. V. Inspector (16) Date

If Reject, D. R. or N.C.R. Number (17) issued

Revision 3
2/3/78

INSTRUCTIONS FOR PREPARING DISCREPANCY REPORT

Item No.

(1) Discrepancy Report number as assigned by Quality Assurance

(2) Date Report generated

(3) Brief description or title of item

(4) Concise, accurate location of item

(5) Drawing and/or Specification number which states original requirement

(6) Clear, concise description of discrepancy

(7) Signature of Inspector reporting item

(8) Signature of Q. V. Supervisor

(9) J. A. Jones Engineering recommended solution for discrepancy

(10) Signature of J. A. Jones Project Engineer and date

(11) Q. A. Approval

R 3

(12) Name and title of party responsible for physical compliance with disposition

(13) Signature of party named in item 12

(14) Remarks, if any, of person responsible for reinspection

(15) Status of reinspection (Accept or Reject)

(16) Signature of person performing reinspection

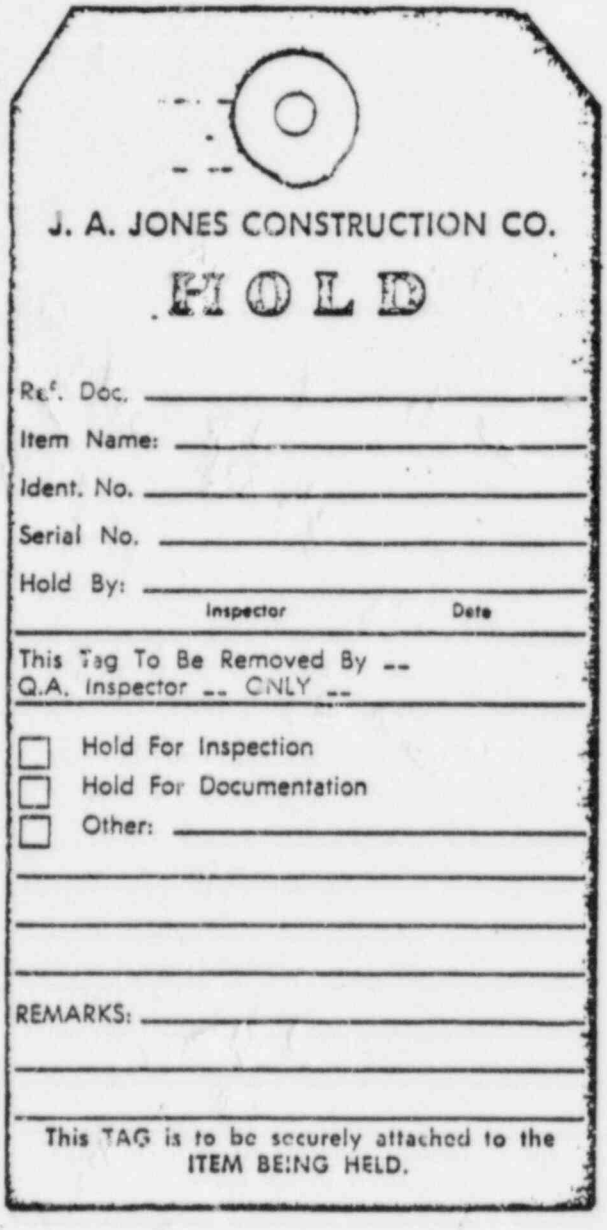
(17) Discrepancy Report Number of reissued Discrepancy Report, if required.

J. A. JONES CONSTRUCTION COMPANY

DISCREPANCY REPORT LOG

D.R. NUMBER	DESCRIPTION	DATE ISSUED	DATE TO ENGINEERING FOR DISPOSITION	DATE OF DISPOSITION	DATE CLOSED	REMARKS

Revision 2 - 12/8/77



J. A. JONES CONSTRUCTION CO.

HOLD

Ref. Doc. _____

Item Name: _____

Ident. No. _____

Serial No. _____

Hold By: _____
Inspector Date

This Tag To Be Removed By --
Q.A. Inspector -- ONLY --

☐ Hold For Inspection
☐ Hold For Documentation
☐ Other: _____

REMARKS: _____

This TAG is to be securely attached to the ITEM BEING HELD.

(Blue)

MAY 27 1981

QA VAULT

. A. JONES CONSTRUCTION COMPA
WATERFORD UNIT NO. 3
CONTRACT NO. W3-NY-4

D. R. Number 0028

Date of Report 5/6/76
5/6/76 SH

DISCREPANCY REPORT

137

Item Description Concrete Honeycomb

Location 7'6" WEST East of Column 10A, 30' South of column line J
SH 5-6-76

Dwg./Spec. No. LOU-1564-G-499503 &/OR LOU-1564.472-Sec II-5.10 P.8

Discrepancy Description:

An area of void exists from chipping out of unsound concrete. This area (along the west wall of pour 19) extends into pour 19 an average of 17" and 10" below the top mat of rebar. See attached drawing. Approximate elevation -34.75.

REPLACES D.R. NO. 0027
T.M.M.

Q. V. Inspector Sam Horton

Q. V. Supervisor T. M. McAllister 5-7-76

Recommended Disposition:

Backfill with Pour # LOU-1564-G-499503 - 17, or either pressure grout per Specification LOU-1564-472 - Section II Paragraph 5.10b.

J. A. Jones Project Engineer [signature] 5/10/76

Disposition:

DN

[redacted] FORM AT VOID ALONG CONST. JOINT & DO NOT BACKFILL WITH #17. WHEN CHIPPING IN VOID IS COMPLETE SUBMIT D.R. INDICATING METHOD OF REPAIR.

CW Ebasco Senior Resident Engineer [signature] 5/13/76 date

Assigned To: Dale Coe

Action Completed: Signature C/A This D.R. is Voided Date

Re-inspection:

Remarks: This discrepancy Report is Voided by Special Process Procedure W-SP-13. Accept or Reject to be determined after disposition to the above procedure.

Accept ☐ Reject ☐ Q. V. Inspector Sam Horton Date 9/27/76

If reject, D. R. Number _____ issued.

ORIGINAL

FREEDOM OF INFORMATION ACT REQUEST
84-455
C/721

J. A. JONES CONSTRUCTION COMPANY
WATERFORD UNIT NO. 3
CONTRACT NO. W3-NY-4

D. R. Number 0029

Date of Report 5/6/76

DISCREPANCY REPORT

137

Item Description Concrete Void

Location 7'6" West of column line 10A, 30' South of column line J

Dwg./Spec. No. LOU-1564-G-499503 OR LOU 1564.472 = Sect II - 5.10

Discrepancy Description:

An area 3'6" high x 4" long x 11" deep along middle of keyway is void of sound concrete. This possible loss of shear area exists on the west wall of pour G-499503-19.

Q. V. Inspector Sam Horton

Q. V. Supervisor T. M. McAllister 5-7-76

Recommended Disposition:

Backfill with Pour # LOU-1564-G-499503 - 17.

J. A. Jones Project Engineer Al Pannier 5/10/76

Disposition:

~~Note Above Accepted From Top of Bottom Keyway To Bottom of Top Keyway In The Above Area~~ Recommended Disposition Is Acceptable BF

CW Ebasco Senior Resident Engineer B Dfowler 5/10/76
date

Assigned To: Dale Coe

Action Completed: Signature J Dale Coe Date 5-10-76

Re-inspection:

Remarks: All defective concrete removed to sound concrete and exposed surface cleaned with water jet. T.M.M. 5-10-76

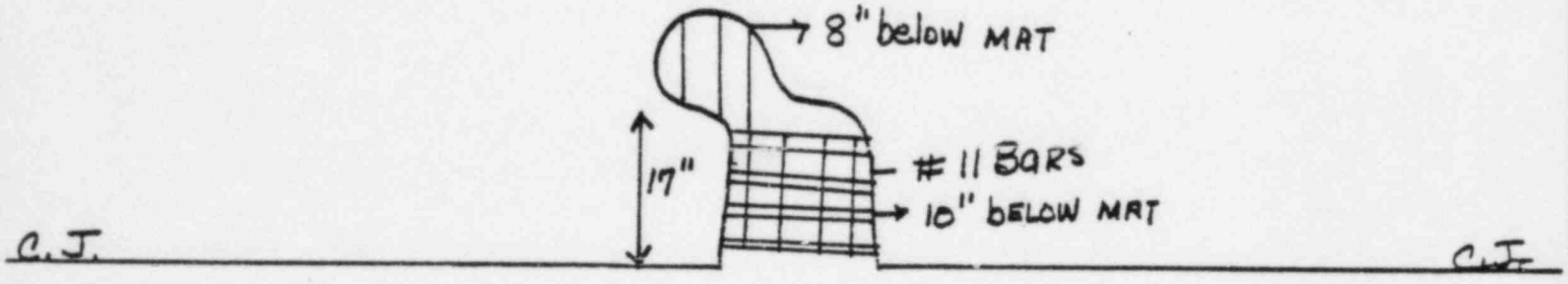
Accept ☒ Reject ☐ Q. V. Inspector J. Dale Coe Date 5/10/76

If reject, D. R. Number _____ issued.

ORIGINAL

[redacted] WALL
EAST

Pour 19



Pour 17

J. A. JONES CONSTRUCTION COMPANY
WATERFORD UNIT NO. 3
CONTRACT NO. W3-NY-4

D. R. Number C093

Date of Report 5/7/76

DISCREPANCY REPORT

137

Item Description Concrete Repair

Location LOU1564-G499503-17 East Wall, 33' from North Wall

Dwg./Spec. No. LOU1564.472

Discrepancy Description:

Chipping has left a void above ~~top~~ Bot bar bottom waterstop approx 10" long, 2 1/2" dep & approx 4" wide

Q. V. Inspector R.W. Lewis 5/7/76

Q. V. Supervisor T.M. McAllister 5-7-76

Recommended Disposition:

POUR IN WITH POUR G-499503-17

J. A. Jones Project Engineer al Pennie 5/7/76

Disposition:

RECOMMENDED DISPOSITION IS ACCEPTABLE PROVIDED PATH FOR AIR ESCAPE IS PROVIDED

CW Ebasco Senior Resident Engineer K.W. Bo... for R.O. Powell date 5/7/76

Assigned To: DALE COE

Action Completed: Signature D Coe Date 5/16/76

Re-inspection:

Remarks: Poured with Pour 17

Accept ☑ Reject ☐ Q. V. Inspector R.W. Lewis Date 5/18/76

If reject, D. R. Number _____ issued.

ORIGINAL COPY

MAY 27 1981

J. A. JONES CONSTRUCTION COMPANY
WATERFORD UNIT NO. 3
CONTRACT NO. W3-NY-4

D. R. Number 0098

Date of Report 5/12/76

DISCREPANCY REPORT

Item Description Concrete Repair

Location LOU 1564-G499503-18, Below Bottom Waterstop, North Wall, approx 15' from East Wall

Dwg./Spec. No. LOU 1564.472

Discrepancy Description:

A void exists below bottom waterstop, North wall, 15' from East wall, approx 5½" long 4" wide & 4" deep.

Q. V. Inspector R.W. Lewis 5/12/76

Q. V. Supervisor T. M. McMinn 5-13-76

Recommended Disposition:

Repair per FCR #50.

J. A. Jones Project Engineer al Lewis 5/19/76

Disposition:

APPLY SIKADUR-HI-MOD EPOXY & DRY PACK PER FCR CH-50

CW Ebasco Senior Resident Engineer R.W. Just for B. Fowler Stache 5/20/76 date

Assigned To: DALE COE

Action Completed: Signature John F Williams Date 5/25/76

Re-inspection:

Remarks: Area dry packed 5/20/76 R.W. Lewis WET Cure started 5/20/76 Dry pack area will be cured with Concrete placement 18 R.W. Lewis 5/26/76

Accept ☑ Reject ☐ Q. V. Inspector R.W. Lewis Date 5/26/76

If reject, D. R. Number _____ issued.

J. A. JONES CONSTRUCTION COMPANY
WATERFORD UNIT NO. 3
CONTRACT NO. W3-NY-4

D. R. Number 0005

Date of Report 4/8/76

DISCREPANCY REPORT

Item Description Waterstop 9"

Location Pour 12B upper Waterstop, East & West Walls

Dwg./Spec. No. G499501 Rev. #6

Discrepancy Description:

upper waterstop, West wall has a hole 3½' North of South Wall & deep gouges 30', 33½' 36½', 38', & 42' North of South Wall.
upper Waterstop, East Wall has gouge 41' North of South Wall

Q. V. Inspector R. W. Lewis

Q. V. Supervisor [signature]

Recommended Disposition:

Repair per EIR 200-7

J. A. Jones Project Engineer [signature]

Disposition:

RECOMMENDED DISPOSITION IS ACCEPTABLE

Ebasco Senior Resident Engineer R.W. Bair for B.D. Fowler date 4/8/76

Assigned To: Dale Coe

Action Completed: Signature [signature] Date 4/9/76

Re-inspection:

Remarks: Repaired IN accordance with EIR

Accept ☑ Reject ☐ Q. V. Inspector R. W. Lewis Date 4/9/76

If reject, D. R. Number _____ issued.

J. A. JONES CONSTRUCTION COMPANY
WATERFORD UNIT NO. 3
CONTRACT NO. W3-NY-4

D. R. Number 0006

Date of Report 4-12-76

DISCREPANCY REPORT

Item Description Water Stop 9" x 3/8

Location Pour 12A, Upper, 10' from West Wall

Dwg./Spec. No. G499501 Rev #6

Discrepancy Description:

Deep gouge in upper waterstop (bottom side), south wall, 10' from West wall.

Q. V. Inspector R. W. Lewis

Q. V. Supervisor T. N. McAllister

Recommended Disposition:

REPAIR PER EIR 200-7.

J. A. Jones Project Engineer A. Prince 4/12/76

Disposition:

RECOMMENDED DISPOSITION IS ACCEPTABLE

Ebasco Senior Resident Engineer B. D. Fowler 4/12/76 date

Assigned To: R. B. Washburn

Action Completed: Signature R. B. Washburn Date 4-13-76

Re-inspection:

Remarks:

Accept ☑ Reject ☐ Q. V. Inspector R. W. Lewis Date 4/13/76

If reject, D. R. Number _____ issued.

MAY 27 1981

J. A. JONES CONSTRUCTION COMPANY
WATERFORD UNIT NO. 3
CONTRACT NO. W3-NY-4

D. R. Number 0007

Date of Report 4-14-76

DISCREPANCY REPORT

Item Description Waterstop 9" X 3/8"

Location Pour 13A, South West corner, South Wall, upper

Dwg./Spec. No. 499501 Rev #6

Discrepancy Description:

upper waterstop, from West wall To 12' East has 10 Nails driven Through waterstop, from Edge of center bulb To 1" off edge of center, bulb.
Note: center bulb Not punctured.

Q. V. Inspector R. W. Lewis

Q. V. Supervisor T. N. McAllister

Recommended Disposition:

REPAIR PER EIR 200-7

J. A. Jones Project Engineer P. Galbreath
FOR A. PRINCE

Disposition:

RECOMMENDED DISPOSITION IS ACCEPTABLE

Ebasco Senior Resident Engineer B. Fowler 4/14/76 date

Assigned To: DALE COE

Action Completed: Signature D. E. Kelley Date 4-14-76

Re-inspection:

Remarks: Repaired per E.I.R.

Accept ☑ Reject ☐ Q. V. Inspector R. W. Lewis Date 4/14/6

If reject, D. R. Number _____ issued.

J. A. JONES CONSTRUCTION COMPANY
WATERFORD UNIT NO. 3
CONTRACT NO. W3-NY-4

D. R. Number 0015

Date of Report 4/27/76

DISCREPANCY REPORT

Item Description Concrete Repair

Location G 499501-15 Southwest Corner - Elevation approx -36.75'

Dwg./Spec. No. LOU-1564.472 Section II-10

Discrepancy Description:

A void area 6" from west wall on South wall above top waterstop 24" long x 3" deep. Also another area exists along top waterstop approximately 4' from West wall on South wall that is 21" long x 4" deep. This void affects waterstop area.

Q. V. Inspector Sam Hooton

Q. V. Supervisor T. N. McWhirter 4-27-76

Recommended Disposition:

Repair as per FCR #50

J. A. Jones Project Engineer Mike Volon for A. Prince

Disposition:

APPLY SIKADUR-HI-MOD EPOXX & THEN DRY PACK PER FCR CH-50

Ebasco Senior Resident Engineer R X Void 4/27/76 date

Assigned To: ROYCE MARHBURN

Action Completed: Signature R. B. Marhburn Date 5-4-76

Re-inspection:

Remarks: Areas dry packed, Curing start 2:00 P.M. 4/29/76 R.W. Lewis Curing will be accomplished while curing pour 15 RW Lewis 5/4/76

Accept ☐ Reject ☐ Q. V. Inspector R.W. Lewis Date 5/4/76

If reject, D. R. Number _____ issued.

ORIGINAL

J. A. JONES CONSTRUCTION COMPANY
WATERFORD UNIT NO. 3
CONTRACT NO. W3-NY-4

D. R. Number 0016

Date of Report 4/27/76

DISCREPANCY REPORT

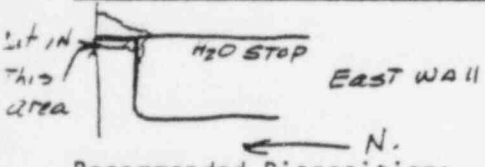
Item Description 9" x 3/8" Water Stop Tee

Location LOU1564G499501-15 N.E. Corner upper Waterstop

Dwg./Spec. No. LOU1564G499501

Discrepancy Description:

The portion of Waterstop Tee which Extends To North face of Concrete has a Cut approx 6" long, it is from 1" To 2" off The edge of center bulb, & is on Embeded side of H2O Stop. (Concrete has been Chipped out).



Q. V. Inspector R. W. Lewis 4/27/76

Q. V. Supervisor T. N. McAllister 4-27-76

Recommended Disposition:

REPAIR PER EIR 200-7 & FCR #50.

J. A. Jones Project Engineer M. Wolen for A. Prince

Disposition:

WATERSTOP MAY BE REPAIRED PER EIR 200-7. CONCRETE REPAIR MAY BE ACCOMPLISHED BY APPLYING SIKADUR-HI-MOD EPOXY & THEN DRY PACKING PER FCR CH-50

CW Ebasco Senior Resident Engineer R. F. Vine 4/27/76 date

Assigned To: ROYCE MASHBURN

Action Completed: Signature R.B. Mashburn Date 4-30-76

Re-inspection:

Remarks: Waterstop repaired by replacing End section of tee. 4/29/76 R.W. Lewis See D.R.# 0012 for Concrete repair.

Accept ☑ Reject ☐ Q. V. Inspector R.W. Lewis Date 5/3/76

If reject, D. R. Number _____ issued.

ORIGINAL

ORIGINAL

J. A. JONES CONSTRUCTION COMPANY
WATERFORD UNIT NO. 3
CONTRACT NO. W3-NY-4

D. R. Number 0017

Date of Report 4-29-76

DISCREPANCY REPORT

Item Description 9" x 3/8 Water STOP

Location LOU1564G499501-15, East Wall Lower WaterStop

Dwg./Spec. No. LOU 1564 G499 501

Discrepancy Description:

The Top side of the lower waterstop has approx 14 deep gouges and holes in Center bulb. The damage starts approx 15ft from South wall & extends approx 12' North.

Q. V. Inspector R. W. Lewis 4/29/76

Q. V. Supervisor T. M. McAllister 4-29-76

Recommended Disposition:

REPAIR PER E.I.R. 200-T.

QA VAULT

EBASCO Q.A.E. REVIEWED 137 5 22 76

J. A. Jones Project Engineer Parker Caldwell Jr

Disposition:

RECOMMENDED DISPOSITION IS ACCEPTABLE

CW Ebasco Senior Resident Engineer Charlie for BD Fowler 4/29/76 Date

Assigned To: MR. JOHN WILLIAMS

Action Completed: Signature John F Williams Date 5/3/76

Re-inspection:

Remarks: Areas repaired as per EIR 200-7
4/29/76 R. W. Lewis

Accept ☑ Reject ☐ Q. V. Inspector R. W. Lewis Date 5/3/76

If reject, D. R. Number _____ issued.

ORIGINAL

FREEDOM OF INFORMATION ACT REQUEST
84-455 C/715

J. A. JONES CONSTRUCTION COMPANY
WATERFORD UNIT NO. 3
CONTRACT NO. W3-NY-4

D. R. Number CC19

Date of Report 4/30/76

DISCREPANCY REPORT

Item Description Concrete Repair

Location LOU1564-G499501-15, East Wall, Bottom of Top H2O Stop

Dwg./Spec. No. LOU1564-G499501

Discrepancy Description:

Voids on Bottom side of upper Waterstop approx 18" long 2½" Wide & 2" deep. at following locations from North Wall 30' & 42'

EBASCO Q.A.E. REVIEWED 137 3-21-91

QA VAULT

Q. V. Inspector R. W. Lewis 4/30/76

Q. V. Supervisor T. M. McAllister 4-30-76

Recommended Disposition:

~~REPAIR AS PER ECR 700-7.~~ P.G.R. AREA AS DESCRIBED WILL BE REPAIRED IN ACCORDANCE WITH FIELD CHANGE REQUEST 50.

J. A. Jones Project Engineer P. Galbreath

Disposition:

APPLY SIKADUR HI-MOD EPOXY & DRYPACK PER FCR CH-50

Ebasco Senior Resident Engineer ~~H. R. Post~~ for B.D. Parker 4/30/76 date

Assigned To: Mr. Mashburn

Action Completed: Signature R. B. Mashburn Date 5-4-76

Re-inspection:

Remarks: FINISHED CONCRETE REPAIR & BEGAN CURING AT 7:15 PM 4/30/76 C. Thomson
Curing will be accomplished while curing Form 15 for Unit 5/4/76

Accept ☑ Reject ☐ Q. V. Inspector R. W. Lewis Date 5/4/76

If reject, D. R. Number _____ issued.

FREEDOM OF INFORMATION ACT REQUEST
84-455 4/716

Original

QA VAULT

MAY 27 1981

J. A. JONES CONSTRUCTION COMPANY
WATERFORD UNIT NO. 3
CONTRACT NO. W3-NY-4

D. R. Number CC20

Date of Report 4/30/76

DISCREPANCY REPORT

Item Description Concrete Repair

Location LOU1564-G499501-15, West Wall, Bottom of Top Horiz. Sep.

Dwg./Spec. No. LOU1564-G455501

Discrepancy Description:

Voids approx 2½" wide, 2" deep & from 6" TO 20" Long at following locations from North Wall 17', 31' 38', 42', 48', 55' & 59'

Q. V. Inspector R. W. Lewis 4/30/76

Q. V. Supervisor T. M. McAllister 4-30-76

Recommended Disposition:

REPAIR IN ACCORDANCE WITH FIELD CHANGE REQUEST #50

J. A. Jones Project Engineer B. Culbreth

Disposition:

APPLY SIKADUR HI MOD EPOXY & DRY PACK PER FCR CH-50

CW Ebasco Senior Resident Engineer R W Bart for B Fowler date 4/30/76

Assigned To: Mr. Washburn

Action Completed: Signature R. B. Washburn Date 5-4-76

Re-inspection:

Remarks: FINISHED CONCRETE REPAIR & BEGAN CURING AT 7:15 PM 4/30/76 curing will be accomplished while curing power is [illegible] C Thomas R W Lewis 5/4/76

Accept ☑ Reject ☐ Q. V. Inspector R. W. Lewis Date 5/4/76

If reject, D. R. Number _____ issued.

FREEDOM OF INFORMATION ACT REQUEST
84-455 c/717

Original

QA VAULT

MAY 27 1981

J. A. JONES CONSTRUCTION COMPANY
WATERFORD UNIT NO. 3
CONTRACT NO. W3-NY-4

D. R. Number 0021

Date of Report 5/3/76

DISCREPANCY REPORT

REVIEWED BY EBASCO 137

Item Description Concrete Repair

Location LOU 1564 G499501-15, South Wall, Bottom of upper WaterStop

Dwg./Spec. No. LOU 1564-G499501

Discrepancy Description:

five areas have been chipped on South Wall, under upper WaterStop Voids left are from 6" To 24" long by 2½" Wide x 2" deep. They are located as follows from West Wall 5', 20', 24', 28' & 30'

Q. V. Inspector R. W. Lewis 5/3/76

Q. V. Supervisor T. M. McWhirter 5-3-76

Recommended Disposition:

REPAIR IN ACCORDANCE WITH FIELD CHANGE REQUEST # 50

J. A. Jones Project Engineer P Coulbrett

Disposition:

APPLY [redacted] SIKADUR HI MOD EPOXY & DRY PACK PER FCR CH-50.

CW Ebasco Senior Resident Engineer B D Fowler 5/3/76 date

Assigned To: Mr. Washburn

Action Completed: Signature R.B. Washburn Date 5-4-76

Re-inspection:

Remarks: Area's repaired in accordance with FCR-50 Curing will be accomplished while curing pour 15 R.W. Lewis 5/4/76

Accept ☑ Reject ☐ Q. V. Inspector R. W. Lewis Date 5/4/76

If reject, D. R. Number _____ issued.

ORIGINAL

FREEDOM OF INFORMATION ACT REQUEST
84-455
C/718

MAY 27 1981

J. A. JONES CONSTRUCTION COMPANY
WATERFORD UNIT NO. 3
CONTRACT NO. W3-NY-4

D. R. Number 0025

Date of Report 5-4-76

DISCREPANCY REPORT

Item Description Concrete Repair

Location LOU 564-G-199803-17, East Wall, Bottom of Top Water Stops

Dwg./Spec. No. LOU 564.472

Discrepancy Description:

Nine Voids below top waterstop from 4" to 24" long, 2" to 6" wide & 2" to 4" deep. Voids as located as follows from south wall 5', 8', 10', 13', 17', 20' 21', 24' & 42'

Q. V. Inspector R.W. Lewis 5/4/76

Q. V. Supervisor T.M. McWhirt 5-5-76

Recommended Disposition:

Repair per FCR #50.

J. A. Jones Project Engineer Al Prince

Disposition:

APPLY SIKADUR-HI-MOD EPOXY & DRY PACK PER FCR CH-50

CW Ebasco Senior Resident Engineer Chas. White for B.D. Fowler 5/5/76 date

Assigned To: Dale Coe

Action Completed: Signature D Coe Date 5/10-76

Re-inspection:

Remarks: Area dry packed, curing start 3:00 PM 5/6/76 R.W. Lewis

Accept ☒ Reject ☐ Q. V. Inspector D. Ernst Date 5/10/76

If reject, D. R. Number _____ issued.

ORIGINAL

QA VAULT

MAY 27 1981

J. A. JONES CONSTRUCTION COMPANY
WATERFORD UNIT NO. 3
CONTRACT NO. W3-NY-4

D. R. Number 0026

Date of Report 5-4-76

DISCREPANCY REPORT

REVIEWED BY EBASCO QA 137

Item Description Concrete Repair

Location LOU1564-GS99503-17, East Wall, above & below lower H2O Stop

Dwg./Spec. No. LOU1564.472

Discrepancy Description:

Voids above & below lower waterstop, 11 ft. from north wall, 4" deep, 20" long & 4½" wide on both sides of waterstop

Q. V. Inspector R.W. Lewis 5/4/76

Q. V. Supervisor T.M. McAllister 5-5-76

Recommended Disposition:

Repair per FCR #50.

J. A. Jones Project Engineer Al Prince

Disposition:

APPLY SIKADUR-HI-MOD EPOXY & DRY PACK PER FCR CH-50

CW Ebasco Senior Resident Engineer Walter for B.D. Fowler 5/5/76 date

Assigned To: Dale Coe

Action Completed: Signature T.W. Lee Date 5/10-76

Re-inspection:

Remarks:

Accept ☒ Reject ☐ Q. V. Inspector D. Ernst Date ~~5/10~~ 5/10/76

If reject, D. R. Number _____ issued.

ORIGINAL

FREEDOM OF INFORMATION ACT REQUEST
84-455
c/720

J. A. JONES CONSTRUCTION COMPANY
WATERFORD UNIT NO. 3
CONTRACT NO. W3-NY-4

D. R. Number 0030

Date of Report 5/6/76

DISCREPANCY REPORT

Item Description Concrete Void

Location 16' South of column line J and 7'6" West of column line 10A

Dwg./Spec. No. LOU 1564-472 Sect. II 5.10

Discrepancy Description:

An area of concrete void exists along the west wall of G-499503-19 approximately 7" deep x 4' long x 16" high.

QA VAULT

MAY 27 1981

Q. V. Inspector Sam Horton

Q. V. Supervisor T. M. McAllister 5-7-76

REVIEWED BY EBASCO QA 137

Recommended Disposition:

Back pour with Pour # LOU-1564-G-499503 - 17

J. A. Jones Project Engineer al Pannie 5/10/76

Disposition:

RECOMMENDED DISPOSITION IS ACCEPTABLE PROVIDED PATH FOR AIR ESCAPE IS PROVIDED

CW Ebasco Senior Resident Engineer B D Fowler 5/10/76 date

Assigned To: Dale Coe

Action Completed: Signature D Coe Date 5/10/76

Re-inspection:

Remarks: All defective concrete removed to sound concrete and exposed surface cleaned with water jet. T.M.M. 5-10-76

Accept ☒ Reject ☐ Q. V. Inspector D Smoot Date 5/10/76

If reject, D. R. Number _____ issued.

ORIGINAL

FREEDOM OF INFORMATION ACT REQUEST 84-455

C/723

V

J. A. JONES CONSTRUCTION COMPANY
WATERFORD UNIT NO. 3
CONTRACT NO. W3-NY-4

D. R. Number 0040

Date of Report 5/17/76

DISCREPANCY REPORT

Item Description Concrete Repair

Location LOU1564-G499203-18 West Wall, upper Waterstop

Dwg./Spec. No. LOU1564.472

Discrepancy Description:

Void above & Below upper waterstop starting approx 7'S of N Wall extending S approx. 18'. Waterstop is No longer Embedded in This area. Void is approx 4½" above & below upper waterstop.

Q. V. Inspector R.W. Lewis 5/17/76

Q. V. Supervisor T.M. McAllister 5/17/76

Recommended Disposition:

Repair per FCR #50

J. A. Jones Project Engineer [illegible] 5/17/76

Disposition:

APPLY SIKADUR HI-MOD EPOXY & DRY PACK PER FCR CH-50

CW Ebasco Senior Resident Engineer [illegible] 5/17/76 Date

Assigned To: DALE COE

Action Completed: Signature John F Williams Date 5/25/76

Re-inspection:

Remarks: Area Dry Packed 3:45 PM 5/20/76 WET Cure Started. R.W. Lewis 5/20/76. Area will be cured with Concrete Placement 18. R.W. Lewis 5/20/76

Accept ☒ Reject ☐ Q. V. Inspector R.W. Lewis Date 5/26/76

If reject, D. R. Number _____ issued.

MAY 27 1981

J. A. JONES CONSTRUCTION COMPANY
WATERFORD UNIT NO. 3
CONTRACT NO. W3-NY-4

D. R. Number 0042

Date of Report 5/17/76

137

DISCREPANCY REPORT

Item Description Concrete Repair

Location LCU1564.6499563-18 West Wall, below upper H2O Stop.

Dwg./Spec. No. LCU1564.472

Discrepancy Description:

Void approx 15"L X 3½"D X 4½H below upper H2O Stop, West Wall, approx 31' South of North Wall.

Q. V. Inspector R. W. Lewis 5/17/76

Q. V. Supervisor T. W. McAllister 5-17-76

Recommended Disposition:

Repair per FCR #50.

J. A. Jones Project Engineer [signature] 5/17/76

Disposition:

APPLY SIKA DUR HI MOD EPOXY & DRY PACK PER FCR SH-50

CW Ebasco Senior Resident Engineer [signature] 5/17/76 date

Assigned To: DALE COE

Action Completed: Signature [signature] Date 5/25/76

Re-inspection:

Remarks: Area Dry Packed 5:30 PM 5/20/76 WET Cure Started R.W. Lewis 5/20/76. Area will be cured with concrete placement 18 R.W. Lewis 5/26/76

Accept ☑ Reject ☐ Q. V. Inspector R.W. Lewis Date 5/26/76

If reject, D. R. Number _____ issued.

ORIGINAL

CA VAULT

MAY 27 1981

J. A. JONES CONSTRUCTION COMPANY
WATERFORD UNIT NO. 3
CONTRACT NO. W3-NY-4

D. R. Number 0043

Date of Report 5/17/76

137

DISCREPANCY REPORT

Item Description Concrete Repair

Location L071564 G499503-18 West Wall above bottom waterstop

Dwg./Spec. No. L071564 472

Discrepancy Description:

Void approx 28"L x 8"H x 5"D located above bottom Waterstop, West Wall, 22' North of South Wall. Void extends beyond the back edge of Waterstop

Q. V. Inspector R.W. Lewis 5/17/76

Q. V. Supervisor T.W. McWhirter 5-17-76

Recommended Disposition:

Repair per FCR #50.

J. A. Jones Project Engineer [signature] 5/17/76

Disposition:

APPLY SIKADUR-HI-MOD EPOXY & DRY PACK PER FCR CH-50

CW Ebasco Senior Resident Engineer [signature] 5/17/76 date

Assigned To: DALE COE

Action Completed: Signature [signature] Date 5/25/76

Re-inspection:

Remarks: Area Dry Packed 5:00 PM 5/20/76 WET CURE started R.W. Lewis 5/20/76 area will be cured with concrete

Placement 18 R.W. Lewis 5/26/76

Accept ☒ Reject ☐ Q. V. Inspector R.W. Lewis Date 5/26/76

If reject, D. R. Number _____ issued.

ORIGINAL

FREEDOM OF INFORMATION ACT REQUEST
84-455
C1728

J. A. JONES CONSTRUCTION COMPANY
WATERFORD UNIT NO. 3
CONTRACT NO. W3-NY-4

D. R. Number 045

Date of Report 5/18/76

DISCREPANCY REPORT

Item Description Concrete, Resteel & Forms

Location LOU 1564 G499503 - 16, 18, 11B & 13B

Dwg./Spec. No. LOU 1564.472 & Dwg LOU 1564 G499501 & 503

Discrepancy Description:

An Undetermined amount of Hydraulic oil spilled from West FAVCO Tower CRANE ON Pours 16, 18, 11B & 13B The major area affected is approx 20' S of Col. line K, extending S To Col. line H, and 12' W. of Col line 3A, extending E To Col. line 5A. Total area is approx 45' x 56'

Q. V. Inspector R.W. Lewis 5/18/76

Q. V. Supervisor [signature] 5/18/76

Recommended Disposition:

OIL ON REINFORCING STEEL ~~WAS~~ IS TO BE REMOVED WITH MINERAL SPIRITS, MANUFACTURER EXXON CORPORATION, BY RUBBING. OIL ON CONCRETE IS TO BE REMOVED WITH FLORCO-X ALL PURPOSE ABSORBANT, BY FLORIDIN COMPANY, THEN THE AREA IS TO BE SPRINKLED WITH CEMENT AND HYDRO-BLASTED, 5 AH 5/19/76

J. A. Jones Project Engineer [signature] 5/19/76

Disposition:

THE ABOVE IS ACCEPTABLE PROVIDED ANY ADDITIONAL CONCRETE SURFACE PREPARATION NECESSARY TO INSTALL PROTECTIVE COATINGS IN THE ABOVE AREAS SHALL BE PERFORMED BY J A JONES.

Ebasco Senior Resident Engineer [signature] for R.D. Fowler
date 5/20/76

Assigned To: DALE COE

Action Completed: Signature [signature] for DALE COE Date

Re-inspection:

Remarks: ACCEPTABLE AREAS: ALL OF POURS LOU-1564-499503-18 AND THREE GAS DECAY TANK FOUNDS, ONE CHARGING PUMP FOUND. (WEST). [signature] 5-21-76 [illegible] FDN OK [illegible]

Accept ☑ Reject ☐ Q. V. Inspector Sam Horton Date 7/13/76

If reject, D. R. Number ________ issued.

J. A. JONES CONSTRUCTION COMPANY
WATERFORD UNIT NO. 3
CONTRACT NO. W3-NY-4

D. R. Number 0046

Date of Report 5/19/76

DISCREPANCY REPORT

137

Item Description Concrete Repair

Location LOU1564 G499503-18, East Wall, 35' North of South Wall

Dwg./Spec. No. LOU 1564.472

Discrepancy Description:

3 Voids exist under #11 bars, Top mat of Rebar. The voids are approx 2½" Wide 1½" high & 3" Deep. The voids are in an area of 1½' in length from 35' North of South wall.

Q. V. Inspector R. W. Lewis 5/15/76

Q. V. Supervisor [signature] 5/19/76

Recommended Disposition:

Apply Sika Dur Hi Mod Epoxy & Dry Pack Spec. LOU-1564-472 - Section II para. 5.10b

J. A. Jones Project Engineer P. Guilbeau Jr. 5/19/76

Disposition:

RECOMMENDED DISPOSITION IS ACCEPTABLE

Ebasco Senior Resident Engineer [signature] for B. Bowden 5/21/76
date

Assigned To: Dale Cole

Action Completed: Signature Jack Williams Date 5/25/76

Re-inspection:

Remarks: Area Dry packed 5/20/76 WET ✓ Cure START ✓ after initial set of Dry Pack R.W. Lewis 5/20/76. Area will be cured with Concrete placement 18 R.W. Lewis 5/26/76

Accept ☑ Reject ☐ Q. V. Inspector R. W. Lewis Date 5/26/76

If reject, D. R. Number _____ issued.

ORIGINAL

J. A. JONES CONSTRUCTION COMPANY
WATERFORD UNIT NO. 3
CONTRACT NO. W3-NY-4

D. R. Number 0047

Date of Report 5/19/76

DISCREPANCY REPORT

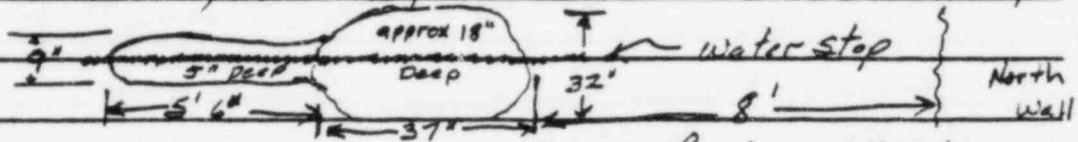
Item Description Concrete Repair

Location LOU 1564 G499503-18 West Wall, Lower Water Stop.

Dwg./Spec. No. LOU 1564.472

Discrepancy Description:

Void exists due to chipping unsound concrete approx 8' South of North wall, above & below lower Water Stop.



Q. V. Inspector R.W. Lewis 5/19/76

Q. V. Supervisor E.W. McWhirter 5-19-76

Recommended Disposition:

Wet 12 Hours; Form and Back Pour Under Waterstop; Set 6 Hours; Apply Epoxy then dry pack; After Drypack, Strip forms and Greencut; See Attached Sketch.

J. A. Jones Project Engineer A. Lewis 5/19/76

Disposition:

Accept disposition as outlined above and on attached sketch. "East Face of Pour 499503-16

Ebasco Senior Resident Engineer P.W. Faist for B.D. Fowler. date

Assigned To: DALE COE

Action Completed: Signature Jake Williams Date 5/25/76

Re-inspection:

Remarks: Finished Pour area at 12:15 PM 5/20/76 R.W. Lewis. area Dry Packed 7:30 pm 5/20/76, Wet cure start 8:45 PM 5/20/76 BR. Area will be cured with Concrete placement 18 R.W. Lewis 5/26

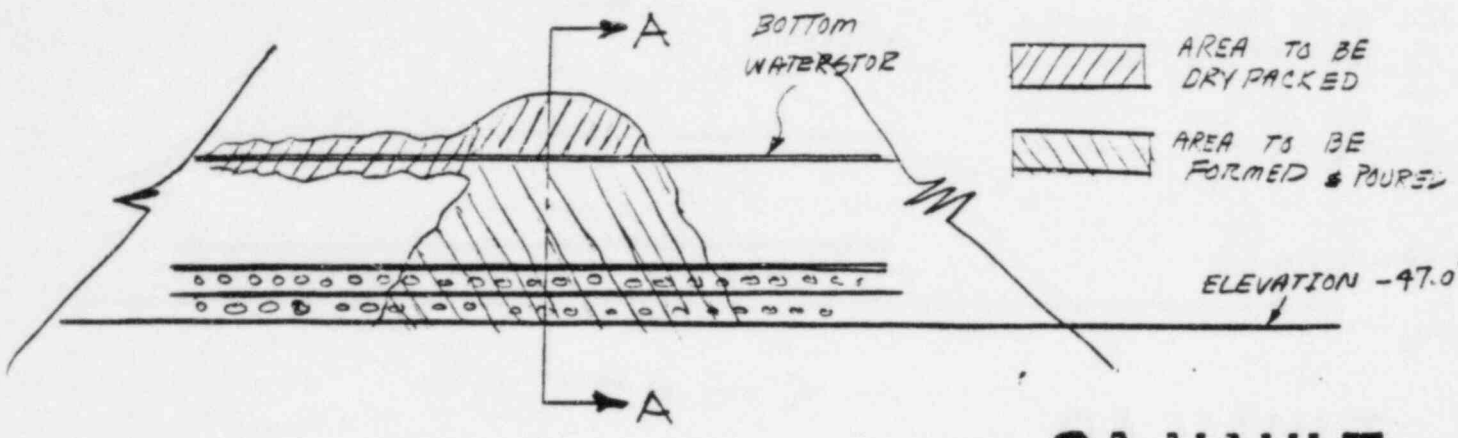
Accept ☑ Reject ☐ Q. V. Inspector R.W. Lewis Date 5/26/76

If reject, D. R. Number _____ issued.

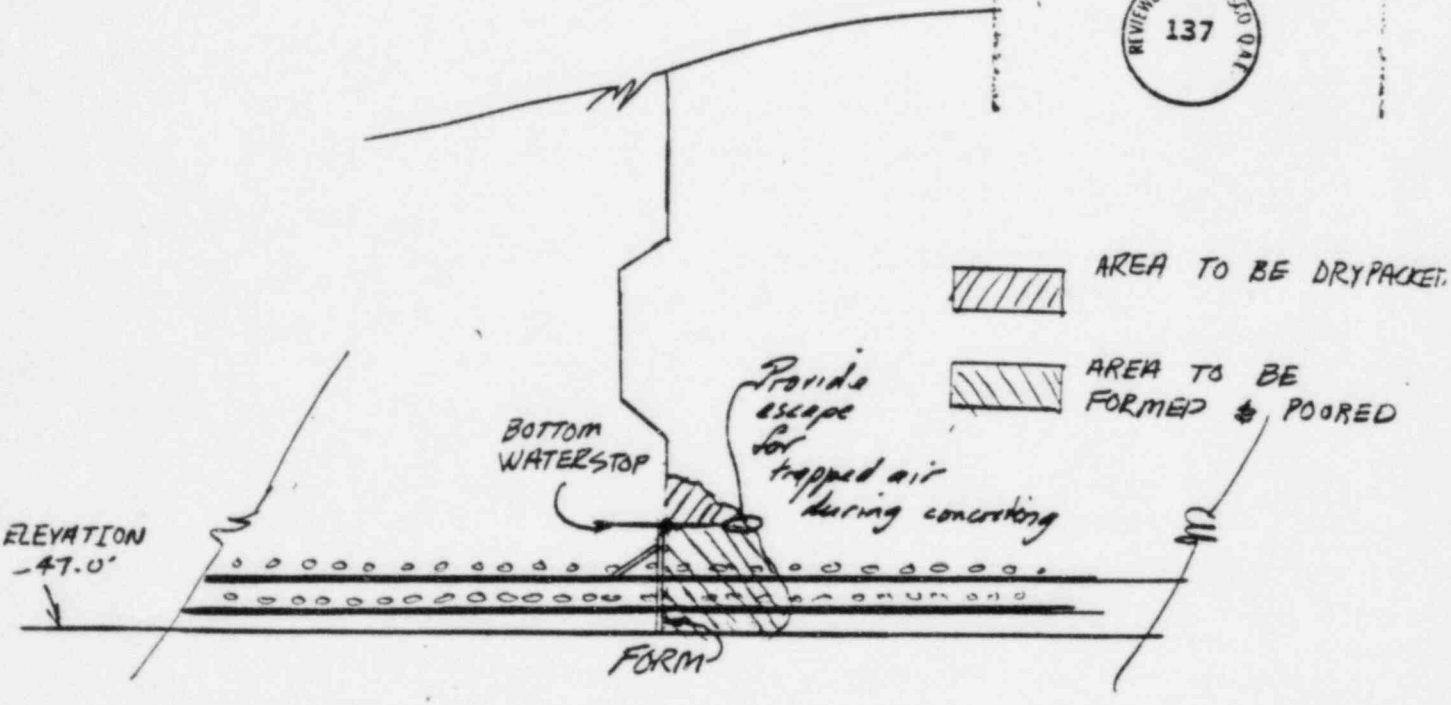
ORIGINAL

DR. NO. 0047

EAST FACE OF POUR 499503-1



ELEVATION A



SECTION A-A

METHOD OF REPAIR

1.) Area to be Wet for 12 Hours Prior to Repair. FCR Required.
2.) Area below Waterstop & too deep to drypack will be formed and then pour with concrete & vibrated.
3.) Concrete will be Screeded at Elevation of Proper Bottom Water Stop Elevation. And Epoxpy Under Waterstop.
4.) Six Hours after Concrete Placement, Remaining areas will be coated with epoxy and drypacked.
5.) Forms Striped After drypacking & Concrete Greencut.

J. A. JONES CONSTRUCTION COMPANY
WATERFORD UNIT NO. 3
CONTRACT NO. W3-NY-4

D. R. Number 0048

Date of Report 5/20/76

DISCREPANCY REPORT

Item Description WATERSTOP Repair

Location AT COLUMN LINE 3FH & W

Dwg./Spec. No. Lou 1564-G-499501

Discrepancy Description:

A piece of 6" waterstop 2'4" long already embedded in concrete was burned due to a cadweld spill. The deformations of the waterstop were burned severly and a puncture hole was made directly adjacent to the center bulb.

Q. V. Inspector Lynn Horton 5/20/76

Q. V. Supervisor [signature] 5/20/76

Recommended Disposition:

Repair per EIR 200-7.

J. A. Jones Project Engineer [signature] 5/20/76

Disposition:

RECOMMENDED DISPOSITION IS ACCEPTABLE

EW Ebasco Senior Resident Engineer [signature] 5/20/76
date

Assigned To: DALE COE

Action Completed: Signature [signature] Date 5-26-76

Re-inspection:

Remarks:

Accept ☑ Reject ☐ Q. V. Inspector Sherry Vann Date 5-26-76

If reject, D. R. Number _____ Issued.

ORIGINAL

J. A. JONES CONSTRUCTION COMPANY
WATERFORD UNIT NO. 3
CONTRACT NO. W3-NY-4

D. R. Number 0049

Date of Report 5/20/76

DISCREPANCY REPORT

QA VAULT

Item Description CONCRETE REPAIR

Location LOU1564G499503-16, EAST WALL, EL MAY 27 1981

Dwg./Spec. No. LOU1564.472

137

Discrepancy Description:

VOIDS EXIST DUE TO CHIPPING OF UNSOUND CONCRETE IN AREAS AS SHOWN ON ATTACHED MAP.

Q. V. Inspector T. M. McElhinney 5-20-76

Q. V. Supervisor

Recommended Disposition:

Voids as shown on attached sketch will be chipped to assure sound concrete. Voids will be sloped to assure venting of air during concrete placement Areas not vented will be drypacked per specification LOU-1564-472, Section II paragraph 5.10b Remaining areas will be back poured with LOU-1564-499-503-18

J. A. Jones Project Engineer [illegible] 5/20/76

Disposition:

THIS IS ACCEPTABLE PROVIDED THAT J.A. JONES Q.V. PERSONNEL WITNESS AND DOCUMENT THE FILLING OF THE VOIDS WITH CONCRETE AND VERIFY THAT THE ENTIRE VOID IS FILLED AND VIBRATED THOROUGHLY. Ebasco Senior Resident Engineer [illegible] 5-20-76 date

Assigned To: DALE COE

Action Completed: Signature John F. Williams Date 5/25/76

Re-inspection:

Remarks: Areas dry packed To assure NO air entrapment 5/20/76 WET Cure Started R.W. Lewis Areas Were Inspected Throughout placement, all Voids were vibrated adequately & Completly filled with Concrete R.W. Lewis 5/26/76

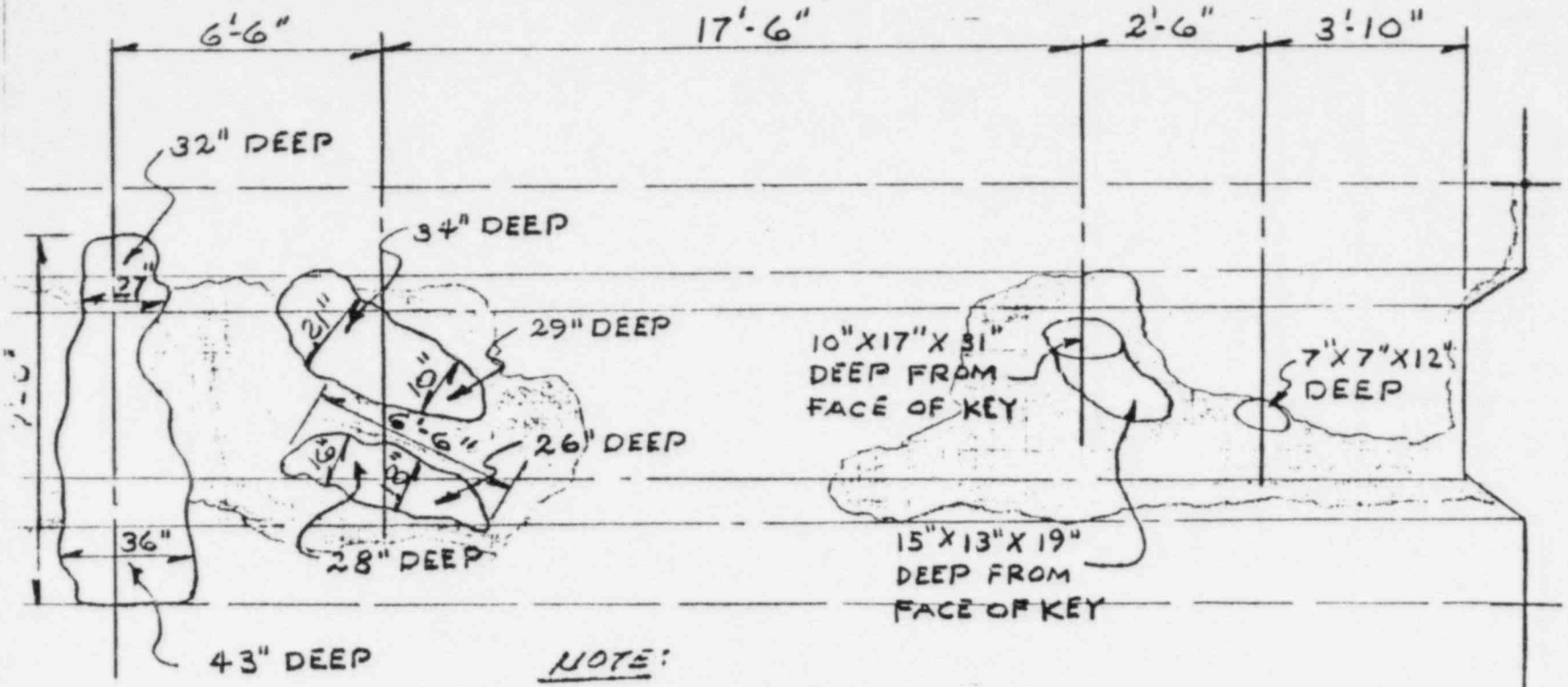
Accept ☒ Reject ☐ Q. V. Inspector R.W. Lewis Date 5/26/76

If reject, D. R. Number _____ issued.

ORIGINAL

FREEDOM OF INFORMATION ACT REQUEST
84-455 C/733

Sheet No. 1 of 2



EAST FACE PLACEMENT NO. 16

MAY 27 1981

DRAWN BY MD DATE 5/26 CHKD. BY DATE

SUBJECT EA E FACE PLACEMENT 15 1/2-16

SHEET NO. 2 OF 2
JOB NO. 75-317

BY AP DATE 5/29/76 SUBJECT EAST FACE
CHKD. BY DATE PLACEMENT NO. 16
SHEET NO. 2 OF 2
JOB NO. 75-317

EAST FACE PLACEMENT NO. 16

CA VAULT

MAY 27 1981

REVIEWED BY CORPS OF ENGINEERS 137

J. A. JONES CONSTRUCTION COMPANY
WATERFORD UNIT NO. 3
CONTRACT NO. W3-NY-4

D. R. Number 0050

Date of Report 5-20-76

DISCREPANCY REPORT

Item Description CLAM SHELL

Location BOTTOM OF CONCRETE POUR LOU-1564-499503-12

Dwg./Spec. No. LOU 1564-499503 R-7 — LOU 1564-482

Discrepancy Description:

THE CLAM SHELL IN THE BOTTOM OF THE ABOVE NOTED POUR IS NOT COVERED BY THE MUD MAT + THEREFORE IS EXPOSED.
SEE ATTACHED SKETCH FOR LOCATION

Q. V. Inspector T. M. McAllister 5-20-76

Q. V. Supervisor T. M. McAllister 5-20-76

Recommended Disposition:

Subject Area will be covered with Visqueen before concrete is placed.

J. A. Jones Project Engineer A. Panico 5/20/76

Disposition:

RECOMMENDED DISPOSITION IS ACCEPTABLE

OW Ebasco Senior Resident Engineer Date for BD Frank 5/20/76 date

Assigned To: DALE EOE

Action Completed: Signature D E Burgess Date 5/26/76

Re-inspection:

Remarks:

Accept ☑ Reject ☐ Q. V. Inspector T. M. McAllister Date 5/26/76

If reject, D. R. Number _____ issued.

ORIGINAL

LOCATION SKETCH SHOWING UNCOVERED SHELL

FOUR - LOU-1564-499503-18

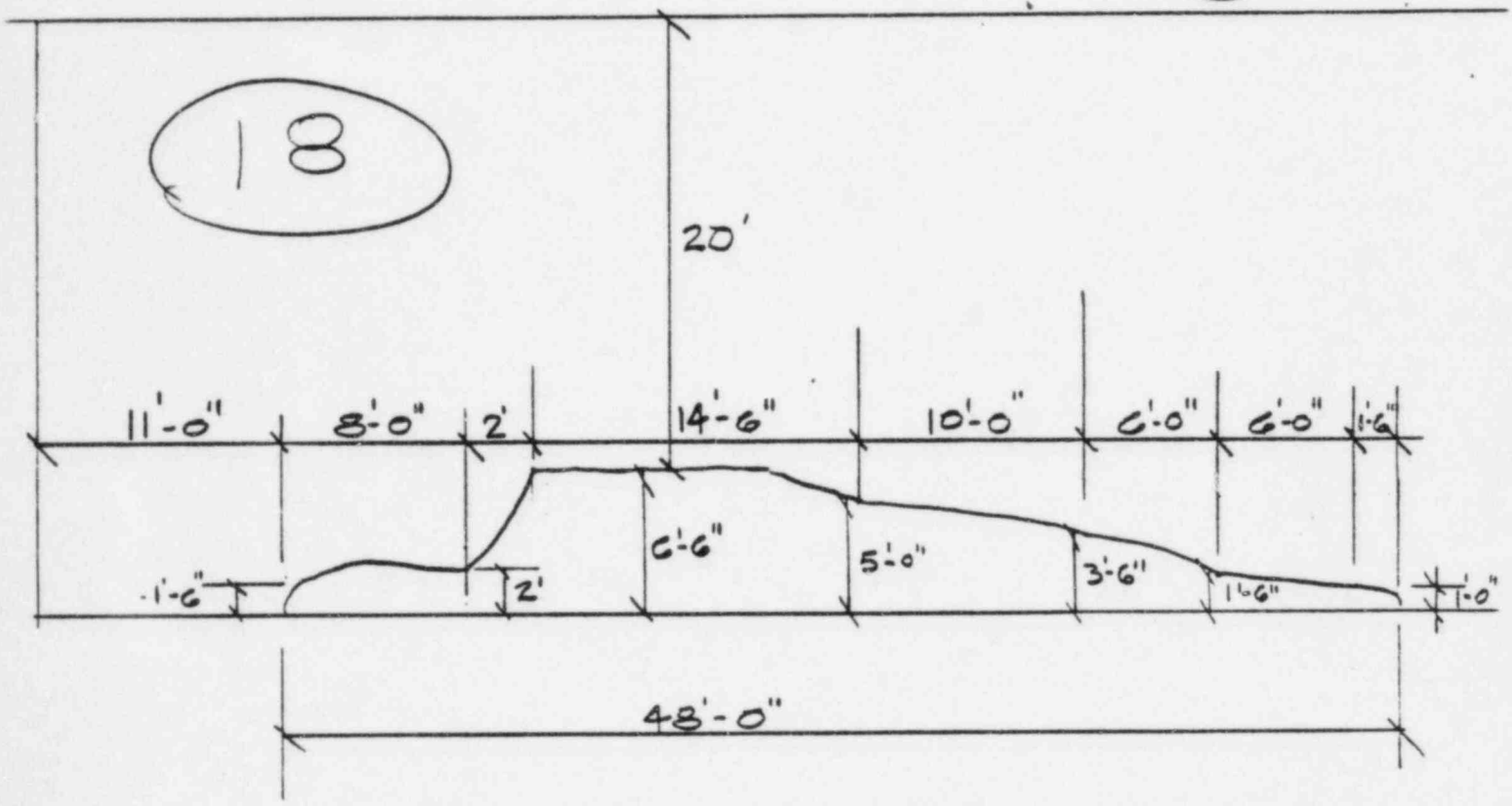
QA VAULT

MAY 27 1981

REVIEWED BY EBASCO 137

13B

18



ORIGINAL

D.R. No. 0050

Sheet No 2 of 2

J. A. JONES CONSTRUCTION COMPANY
WATERFORD UNIT NO. 3
CONTRACT NO. W3-NY-4

D. R. Number 0051

Date of Report 5/24/76

DISCREPANCY REPORT

Item Description 9"x 3/8" PVC Waterstop

Location LOU1564G499503-18, North Wall, Lower Waterstop

Dwg./Spec. No. LOU1564G499501

Discrepancy Description:

Gouges in lower waterstop (Top surface) at following locations from East Wall. (Note Center bulb is Not Penetrated) 9'8", 10'6½", 13'8". Gouges in Ribs of Waterstop 17'8" from East Wall

Q. V. Inspector R.W. Lewis 5/24/76

Q. V. Supervisor T. M. McWhirter 5-24-76 (4:15 PM)

Recommended Disposition:

Repair as per E.I.R. 200-7

J. A. Jones Project Engineer A. Lewis 5/24/76

Disposition:

Follow recommended disposition

Ebasco Senior Resident Engineer [signature] for P.D. Fowler date 5/24/76

Assigned To: DALE COE

Action Completed: Signature J.A. Jenson Date 5/24/76 - 10:PM.

Re-inspection:

Remarks: THESE AREAS PREVIOUSLY ACCEPTED BY J.A.J. Q.V. 5-24-76
THIS D.R. WRITTEN AT REQUEST OF EBASCO Q.C. T. McWhirter

Accept ☑ Reject ☐ Q. V. Inspector C.R. Thomas Date 5/24/76 (6:00 PM)

If reject, D. R. Number _____ issued.

ORIGINAL

J. A. JONES CONSTRUCTION COMPANY
WATERFORD UNIT NO. 3
CONTRACT NO. W3-NY-4

D. R. Number 6054

Date of Report 5/27/76

DISCREPANCY REPORT

Item Description UNCONSOLIDATED CONCRETE

Location CONCRETE PLACEMENT 499503-19

Dwg./Spec. No. LOU-1564.472 SECTION II LOU-1564-G499503-19

Discrepancy Description:

~~UNCONSOLIDATED CONCRETE~~ Voids EXISTS ON THE EAST WALL OF POUR 499503-19. THIS AREA IS LOCATED 14'-6" NORTH OF THE SOUTHEAST CORNER OF THE WALL. THE BOTTOM ELEVATION RANGES FROM -36.75 TO -37.75'. THIS AREA EXTENDS 40' NORTHWARD SEE ATTACH DWG FOR DETAILS.

Q. V. Inspector L D Fowler 5/27/76

Q. V. Supervisor L D Fowler 5/27/76

Recommended Disposition:

Above area will be inspected & verified by Q.V. Apply Sikadur Hi Mod Epoxy to subject area. Area to be dry packed per specification LOU-1564-472 Section II paragraph 5.10b No more than 1/3 C.F. of grout shall be placed at one time.

J. A. Jones Project Engineer [illegible] 5/27/76

Disposition:

FIELD CHANGE REQUEST CH-152 WILL ALLOW THE ABOVE. WORK MAY PROCEED UPON RECEIPT OF THE FCR.

CW Ebasco Senior Resident Engineer B D Fowler 6/2/76 date

Assigned To: Harold Quigley

Action Completed: Signature Harold Quigley Date 6/7/76

Re-inspection:

Remarks: Voids were epoxied & dry packed as per instructions & FCR CH 152. Curing Compound applied 6/7/76 Expire 30.

Accept ☑ Reject ☐ Q. V. Inspector R W Fenn Date 6/7/76

If reject, D. R. Number _____ issued.

ORIGINAL

SHEET NO. 2 OF 2

JOB NO.

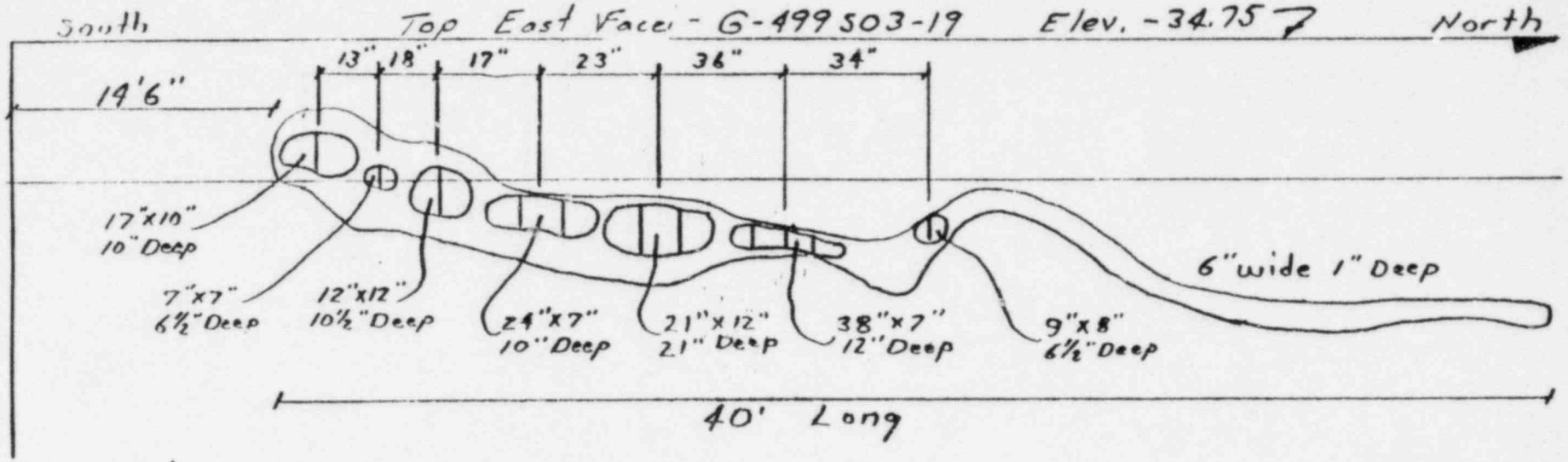
SUBJECT

DATE

BY

CHKD. BY

DATE



DISCREPANCY REPORT NO. 0054

SHT. 2 OF 2

J. A. JONES CONSTRUCTION COMPANY
WATERFORD UNIT NO. 3
CONTRACT NO. W3-NY-4

D. R. Number 0056

Date of Report 5-28-76

DISCREPANCY REPORT

Item Description CONCRETE, FORMS & REBAR

Location LOW 1564 G 499503 - 11B & 499502-10B

Dwg. ~~Spec.~~ No. LOW 1564 G 499503

Discrepancy Description:

AN UNDETERMINED AMOUNT OF ~~HYDRAULIC~~ HYDRAULIC OIL HAS SPILLED FROM THE WEST FALCO TOWER CRANE ON FOUR 11B & 10B. THE AFFECTED AREA IS APPROX. 30'X30' BOUNDED BY COL. LINE L ON THE NORTH AND 20' WEST OF THE 11B-13B C.J.

T. M. 5-28-76

Q. V. Inspector T. M. McAllister 5-28-76

Q. V. Supervisor T. M. McAllister 5-28-76

Recommended Disposition:

Subject oil on reinforcing steel is to be removed with mineral spirits manufacturer Exxon Corp. by rubbing. Oil on concrete is to be removed with Floreo-X All purpose absorbant by Floridin Co. Then the area is to be sprinkled with cement & Hydro-Blasted

J. A. Jones Project Engineer [signature] 5/28/76

Disposition:

THE ABOVE IS ACCEPTABLE, PROVIDED ANY ADDITIONAL CONCRETE SURFACE PREPARATION NECESSARY TO INSTALL PROTECTIVE COATINGS OR REPAIR & SUITABLE FINISH IN THE ABOVE AREA SHALL BE PERFORMED BY JAJONES.

Ebasco Senior Resident Engineer [signature] for B.D. Fowler date 5/31/76

Assigned To: HAROLD QUIGLEY

Action Completed: Signature [signature] Date _____

Re-inspection:

Remarks: _____

Accept ☑ Reject ☐ Q. V. Inspector [signature] Date 7/13/76

If reject, D. R. Number _____ issued.

ORIGINAL

J. A. JONES CONSTRUCTION COMPANY
WATERFORD UNIT NO. 3
CONTRACT NO. W3-NY-4

D. R. Number 0058

Date of Report 6/2/76

DISCREPANCY REPORT

Item Description 6" x 3/8" PVC Waterstop

Location LOU1564-G499501-12A at Column 6FH, W

Dwg./Spec. No. LOU1564-G499501, LOU1564.476

Discrepancy Description:

In Column 6FH, W & slightly East, The Water Stop Embedded in C.F.S. has several deep gouges (approx 6) in center bulb, approx 3½' Center bulb does Not appear To be punctured.

Q. V. Inspector R.W. Lewis 6/2/76

Q. V. Supervisor T.M. McMath 6-2-76

Recommended Disposition:

REPAIR PER EIR-200-7.

J. A. Jones Project Engineer A Pane 6/2/76

Disposition:

RECOMMENDED DISPOSITION IS ACCEPTABLE

Ebasco Senior Resident Engineer Chris for B.D. Fowler 6/2/76 date

Assigned To: Royce Mashburn

Action Completed: Signature R.B. Mashburn Date 6-4-76

Re-inspection:

Remarks: Repaired per EIR 200-7

Accept ☑ Reject ☐ Q. V. Inspector R.W. Lewis Date 6/4/76

If reject, D. R. Number _____ issued.

ORIGINAL

J. A. JONES CONSTRUCTION COMPANY
WATERFORD UNIT NO. 3
CONTRACT NO. W3-NY-4

D. R. Number 0059

Date of Report 6/4/76

DISCREPANCY REPORT

Item Description CONCRETE REPAIR

Location ELEVATOR PIT 499303-18

Dwg./Spec. No. 499303 - R7

Discrepancy Description:

VOID EXISTS ALONG BOTTOM OF ELEVATOR PIT, ON SOUTH SIDE, DUE TO INTERFERANCE OF ANGLE IRON. VOID IS 8'-11 x 0'-3 x 0'-3¾. EL.-39.33'

Q. V. Inspector D. Mowat 6/4/76

Q. V. Supervisor T. M. McAllister 6-4-76

Recommended Disposition: THE DISPOSITION OF.

REPAIR PER NCR-152.

J. A. Jones Project Engineer A. Prince 6/4/76

Disposition:

COMPLY WITH THE ABOVE DISPOSITION. RGJ

Ebasco Senior Resident Engineer B. D. Fowler 10/22/76 date

Assigned To: HAROLD QUIGLEY

Action Completed: Signature R. B. Mashburn Date 11-4-76

Re-inspection: Epoxy A-6090 - certified ~~8/10/76~~ 8/10/76
Epoxy B-6033 " 3-29-76

Remarks: Repair area was worked in accordance with FCR-152 - with 3 layers being applied each re scratched to assure bonding. Epoxy curing compound used for curing purposes.

Accept ☒ Reject ☐ Q. V. Inspector A. Hooton Date 11/4/76

If reject, D. R. Number _____ issued.

J. A. JONES CONSTRUCTION COMPANY
WATERFORD UNIT NO. 3
CONTRACT NO. W3-NY-4

D. R. Number 0063

Date of Report 6/9/76

DISCREPANCY REPORT

Item Description WATERSTOP REPAIR (6")

Location 1'-3 ~~E~~ (A.E. 6/9/76) E. OF TH & 1'-6 S. OF W

Dwg./Spec. No. 499 501 R-7

Discrepancy Description:

PER FCR CH 110 REVERSAL OF KEYWAY. W.S. "T" NEEDS TO BE MOVED 6" TO THE EAST.

Q. V. Inspector R. Zmuda 6/9/76

Q. V. Supervisor T. M. McWhite 6-9-76

Recommended Disposition:

Remove existing W.S. "T" and repair per EIR # 200-7. Construct a new W.S. tee per EIR # 300-120.

J. A. Jones Project Engineer al Pannier 6/9/76

Disposition:

RECOMMENDED DISPOSITION IS ACCEPTABLE

Ebasco Senior Resident Engineer B D Fowler per tel 6/9/76 date

Assigned To: ROYCE WASHBURN

Action Completed: Signature Royce Washburn Date 6/11/76

Re-inspection:

Remarks:

Accept ☒ Reject ☐ Q. V. Inspector R. Zmuda Date 6/11/76

If reject, D. R. Number _____ issued.

ORIGINAL

ORIGINAL

J. A. JONES CONSTRUCTION COMPANY
WATERFORD UNIT NO. 3
CONTRACT NO. W3-NY-4

D. R. Number 0064

Date of Report 6/9/76

DISCREPANCY REPORT

Item Description Cadweld Installation

Location LOU-1564-49950E-10B col.- 1A-P1

Dwg./Spec. No. LOU-1564-479 - Section IV 13.04

Discrepancy Description:

A cadweld was ejected visually. The method of replacing cadweld was in violation of LOU 1564-479. the ejected cadweld was cut immediately above & below the sleeve. The two rods were then butted to each other causing lack of proper elevation by 9 inches

Q. V. Inspector Sam Hoskton 6/9/76

Q. V. Supervisor T. M. McMaster 6-10-76

Recommended Disposition:

ALLOW CONSTRUCTION TO PROCEED WITH NO ADDITIONAL WORK AT THIS POINT IN TIME. AT HIGHER ELEVATIONS, CADWELD NEW PIECE ON BARS TO BRING BAR TO REQUIRED FINAL ELEVATION.

J. A. Jones Project Engineer Al Ponic 6/11/76

Disposition:

RECOMMENDED DISPOSITION IS ACCEPTABLE

CW Ebasco Senior Resident Engineer [signature] 6/15/76 date

Assigned To: Harold Quigley

Action Completed: Signature Elder Jones Date 12 NOV 76

Re-inspection:

Remarks: At this point in time, there is sufficient projection of dowels for normal cadwelding operations to proceed.

Accept ☑ Reject ☐ Q. V. Inspector Sam Hoskton Date 11-23-76

If reject, D. R. Number _____ issued.

ORIGINAL

J. A. JONES CONSTRUCTION COMPANY
WATERFORD UNIT NO. 3
CONTRACT NO. W3-NY-4

D. R. Number 0065

Date of Report 6/9/76

DISCREPANCY REPORT

Item Description Cadweld Installation

Location Lou 1564-499502-9A Col. 12A-5

Dwg./Spec. No. Lou-1564-479 Section IV - 13.04

Discrepancy Description:

A cadweld was rejected visually. The method of replacing cadweld was in violation of Lou1564-479. The rejected cadweld was cut immediately above & below the sleeve. The two rods were then butted to each other causing lack of proper projection by 9 inches.

Q. V. Inspector Sam Horton 6/9/76

Q. V. Supervisor T. M. McAllister 6-10-76

Recommended Disposition:

ALLOW CONSTRUCTION TO PROCEED WITH NO ADDITIONAL WORK AT THIS POINT IN TIME. AT HIGHER ELEVATIONS, CADWELD NEW PIECE ON BARS TO BRING BAR TO REQUIRED FINAL ELEVATION.

J. A. Jones Project Engineer [signature] 6/11/76

Disposition:

RECOMMENDED DISPOSITION IS ACCEPTABLE

cc Ebasco Senior Resident Engineer R.W. Bunt for B.D. Fowler 6/15/76 date

Assigned To: Royce Washburn

Action Completed: Signature [signature] Date 22 NOV 7

Re-inspection:

Remarks: At this point in time, there is sufficient projection of dowels for our normal cadwelding operations to proceed.

Accept ☑ Reject ☐ Q. V. Inspector Sam Horton Date 11-25-76

If reject, D. R. Number _____ issued.

J. A. JONES CONSTRUCTION COMPANY
WATERFORD UNIT NO. 3
CONTRACT NO. W3-NY-4

D. R. Number 0073

Date of Report 6/23/76

DISCREPANCY REPORT

Item Description Honeycomb in column K11A

Location Column K11A at elevation -29.75 and -26.75

Dwg./Spec. No. LOU-1564-G563S01 R-2

Discrepancy Description:

Honeycomb areas exist in column K11A at 5' and 8' from top of mat. Approximate depth 4"-5" on north face x 4" wide at elevation -26.75 - this is deepest area. Honeycomb extends around column at both elevations.

Q. V. Inspector D. Emmett 6/23/76

Q. V. Supervisor T. M. McElrath 6-23-76

Recommended Disposition:

Repair concrete columns per Specification No. LOU-1564.472, paragraph 5.10B.

J. A. Jones Project Engineer al Pannio 6/24/76

Disposition:

ISSUE NONCONFORMANCE REPORT FOR EVALUATION BY OUR ENGINEERING

Ebasco Senior Resident Engineer BD Fowler/cw 7/1/76 date

Assigned To: JIM ORR

Action Completed: Signature N/A Transferred To N.C.R Date

Re-inspection:

Remarks: Honeycomb areas were chipped, No further action required by CONSTRUCTION ON This DR, Accountability Transferred To NCR JAJ-W3-85

Accept ☑ Reject ☐ Q. V. Inspector K. W. Lewis Date 7/2/76

If reject, D. R. Number _____ issued.

MAY 27 1981

J. A. JONES CONSTRUCTION COMPANY
WATERFORD UNIT NO. 3
CONTRACT NO. W3-NY-4

D. R. Number 0074

Date of Report 6/23/76

DISCREPANCY REPORT

Item Description ~~CHAMFER~~ CHAMFER STRIP EMBEDED IN CONCRETE

Location BETWEEN POURS 565-1 & 565-6 EXT. FACE

Dwg./Spec. No. LOU 1564 565

Discrepancy Description:

~~CHAMFER~~ CHAMFER STRIP WAS INSTALLED @ CONSTRUCTION JOINT BETWEEN POURS 565-1 & 565-6. IT IS STILL EMBEDED.

Q. V. Inspector D. Dennett 6/23/76

Q. V. Supervisor T. M. McAllister 6-23-76

Recommended Disposition:

Remove chamfer strip and patch concrete per Specification No. LOU-1564-472 paragraph 5.10b.

J. A. Jones Project Engineer Al Pannie 6/24/76

Disposition:

RECOMMENDED DISPOSITION IS ACCEPTABLE

Ebasco Senior Resident Engineer B O'Toole 6/24/76 date

Assigned To: JIM ORR

Action Completed: Signature J Orr Date 7/15/76

Re-inspection:

Remarks: Cured with Horncure 30.

Accept ☑ Reject ☐ Q. V. Inspector Sherry Vann Date 7-15-76

If reject, D. R. Number _____ issued.

ORIGINAL

J. A. JONES CONSTRUCTION COMPANY
WATERFORD UNIT NO. 3
CONTRACT NO. W3-NY-4

D. R. Number 0075

Date of Report 6/23/76

DISCREPANCY REPORT

Item Description 2"x4" LEFT IN CONCRETE

Location POUR 565-3 [ELEV. -25.75, 22'-6 N. OF G, EXT FACE)

Dwg./Spec. No. LOU 1564 565-3

Discrepancy Description:

9"-10" PIECE OF 2"X4" WAS LEFT IN 565-3 — WOOD IS OUT, BUT IMPRINT REMAINS

Q. V. Inspector D. Grant 6-23-76

Q. V. Supervisor L. M. McWhite 6-23-76

137

Recommended Disposition:

Clean imprint of any debris and patch concrete per Specification No. LOU-1564-472 paragraph 5.10b.

J. A. Jones Project Engineer al Pennie 6/24/76

Disposition:

RECOMMENDED DISPOSITION IS ACCEPTABLE.

Ebasco Senior Resident Engineer B D Fowler 6/24/76 date

Assigned To: JIM ORR

Action Completed: Signature Jim Orr Date 7/15/76

Re-inspection:

Remarks: Void area was scarified, epoxied and three successive layers of grout was added. Curing cpd added to ext. area for curing.

Accept ☑ Reject ☐ Q. V. Inspector Jim Horton Date 7/15/76

If reject, D. R. Number _____ issued.

ORIGINAL

FREEDOM OF INFORMATION ACT REQUEST
84-455
c/745

J. A. JONES CONSTRUCTION COMPANY
WATERFORD UNIT NO. 3
CONTRACT NO. W3-NY-4

D. R. Number 0076

Date of Report 6/23/76

DISCREPANCY REPORT

Item Description SECTION OF "ELEPHANT TRUNK" EMBEDED IN CONC.

Location POUR 499 504 - 6A-1 [15' E. OF 1A & 1'-6 N. OF U, EL 27.75

Dwg./Spec. No. LOU 1564 499 504 6A-1

Discrepancy Description:

1' SECTION OF "ELEPHANT TRUNK" IS EMBEDED IN CONCRETE WALL @ ABOVE LOCATION.

QA VAULT

MAY 27 1981

REVENUE AT LARGE OAT 137

Q. V. Inspector D. Z. Must 6/23/76

Q. V. Supervisor T. M. McAllister 6-23-76

Recommended Disposition:

Remove "Elephant Trunk" from concrete. The area to be dry packed per Specification LOU-1564-472 Section II paragraph 5.10b. No more than 1/3 CF of grout shall be placed at one time.

J. A. Jones Project Engineer al Pumie 6/24/76

Disposition: SINCE TRUNK HAS NOT BEEN REMOVED, IT IS NOT POSSIBLE TO DETERMINE SIZE OF RESULTING VOID & THEREFORE METHOD OF REPAIRING CANNOT BE DETERMINED. RESUBMIT D.R. WHEN TRUNK IS REMOVED

Ebasco Senior Resident Engineer B Dykstra 6/24/76 date

Assigned To: Royce Mashburn

Action Completed: Signature R. B. Mashburn Date 7-6-76

Re-inspection:

Remarks: THIS DR IS CLOSED AND SUPERCEDED BY D.R. NUMBER 0184 WHICH COMPLIED WITH THE RECOMMENDED DISPOSITION

Accept ☒ Reject ☐ Q. V. Inspector H. L. Smithers Date 7/6/76

If reject, D. R. Number 0084 issued.

ORIGINAL

FREEDOM OF INFORMATION ACT REQUEST
84-455
6/746

J. A. JONES CONSTRUCTION COMPANY
WATERFORD UNIT NO. 3
CONTRACT NO. W3-NY-4

D. R. Number 0077

Date of Report 6/28/76

DISCREPANCY REPORT

Item Description Damaged Waterstop

Location G-499503-18

Dwg./Spec. No. Lev 1564-476

Discrepancy Description:

At elevation -34.75 and 9'4" East of west bulkhead of pour 565-5, there are three minor cuts in the waterstop bulb. These cuts did not penetrate through the bulb itself.

Q. V. Inspector Jane Stockton 6/28/76

Q. V. Supervisor [signature] for T. McAllister

Recommended Disposition:

REPAIR IN ACCORDANCE WITH ENGINEERING INFORMATION REQUEST NO. 200-7.

J. A. Jones Project Engineer P. Caldwell

Disposition:

RECOMMENDED DISPOSITION IS ACCEPTABLE

Ebasco Senior Resident Engineer E D Fowler/cw 6/29/76 date

Assigned To: MR. TIM ORR, AREA SUPT.

Action Completed: Signature E. F. Spurr Date 6/29/76

Re-inspection:

Remarks: Repaired per EIR 200-7

Accept ☑ Reject ☐ Q. V. Inspector R. W. Lewis Date 6/29/76

If reject, D. R. Number _____ issued.

ORIGINAL

J. A. JONES CONSTRUCTION COMPAN.
WATERFORD UNIT NO. 3
CONTRACT NO. W3-NY-4

D. R. Number 0081

Date of Report 7/1/76

DISCREPANCY REPORT

Item Description REJECTED CADWELD

Location Between P1 & Q, on Column Line 1A

Dwg./Spec. No. Lov 1564-479

Discrepancy Description:

Cadweld number 7W-653 was a visual reject. At elevation appox -34.00, there was only a 1" projection of #9 bar above concrete. This is an insufficient amount of bar to install a new cadweld in place.

Q. V. Inspector Sam Stoton 7/1/76

Q. V. Supervisor R. W. Lewis 7/2/76

Recommended Disposition:

~~Chip out concrete around bar until there is enough room to make cadweld.~~ CUT EXISTING CADWELD OFF BARS; CLEAN BOTH BARS SUFFICIENTLY TO RECIEVE NEW CADWELD, RE-CADWELD SAME BARS AT SAME LOCATION.

J. A. Jones Project Engineer A. Prince 7/2/76

Disposition:

Ebasco Senior Resident Engineer _____ date

Assigned To: JIM ORR

Action Completed: Signature _____ Date _____

Re-inspection:

Remarks: NO ACTION TAKEN - HANDLED ON EIR 2M-37 FOR STANDARD REPAIR 7-14-76 DLC

Accept ☐ Reject ☐ Q. V. Inspector DLC for D. A. Greathouse Date 7-14-76

If reject, D. R. Number _____ issued.

QA VAULT

MAY 27 1981

J. A. JONES CONSTRUCTION COMPANY
WATERFORD UNIT NO. 3
CONTRACT NO. W3-NY-4

D. R. Number 10083

Date of Report 7/2/76

137

DISCREPANCY REPORT

Item Description Embed Plate (P19)

Location L021564G895509 Wall R., 1.50' W of Col. V7R, 2' N. of J, Elev -27.17.

Dwg./Spec. No. L021564G895509 R4, W-STTP-5, W-WP-5

Discrepancy Description:

P19 Embed plate was installed on form before engineering and Q.V. inspection could record and verify serial number. Not in accordance with W-WP-5, para. 9.1

Q. V. Inspector F. W. Lewis 7/2/76

Q. V. Supervisor [signature] 7/2/76

Recommended Disposition:

After placement, strip forms and record I.D. Number on embed map log.

J. A. Jones Project Engineer A. Prince 7/2/76

Disposition:

RECOMMENDED DISPOSITION IS RECEPTABLE

Ebasco Senior Resident Engineer B.D. Fowler/cw 7/2/76 Date

Assigned To: DON KELLEY

Action Completed: Signature D E Kelley Date 7-7-77

Re-inspection:

Remarks: PLATE # 2812 CWK

Accept ☑ Reject ☐ Q. V. Inspector C Kinney Date 7/7/77

If reject, D. R. Number _____ issued.

OK

FREEDOM OF INFORMATION ACT REQUEST
94-455

ORIGINAL

CLOSED

C/749

J. A. JONES CONSTRUCTION COMPANY
WATERFORD UNIT NO. 3
CONTRACT NO. W3-NY-4

D. R. Number 0054

Date of Report 7/2/76

DISCREPANCY REPORT

Item Description Void in Concrete

Location Pour 499504-6A1 (15' E. of 1A & 1'6" N. of 4)

Dwg./Spec. No. Low 1564-472

Discrepancy Description:

At approximate elevation -27.75 a tremie was removed from concrete wall. This left a void appox 2' long x 8½" wide x 1½" deep (at deepest point). This is a follow up to discrepancy report # 0076.

Q. V. Inspector Sam Horton 7/8/76

Q. V. Supervisor William Ell 7/6/76

Recommended Disposition:

Dry Pack Area in Accordance with Specification Low-1564.472 Sect II. No More than ½ CF of Grout Shall be Placed at One Time.

J. A. Jones Project Engineer [signature] 7/8/76

Disposition:

Recommended Disposition is Acceptable

Ebasco Senior Resident Engineer B.L. Fowler 7/12/76 date

Assigned To: Royce Mashburn

Action Completed: Signature R.B. Mashburn Date 7-13-76

Re-inspection:

Remarks:

Accept ☑ Reject ☐ Q. V. Inspector Sam Horton Date 7/13/76

If reject, D. R. Number _____ issued.

A. JONES CONSTRUCTION COMPANY
WATERFORD UNIT NO. 3
CONTRACT NO. W3-NY-4

D. R. Number 0095

Date of Report 7/21/76

DISCREPANCY REPORT

Item Description Embed plate (P16.1)

Location LOU.1564G895S11 Col H3A (Wall 38)

Dwg./Spec. No. LOU1564G895S11 Rev. 4 W-WP-5 para. 9.1

Discrepancy Description:

E'bed plate (P16.1) was installed on form p 2 to Engineering & Q.V. Inspection verifying identification. Not in accordance with W-WP-5 para 9.1

Q. V. Inspector R.W. Lewis 7/21/76

Q. V. Supervisor T.N. McAllister 7-21-76

Recommended Disposition:

VERIFY THAT THE DIMENSIONS ARE CORRECT FOR A P16.1, AFTER PLACEMENT COMPLETE EMBED MAP LOG WITH CORRECT I.D. AH

J. A. Jones Project Engineer [signature] 7/21/76

Disposition:

RECOMMENDED DISPOSITION IS ACCEPTABLE

Ebasco Senior Resident Engineer BD Fowler/CW 7/21/76 /date

Assigned To: JIM ORR

Action Completed: Signature [signature] Date 9/8/76

Re-inspection:

Remarks: Verified & recorded serial number on Embed map log. R.W. Lewis 9/8/76

Accept ☑ Reject ☐ Q. V. Inspector R.W. Lewis Date 9/8/76

If reject, D. R. Number _____ issued

POP-N-713

Attachment A

J. A. JONES CONSTRUCTION COMPANY
WATERFORD SES UNIT NO. 3
CONTRACT NO. W3-NY-4

D. R. Number 443

Date of Report 5/8/78

DISCREPANCY REPORT

Item Description Cadwelder N. 122-W, Numbering Sequence

Location Reactor Containment Building

Dwg./Spec. No. JAJ-W-WP-4

Discrepancy Description:

On 4/4/78, Welder No. 122-W lost Qualification due to Two (2) Rejects in Fifteen (15) Welds. After Re-qualification on 4/17/78, numbering was started anew. Numbers "1" thru "32" were then duplicated between 4/28/78 and 5/4/78. (Original qualification lost on 122-W-54).

Q. V. Inspector D E Sewell 5-5-78

Q. V. Supervisor T. N. McAllister 5-8-78

Disposition:

Although numbering sequence was duplicated, "1" thru "32", all welds are traceable and identifiable by Map Number and location on same. All duplicate numbers shall be indicated by an Asterisk(*)on Daily Cadweld Inspection Reports and numbering will continue with No. 33. D.R. Number shall be referenced on each of the affected Daily Cadweld Inspection Reports.

J. A. Jones Project Engineer E. Woolery

Q. A. Approval J T Ly 5/8/78

Assigned to: Floyd Slatton

Action Completed: Signature L. Slatton Date 5/8/78

Re-inspection:

Remarks:

Accept ☑ Reject ☐ Q. V. Inspector D E Sewell Date 5/8/78

If Reject, D. R. or N.C.R. Number _____ issued

ATTACHMENT NCR #

CADWELD Oper # 122W Position/BAR size Horiz #8

pg 1 of 1

CADWELD NUMBER	Test Sequence NUMBER	Test Splice Number	REMARKS
122W 50	1		
51		#8-Horz.	REJECT Replaced by 179W 49+50
52			
* 53			*
* 54	4	#8-Horz.	REJECT 4/4/78 *
33			
38			
39	↓		
122W 90	9		

ATTACHMENT NCR #

CADWELD Oper # 122 W Position/BAR size Horiz. # 11

CADWELD NUMBER	Test Sequence NUMBER	Test Splice Number	REMARKS
122 W 1	1		
2			
3			
4			
5			
6			
7			
8			
9		122W 9	Sister
10			
11			
12			
13			
14			
15			
16			
17			
18			
19			
20			
21			
22			
23			
24			
25			
26			
27			
28			
29		122W 29	Sister
30			
31			
32			
33	↓		
122 W 34	34		

ATTACHMENT NCR #

CADWELD Oper # 122W Position/BAR size Horiz. # 11

CADWELD NUMBER	Test Sequence NUMBER	Test Splice Number	REMARKS
122W 35	35		
36			
37			
38			
39			
40			
41			
42			
43			
44			
45			
46			
47			
48			
49			
122W 1		122W1	Sister Ref. DR # 443
2			
3			
4			
5			
6			
7			
8			
9			
10			
11			
12			
13			
14			
15			
16			
17			
18	↓		
122W 19	68		

ATTACHMENT NCR #

CADWELD Oper # 122 W Position/BAR size Horiz. #11

CADWELD NUMBER	Test Sequence NUMBER	Test Splice Number	REMARKS
122 W 20	69		DR # 443
21			
22			
23			
24			
25			
26			
27			
28			
29			
30			
31			
32		122 W 32	Sister
34			
35			
36			
37			
43			
44			
45			
46			
47			
48			
49			
50			
51			
52			
54			
55			
56			
57			
58	100		
59			
122 W 60	102		

ATTACHMENT NCR #

CADWELD Oper # 122W Position/BAR size Horiz. #11

CADWELD NUMBER	Test Sequence NUMBER	Test Splice Number	REMARKS
122W61	103		
62			
63			
64			
65			
66			
67			
68			
122W69			
76			
77			
78			
79			
80			
81			
82			REJECT
83			
84			
85			
86			
87			
88	↓		
122W89	123	122W-89	Sister ~~Reject~~ failed

Cad Weld splices 123
~~tensile tests~~ 5
~~cycles~~ 1
Failed 1

ATTACHMENT NCR #

CADWELD Oper # 122 W Position/BAR size Horiz. # 14

pg 1 of 1

CADWELD NUMBER	Test Sequence NUMBER	Test Splice Number	REMARKS
122W 53	1		DR #
70	2		
71	3		
72	4		
73	5		
74	6		
122W 75	7		

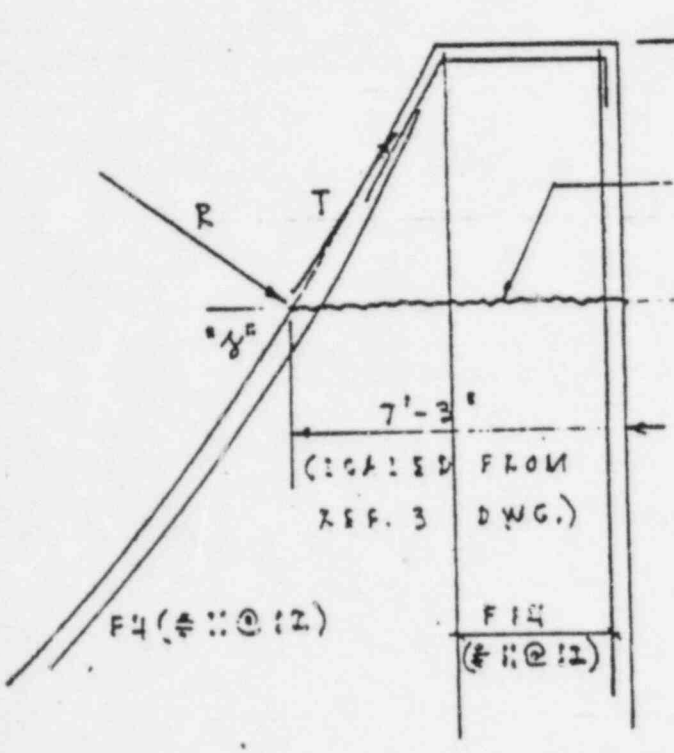
Attachment NCR #

CADWELD Oper # 122W   Position/BAR size VERT #11

pg 1 of 1

CADWELD NUMBER	Test Sequence NUMBER	Test Splice Number	REMARKS
*122W 42	1	122W42	+ DR# Sister test
* DUPLICATE			

USING THE MAGNITUDES OF THE REACTION FORCES T, R COMPUTED ON PAGE 4, DETERMINE WHETHER THE UNDERLYING REINFORCED CONCRETE IS STRUCTURALLY ADEQUATE.



THE SKETCH OF THE GEOMETRY IS EXCERPTED FROM DETAIL 'B' OF BLASCO DRAWING LOU-1567-G-502, REV. NO. 6, DATED 12/12/78 (REFERENCE 3)

SINCE T, R ARE COMPUTED AS SRSS OF N-S AND E-W DLE, AND SINCE THE RESPECTIVE BEARING POINTS ARE 90° APART, REDUCE THESE FORCES BY $\sqrt{2}$.

FROM P. 4, $T = 2254\,k/\sqrt{2}$

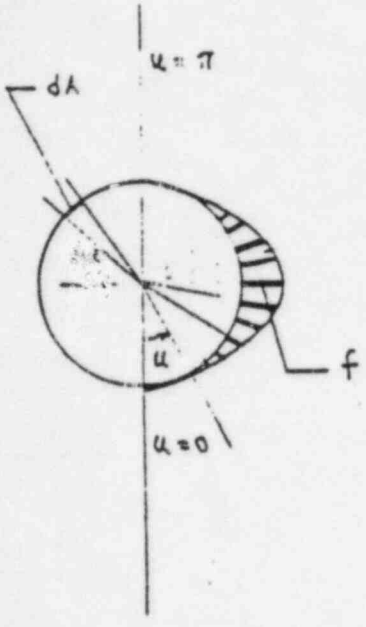
$R = 24721\,k/\sqrt{2}$

COMPUTING THE HORIZONTAL COMPONENT:

$$H = R \sin 50^\circ + T \cos 50^\circ$$

$$= \frac{24721}{\sqrt{2}} \times 0.7660 + \frac{2254}{\sqrt{2}} \times 0.6428$$

$$= \frac{20385\,k}{\sqrt{2}} = 14414\,k$$



ASSUME THAT H = 14414 k IS THE RESULTANT OF THE SINUSOIDALLY DISTRIBUTED FORCE SHOWN ON THE LEFT.

$u = \frac{\pi}{2}$

THEN: $dR' = f(u)\, dA$

$= f \sin u \; r \, du$

$R' = \int_{u=0}^{\pi} f \sin u \; r \, du$

$R' = -fr(\cos u)\Big|_0^{\pi} = 2fr$

SO THAT:

$f = \frac{R'}{2r} = \frac{1441.4 \text{ k}}{2 \times 70.0}$

$f = 103 \text{ k/ft}$

COMPUTING THE SHEAR STRESS v_u:

$v_u = \frac{V_u}{\phi b d} = \frac{103 \text{ k}}{0.85 \times 12'' \times 7.25 \times 12}$

$v_u = 0.116 \text{ ksi} = 116 \text{ psi}$

EVALUATING v_u AGAINST $2\sqrt{f_c'}$, FOR 4000 PSI CONCRETE (SEE NOTE, REF. 3):

$2\sqrt{4000} = 126 \text{ psi} > v_u$ OK.

HARSTEAD ENGINEERING ASSOCIATES • INC.

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WATERFORD III SES
ANALYSIS OF CRACKS AND WATER SEEPAGE
IN FOUNDATION MAT
LOUISIANA POWER & LIGHT COMPANY
REPORT NO. 8304-1
SEPTEMBER 19, 1983

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G. A. Harstead

LKO pp.

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1.0 Introduction

This report summarizes a study undertaken by Harstead Engineering Associates on behalf of Louisiana Power and Light Company.

The following major evaluation items are addressed in this report:

a) The engineering criteria employed in the preparation of the site and in the design and construction of the Waterford III Nuclear Power Island Structure (NPIS) basemat.

b) Cracking and leakage in the basemat.

c) The laboratory tests performed on water and leachate samples extracted from the surface of the basemat.

d) The stability calculations performed for the Steel Containment Vessel.

As required, relevant source material is either referenced or contained as an appendix to this report.

2.0 Site Inspections and Interviews

HEA personnel have visited both the New York office of Ebasco, Inc. and the Waterford III site.

These visits are summarized in HEA Trip Reports Nos. 1-6 (References 1-5), and were conducted in order to meet with key personnel familiar with the design bases of the Waterford III NPIS basemat, to document first-hand the extent of cracking and leaking at the surface of the basemat, to gather pertinent reports and drawings, and to confirm a scope of work and corresponding schedule.

3.0 Foundation Mat Design Concept

3.1 Site

The site of the Waterford 3 plant is located next to the Mississippi River. Natural grade is at about Elevation + 15.0 feet. To a depth of about 55.0 feet from grade, the soil consists of alluvial deposits which are relatively soft. At greater depth are the Pleistocene Age soils. The upper parts of these soils are stiff.

3.2 Design

The Safety class structures are supported on a continuous mat 270 feet wide, 380 feet long and 12 feet thick. The bottom of the mat is at a depth of about 60 feet below natural grade. Support for the mat is provided on the stiff Pleistocene clays, where the natural soil pressures were about 3300 psf. After the completion of construction, the soil pressure under the foundation mat is about 3100 psf. These pressures consist of the weight of soil and construction above the mat less the buoyant pressure due to ground water. The water table is generally at an elevation of + 8.0 feet; therefore, the buoyant pressure is about 3400 psf. The weight of the soil which was excavated was about 5700 psf, while the weight of the construction now in place is about 5500 psf. The interesting feature of this is that the soil below the plant is experiencing almost the same pressures that it has in recent history. Therefore, increased consolidation of soil and the accompanying settlement that often occurs when new construction weight is added to soil does not occur in this case.

Inasmuch as the water table is at about Elevation + 8.0 feet or almost at natural grade, walls were erected

around the perimeter of the mat. These walls must resist the lateral pressure of the surrounding backfill soil and the hydrostatic pressure of the ground water. These walls extend up and provide flood protection up to Elevation + 30.0 feet, which is 22.0 feet above the normal water table.

The mat and the walls form a reinforced concrete box structure, with interior walls and concrete placements referred to as counterforts providing additional stiffening. The mat and the exterior walls are monolithic and therefore prevent water flow through joints and in the sense that ground water is prevented from collecting inside the structure, the structure has been called a floating structure.

3.3 Construction

The steps involved were:

a) Dewatering the site
b) Excavation down to Elev. - 47.0 feet
c) Construction of the mat
d) Construction of superstructure
e) Gradual release of Dewatering
f) Backfill of excavation surrounding the construction

The soil pressures existing at Elevation - 47.0 feet vary considerably during construction. After dewatering the pressure increases to the weight of the soil above due to loss of buoyancy and then after excavation the pressure, of course, reduces to zero. When the pressure is reduced, the soil heaves or rises due to the removal of the weight of the overlying soil.

As construction proceeds, the structural weight causes the soil pressure to increase and the soil begins to resettle. In order to provide additional compaction, the

soil bearing pressure is allowed to increase. The pressure was allowed to increase to 4500 psf. As construction continued, the gradual release of dewatering offset the increasing structural weight.

The construction was planned to maintain a maximum differential soil bearing pressure of 2000 psf. In the final condition, a maximum differential soil pressure of 1000 psf was established by the designers (Reference 6).

During construction, settlement and water pressure readings were taken in order to ensure that control was being maintained over differential mat settlements.

4.0 Significant Events During Construction

4.1 Stop Work Order No. 1

LP&L issued SWO No. 1 on December 16, 1975 in order to correct deficiencies and nonconforming work in the inspection and control of concrete mixing, transporting and placing of concrete, and curing and finishing. This resulted from observation of Placement No. 6. and #2

4.2 Concrete Placement of the Mat

During placement of Section 10B, a rain storm broke out. The placement was completed; however, because the concrete quality was unknown due to dilution with rain water, NCR No. W3-39 was filed.

A repair program was established which included coring, strength testing, pressure grouting of drilled holes, repair of surfaces, and waterproofing of the west face.

Discrepancy Notice C-13 dated 12-16-75 noted cracks in the west face of Placement No. 2. Cracks were chipped out and surface roughened prior to making adjacent Placement No. 4.

During placement of concrete in Placement No. 19, concrete was placed over a previous layer while it was no longer plastic. This surface was raked and fresh concrete was placed. Concrete was later chipped out in certain areas to a depth of 6 inches to 12 inches below the mat top rebar and replaced with fresh concrete. Still later, 11 cores were taken to a minimum depth of 5 feet. The cores were tested and the core holes grouted.

The "cold joints" and dilution of concrete are undesirable because of voids and weaknesses. The extensive and methodical repair program that took place as indicated in the documentation and subsequent observations of the foundation mat indicate that the repair was effective and that

there is no concern about the strength or corrosion protection of the concrete.

4.3 Change in Allowable Soil Bearing Pressure During Construction

On March 15, 1977, Ebasco requested that the maximum temporary bearing pressure during construction be increased from 4000 psf to 4500 psf. This recommendation was based on the fact that the maximum allowable bearing pressure of the soil is 15,000 psf, the desire to accelerate recompression of the soil that heaved after dewatering and excavation, and the need to permit backfilling under the Turbine Building.

Observed in report

Due to scheduling difficulties, the dewatering system was not in place during the initial removal of 20 feet of soil. The remaining soil heaved between 1.5 and 3.5 inches. After the dewatering was under way and about 1.0 inch of the heave was recovered, the job was shut down. The dewatering was not operating long enough to balance the total heave.

In November 1974, the dewatering was reinstated. In January 1975, the remainder of excavation was restarted and the heave increased to between 4.0 and 9.0 inches. When concrete construction proceeded, the heave reduced to between 1.0 and 6.0 inches.

The above compares to a heave projected as 2.0 inches. Rebound is a function of both load removed and time of load removal. The differences in schedule and loading were cited as reasons for the difference.

In order to ensure full recompression of the rebound, a greater soil pressure was recommended.

4.4 Site Settlements

In September 1978, a report "Review of Site Settlements" by M. Pavone and J. L. Ehasz, was issued (Reference

7). It was noticed that there was a total settlement of about 11.0 inches from the maximum heave position.

Since the maximum heave was previously noted as being between 4.0 and 9.0 inches, the overall settlements were therefore beyond the original zero position of the soil. The settlements have remained constant since early 1979.

A curvature in the North-South direction was noted, the center of the mat being 2.5 and 1.5 inches higher than the south and north edges respectively.

4.5 Cracks Observed in the Top of Mat in the Containment Area

Nonconformance Report NCR W3-535, dated August 3, 1977 reported that cracks were discovered in the top of mat, which were weeping water. The rate of weeping water was enough to show the crack and to moisten the surrounding concrete. A crack map was prepared (Reference 8) and the crack widths were noted as being between 2 to 5 mils. The piezometer level was kept below Elevation - 50.0 feet since the start of 1975, until September 1977. The concrete in this region was placed in December of 1975 and January of 1976. The lower concrete ring of the shield building was also in place. The cracks were chipped out to a 1.0 inch depth and to 12 inches on either side and repaired with epoxy grout. It was hypothesized in Ebasco Letter of July 27, 1977 (Reference 9) that the general curvature of the mat caused tension in the upper portion of the mat. Locally the lower ring wall of the shield building would have caused tension in the lower portion of the mat. This was termed as a stress reversal and the possibility of an intertie between cracks could exist providing a direct leak path. It was also stated that leakage of water through the mat was undesirable because:

a) a film of water could be presumed to develop between the mat and the fill concrete beneath the containment vessel. This could require a reanalysis of containment stability (see Section 9.0).

b) if the leakage increased and water found its way out of the fill concrete it would be collected in the mat drainage system and run through the waste treatment system (see Section 5.1)..

The repair apparently stopped further leakage.

4.6 Cracks in Mat Outside of Containment Area

Ebasco Nonconformance Report W3NCR-16143 (Reference 10) noted that: "there are concrete cracks in the base mat of the Reactor Auxilliary Building. This is evidenced by the percolation of water in small amounts, up through these cracks. These cracks are located in the Gas Surge Tank Room, Waste Gas Tank Room, and Waste Gas Compressor "B" Room, all at elevation - 35.0 feet.

These are examples of where cracks were found:

G. Harstead of HEA observed the above-mentioned locations where cracks had been observed, as well as other areas, during the period of July 11-14, 1983 (Reference 1).

All accessible areas of the basemat were subsequently inspected and any cracks found were mapped during the period of August 30 - September 2, 1983 by A. du Bouchet of HEA with the assistance of LP&L and Ebasco personnel (Reference 5).

The crack maps generated during this inspection are contained in Appendix A. The reference points employed to locate these cracks accord with the geometry detailed in Ebasco Drawings LOU-1564 G-499 S01, -02 and -03.

In addition to mapping the orientation and extent of each crack, notations were made concerning any prior repairs to the crack, floor finish or lack thereof, evidence of dampness or seepage, and crack width.

As noted in Reference 5, "Crack width dimensions could not be quantified, but are designated throughout as 'hairline'. In several instances, the existence of a crack could only be inferred by the darker coloration caused by the presence of moisture. No actual gaps were noted."

The amount of moisture noted during this inspection period was minimal. In some instances dampness/moisture were present. There was, however, no evidence of seepage or migration that might have been deduced by the presence of standing water or draining along the local slope of the basemat.

5.0 Analysis of Waterford III Structural Foundations

5.1 Structural Concept

The foundation concept is an ingenious solution of the site problems in meeting the safety criteria established for the nuclear safety related structures. The most significant factor in assessing the adequacy of the design is that the final soil pressure after construction is actually less than the soil pressure which existed prior to the start of construction. The stability and safety that this implies has been demonstrated, in that, the settlement has not changed for the past several years except for changes that would be expected by changes in the water table.

As part of this concept, the mat and exterior walls were to remain watertight. If water could readily flow in and no provision was made to pump water out, conceivably the water inside would increase the effective soil pressure and result in further soil settlements, although the effective soil pressure would still be less than one half of the maximum allowable. For many reasons, flooding would be intolerable; however, there would probably be little detrimental effect upon the structure. The differential hydrostatic pressure on the exterior walls would be eliminated, thereby reducing the lateral load on the building. The loading on the mat would remain approximately the same because the increased effective soil pressure would be equal to the weight of the water which leaked into the structure. There would be long term settlements in this case and perhaps some differential settlements, which is not an unusual situation in many structures.

Section 11.2 of the Waterford III FSAR (Reference 11) details the capacity of the Waste Management System (WMS).

Table 11.2-4 specifies a total expected waste flow of 1425 gpd based on the following flow sources:

Containment Building sump (40 gpd), Auxiliary Building floor drains (200 gpd), laboratory drains and waste water (400 gpd), sampling drains (35 gpd), miscellaneous (700 gpd) and blowdown (50 gpd).

Table 11.2-2 specifies a total useful internal volume for the two WMS waste removal tanks of 7200 gals.

HEA therefore concludes that the capacity of the Waste Management System as detailed above effictively eliminates the possibility of ground water accumulation within the NPIS.

6.0 Review of Engineering Design and Construction

To determine if implementation of the unique floating foundation concept resulted in excessive differential movements during construction, documents pertaining to the design, engineering, and construction were reviewed. Data included related sections of the FSAR, instrumentation reports, calculations related to the design, formulation and application of the foundation design principle, and relevant correspondence. The following specific areas were addressed:

a) Geologic studies
b) Development of engineering properties for foundation soils
c) Foundation design concept
d) Design of combined mat
e) Earth pressure considerations
f) Groundwater environment
g) Excavation sequence
h) Dewatering system
i) Construction of mat
j) Summary of movements recorded during construction.

Pertinent data related to the above will be analyzed to establish that the design concept was developed and implemented successfully.

6.1 Geologic Studies

The Waterford Nuclear Power plant is located on the west bank of the Mississippi River about 20 miles from New Orleans. The site consists of over 3,000 acres with surface elevations ranging from approximately sea level in the

southwest to about elevation plus 14 feet MSL at the base of the flood control levee.

The crest of the levee is the highest point of the site and is about elevation plus 30 feet MSL. The Mississippi River is 110 feet deep and about 2,200 feet in width adjacent to the plant.

Geologic studies conducted at the site included review and interpretation of geologic literature, subsurface borings, geophysical logs, cross-hole data and laboratory tests. The stratigraphic sequence is described as follows (FSAR Section 2.5.4.1);

Sequence	Depth (Feet)
Recent alluvium deposits	0 - 50
Pleistocene sands and clays	50 - 1,100
Plio-Pleistocene interbedded sands and clays	1,100 - 1,900
Pliocene alternating sands and clays	1,900 - 4,900
Massive sandstone interbedded with shale	4,900 - 7,500
Shale alternating with thin sandstone layers	7,500 -10,500
Marine shales	10,500 -40,000

This review will be confined to the upper 500 feet of soil strata.

6.2 Development of Engineering Properties

A total of 74 soil borings were drilled at the site to determine the detailed stratigraphy applicable to the upper 500 feet of subsurface materials. Static and dynamic engineering properties were established based on laboratory tests on selected samples and in situ geophysical measurements. A brief visual description of the principal soil strata is provided below:

Sequence	Depth (MSL)
1 Soft clay and silty clay with silt and sand	GS to -40
2 Stiff tan and grey fissured clay	-40 to -77
3 Very dense tan silty sand	-77 to -92
4 Medium stiff grey clay with silt lenses	-92 to -108
5 Stiff dark grey clay - organic	-108 to -116
6 Soft to medium stiff tan and grey clay	-116 to -127
7 Very stiff clays with silts and sands	-127 to -317
8 Very dense sands and silty sands	-317 to -500

Design values applicable to each stratum are defined in Appendix B (FSAR Table 2.5-14).

6.3 Foundation Design Concept

In reviewing the consolidation characteristics of the potential foundation bearing strata it is apparent that excessive settlement could be anticipated if the Nuclear Plant Island structures were founded directly in the stiff Pleistocene deposits (layer 2) unless the total bearing pressure from the structures were reduced during construction by buoyancy effects. Of particular concern are the clays with relatively Low Overconsolidation Ratios (OCR), such as layer 4, which has an OCR of 1.4.

By excavating a depth of soil approximately equal to the weight of the structure, the effective pressure at the base remains unchanged, thereby reducing the potential for underlying clay layers to settle. The floating foundation principle has not been used previously in nuclear power plant design; however, historically, many large structures have been constructed using this concept. See, for example, an extract from a paper entitled "State of The Art of Floating Foundations" by H. Golder, which is contained in Appendix C.

The following is a brief summary of the significant control parameters developed for the Waterford Plant incorporating the floating foundation principle.

a) All Category I structures were combined in a nuclear plant island on a common mat.

b) Base of mat foundation is in the stiff Pleistocene clays at Elevation - 47 MSL.

c) Effective bearing pressure of the Nuclear Plant structure is 3,100 psf. compared to the existing overburden pressure of 3,300 psf.

d) Dewatering systems were required to minimize potential for heave at base of excavation, control pore pressure in layer 3 and stabilize excavation slopes.

e) During construction the total pressure at base of mat may have increased to 4,000 psf resulting in an additional pressure of 700 psf. It was estimated that the heave after excavation would be in the order of 2 inches and recompression from this additional pressure would be complete by the end of construction.

f) A filter layer of compacted sand and shell (18 inches) was placed at base of excavation underlying mat to permit distribution of pore pressure in the underlying clay on application of load.

g) As soon as the total load from the Nuclear Plant Island and surrounding granular backfill reached 4,000 psf, segments of the dewatering system were released in stages to achieve buoyancy of the structures and backfill and permit construction to continue. Details of the proposed Recharge Program were developed during construction related to well efficiency and piezometric response.

h) A maximum differential loading of 1 ksf was applied

to base of structures to minimize tilting, heaving, and settlement.

i) A detailed instrumentation program was required to monitor movement of structures and groundwater levels.

j) Long term settlement was anticipated to be less than 1 inch due primarily to local pore pressure adjustments in the clays.

A generalized site cross-section showing the Nuclear Island structures and adjacent non-Category I Turbine Building is outlined in Appendix D (FSAR Fig. 2.5-80).

6.4 Design of Combined Mat

Details of the parametric and sensitivity studies conducted to establish the appropriate mat thickness and required reinforcement for static and dynamic loading conditions are outlined in Reference 12. The selection of the subgrade modulus applicable to the foundation soils and mat geometry is judgemental. The values used to estimate impact on mat thicknesses of 10, 12, and 15 feet (k_s=150 pci and 125 pci) are considered reasonable. The twelve foot thickness finally selected was based on an economic compromise between the cost of additional concrete to eliminate shear reinforcement and providing some shear reinforcement in local areas.

The influence of a constant or variable modulus on the shear and moment diagrams is shown in Appendices E and F (Figures 7 and 8 - Reference 12). The design envelope selected covers all possible support conditions.

An inherently conservative approach was also adopted in analyzing the mat for seismic loadings resulting from the SSE (0.1g) and OBE (0.05g). As shown in Appendix G (Figure 9, Reference 12) the total shear and moment increases rapidly with increasing foundation stiffness to

approximately G = 3,000 ksf where G = the Dynamic Shear Modulus.

Although the indications of soil stiffness based upon geophysical site measurements indicated that the value of G should be 1000 ksf, the seismic responses in the plant structures would be greater for increased soil stiffness. In order to be very conservative, the seismic analysis was based upon a dynamic model using a G = 3000 ksf which resulted in peak seismic response and therefore peak moments in the mat.

The seismic analysis mathematical model contains elastic springs representing the stiffness of the soil. The results of the analysis include soil spring deformations which represent soil movement with respect to some origin point of earthquake. The peak horizontal deformations were used to calculate the passive earth pressure on the perimeter walls.

6.5 Earth Pressure Considerations

The procedures outlined in section 2.5.4.10.3 of the FSAR related to determination of static and dynamic earth pressures on the structural walls were reviewed. An "At Rest" earth pressure coefficient of K_o = 0.5 was selected for the compacted granular fill.

This highly conservative approach adopted in determining the earth pressure for dynamic loading conditions (correlating movement of structure from dynamic analysis with strain obtained from a typical earth pressure diagram) combined with static loads results in a heavily reinforced perimeter wall.

6.6 Groundwater Environment

Evaluation of piezometric response in the Recent alluvium to fluctuations in the river level indicated that the

clays, silts, and sands were discontinuous and unresponsive. Average permeability of these deposits is estimated to be in the order of 1.5×10^{-6} cms/sec (FSAR Fig. 2.5-12). Similar conclusions were reached regarding the transmissibility of potential sand layers in the Pleistocene clays. Below the stiff clays at Elev. -77 MSL it has been stated that all strata are responsive to river level fluctuations. The major source of recharge for the granular backfill surrounding the Power Plant is expected to be from rain and run-off, possible interconnections with discontinuous sand layers extending to the river and the tan silty sand layer at Elev. -77 MSL.

Water quality has been analyzed and no corrosive elements were detected which could impact the reinforcing steel embedded in the concrete mat (see Section 8.0). The possibility of the water becoming saline at some future date was considered; however, lack of oxygen would prevent corrosion from this water source.

The greatest potential for corrosive elements to be present in the groundwater immediately adjacent to the concrete mat would be from the Mississippi River; however, the seepage path required in the assumed continuous silty sand stratum at Elev. -77 MSL, relatively low permeability, estimated gradient of 0.008 and probable filter medium would result in a groundwater environment surrounding the Plant with all corrosive elements removed or highly diluted.

6.7 Excavation Sequence

Unfortunately due to schedule and legal problems it was not possible to complete the required excavation for the Plant Island structures until October, 1975. The following is a brief summary of the major excavation phases commencing with the initial excavation in April, 1972 (FSAR Section 2.5.4.5.1).

Excavated

Stage	From	To	Started	Finished
Phase I	Grade	-5	April 72	July 72
II	-5	-22	January 75	June 75
III	-22	-40	April 75	August 75
IV	-40	-48	October 75	March 76
Turbine Bldg.	Grade	-40	January 77	March 77

Concurrent with the excavation phases, extensive dewatering systems were installed and operated.

6.8 Dewatering Systems

The dewatering systems were installed by Moortrench-American Corporation based on performance specifications prepared by Ebasco. A total of 251 dewatering wells were located around the perimeter of the excavation with 217 pumping from the Recent alluvium and the remaining 34 from the Elev. -77 Pleistocene sands. A second series of 12 deep pump relief wells were located around the combined structure mat and pumped from the Elev. -77 sands. No details were provided on the design of the well systems. It is assumed these studies were performed by Mooretrench. On evaluating the Instrumentation Reports covering the monitoring of the dewatering operation it appears that the systems generally performed as intended. It was noted in a letter from Ebasco to Boh Bros. dated June 29, 1977 (Appendix H) that significant operational and maintenance problems had developed. Corrective action was taken by the contractor and it is understood that the wells were stabilized and instrumentation readings were obtained in conformance with specifications. An extensive Recharge Program (required to achieve buoyancy of the structures) was implemented successfully in October, 1977 and completed by July, 1979 when normal groundwater pressure levels were achieved.

6.9 Subsurface Instrumentation Program

The scope of the Instrumentation Program consisted of monitoring piezometric levels, foundation soil heave, settlement, excavation slope movements and potential site subsidence due to dewatering. A total of 24 piezometers were installed to measure groundwater response in selected soil strata. Five additional piezometers were located in the filter layer underlying the combined mat. A total of nine (9) heave points, two (2) extensometers, six (6) inclinometers, and twenty-eight (28) settlement monuments were installed to measure movement of structures and excavation slopes.

6.10 Construction of Mat

The excavation for the combined mat was performed with backhoes by making an eight (8) foot vertical cut in the stiff Pleistocene clay from Elev. -40 to Elev. -48. The excavation was performed in strips. The initial strip was located under the Reactor Building area approximately 120 feet wide running to the full width of the mat. Subsequent strips (Nos. 2 and 6) were cut north and south of strip No. 1 as shown in Appendix I (Fig. 2.5-118). Concrete placements were made simultaneously in alternate strips. All exposed vertical cut faces were gunited within 8 hours of exposure to prevent dessication prior to concrete mat placement.

6.11 Summary of Movements Recorded During Construction

On completion of excavation in October, 1975 for the common mat it was noted that the clays had heaved a total of 5 to 10 inches with the maximum amount occurring at the north end closest to the river. This magnitude of heave was considerably greater than anticipated in original design (approximately 2 inches) and was due primarily

to general relaxation of the clays due to the number of excavation phases and the stop/start operation of the dewatering systems.

To compensate for the additional heave, the permissible overload of 700 psf was increased to 1,200 psf in order to accomplish most of the recompression during construction. This increase permitted the load from the structures and backfill to be increased to 4,500 psf prior to commencing the Recharge Program to achieve buoyancy. By July, 1977 recompression of the heave had occurred due to loading from structures and backfill, assisted by larger and more efficient dewatering pumps. The dewatering system was continued until October, 1977 when the average net settlement was approximately 2 inches. During the period October, 1977 to July, 1979 the rate of movement was controlled by releasing the dewatering system in stages, permitting construction of the plant to continue. The average net settlement increased to approximately 5 inches during this period. Readings have stabilized at that level for the past four years with only minor fluctuations noted due to change in river level. The composite foundation mat settlement is shown in Appendix J (FSAR Fig. 2.5-197).

Detailed review of the instrumentation records covering construction of the Plant indicated that the applied structural load was sufficiently controlled so that the permissible maximum differential loading of 1 ksf across the base of mat was not exceeded. Adherence to this criterion resulted in minimum deflections and minimum curvature (for the mat geometry) at the surface and base of mat. Maximum differential movement was recorded at 2.5 inches with the maximum settlement occurring at the north and south ends.

Although the maximum recorded heave and subsequent settlement was considerably in excess of original design estimates, careful control had been exercised in applying load from structures and equipment in a uniform sequence. By conforming to the maximum differential loading criterion of 1 ksf recompression of the heave and consequently rate of strain was controlled. This procedure minimized unusual and severe distortions of the mat.

7.0 Evaluation of Cracking

While it is not possible to precisely predict stresses in reinforcing bars, an upper bound estimate is possible by estimating the strain as the crack width divided by crack spacing. Assuming crack widths of 5 mils spaced 10 ft. on center, it may be shown (Appendix K) that the approximate stress in the top rebar is 1200 psi. The actual crack width and spacing would indicate a much lower stress. Nevertheless, if the conservative value of 1200 psi tension in the top reinforcing bars is conservatively assumed to be constant for the entire 330 feet of length of the mat, the indicated differential settlement would be somewhat less than 1.0 inch. This provides added assurance that differential soil pressures were very well controlled during construction. This also indicates that the mat is quite tolerant of such differential settlements.

Furthermore, settlement stresses are considered secondary stresses in that they do not impair the structural capacity to carry other imposed loads such as dead load and seismic loads. This is possible provided that there is no failure of the supporting soil. In the case of Waterford III the soil is loaded at about one fourth of the design load and in fact, less than the previous in-situ condition. When this is compared to the reinforcing bar yield stress of 60,000 psi, it is clear that these cracks did not give any evidence at all of any structural distress.

Cracks are expected in reinforced concrete structures, and are caused by many factors, such as:

application of tensile forces,
drying shrinkage of concrete
thermal gradients,
and differential settlements.

The last three effects are the result of geometric constraints, which do not limit the ability of a properly designed reinforced concrete structure supported on competent soil to carry imposed loads. By "properly designed" it is meant that sufficient reinforcing steel is placed in the concrete to prevent large tensile cracking of the concrete, crushing of concrete, or diagonal tension shear failure.

The cracks that were reported are of little concern with respect to the structural adequacy of the mat; therefore, the precise cause of the cracks is not important. The cracks could be the result of:

shrinkage
temperature gradient,
settlement, or
a combination of the above.

However, it is concluded that the origin of the cracks detected during construction was not due to severe differential movements occurring during or immediately after application of loads from structures and equipment.

The water reported to have surfaced through the cracks is probably ground water under a pressure head. Based on records of dewatering, there does appear to have been sufficient hydrostatic head available to force water through the cracks observed in the mat. Regardless of the hydraulic process, very little water was observed. It was described as "not resulting in generally enough water to form a sheen but enough to definitely show the cracks and to moisten surrounding concrete". With the low rate of water weeping and the rather limited cracking, there is no reason for concern.

In 1983, additional cracks in the mat were reported in

areas outside of the Reactor Building (see Section 4.6 and Appendix A). These cracks probably developed several years ago. During an interview with Mr. J. Sleger, he stated that one crack was observed with evidence of seepage during the late summer of 1979. It is very probable that all of the cracks discovered in 1983 were present for some years. Indeed, several of these cracks gave indications of epoxy repairs.

All of these cracks appear to be the same; namely, a crack which is either a hairline crack or which is invisible to the naked eye. Many of the cracks are associated with "leachate", moisture and/or evidence of an epoxy repair at the top surface of the mat. Both "leachate" and moisture are observed in very small quantities. These cracks are not indicative of any high stress in the reinforcing bars. In fact, based upon the observed cracking, one could conclude that the foundation mat is virtually unloaded. If the foundation mat was actually loaded as assumed in the design calculation, one would expect considerably more cracking. This tends to confirm the statement that the calculations for the mat are indeed conservative.

Crack widths of anywhere from 10 to 80 mils, depending upon crack spacing, which would not be beyond expectation, are not cause for concern of the structural integrity of the mat.

While cracking of concrete is expected, it is, of course, important to evaluate the cracking for several reasons:

a) If the crack width becomes very large and there are corrosive chemicals and oxygen present, the reinforcing steel may be subject to rusting.

b) Large and extensive cracking may be indicative of forces acting on the structure which can cause damage such that the ability of the structure to resist loads, due to service, is compromised.

c) For the case of the Waterford III mat in particular, seepage of water from cracks may invalidate the "floating mat" concept and affect the containment vessel stability.

The cracks in the mat have widths that are so small that there is no chance of intrusion of corrosive materials and that corrosive materials are not in the environment within the plant or outside. In the Commentary to ACI 318-71 Section 10.6 it is stated that "To assure protection of reinforcement against corrosion and for aesthetic reasons, many fine hair cracks are preferable to a few wide cracks." From the observation of the Waterford III mat, one would have to describe the situation as one of a few hair cracks much less than the many fine hair cracks envisaged as a preferable condition.

The observations of the cracks indicate the seepage of water up through cracks carries with it "leachate" which contains primarily calcium carbonate and magnetic iron. The leachate apparently seals the cracks because many of the cracks show leachate deposits which are now dry. This self sealing process may eventually eliminate leakage; however, seepage is still in evidence even though the process has probably been underway for several years. Nevertheless, the present seepage is minor and poses no difficulties.

Since the advent of Portland cement in construction, it has been known that steel reinforcing bars embedded in Portland cement concrete are protected from corrosion.

Quoting from the Commentary to ACI-318-71 Section 10.6 "Recent extensive laboratory work involving modern deformed bars has confirmed that crack width at service loads is proportional to steel stress." As noted above, the observed cracks indicated a very low stress in the reinforcing steel.

8.0 Corrosion Potential

8.1 Passivation Mechanism in Reinforced Concrete

In order to assess the potential for corrosion in the reinforcing steel of the NPIS basemat, several references concerning corrosion of steel in concrete were reviewed (References 14-18).

As noted in Reference 14, "the corrosion resistance of steel in Portland cement concrete has been recognized for more than a century. The protective mechanism, not described until recent years, is due to a passivating film of gamma ferric oxide which is formed and maintained in the alkaline environment produced by cement hydration".

As noted in Reference 15, "Iron and steel are not thermodynamically stable in water. Either acid or neutral water corrodes iron and forms a ferrous solution. This solution, in contact with oxygen, oxidizes to form hydrated ferric oxide -- a major constituent of rust. If the water is sufficiently alkaline, at pH 8 to 14 for example, the Fe_2O_3 and Fe_3O_4 which form are relatively insoluble and deposit a protective film on the metal surface. The metal is then said to be passivated".

The passivating mechanism, therefore, requires an alkaline environment (pH of about 12.5) and an absence of oxygen in order to form a protective film on the surface of the reinforcing steel.

The alkalinity of the water derives from the hydration of the cement, which generates calcium hydroxide.

A relatively oxygen-free environment is generally insured by careful control of the concrete mix and its subsequent placement. Depth of concrete cover is also a factor.

As noted in Reference 16, "In addition, concrete of

low water-cement ratio and well cured has a low permeability which minimizes penetration of corrosion inducing factors -- oxygen, chloride ion, carbon dioxide, and water."

8.2 Job Specifications

Section I, Paragraph 7.3 of the Ebasco Concrete Masonry specification (Reference 19) stipulates that: "The aggregate, sand and water combined in the same amounts as in the concrete mix shall not contain a total soluble chloride ion content of more than 250 ppm water when water is extracted from the combination after being thoroughly mixed, unless the Engineer allows a deviation in writing...".

Section I, Paragraph 9.7 of that specification further requires that: "No admixture containing chlorides to an extent that the requirements of Paragraph 7.3, with the admixture mixed with the water, are exceeded shall be acceptable unless the Engineer allows a deviation in writing...".

Section II, Paragraph 8.4 of that specification also stipulates that: "Calcium Chloride shall not be used for accelerating the set of the cement in any concrete containing reinforcement or embedded metal parts".

The limitation on the maximum allowable soluble chloride contained in the concrete mix defined in the Reference 19 specification is subsequently verified by the sampling and testing procedures mandated by that specification.

8.3 Laboratory Testing

In order to deduce any evidence of corrosion in the basemat reinforcing steel, several water samples and a solid (leachate) sample were subjected to laboratory analysis.

The three water samples subjected to laboratory analysis were obtained at the following locations:

a) Water rising in Conduit No. 33074, which rises near the West Temporary Electrical Pit, runs to the southeast for approximately 90 feet, and again rises above the basemat. At the south end, no water was rising, indicating a blockage to the flow of water. The conduit is located approximately 3 feet below the top of the basemat.

b) Ground water flowing through conduits which extend from the side of the mat to the East Temporary Electrical Pit.

c) Water collecting at a crack in the Waste Gas Tank Compressor B room.

The solid sample was collected along the top surface of a crack located along an east-west axis between column lines R and Q_1, and straddling column line 1_M.

The laboratory report summarizing the results of the analyses performed on these samples is contained as Appendix M.

As noted under 'Testing Methods and Results' each of the three liquid samples were subjected to analysis for pH, chloride, alkalinity, iron, calcium and sodium. The results of these analyses are subsequently tabulated on page 2 (note that samples designated '1', '2' and '3' accord with the order in which the sample locations are defined herein).

The value of the pH obtained for sample 1, 12.5, accords with the pH of concrete, as previously noted. The pH of 7.5 obtained for samples 2 and 3 is due to the carbonation process which normally occurs at the surface of concrete exposed to open air.

As noted in Reference 14, "Free carbon dioxide reduces pH by carbonation, but only to a depth of a few millimeters in sound concrete".

The report results indicate the virtual absence of iron in the three liquid samples, a clear indicator that the chemical constituents of rust are not present. The ppm of chloride are also well within the maximum allowable 250 ppm mandated in the Ebasco Concrete Masonry specification (Reference 19), as previously noted.

The solid (leachate) sample was subjected to spectrographic and X-ray diffraction techniques. Iron and Calcium are identified as the two major chemical constituents contained in the solid sample.

As noted in the appended laboratory report under 'Remarks', the calcium hydroxide liberated during the hydration of Portland cement will form calcium carbonate in the presence of carbon dioxide; the iron content contained in the solid sample is identified as magnetite.

The results of the testing of the water samples and leachate are consistent with the process of corrosion protection of the steel reinforcing bars embedded in the concrete. As a matter of interest, it should be noted that the reinforcing bars are large. In general, the top reinforcing bar diameter is 1-3/8 inches while the bottom reinforcing bar diameter is 2-1/4 inches.

These properties accord with the properties of the iron compound which (under properly controlled conditions) forms a passivating film on the surface of the reinforcing steel (see the initial extract from Reference 15).

It is interesting to note that this deposition mechanism also occurs in boilers, and is succinctly stated in Section 6, page 129 of Mark's Standard Handbook for Mechanical Engineers (Seventh Edition):

> "At saturation temperatures above moderately low pressures, a second mechanism predominates, in which iron removes oxygen from water or steam, forming iron oxide and releasing hydrogen:
>
> $$3\,Fe + 4H_2O \rightarrow Fe_3O_4 + 8H$$
>
> It is noteworthy that this mechanism does not require the intervention of dissolved gaseous oxygen in the water, which is often the rate-limiting factor in the electrochemical corrosion discussed earlier in this subsection.
>
> The stable oxide at boiler temperatures in a non-oxidizing environment is magnetite, Fe_3O_4 (ferrous ferrite). A normal protective skin of magnetite is formed from the underlying steel".

On the basis of the foregoing evaluation, it is therefore concluded that there is no evidence to infer the existence of basemat rebar corrosion in the vicinity of a crack.

8.4 Steel Containment Corrosion

As noted in HEA Trip Report No. 6 (Reference 5), an inspection of the annular area between the Containment Vessel and the Shield Building revealed some surface corrosion at the base of the Containment Vessel, which might be due to the presence of water generated by construction activity.

As soon as this area can be adequately controlled with respect to the presence of such construction-related water, it is the recommendation of HEA that a program be implemented to clean and field paint the base of the Containment Vessel to insure that the corrosion process has been eliminated in this area.

9.0 Steel Containment Stability

9.1 Ebasco Calculation 1352.063

Ebasco Calculation 1352.063 (Reference 13) was executed as a consequence of Ebasco Nonconformance Report W3NCR-16143, dated May 11, 1983 (Reference 10).

Attachment III to that NCR notes that "The effect of postulated widespread hairline cracking of the basemat has been investigated by Civil Engineering for stability of the Containment Vessel against flotation and overturning under buoyant conditions caused by postulated groundwater intrusion...".

An attached memorandum from P.-C. Liu to B. Grant dated May 24, 1983 specifically indicates that the stability of the Containment Vessel has been reviewed for a postulated hydrostatic infiltration to Elev. -1.50 feet. An examination of Ebasco Drawing No. 1564 G-817, Rev. 13, dated 02/03/83 designates El. -1.50 ft. as Top of Pier, 4.5 feet below the tangent line of the cylindrical shell and the ellipsoidal base of the Containment Vessel.

Ebasco Calculation 1352.063 (Reference 13) assumes that the base of the Containment Vessel is flat, and computes the safety factors against uplift, sliding and overturning due to the effects of E-W DBE, vertical DBE and buoyancy.

The factors of safety against uplift, sliding and overturning initially computed are 2.44, 2.51 and 6.77.

At a meeting held at Ebasco's New York office (see Section 2.0) it was agreed that Ebasco would revise the stability calculation to reflect the SRSS of the E-W and N-S DBE's, and to reduce the dead load of the Containment Vessel by the magnitude of the buoyant force.

The Revision 1 calculation, dated 07/28/83, computes revised factors of safety against sliding and overturning of 1.17 and 3.16.

In order to confirm the stability of the Containment Vessel, a simple stability model was formulated by HEA (Appendix L) which takes the curvature of the base of the Containment Vessel into account.

This stability model is formulated on the basis of two intrinsic properties of the ellipsoidal base of the Containment Vessel: that sliding and translation of the base of the Containment Vessel with respect to the mass concrete support cannot be uncoupled, and that any displaced configuration of the base of the Containment Vessel will result in "two-point" contact (points designated 'j' and 'k' on page 3 of the Appendix L calculation). The latter assumption derives from the fact that the radius of curvature of the ellipsoidal base of the Containment Vessel is not a constant.

As shown in the computation, the critical stability mode for the Containment Vessel is overturning and not sliding. The factor of safety computed against overturning is 2.34.

HEA therefore confirms the stability of the Containment Vessel under the action of the postulated earthquake and buoyancy forces.

The HEA computation also confirms the structural adequacy of the underlying mass concrete supporting the Containment Vessel as shown in Detail "B" of Ebasco Drawing LOU-1564-G-502, Rev. No. 6, dated 12/17/78.

Factors of safety against uplift, sliding and overturning were also computed for the Shield Building with respect to the top of the Mat. The respective factors of

safety calculated were 3.23, 1.35 and 1.32, which do not take into account the additional shear and axial restraint that would be generated by the reinforcing steel tieing the Shield Building and the Mat together.

HEA therefore additionally confirms the stability of the Shield Building with respect to the top of the mat.

10.0 Conclusions and Recommendations

10.1 Containment Vessel

The steel Containment Vessel is seated on a concrete dish. If it is assumed that hydrostatic pressure develops on the interface between the bottom head of the Containment Vessel and the supporting fill concrete, there would be a reduction in stability. Calculations were performed which indicate a more than adequate margin of safety. Therefore, it can be concluded that the cracking and seepage in the foundation mat could extend into the supporting fill concrete without causing any concern about the Containment Vessel stability.

Quite independent of the cracking in the foundation mat, some surface corrosion was noted on the lower cylindrical portion of the containment vessel. This surface corrosion has not affected the strength of the Containment Vessel. However, this surface corrosion should be cleaned and the steel protected to prevent future corrosion.

10.2 Foundation Mat

While certain difficulties were encountered during construction and procedural changes were made, they were resolved in a controlled manner so that there were no adverse effects upon the structural integrity of the foundation mat.

Cracks in the mat were reported in 1977 and again in 1983. However, it is likely that the cracks reported in 1983 were in existence for some time but were only noticed in 1983. In fact, if it weren't for the moisture associated with the cracks, the cracks might not have been noticed at all. The extent of cracking is minor and is certainly within expectations for a structure of this type. The specific causes of the cracks are probably a

combination of temperature effects, drying shrinkage and differential soil settlements under imposed loads.

While the cracking can be considered minor, the seepage of water through the foundation mat contrasted with statements that the foundation mat was a "watertight barrier". However, the limited amount of water seepage does not invalidate the fundamental assumption that the foundation mat can support and maintain the imposed hydrostatic pressure of the groundwater.

It was also determined that there is a self sealing of the cracks by the leachate. The leachate has two major components; calcium carbonate and magnetic iron. This magnetic iron is probably magnetite, Fe_3O_4 which is the passivating oxide which forms on and protects the steel embedded in the concrete from rusting. The water taken from a crack is not very dissimilar to water taken from the ground surrounding the foundation mat. In neither case is the water considered aggressive.

Furthermore, visual inspections of cracks reveal no evidence of rusting. If corrosion of reinforcing bars in the concrete were a problem it would be expected that the cracking would be extensive. This is because corrosion products of iron occupy a much larger volume than that of the iron. The resulting expansive forces would cause additional cracking and open up existing cracks and a rust discoloration would appear. The inspection and testing revealed no indications of such a corrosion process.

As a matter of fact, the cracking in the foundation is minor and there are no corrosive agents within the NPIS nor are any expected in the future. Therefore, there is no need to perform a program of crack repair or periodic inspection. Indeed, the leachate appears to provide

for a self sealing process.

While the laboratory test results indicated that there was iron in the leachate, the sample of pit water indicates virtually no iron. This strongly suggests that the iron is not currently waterborn and therefore is not now coming from the reinforcing bars. While the source of the iron is not known, it probably occurred over the past seven years of construction. Possible sources include pipe threading and sweeping of the floor with steel bristled brooms.

In conclusion, there is no evidence of any process which has been or could be detrimental to the structural integrity of the foundation mat.

REFERENCES

1. HEA Trip Report No. 1, W3-HE-LP-001, July 15, 1983.
2. HEA Trip Report No. 2, W3-HE-LP-002, August 1, 1983.
3. HEA Trip Report No. 3, W3-HE-LP-003, August 22, 1983.
4. HEA Trip Reports Nos. 4 & 5, W3-HE-LP-004, August 24, 1983.
5. HEA Trip Report No. 6, W3-HE-LP-006, September 6, 1983.
6. Foundation Design of the Waterford Nuclear Plant, by J. L. Ehasz and E. Radin, December, 1973.
7. Review of Site Settlements, by M. Pavone and J. L. Ehasz, September, 1978.
8. RCB Foundation Crack Map, Ebasco Drawing No. SK 1564-4.1-G-28, August 17, 1977.
9. Ebasco Letter Doc: CH-039-77, File: 6Q-R-4, July 27, 1977.
10. Ebasco Nonconformance Report W3NCR-16143, May 27, 1983.
11. WSES-FSAR-UNIT-3, Section 11.2, Liquid Waste Management System.
12. Compatibility of Large Mat Design to Foundation Conditions, by J. L. Ehasz and P.-C. Liu
13. Ebasco Calculation OFS No. 1352.063, Steel Containment Stability, Rev. 1, July 28, 1983.
14. Steel Corrosion in Concrete, by D. A. Hausmann, Materials Protection, November, 1967, pp. 19-23.
15. The Mechanism of Steel Corrosion in Concrete Structures, by C. T. Ishikawa and B. Bresler, Materials Protection, March, 1968, pp. 45-47.

16. Mechanisms of Corrosion of Steel in Concrete, by G. J. Verbeck, ACI Publication SP-49, June, 1975, pp. 21-38.

17. Criteria for Cathodic Protection of Steel in Concrete Structures, by D. A. Hansmann, Materials Protection, October, 1969, pp. 23-25.

18. Cathodic Protection of Steel in Concrete, by R. C. Robinson, ACI Publication SP-49, June, 1975, pp. 83-93.

19. Ebasco Specification Concrete Masonry, Project Identification No. LOU-1564.472, Issue Date: December 31, 1971.

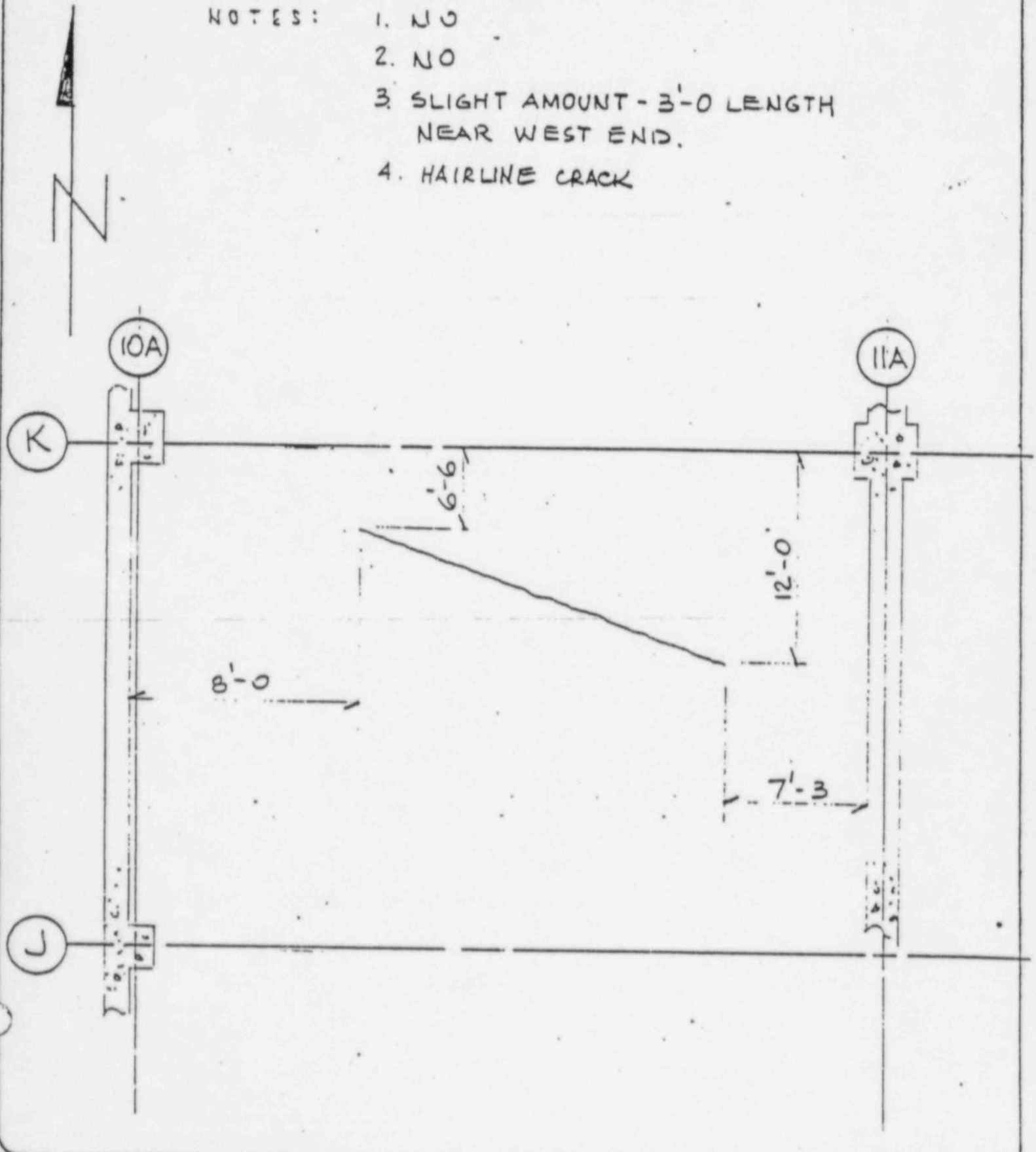
APPENDIX A

Basemat Crack Maps

PROJECT
CLIENT -F.E.-
SUBJECT BASEMAT CRACK MAP

SUBD. SUBDIV. SHEET
PREP. BY RGB DATE 8/31/83
CHCKD. BY ddb DATE 08/31/83

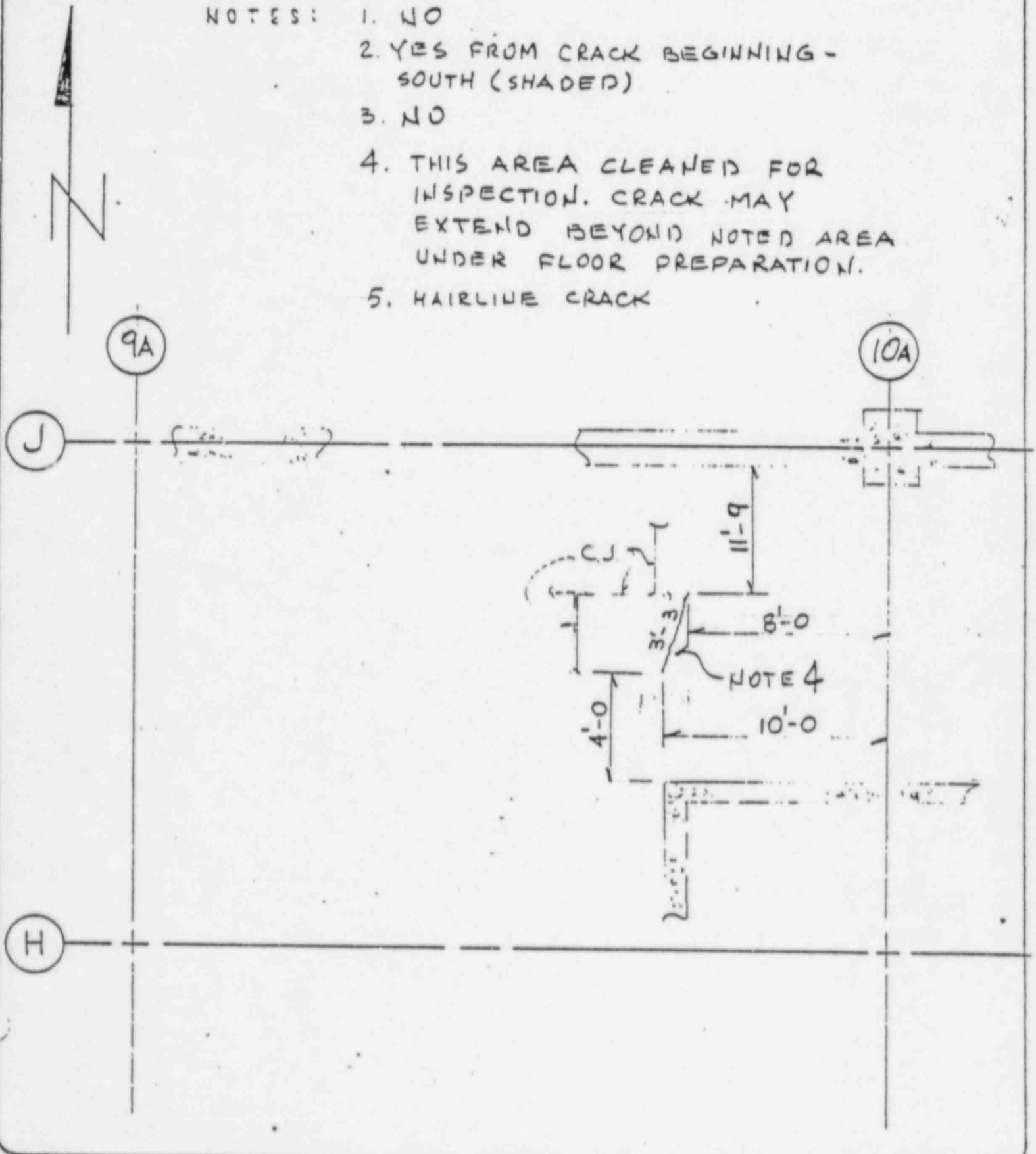
NOTES:
1. NO
2. NO
3. SLIGHT AMOUNT - 3'-0 LENGTH NEAR WEST END.
4. HAIRLINE CRACK



PROJECT
CLIENT, [illegible]
SUBJECT [illegible] CRACK MAP

PREP. BY [illegible] DATE 8/31/83
CHCKD. BY [illegible] DATE 08/31/83

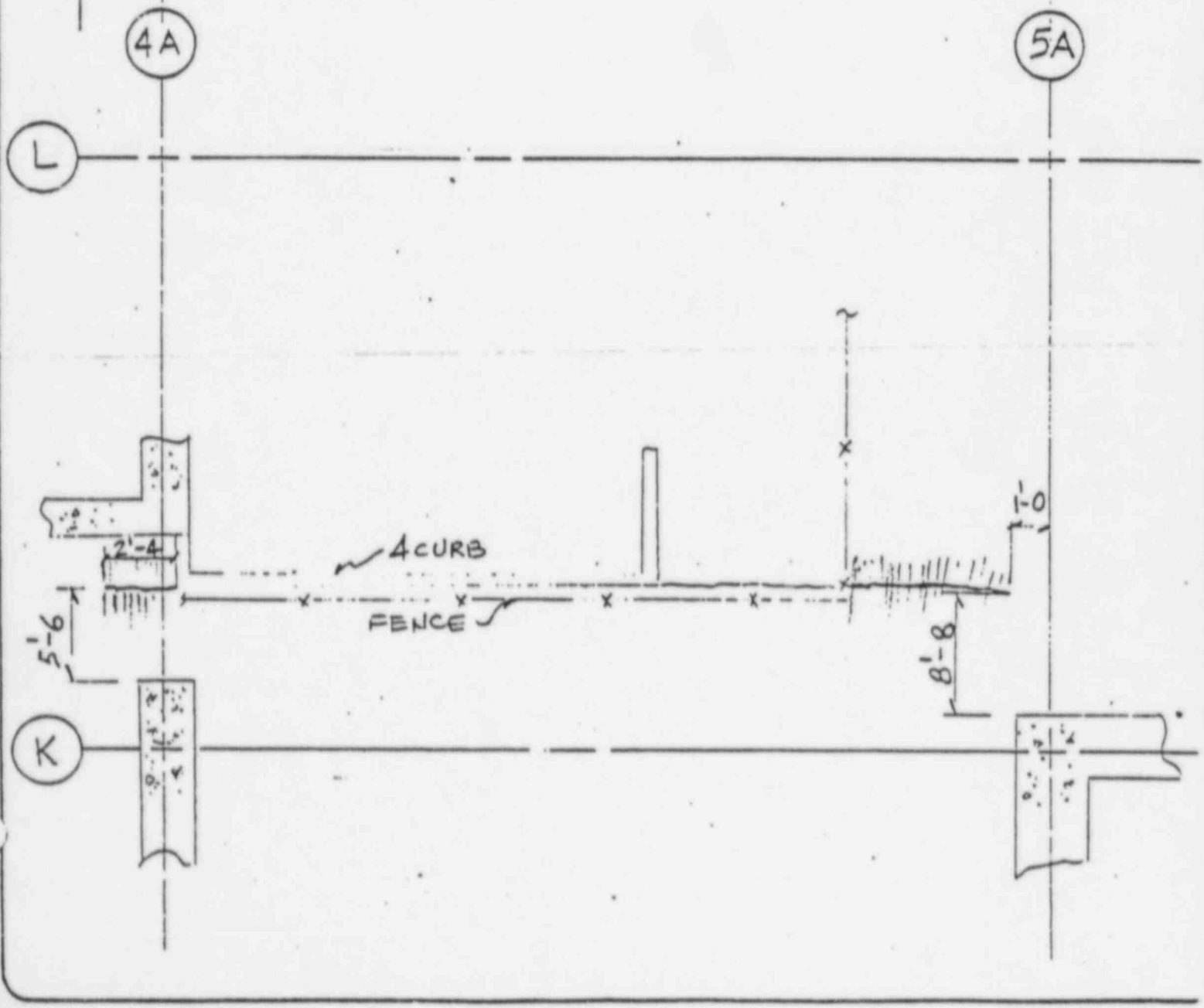
NOTES:
1. NO
2. YES FROM CRACK BEGINNING - SOUTH (SHADED)
3. NO
4. THIS AREA CLEANED FOR INSPECTION. CRACK MAY EXTEND BEYOND NOTED AREA UNDER FLOOR PREPARATION.
5. HAIRLINE CRACK



PROJECT
CLIENT -T.L.-
SUBJECT ASPHALT CRACK MAP

SUBJ. SUBDIV. SHEET
PREP. BY [signature] DATE 8/31/83
CHCKD. BY Adl DATE 08/31/83

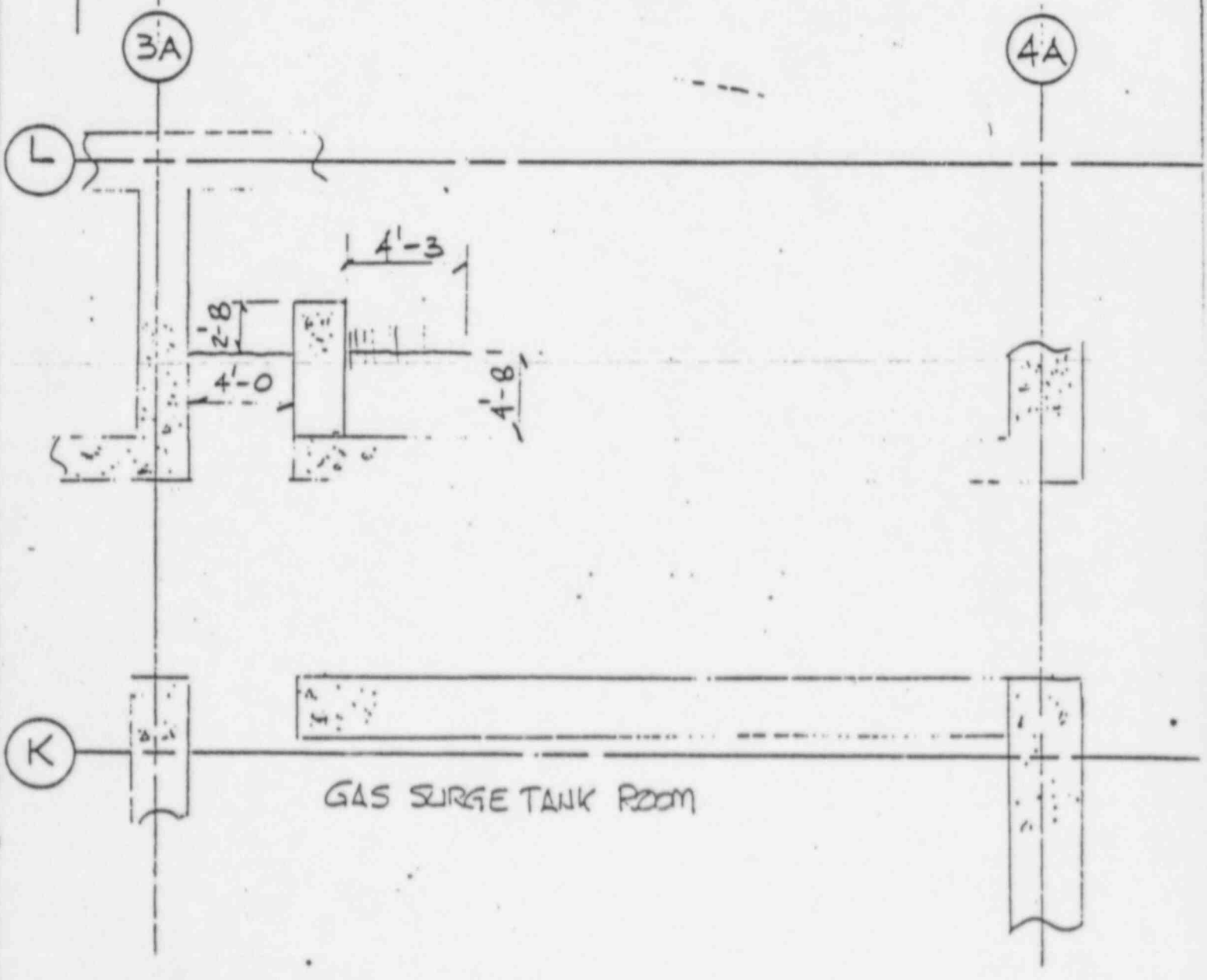
NOTES: 1. EXPOSED AREA - NO
2. YES - SHADED AREA
3. NO
4. UNABLE TO DETERMINE IF CRACK IS UNDER CURB
5. HAIRLINE CRACK



PROJECT
CLIENT. -F.L.-
SUBJECT BASEMAT CRACK MAP

PREP. BY [illegible] DATE 8/31/23
CHCKD. BY AdL DATE 08/31/23

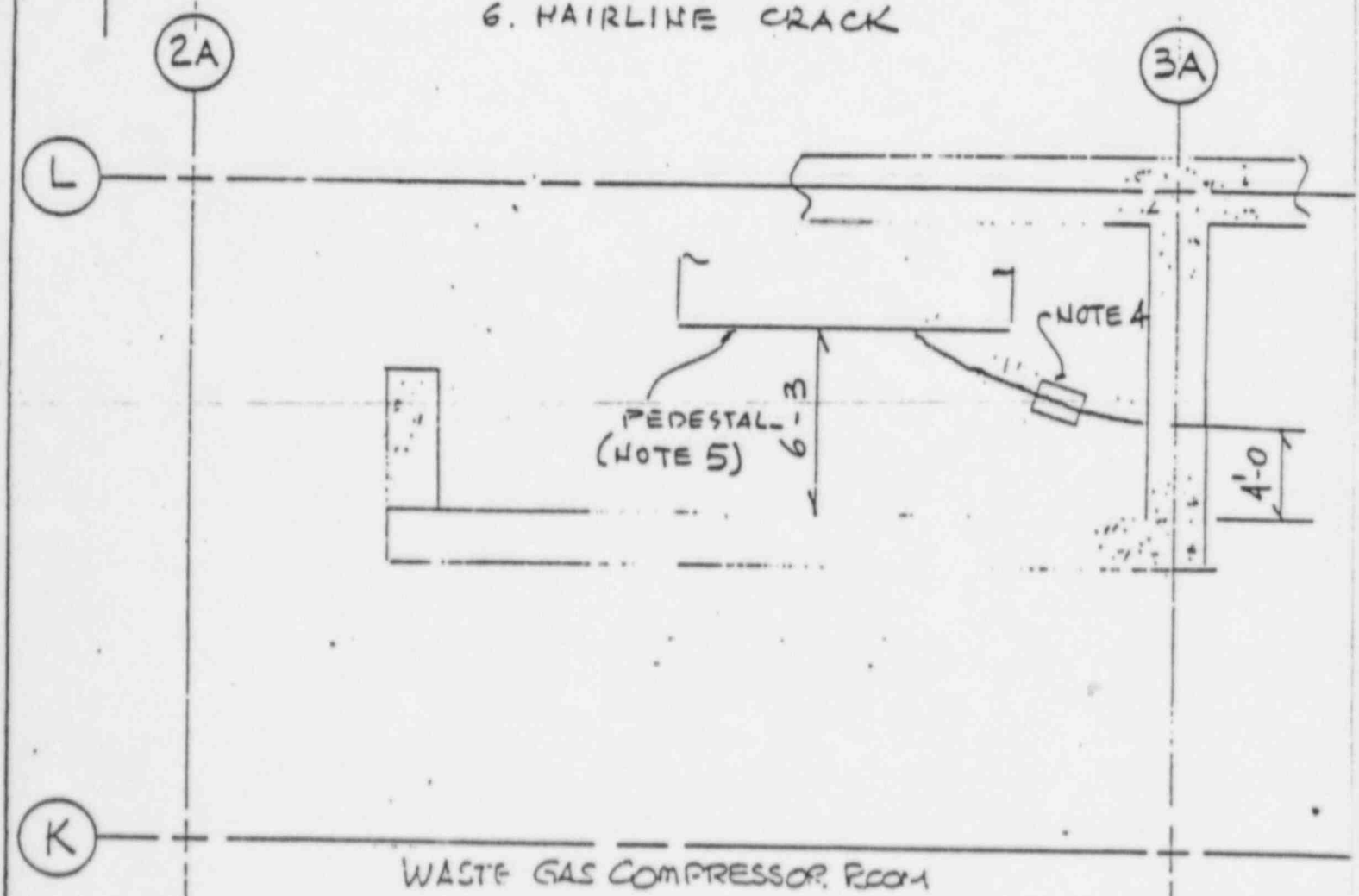
NOTES: 1. NO
2. YES - SHADED AREA
3. DRY - SHADED AREA
DAMP - UNSHADED AREA
4. HAIRLINE CRACK



PROJECT
CLIENT -F.I.-
SUBJECT BASEMAT CRACK MAP

SUBJ. SUBDIV. SHEET
PREP. BY [illegible] DATE 8/31/83
CHCKD. BY [illegible] DATE 08/31/83

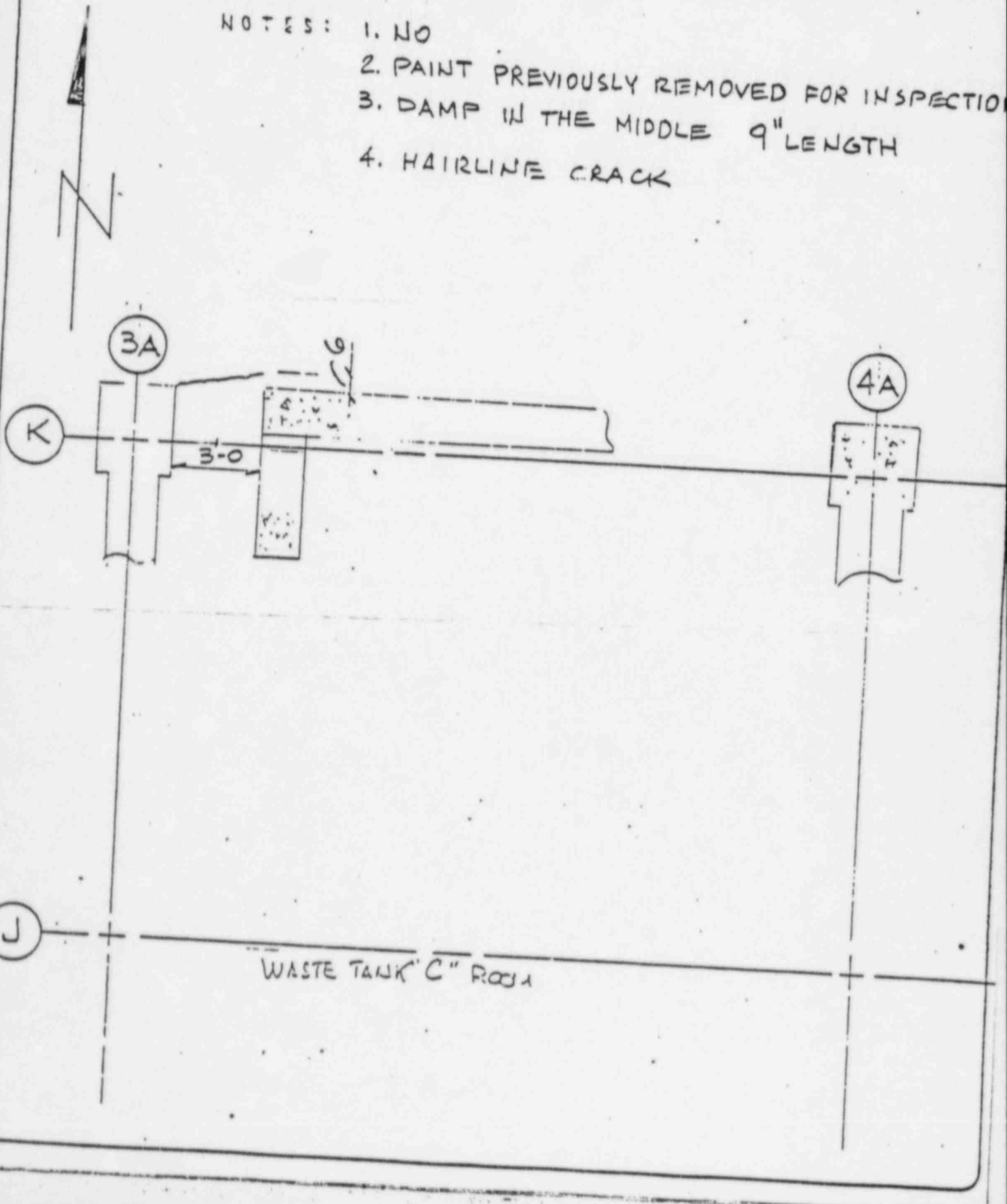
NOTES:
1. NO
2. YES - SHADED
3. DAMP
4. PREVIOUSLY GRINDED AREA FOR INSPECTION
5. UNABLE TO DETERMINE WHETHER CRACK RUNS UNDER PEDESTAL
6. HAIRLINE CRACK



PROJECT
CLIENT. T.V.A.
SUBJECT BASEMAT CRACK MAP

SUBJ. SUBDIV. SHEET
PREP. BY [illegible] DATE 8/31/83
CHCKD. BY AdL DATE 08/31/8

NOTES: 1. NO
2. PAINT PREVIOUSLY REMOVED FOR INSPECTIO
3. DAMP IN THE MIDDLE 9" LENGTH
4. HAIRLINE CRACK



CLIENT [illegible]

SUBJECT BASEMAT CRACK MAP

PREP. BY JS/GW DATE 9/1/83

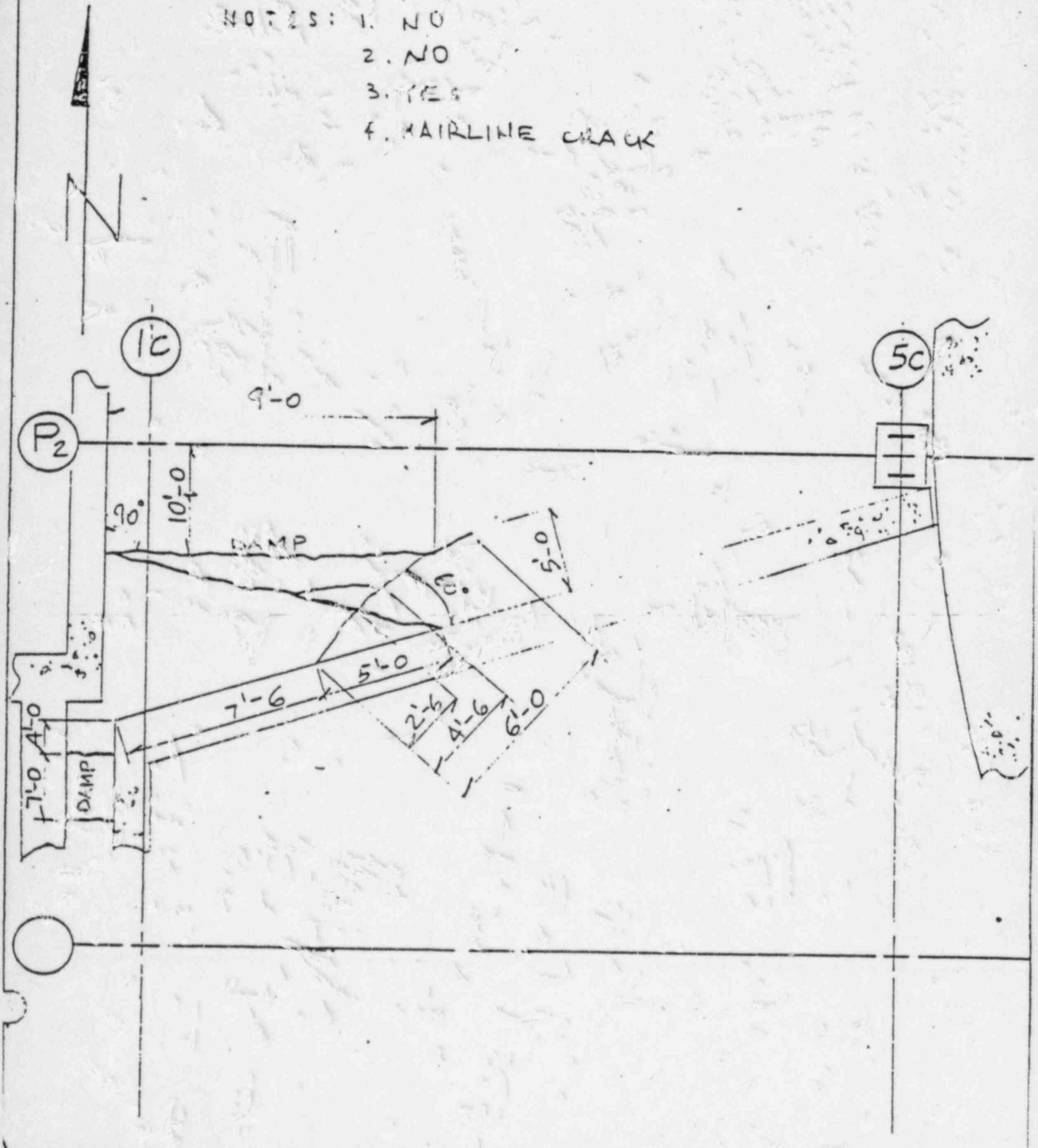
CHCKD. BY ACB DATE 09/02/83

NOTES: 1. NO

2. NO

3. YES

4. HAIRLINE CRACK



PROJECT

CLIENT

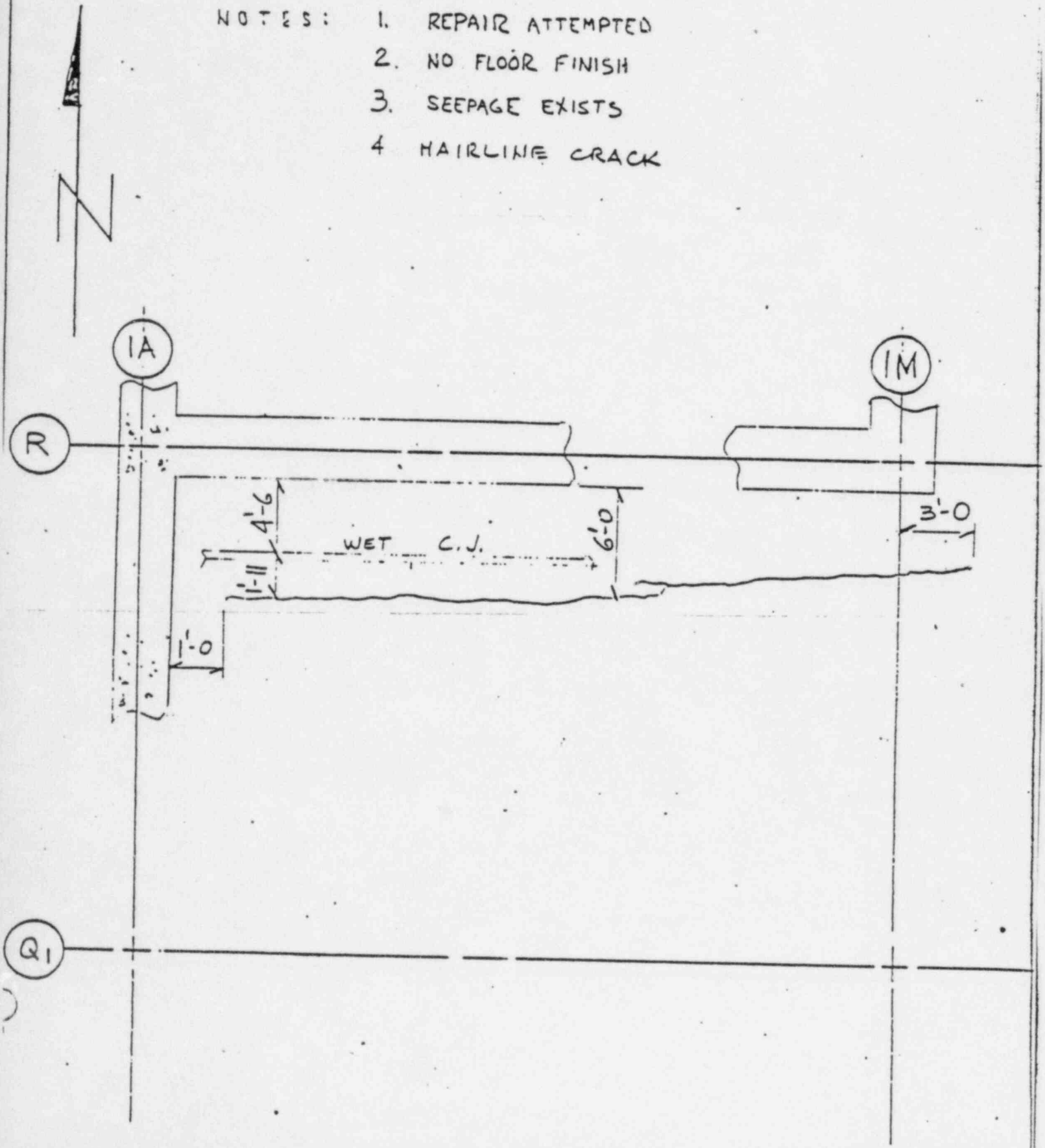
SUBJECT BASEMAT CRACK MAP

PREP. BY KR/GW DATE 9/1/83

CHCKD. BY ADB DATE 09/02/83

NOTES:

1. REPAIR ATTEMPTED
2. NO FLOOR FINISH
3. SEEPAGE EXISTS
4. HAIRLINE CRACK



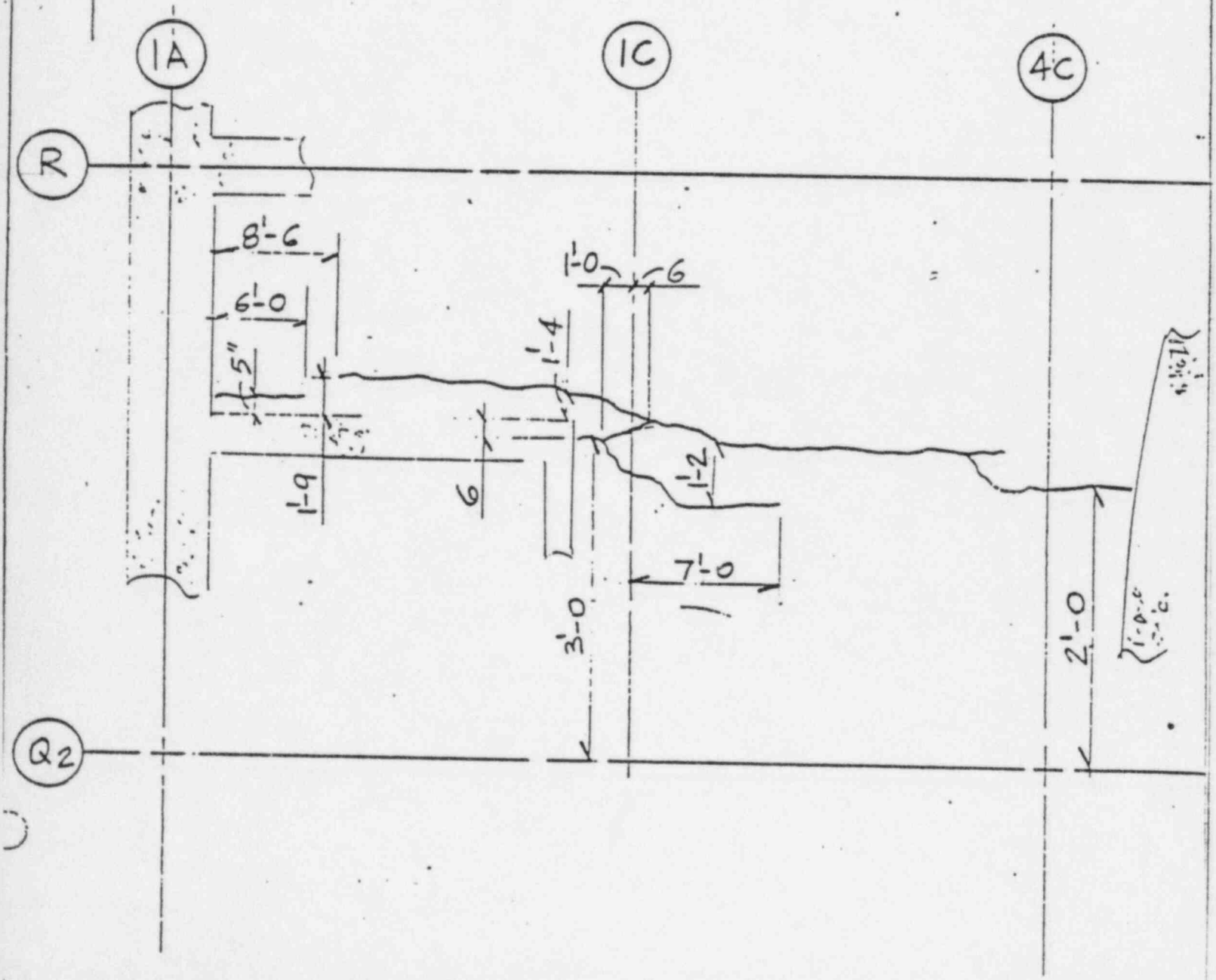
CLIENT [illegible]

SUBJECT [illegible] CRACK MAP

PREP. BY RR/GW DATE 9/1/83

CHCKD. BY AHB DATE 09/02/83

NOTES:
1. REPAIR ATTEMPTED
2. NO FLOOR FINISH
3. NO EVIDENCE OF SEEPAGE
4. HAIRLINE CRACK



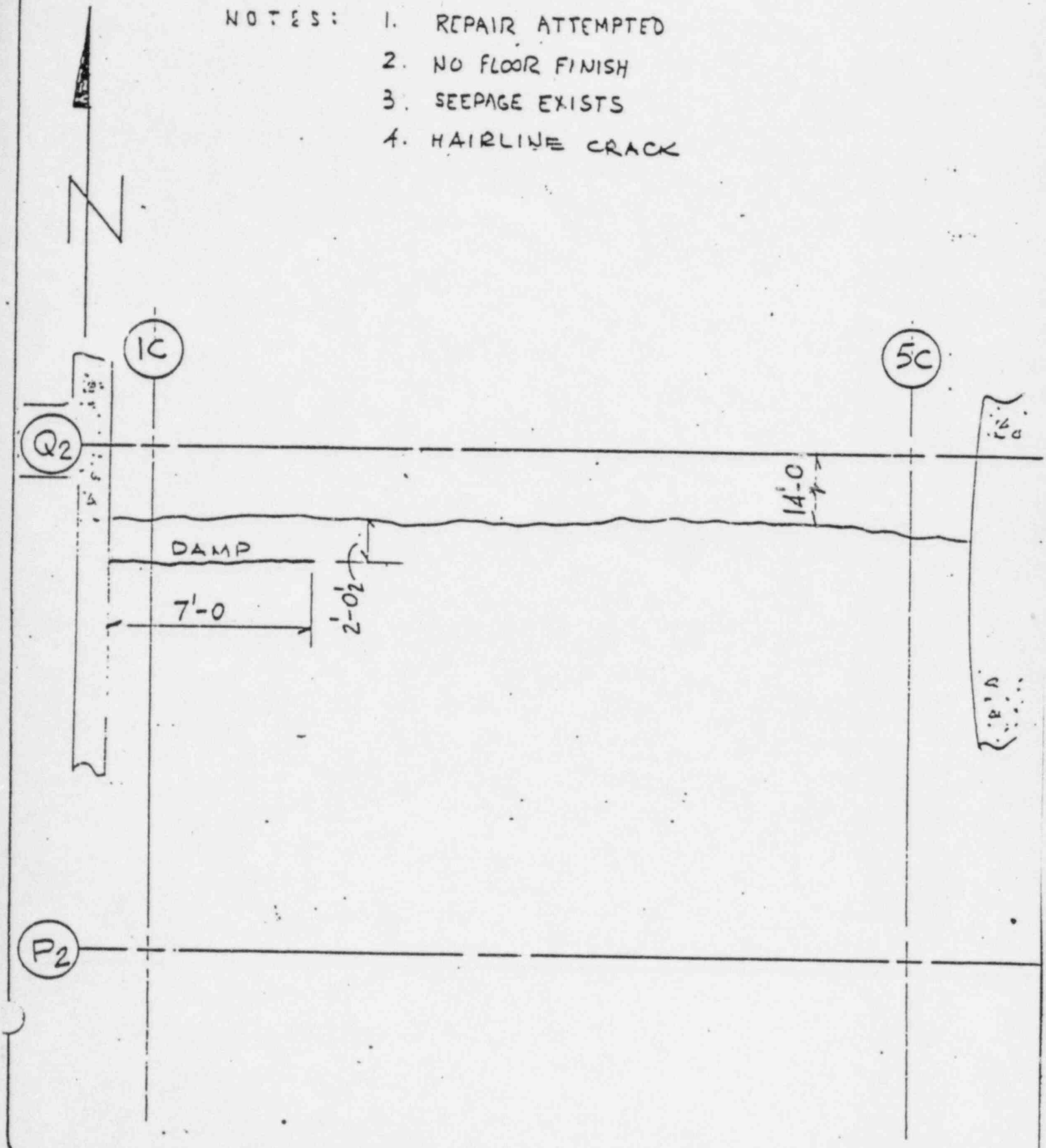
CLIENT [illegible]

SUBJECT BASEMENT CRACK MAP

PREP. BY RG/GN DATE 9/1/83

CHCKD. BY AdB DATE 09/02/8

NOTES:
1. REPAIR ATTEMPTED
2. NO FLOOR FINISH
3. SEEPAGE EXISTS
4. HAIRLINE CRACK



PROJECT

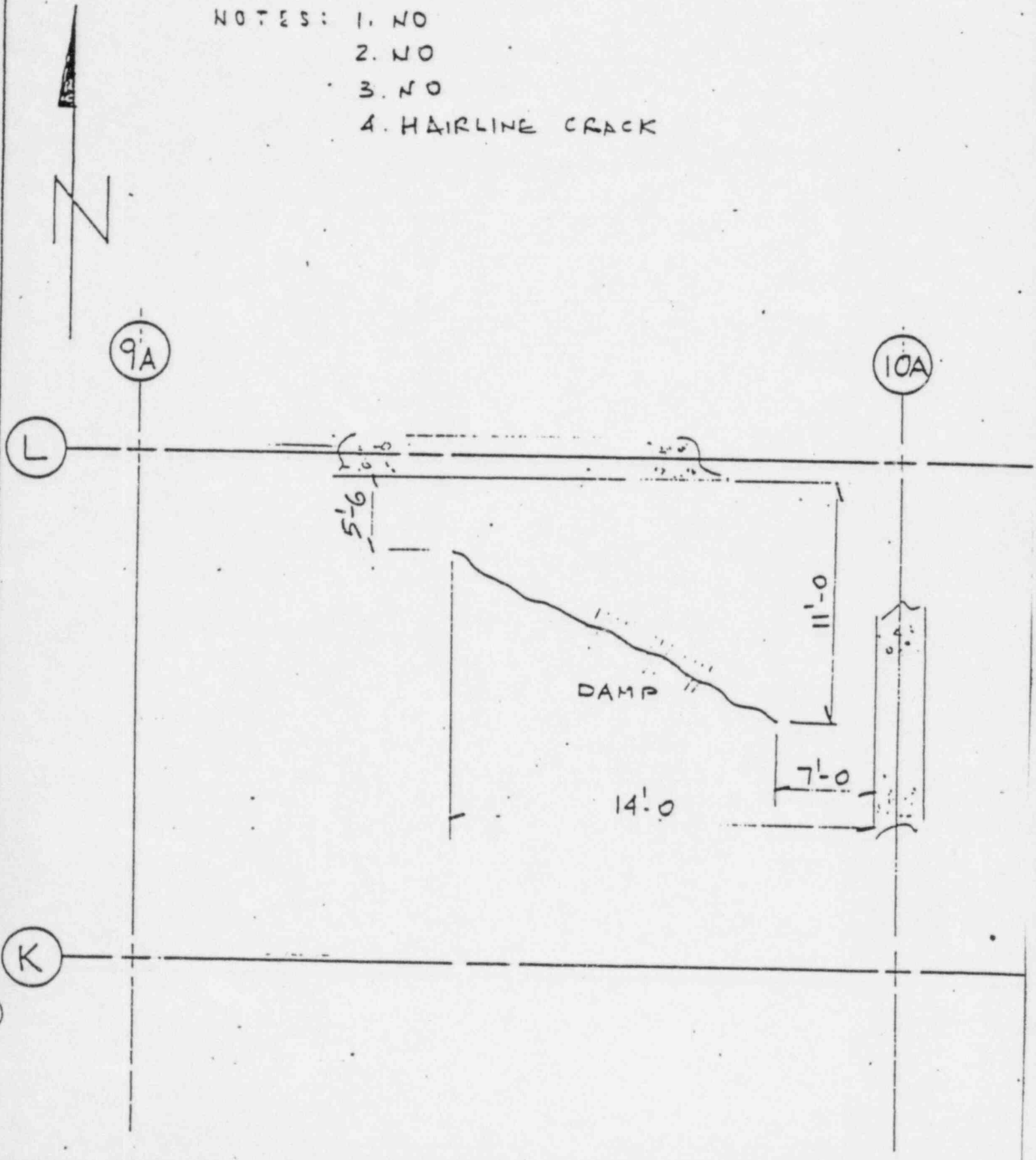
CLIENT -P.C.-

SUBJECT BASEMENT CRACK MAP

PREP. BY I.S/GW DATE 9/1/83

CHCKD. BY AGB DATE 09/02/83

NOTES: 1. NO
2. NO
3. NO
4. HAIRLINE CRACK



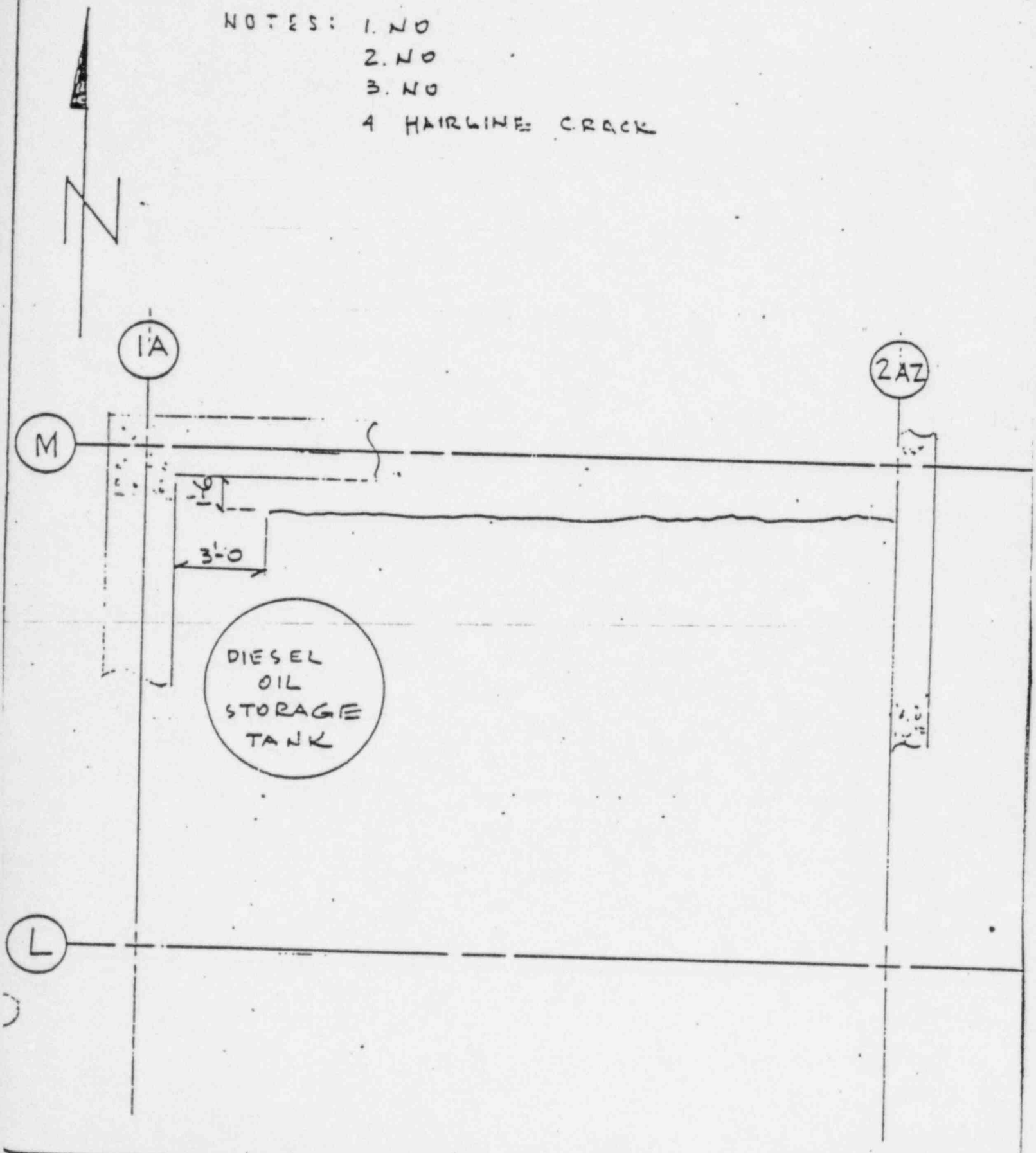
CLIENT [illegible]

SUBJECT [illegible] CRACK MAP

PREP. BY [illegible] DATE 9/1/8[illegible]

CHCKD. BY [illegible] DATE 09/02/8

NOTES: 1. NO
2. NO
3. NO
4 HAIRLINE CRACK



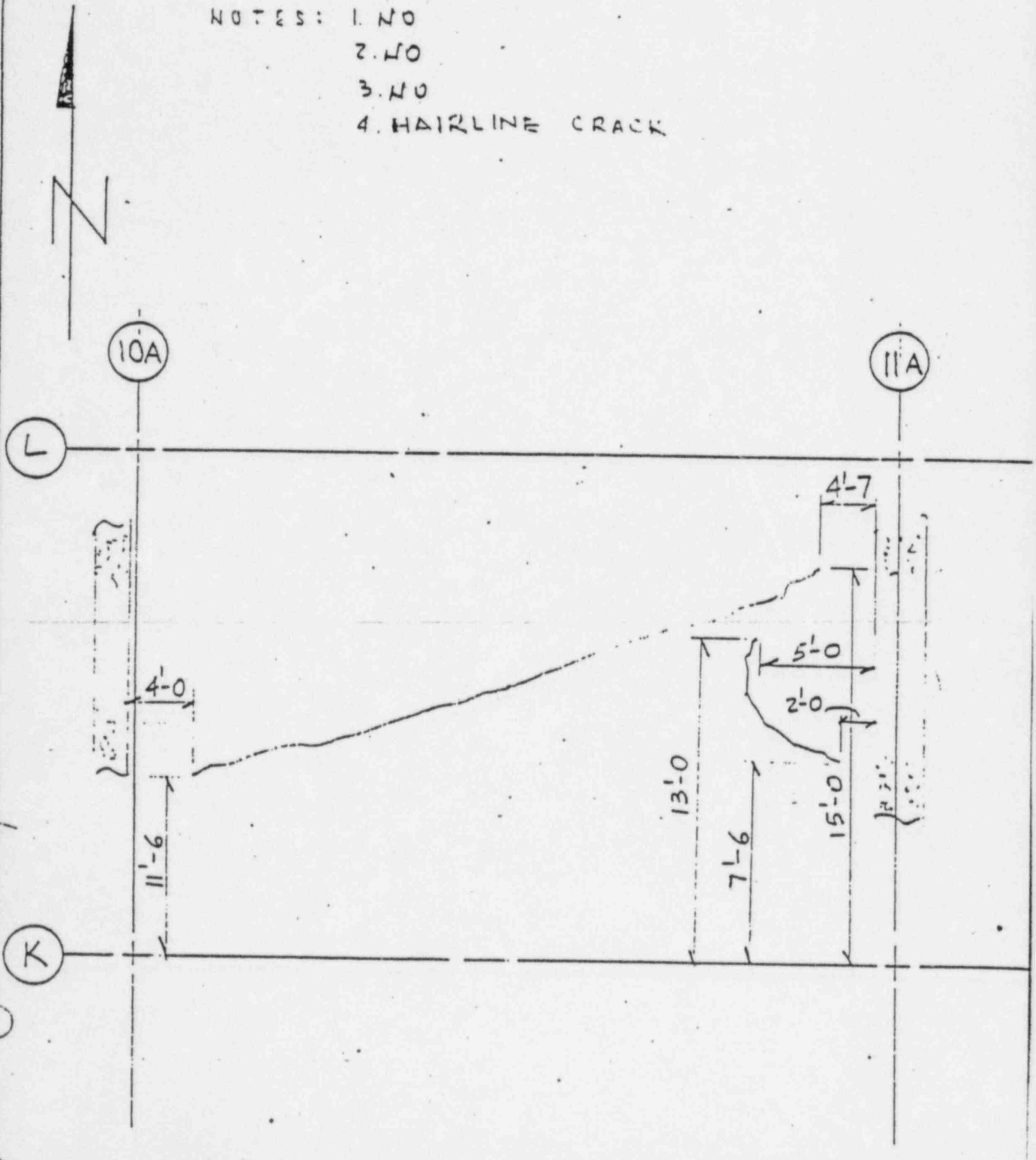
CLIENT [illegible]

SUBJECT [illegible] CRACK MAP

PREP. BY [illegible] DATE 9/1/83

CHCKD. BY [illegible] DATE 09/02/83

NOTES: 1. NO
2. NO
3. NO
4. HAIRLINE CRACK



PROJECT

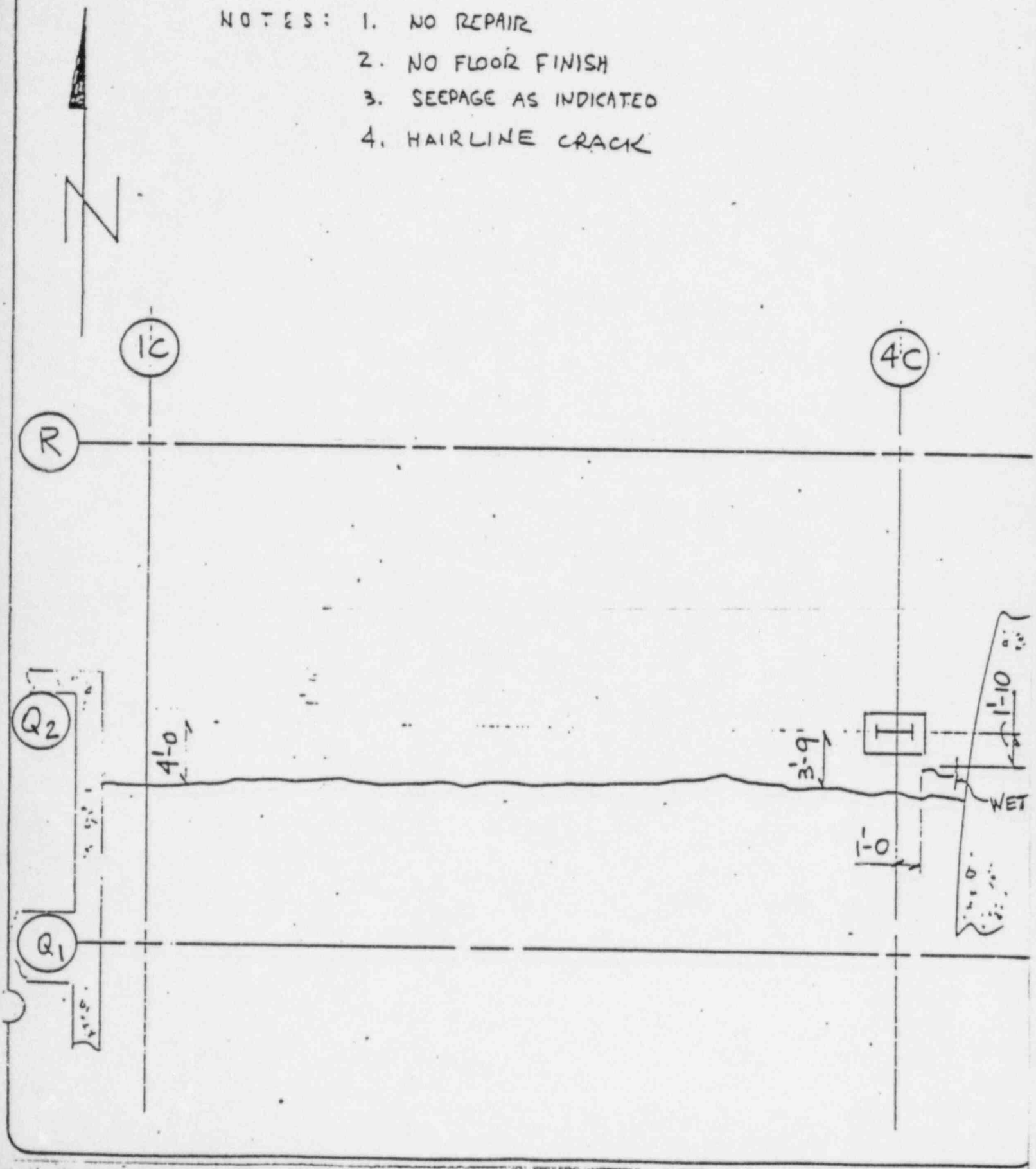
CLIENT -F L-

SUBJECT [illegible] CRACK MAP

PREP. BY RR/GUI DATE 9/1/83

CHCKD. BY A.C.E. DATE 09/02/83

NOTES:
1. NO REPAIR
2. NO FLOOR FINISH
3. SEEPAGE AS INDICATED
4. HAIRLINE CRACK



CLIENT [illegible]

SUBJECT BASEMENT CRACK MAP

PREP. BY RR/GN DATE 9/1/83

CHCKD. BY AGB DATE 09/02/83

NOTES:
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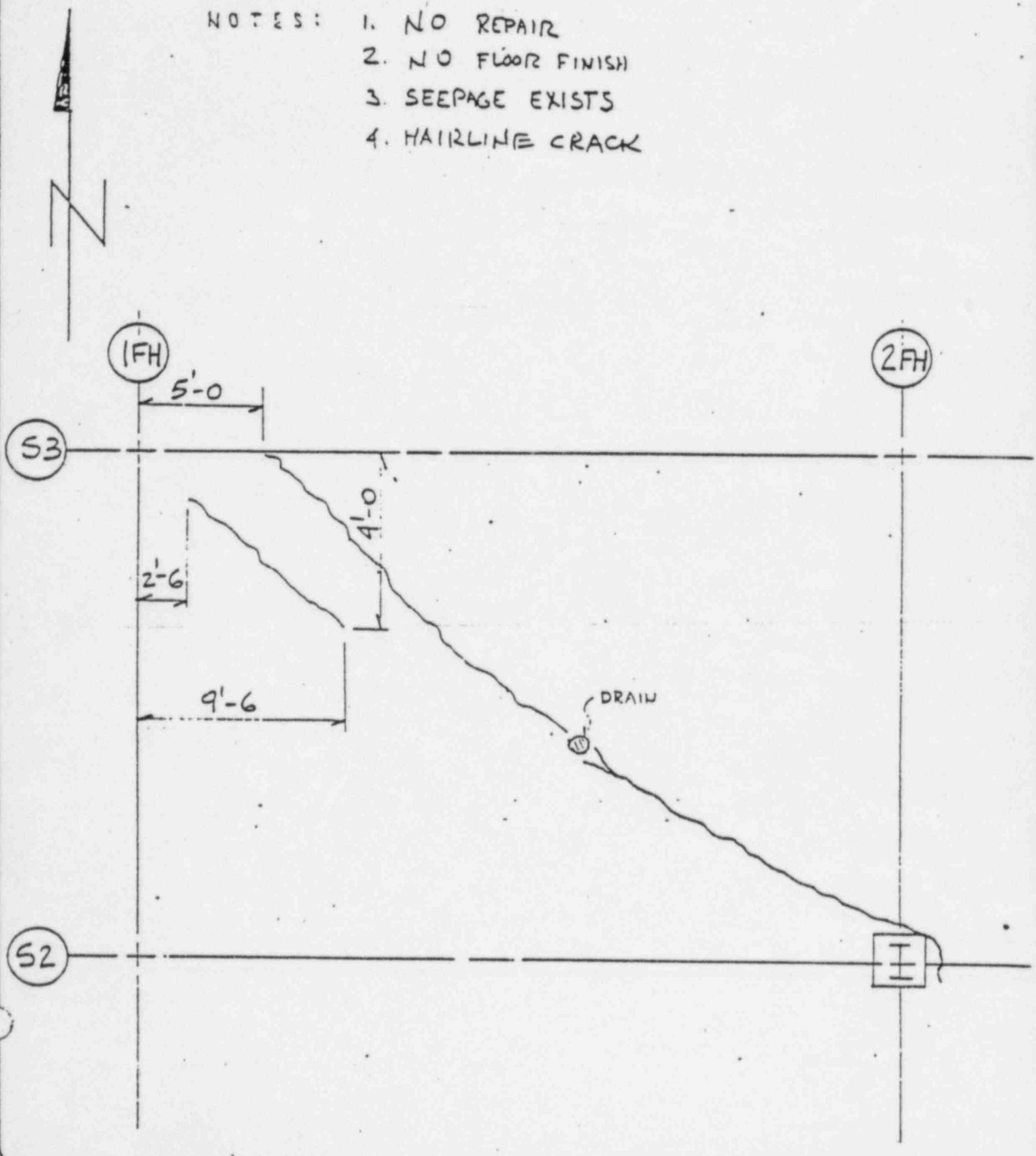
2. NO FLOOR FINISH
3. SEEPAGE EXISTS
4. HAIRLINE CRACK



CLIENT [illegible]

SUBJECT BASEMAT CRACK MAP

PREP. BY RR/GA DATE 9/1/83

CHCKD. BY [illegible] DATE 09/02/83

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2. NO FLOOR FINISH
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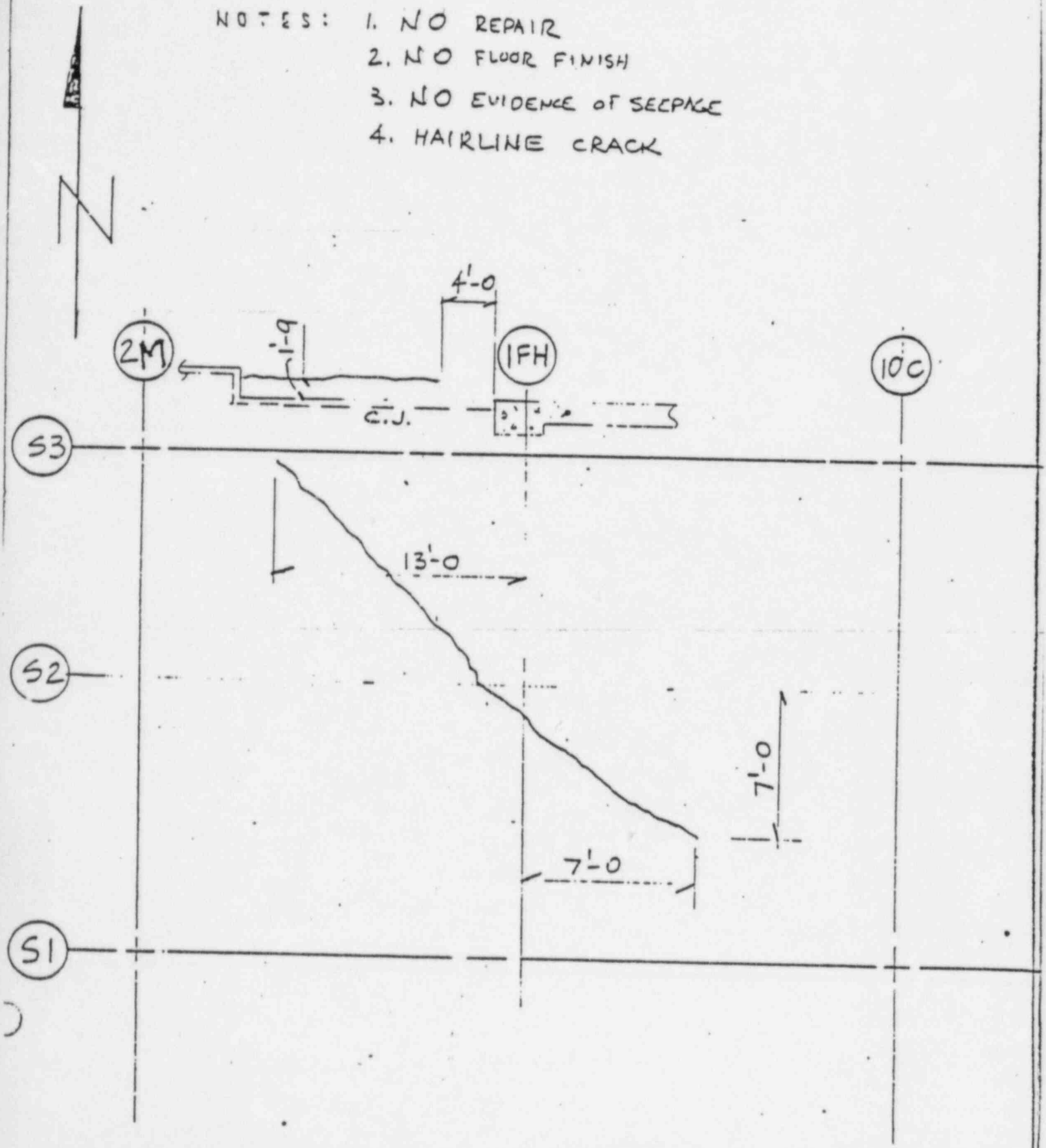
4. HAIRLINE CRACK



PROJECT
CLIENT [illegible]
SUBJECT BASEMAT CRACK MAP

JOB NO. SUBDIV. SHEET
PREP. BY RR/GW DATE 9/1/83
CHCKD. BY AGC DATE 09/02/83

NOTES:

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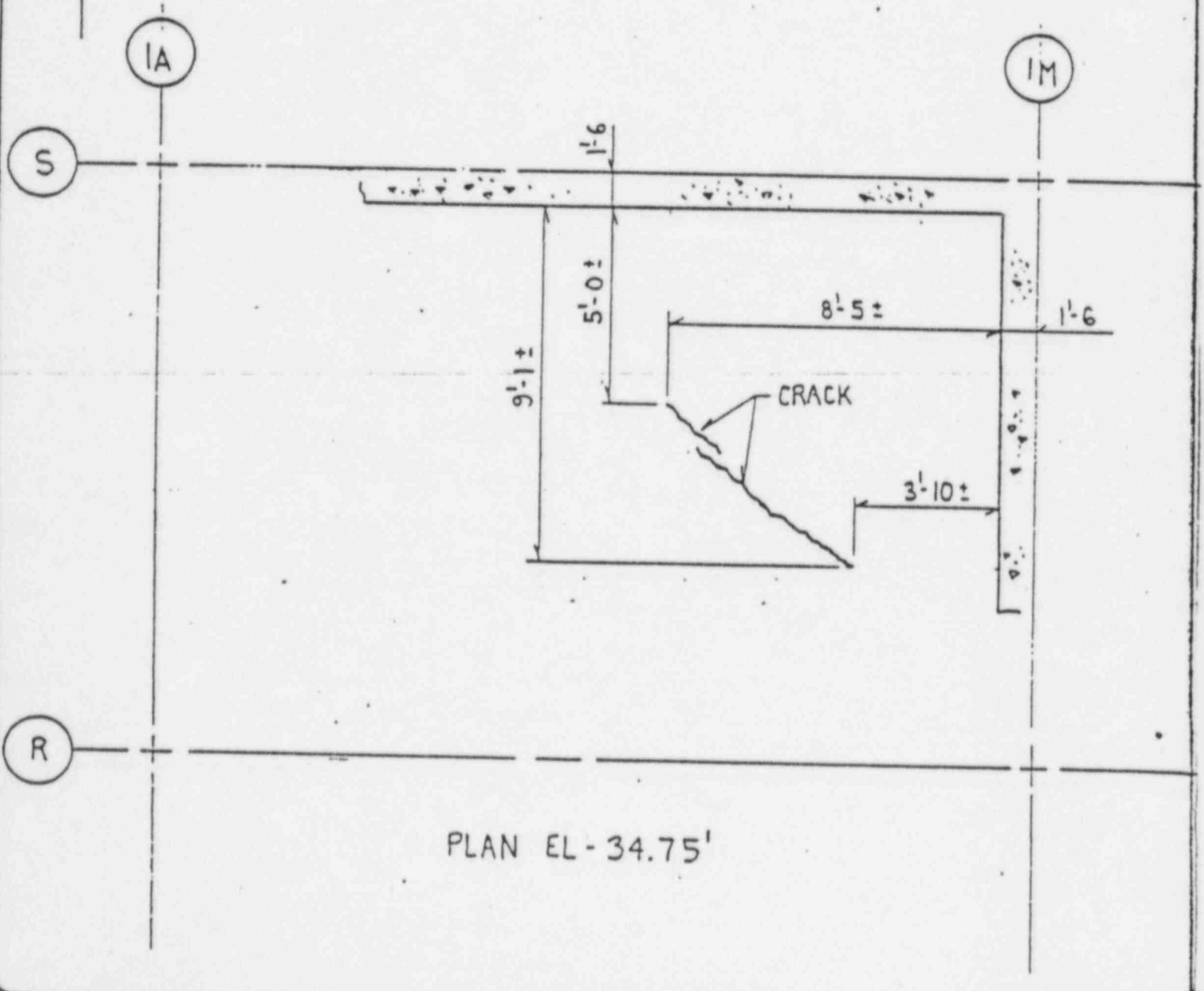
3. NO EVIDENCE OF SEEPAGE
4. HAIRLINE CRACK



PLAN EL - 34.75'

CLIENT TVA

SUBJECT BASEMAT CRACK MAP

PREP. BY RR/EN DATE 9/1/83

CHCKD. BY ADL DATE 09/02/83

NOTES:

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3. NO EVIDENCE OF SEEPAGE
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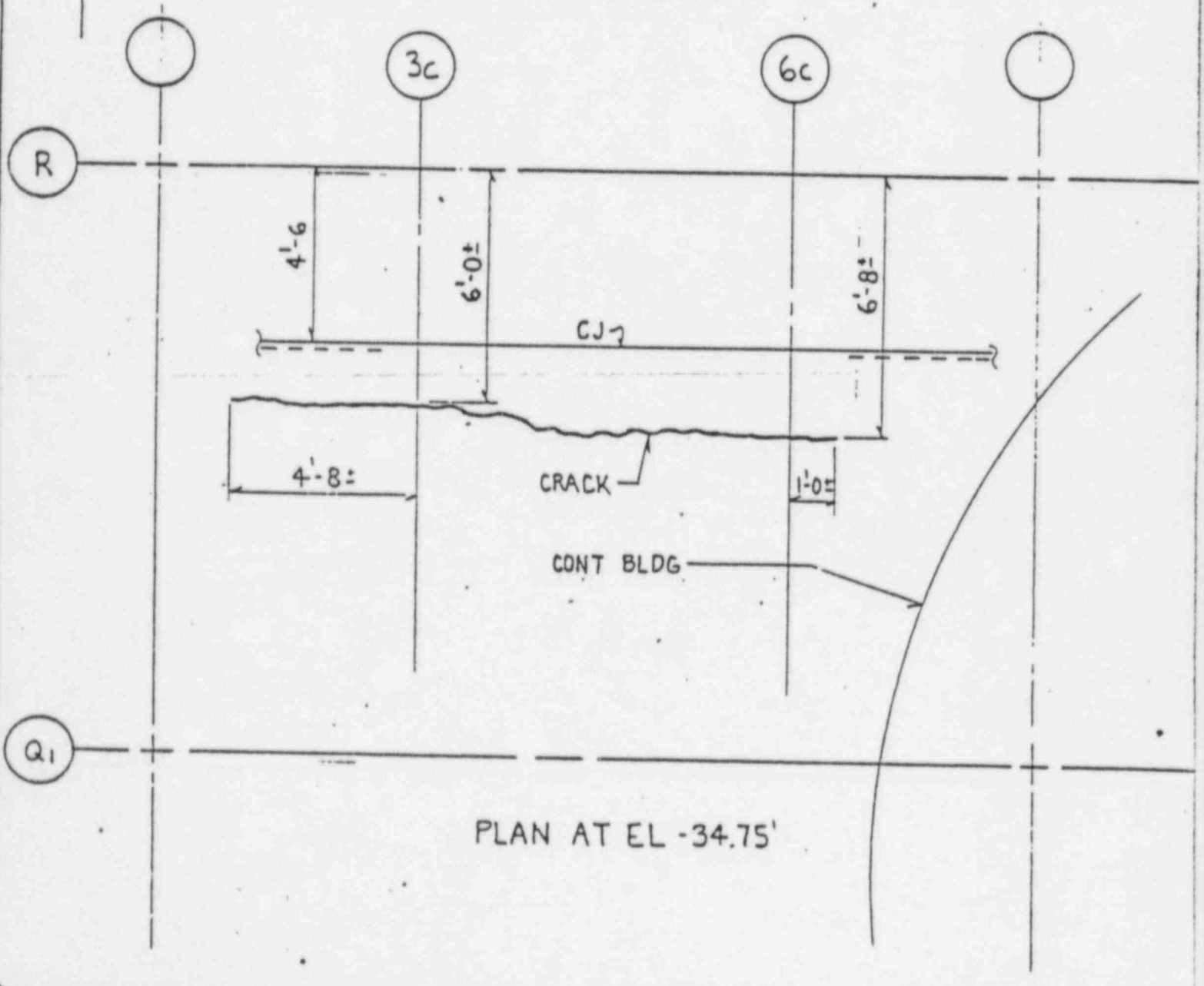

PLAN AT EL -34.75'

CLIENT FPL
SUBJECT BASEMAT CRACK MAP

PREP. BY RR/GW DATE 9/1/83
CHCKD. BY AGB DATE 09/02/83

NOTES:

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2 NO FLOOR FINISH
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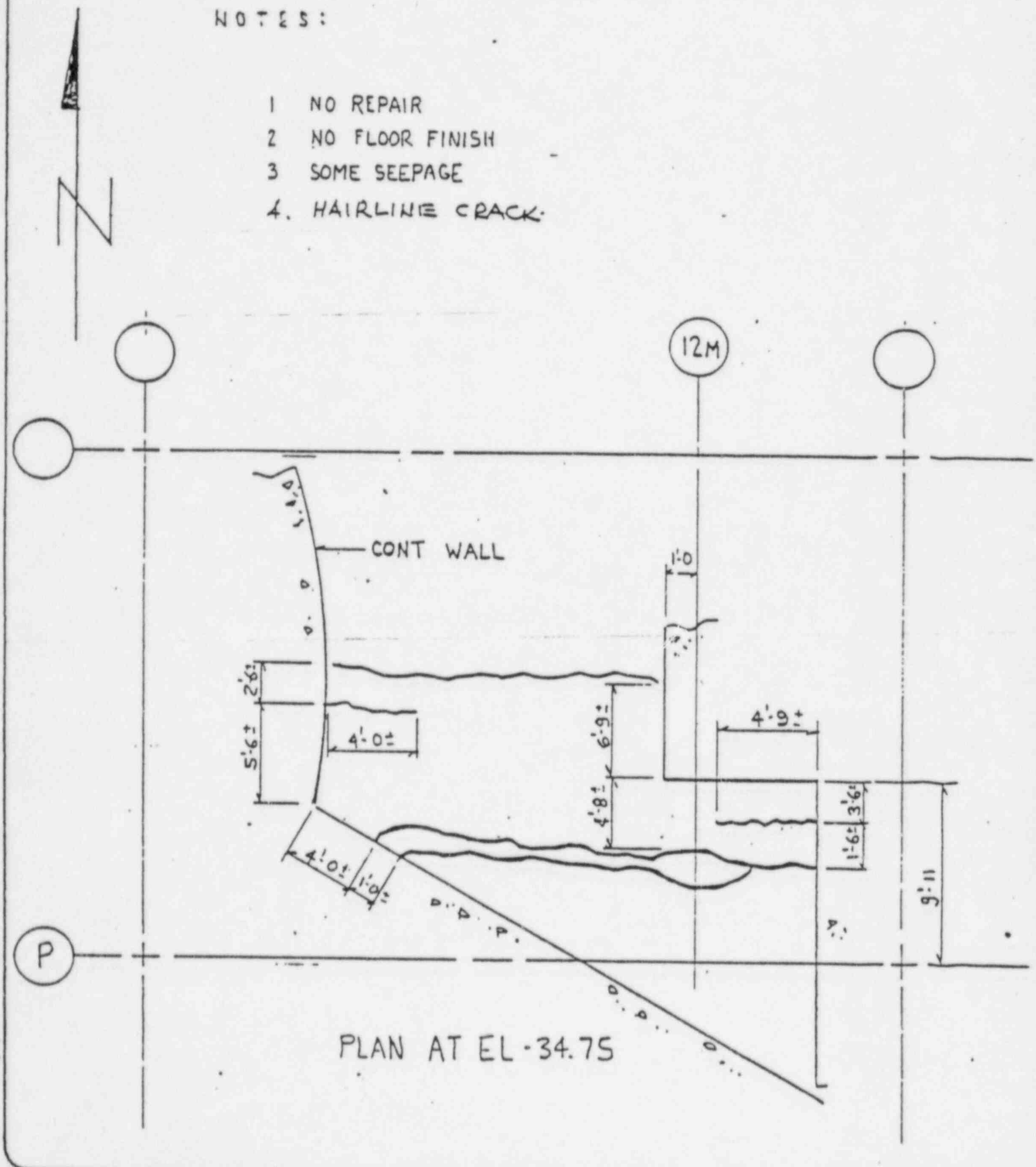
4. HAIRLINE CRACK.



PLAN AT EL -34.75

PROJECT
CLIENT
SUBJECT BASEMENT CRACK MAP

SUBJ. SUBDIV. SHEET
PREP. BY [illegible] DATE 9/1/83
CHCKD. BY AdB DATE 09/02/83

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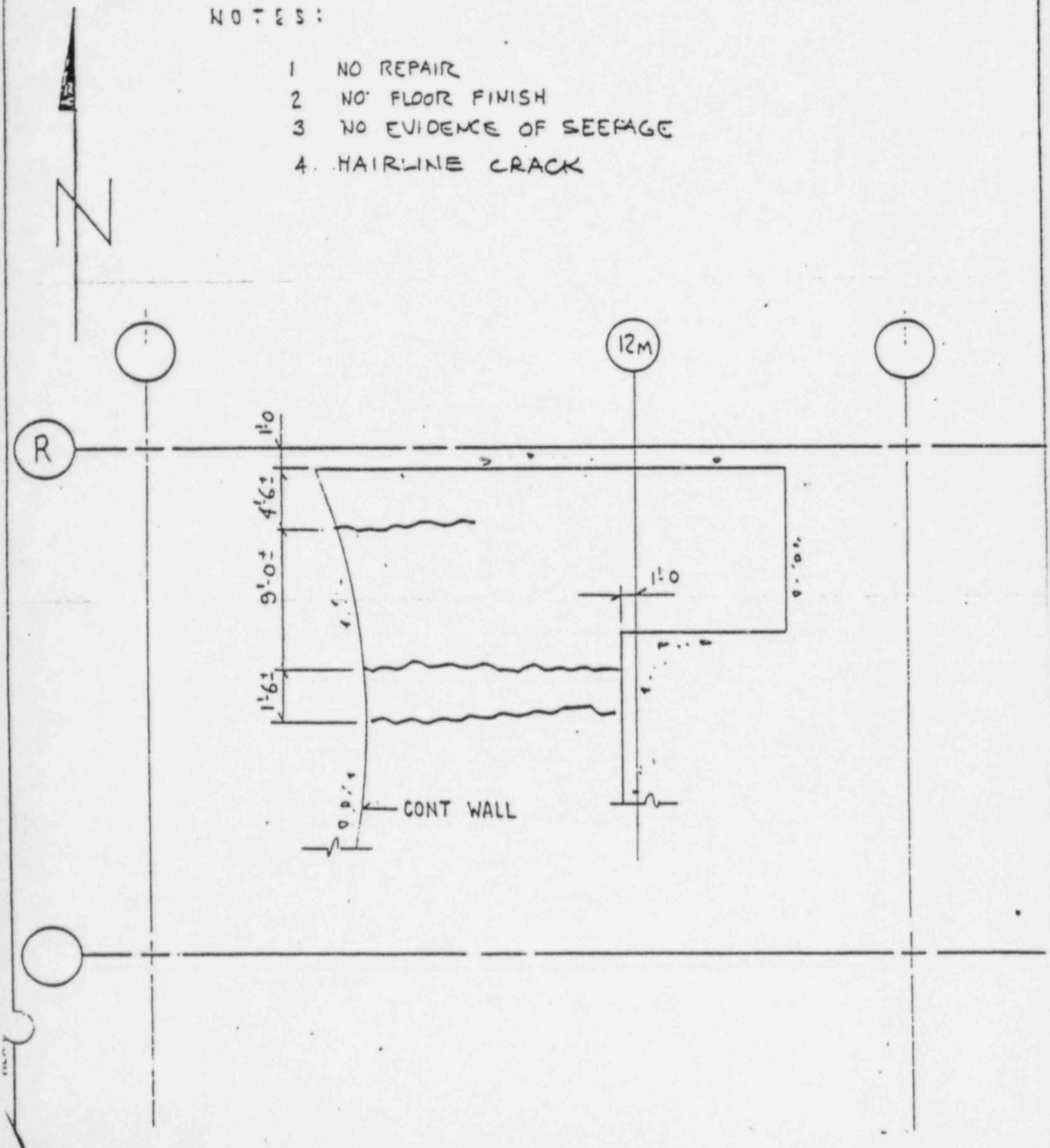
4. HAIRLINE CRACK



PROJECT
CLIENT
SUBJECT BASEMENT CRACK MAP

SUBJ. SUBDIV. SHEET
PREP. BY RC/GW DATE 9/1/83
CHCKD. BY ADL DATE 09/02/83

NOTES:

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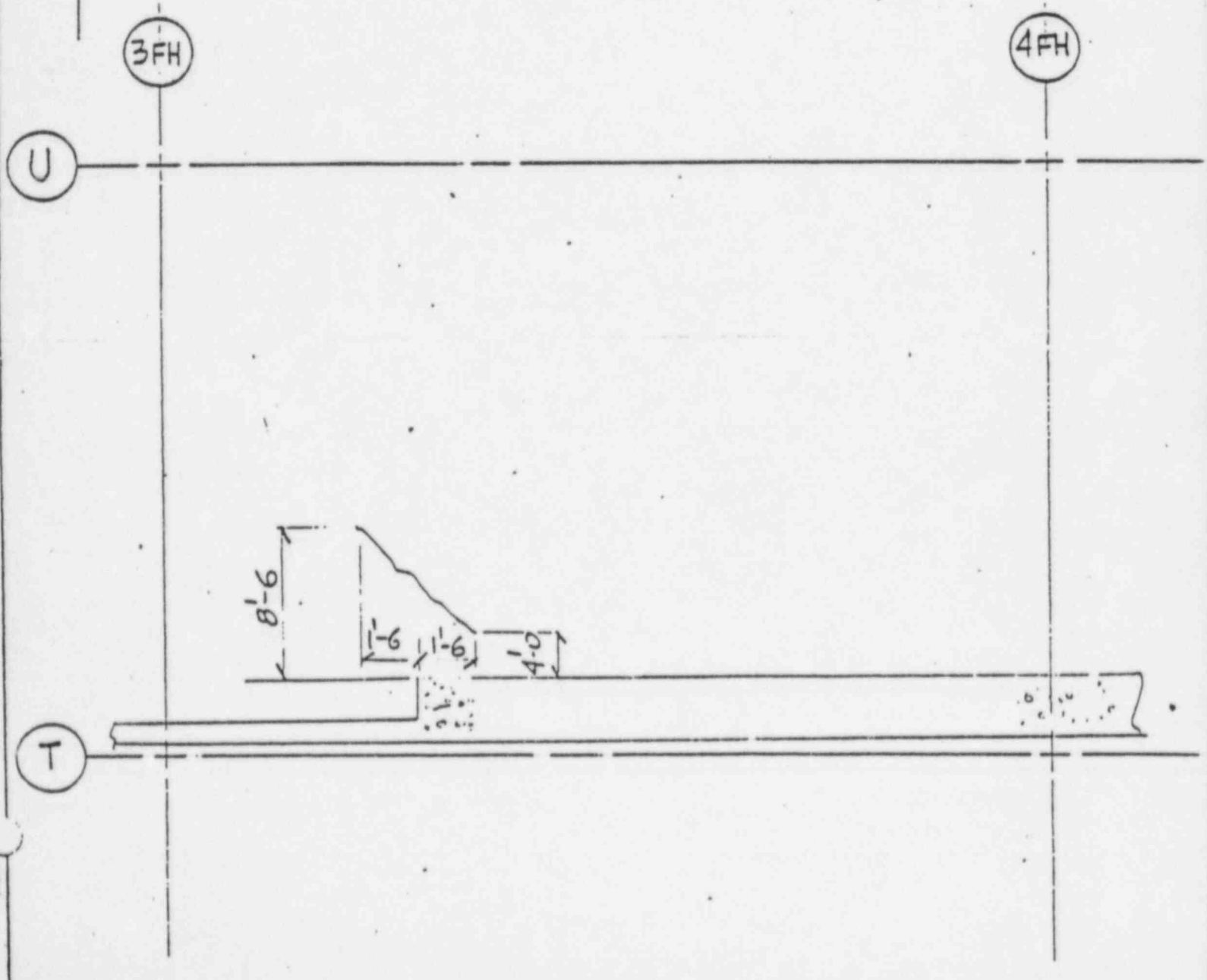
2. FLOOR IS FINISHED
3. SEEPAGE EXISTS
4. HAIRLINE CRACK



PROJECT
CLIENT
SUBJECT DESIGN CRACK MAP

PREP. BY RR/GW DATE 9/1/83
CHCKD. BY AAE DATE 09/02/83

NOTES:

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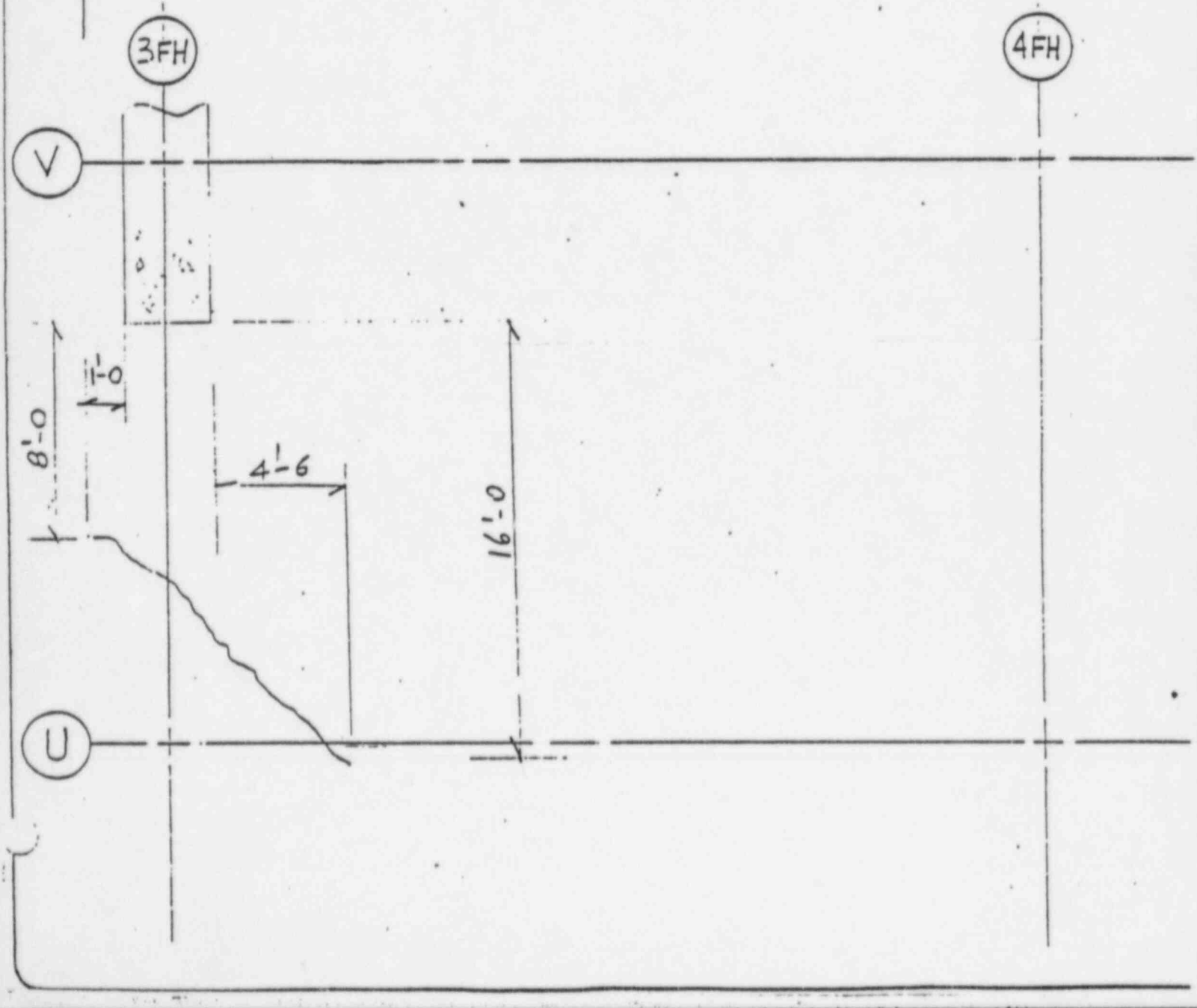
2. FLOOR IS FINISHED
3. SEEPAGE EXISTS
4. HAIRLINE CRACK



PROJECT		SUBJ.	SUBDIV. SHEET
CLIENT	[illegible]	PREP. BY	DATE 9/1/83
SUBJECT	[illegible]	CHCKD. BY	DATE 09/02/83

NOTES:

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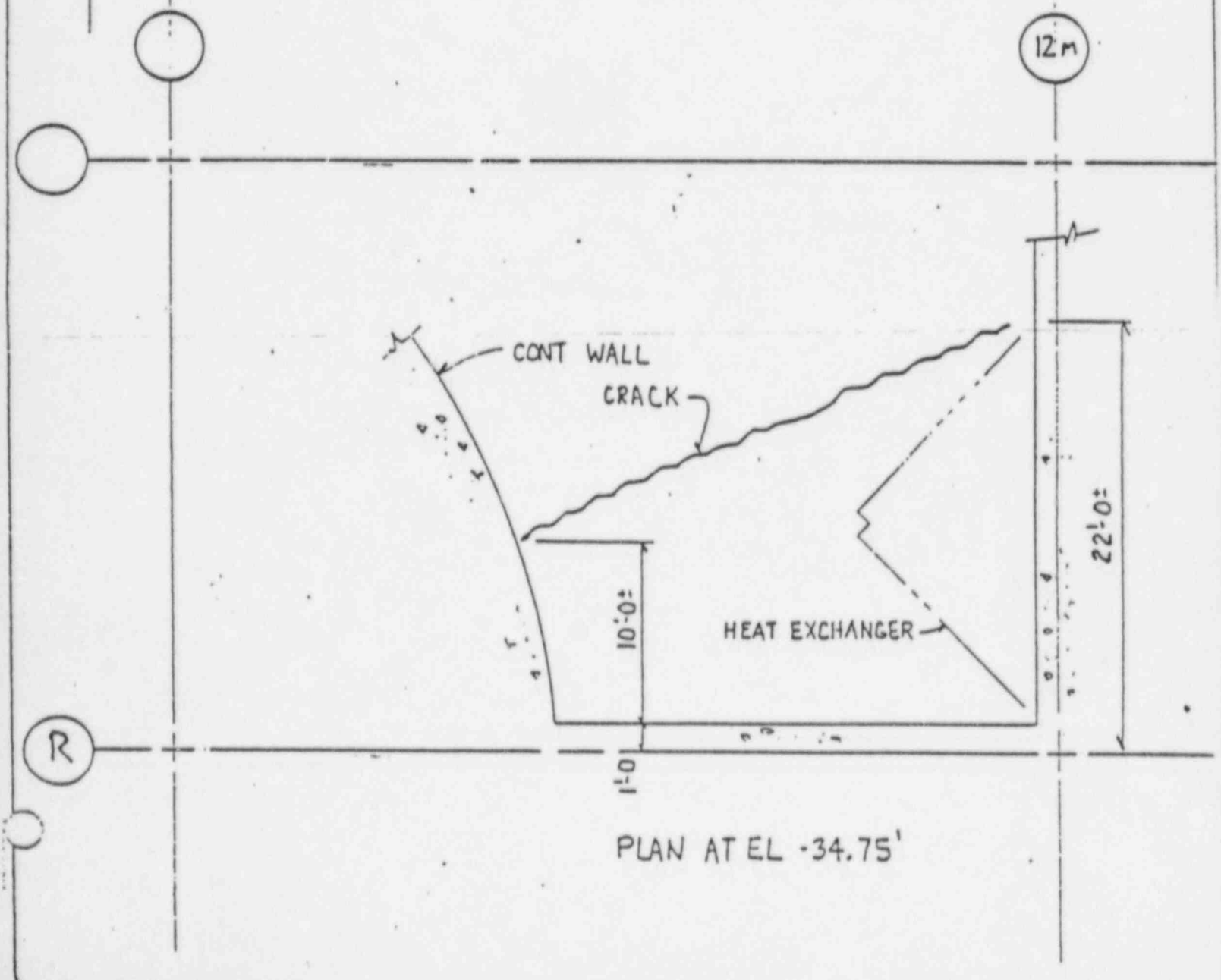
4. HAIRLINE CRACK



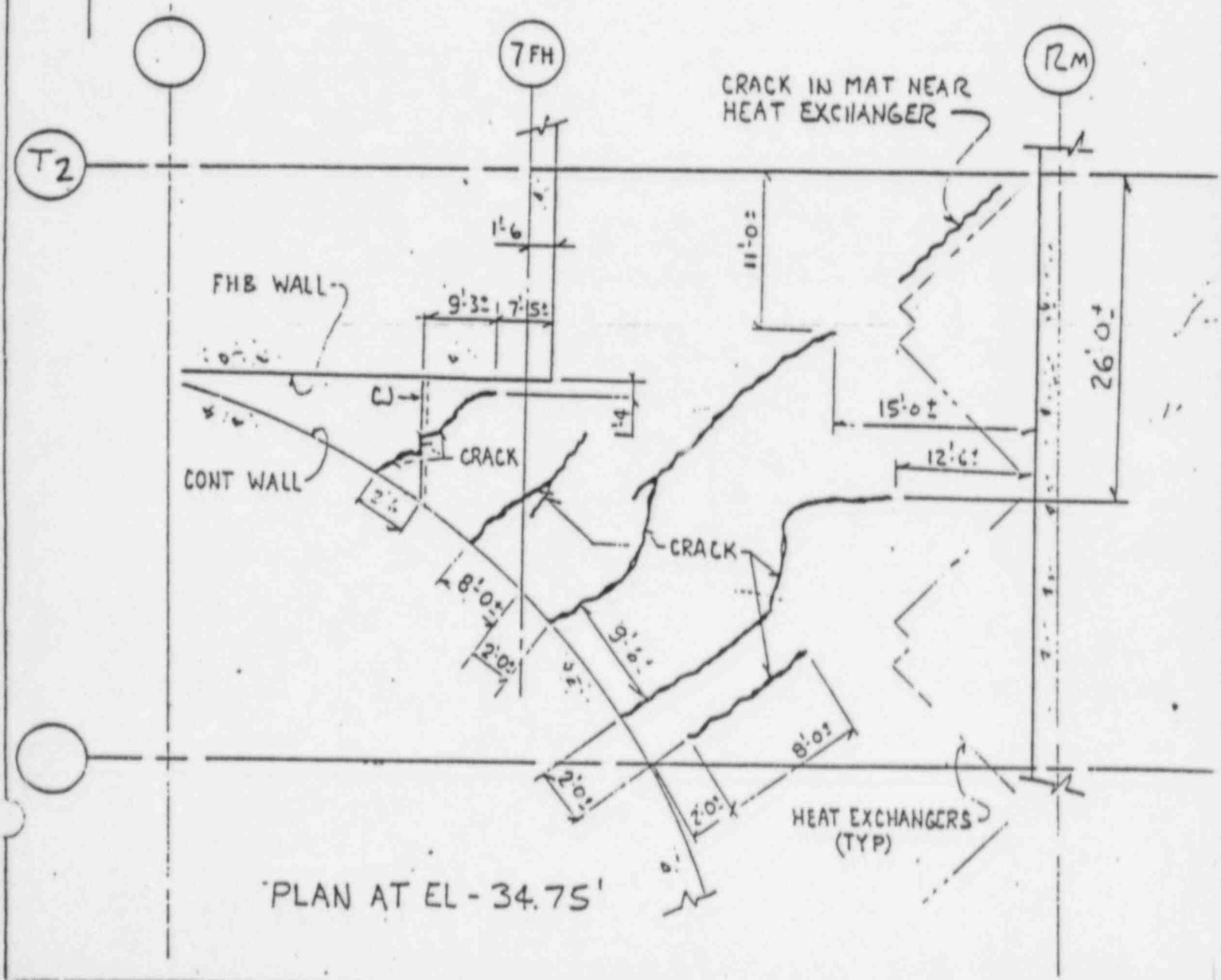
PLAN AT EL -34.75'

PROJECT
CLIENT
SUBJECT

SUBJ. SUBDIV. SHEET
PREP. BY RR/GW DATE 9/1/83
CHCKD. BY AGL DATE 09/02/83

NOTES:

1 NO REPAIR
2 NO FINISH
3 SOME EVIDENCE OF SEEPAGE
4. HAIRLINE CRACK



PLAN AT EL - 34.75'

PROJECT	SUBJ. SUBDIV. SHEET
CLIENT	PREP. BY RC/GW DATE 9/1/83
SUBJECT	CHCK'D. BY ADB DATE 09/02/83

NOTES:

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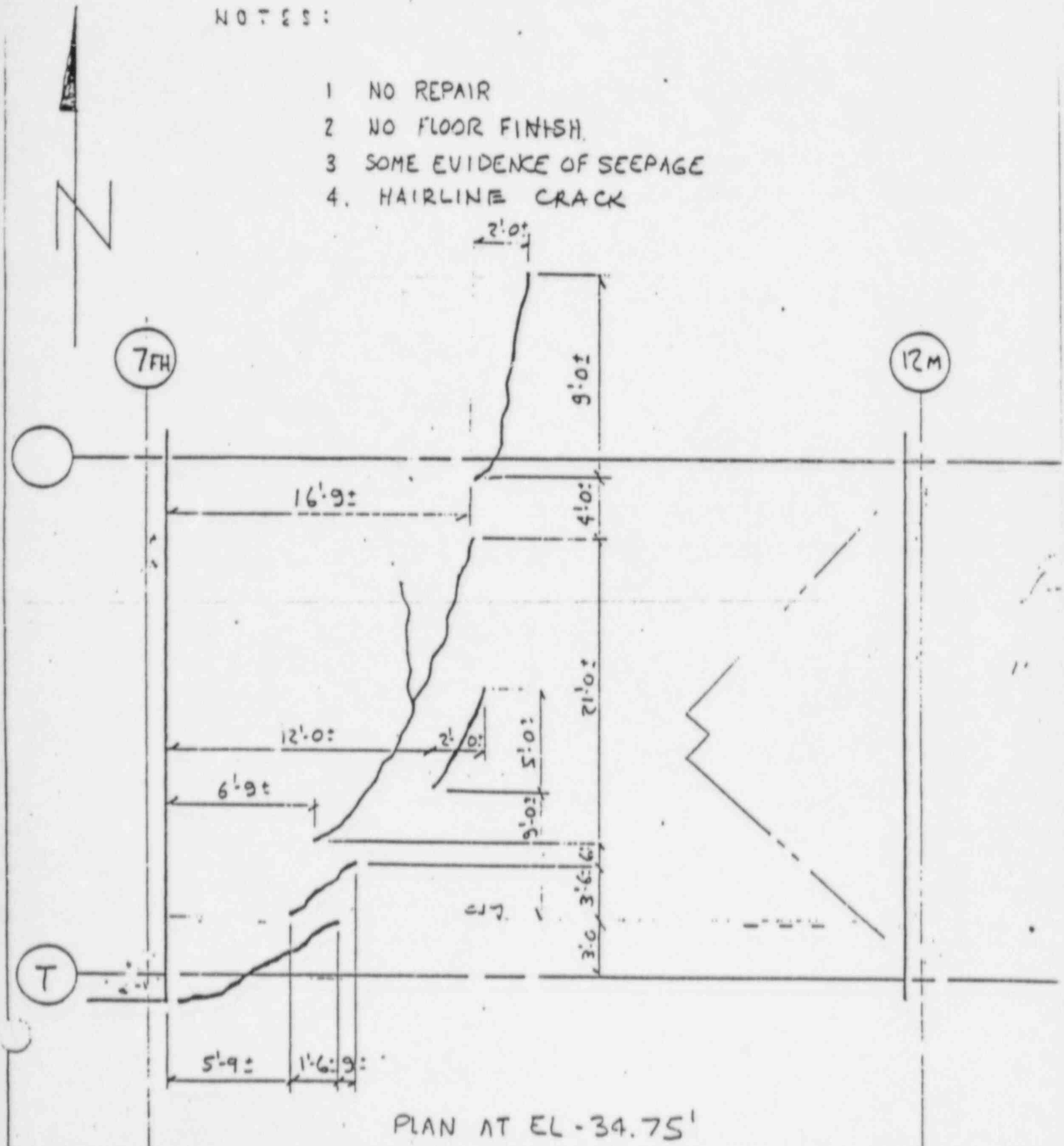
2 NO FLOOR FINISH
3 SOME EVIDENCE OF SEEPAGE
4. HAIRLINE CRACK



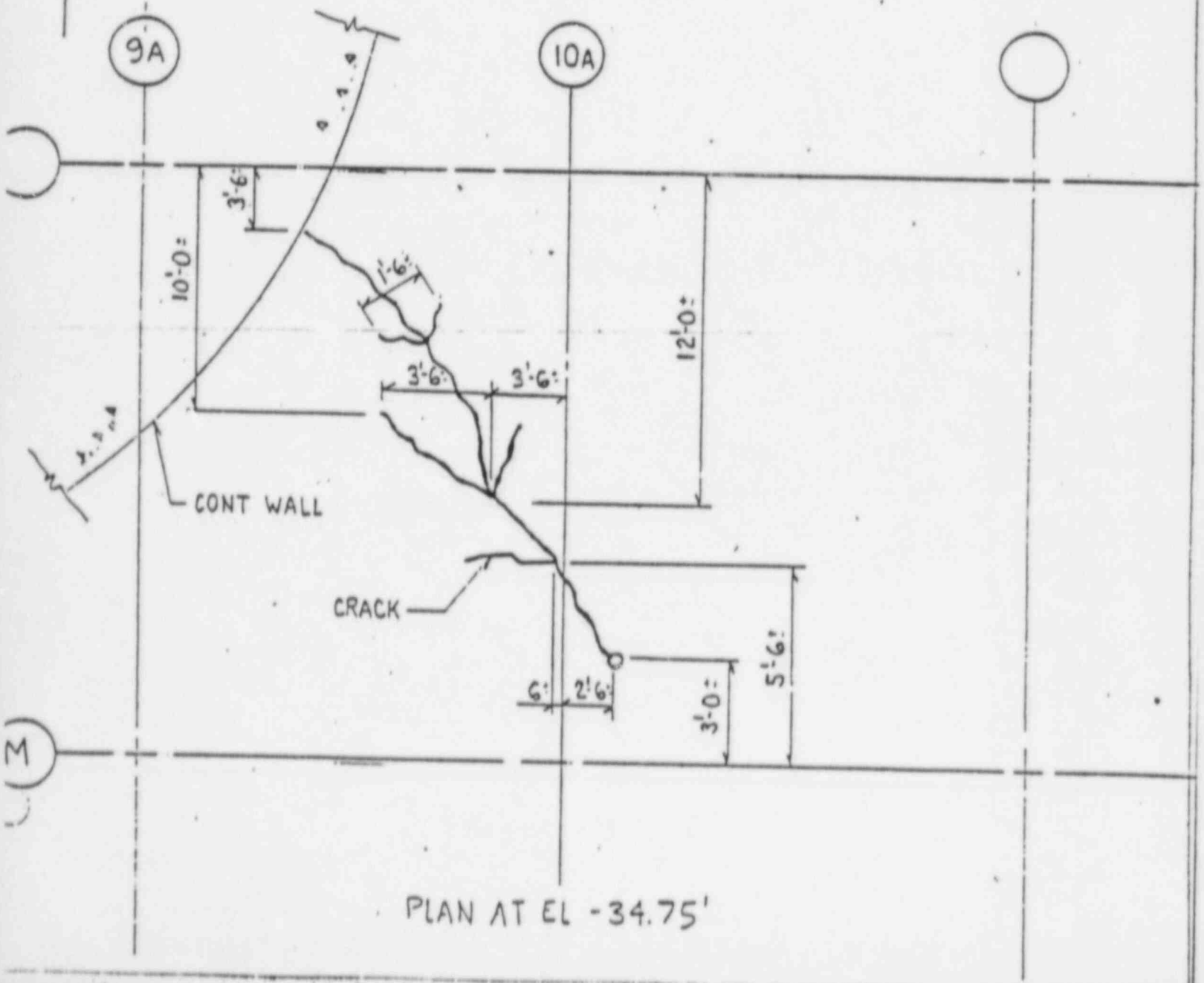
PLAN AT EL -34.75'

PROJECT
CLIENT
SUBJECT BASEMENT CRACK MAP

SUBJ. SUBDIV. SHEET
PREP. BY AA/GN DATE 9/2/83
CHCKD. BY AAE DATE 09/02/83

NOTES:

1. NO REPAIR
2. NO FLOOR FINISH
3. CRACK IS DAMP
4. HAIRLINE CRACK



PLAN AT EL -34.75'

HEA

HARSTEAD ENGINEERING ASSOCIATES • INC.
169 KINDERKAMACK ROAD, PARK RIDGE, N. J. 07656

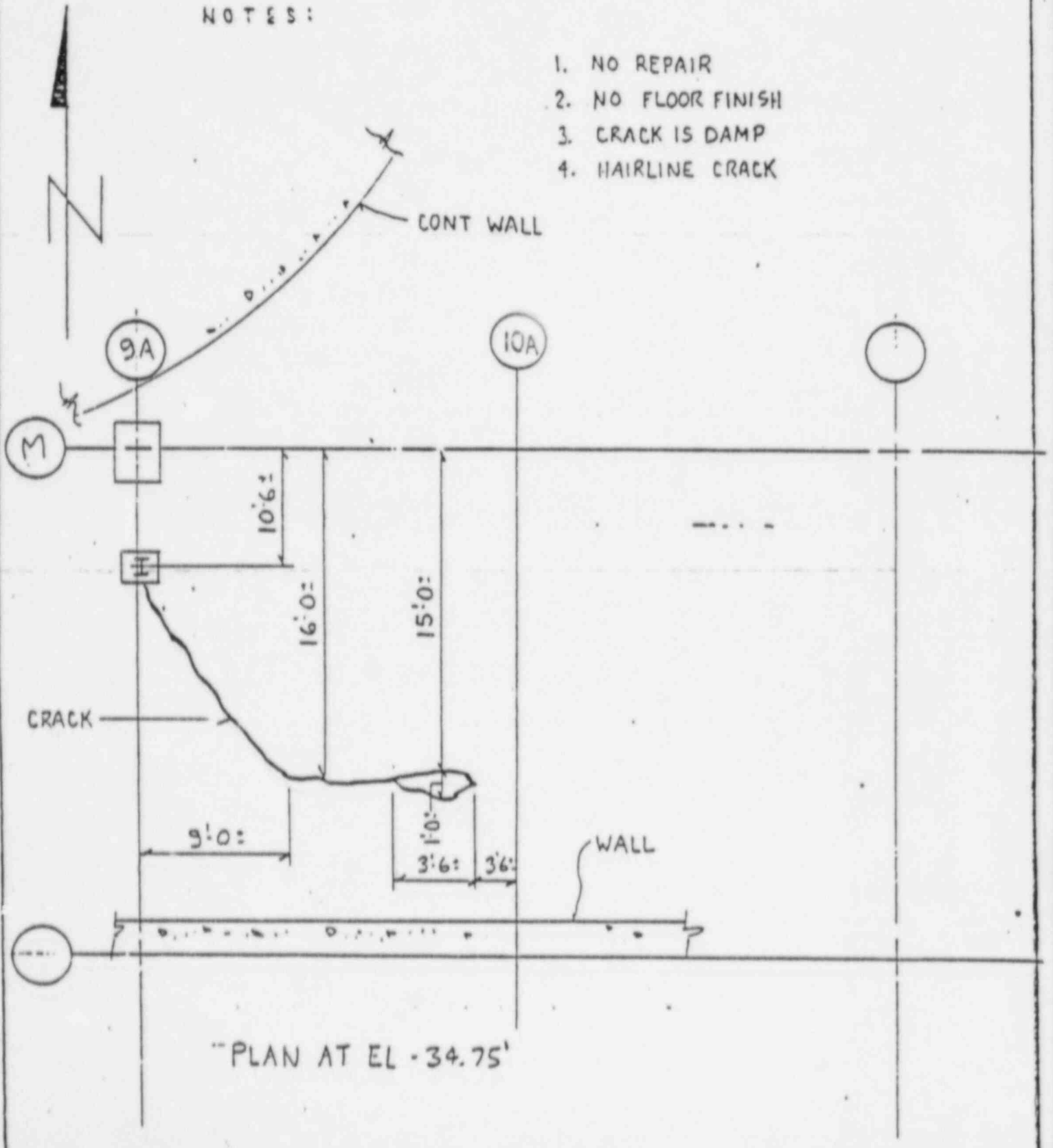
PROJ. NO.
C- - -
SUBJ. SUBDIV. SHEET

PROJECT
CLIENT
SUBJECT BASEMENT CRACK MAP

PREP. BY RL/GW DATE 9/2/83
CHCKD. BY AGI DATE 09/02/83

NOTES:

1. NO REPAIR
2. NO FLOOR FINISH
3. CRACK IS DAMP
4. HAIRLINE CRACK



PLAN AT EL -34.75'

HEA 103

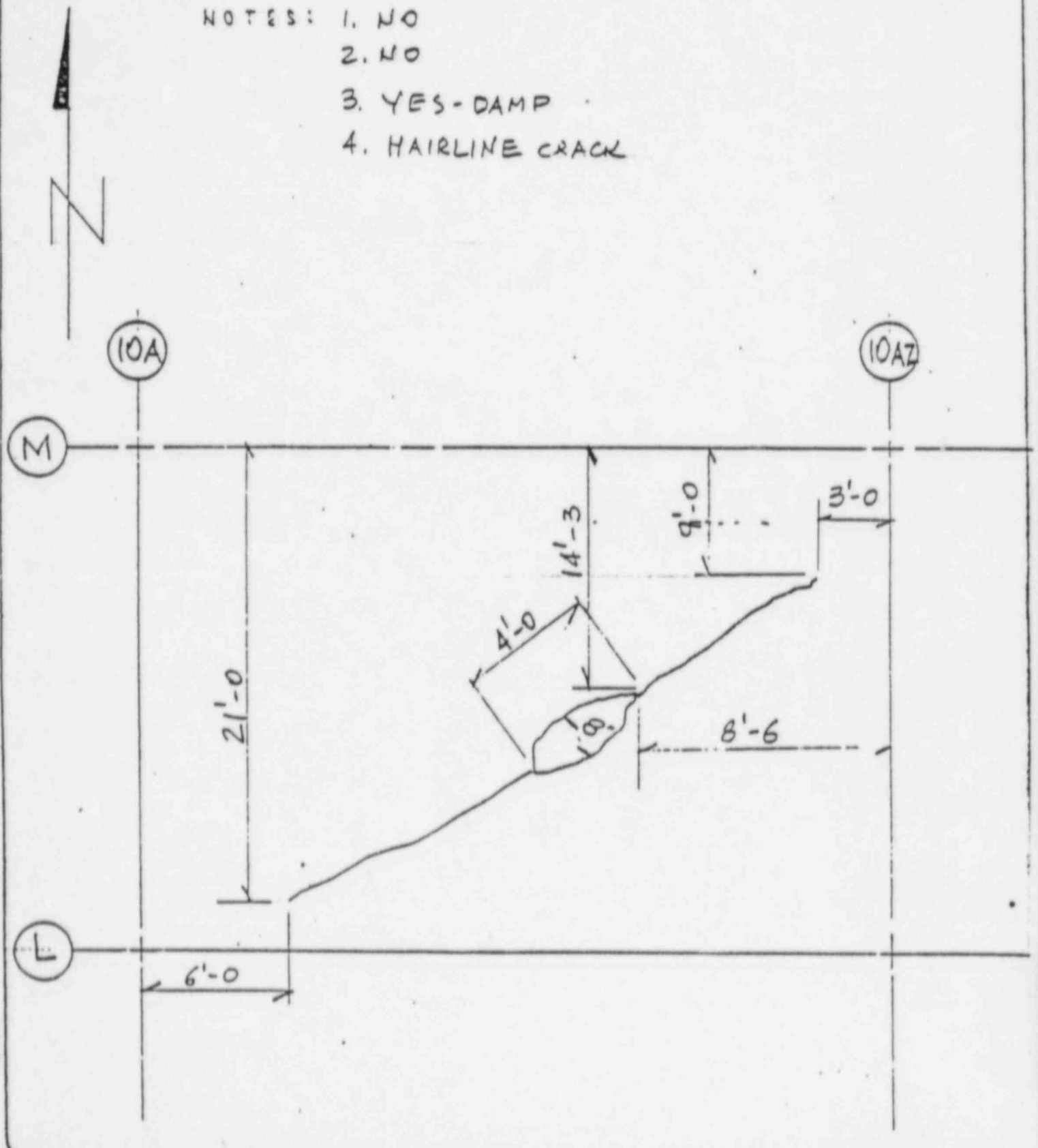
HARSTEAD ENGINEERING ASSOCIATES • INC.
169 KINDERKAMACK ROAD, PARK RIDGE, N. J. 07656

PROJ. NO.
C- - -
SUBJ. SUBDIV. SHEET

PROJECT
CLIENT [illegible]
SUBJECT BASEMENT CRACK MAP

PREP. BY JS/GW DATE 9/2/83
CHCKD. BY ACB DATE 09/02/83

NOTES: 1. NO
2. NO
3. YES - DAMP
4. HAIRLINE CRACK



HEA 103

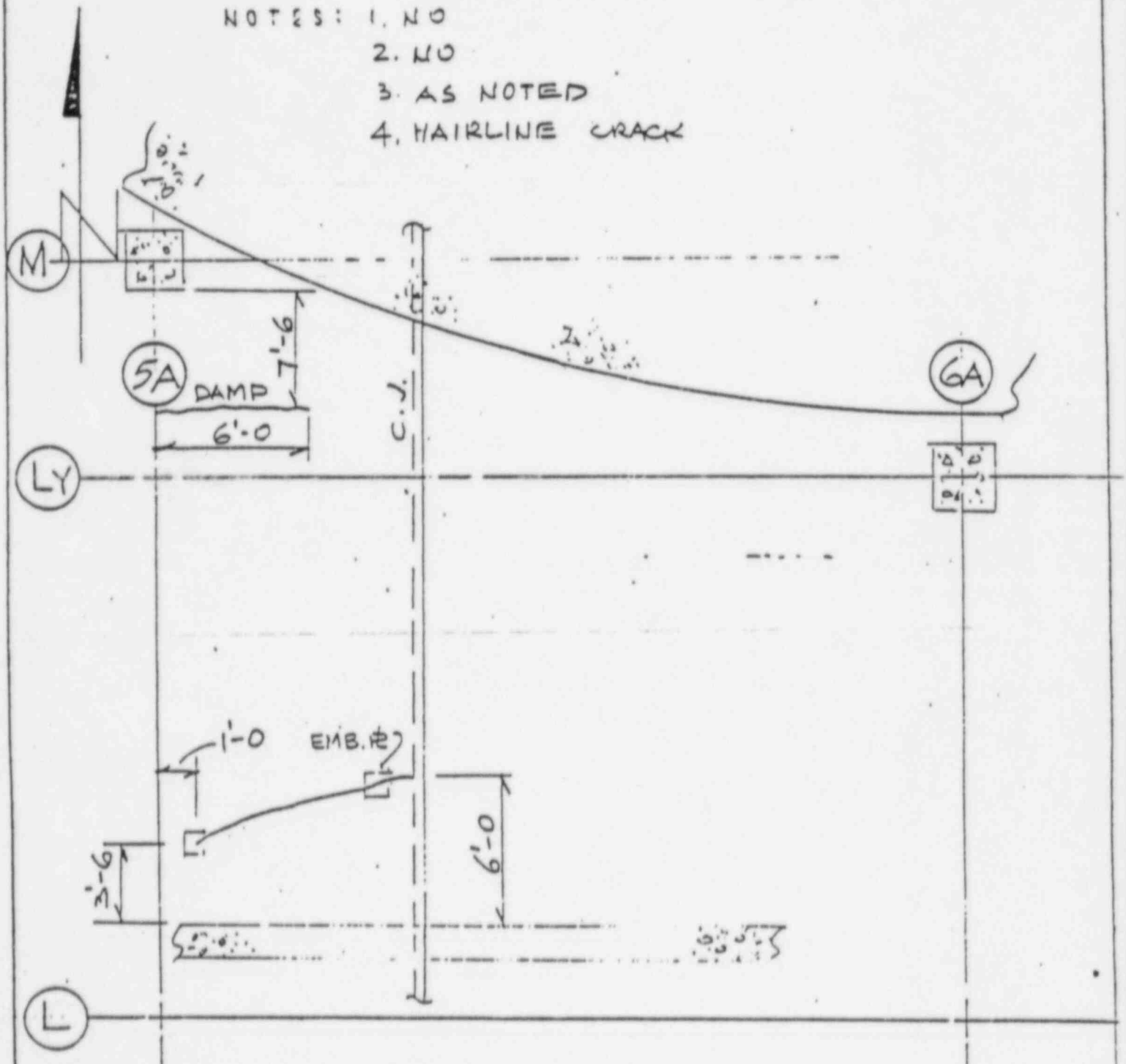
HANSTEAD ENGINEERING ASSOCIATES • INC.
169 KINDERKAMACK ROAD. PARK RIDGE. N J 07656

C- - -
SUBJ. SUBDIV. SHEET

PROJECT
CLIENT -?-
SUBJECT BASIN A - CRACK MAP

PREP. BY JS/GW DATE 9/6/83
CHCKD. BY AdR DATE 09/22/83

NOTES: 1. NO
2. NO
3. AS NOTED
4. HAIRLINE CRACK



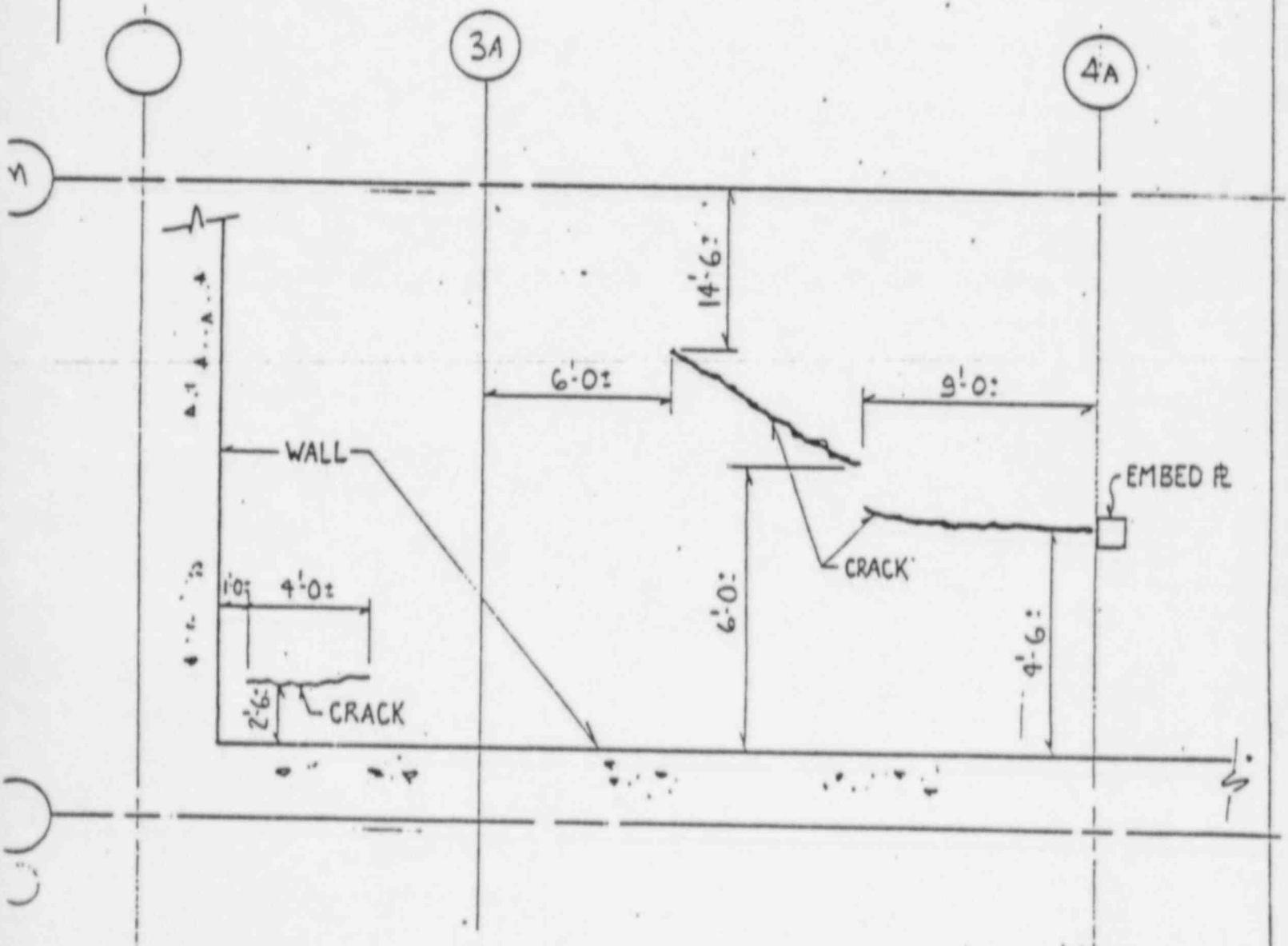
MEA 103

PROJECT
CLIENT
SUBJECT

SUBJ. SUBDIV. SHEET
PREP. BY RR/GW DATE 9/2/83
CHCKD. BY Ad DATE 09/02/83

NOTES:

1 NO REPAIR
2 NO FLOOR FINISH
3 CRACK IS PARTIALLY DAMP
4 HAIRLINE CRACK



PLAN AT EL - 34.75'

HARSTEAD ENGINEERING ASSOCIATES • INC.
169 KINDERKAMACK ROAD, PARK RIDGE, N. J. 07656

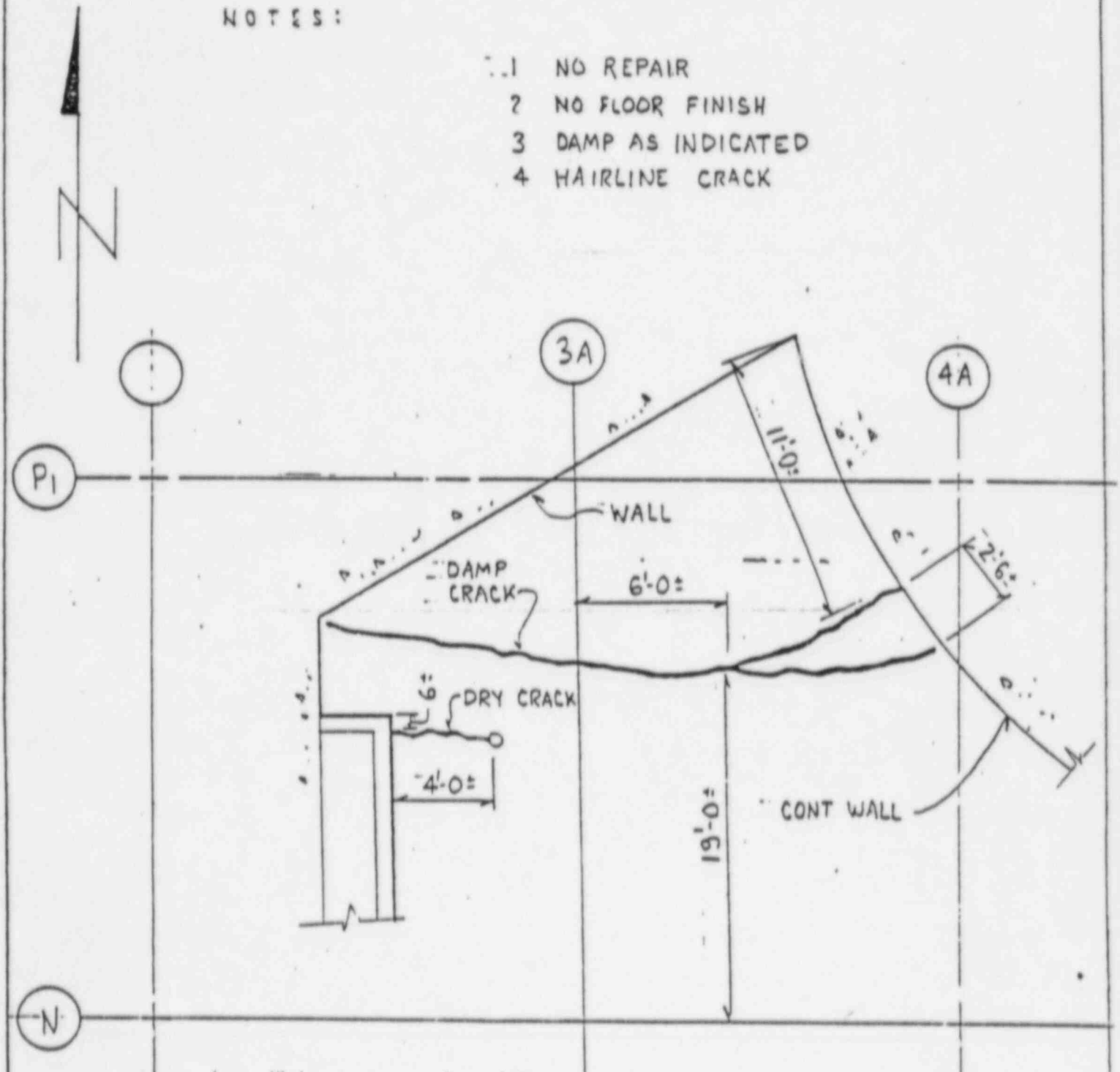
PROJECT
CLIENT
SUBJECT BASEMENT CRACK MAP

PROJ. NO.
C- - -
SUBJ. SUBDIV. SHEET

PREP. BY RR/GW DATE 9/2/83
CHCKD. BY AdB DATE 09/02/83

NOTES:

1 NO REPAIR
2 NO FLOOR FINISH
3 DAMP AS INDICATED
4 HAIRLINE CRACK



PLAN AT EL -34.75'

HEA 103

HEA

HAMPSTEAD ENGINEERING ASSOCIATES • INC.
169 KINDERKAMACK ROAD, PARK RIDGE, N. J. 07656

PROJ. NO.
C- - -
SUBJ. SUBDIV. SHEET

PROJECT
CLIENT
SUBJECT BASEMENT CRACK MAP

PREP. BY RR/GW DATE 9/7/83
CHCKD. BY AdL DATE 09/02/83

NOTES:

1 NO REPAIR
2 NO FLOOR FINISH
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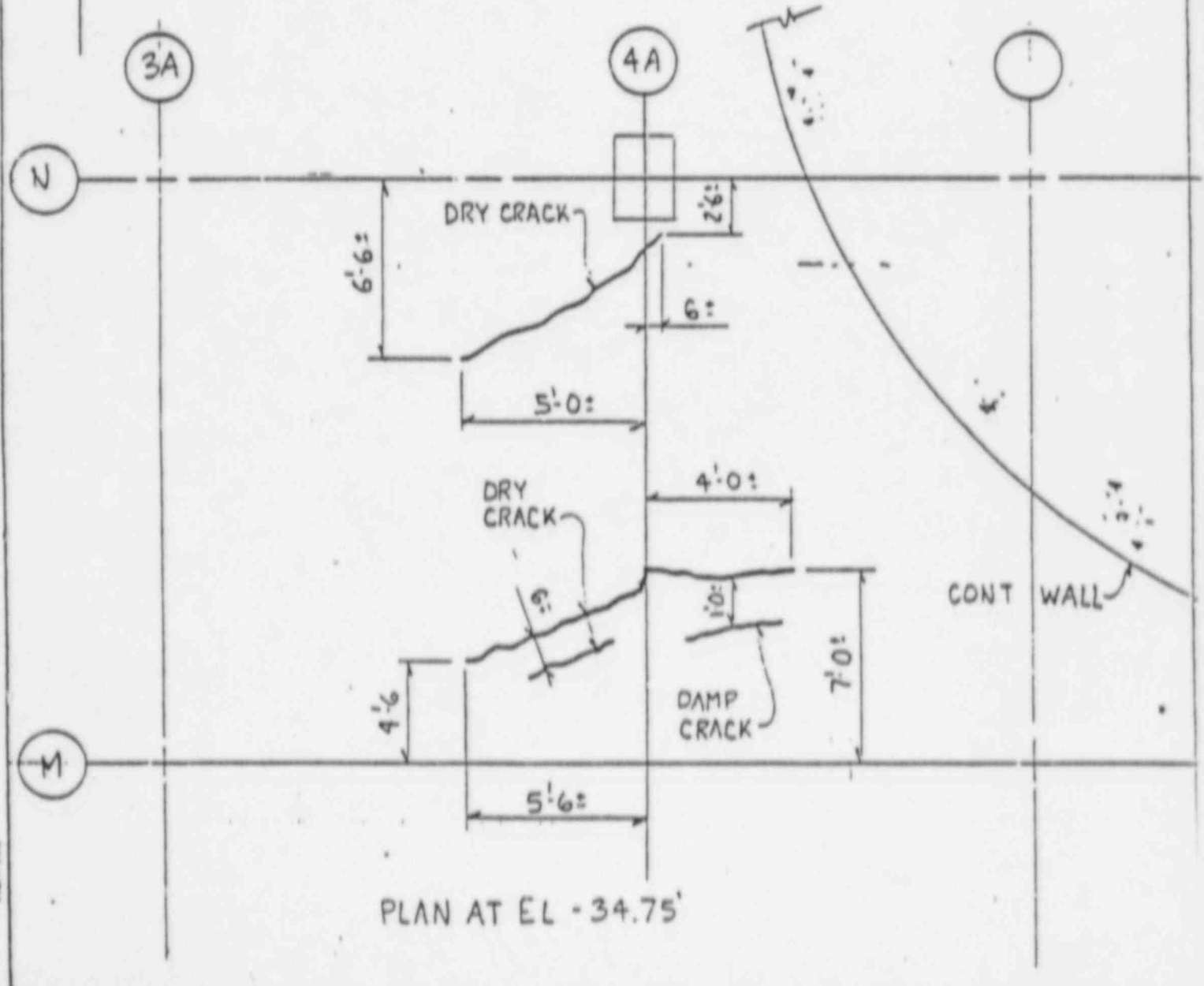
4 HAIRLINE CRACK



PLAN AT EL -34.75'

HEA 103

APPENDIX B

Properties of Subsurface Materials

Design Values

TABLE 2.5-14

PROPERTIES OF SUBSURFACE MATERIALS
DESIGN VALUES

	Visual Stratum Description	Elev.(MSL)	Unified Soil Description	Specific Gravity (Gs)	Natural Density (PCF)	Coefficient of Permeability (k) - cm/sec	Unconfined Compressive Strength -qu(ksf)	Undrained Shear Strength	Drained Shear Strength	Overconsolidation Ratio (OCR)	Average Shear Modulus Gmax(ksf)	Young's Modulus E (ksf)	Poisson's Ratio
1)	Clay and silty clay with silt and sand (Recent material**)	Grade to -40	CH	2.70	111	1.5×10^{-6}	1.0	c = 0.5 KSF $\phi = 0^{\circ}$	c' = 0 KSF $\phi = 25^{\circ}$	1.5 + 0 2.0	1200	3600	0.48
2)	Stiff tan and gray fissured clay	-40 to -77	CH	2.72	119	1×10^{-8}	3.0	c = 1.5 KSF $\phi = 0^{\circ}$	c' = 0.8 KSF $\phi = 12.5^{\circ}$	3.4	3900	11,600	0.49
3)	Very dense tan silty sand	-77 to -92	--	2.70	125	3×10^{-5}	--	--	c' = 0 KSF $\phi = 41^{\circ}$	--	3900	11,500	0.48
4)	Medium stiff gray clay with silt lenses	-92 to -108	CH	2.74	119	--	2.4	c = 1.2 KSF $\phi = 0^{\circ}$	c' = 0.8 KSF $\phi' = 12.5^{\circ}$	1.4	3900	11,600	0.49
5)	Stiff dark gray clay - organic	-108 to -116	MH & CH	2.68	104	--	3.6	c = 1.8 KSF $\phi = 0^{\circ}$	c' = 0.8 KSF $\phi' = 12.5^{\circ}$	1.7	3900	11,600	0.49
6)	Soft to medium stiff tan and gray clay with sand lenses	-116 to -127	ML & CL	2.69	119	--	1.4	c = 0.7 KSF $\phi = 0^{\circ}$	c' = 0.8 KSF $\phi' = 12.5^{\circ}$	2.0	3900	11,600	0.49
7)	Very stiff clays with silts and sands	-127 to -317	CH & CL	2.71	119	--	4.0	c = 2.0 KSF $\phi = 0^{\circ}$	c' = 0.8 KSF $\phi' = 12.5$	1.5 to 2.4	3900	11,500	0.48
8)	Very dense sands and silty sands	-317 to -500	--	2.70	119 to 125	--	--	--	--	--	10,000	29,000	0.45

*Computed from field Vp and Vs measurements
**Excavated and replaced with compacted backfill

Note: The average shear moduli values are averaged from maximum shear moduli obtained from field geophysical test results. They are representative only for low shear strains of approximately 10^{-5} in./in.

APPENDIX C

Synopsis/Introduction

of

State-Of-The-Art of Floating Foundations

by H. Q. Golder

Journal of the
SOIL MECHANICS AND FOUNDATIONS DIVISION
Proceedings of the American Society of Civil Engineers

STATE-OF-THE-ART OF FLOATING FOUNDATIONS[a]

By Hugh Q. Golder,[1] M. ASCE

SYNOPSIS

For a floating foundation the soil must have weight but it need not have shear strength. The foundation must be able to resist pressure on its base and sides and, if the weight or level of the soil varies, the pressures will not be uniform, and shear and bending forces will act on the foundation. In practice, most foundations are partly floating, and almost all so-called floating foundations are only partly floating because a small residual pressure is usually left on the soil. After a history of their development and the reasons for their use are given, the problems to be considered in using floating foundations are examined. Among the most important problems are excavation, bottom heave, settlement and tilting, and structural problems.

INTRODUCTION

In considering an engineering problem it is often helpful to begin with the limits between which the problem lies, in a physical sense, although these limits are not necessarily practical in an engineering sense.

When a foundation rests on the ground surface it is supported by the shear strength of the soil or rock of which the ground is composed. When the foundation is placed below the ground surface, for frost or drying protection, and the weight of the overburden is deducted from the applied pressure, the foundation is supported partly by the shear strength and partly by "buoyancy," i. e., the foundation is partly floating. The limit to a floating foundation is a ship in water.

This analogy of a ship indicates certain useful facts, namely:

1. The ship displaces a volume of water equal to its weight;
2. after the initial settlement there is no further settlement;
3. the pressure on the horizontal base is uniform;
4. if the water level ceases to be uniform, (i. e., wave action) the pressures change and the hull is subjected to bending and shear forces;
5. there are lateral pressures on the side of the hull;
6. the water has no shear strength, i. e., shear strength is not necessary for support; and
7. the hull is complete when launched into the water and launching stresses may be high.

The preceding facts indicate that, for a floating foundation, the soil must have weight but it need not have shear strength. The foundation must be able to resist pressure on its base and sides and, if the weight or level of the soil varies, the pressures will not be uniform, and shear and bending forces will act on the foundation. Once in position, the foundation will not settle further (if fully floating) unless further load is added. In soil of low shear strength construction of floating foundations may be difficult but the depth is not limited by shear strength if suitable construction procedures are used; however, "launching" stresses in the foundation may be high. In practice, most foundations are partly floating, and almost all of the so-called floating foundations are only partly floating because a small residual pressure is usually left on the soil.

A floating foundation will be considered herein as one in which the greater part of the building load is balanced against the weight of excavated material and is not supported by the shear strength of the soil.

HISTORY

The concept of using floating foundations is not new. There is some evidence that they were used in the 18th century, and it is probable that they were used intuitively before that date.

In the discussion[2] of a paper by Casagrande and Fadum K. Terzaghi refers to a German work by G. Hagen[3] dated 1870, in which there is reference to the use of floating foundations by John Rennie in London at the Albion Mills. There is no doubt that Hagen really knew what a floating foundation was. He says ". . .a heavy building can still be safely built by sinking it partly into the ground so that it actually floats. The complete weight of the building must not be greater than that of the excavated material."

The reference to Rennie is taken from "A Treatise on the Steam Engine" by J. Farey (1827). According to Hagen, Farey says

Note.—Discussion open until August 1, 1965. To extend the closing date one month, a written request must be filed with the Executive Secretary, ASCE. This paper is part of the copyrighted Journal of the Soil Mechanics and Foundations Division, Proceedings of the American Society of Civil Engineers, Vol. 91, No. SM2, March, 1965.

[a] This is one of the "state-of-the-art" papers presented at the ASCE Soil Mechanics and Foundations Division Conf. on "Design of Foundations for Control of Settlements," held at Northwestern Univ., Evanston, Ill., June, 1964, the compiled papers were presented in the September, 1964, division Journal.

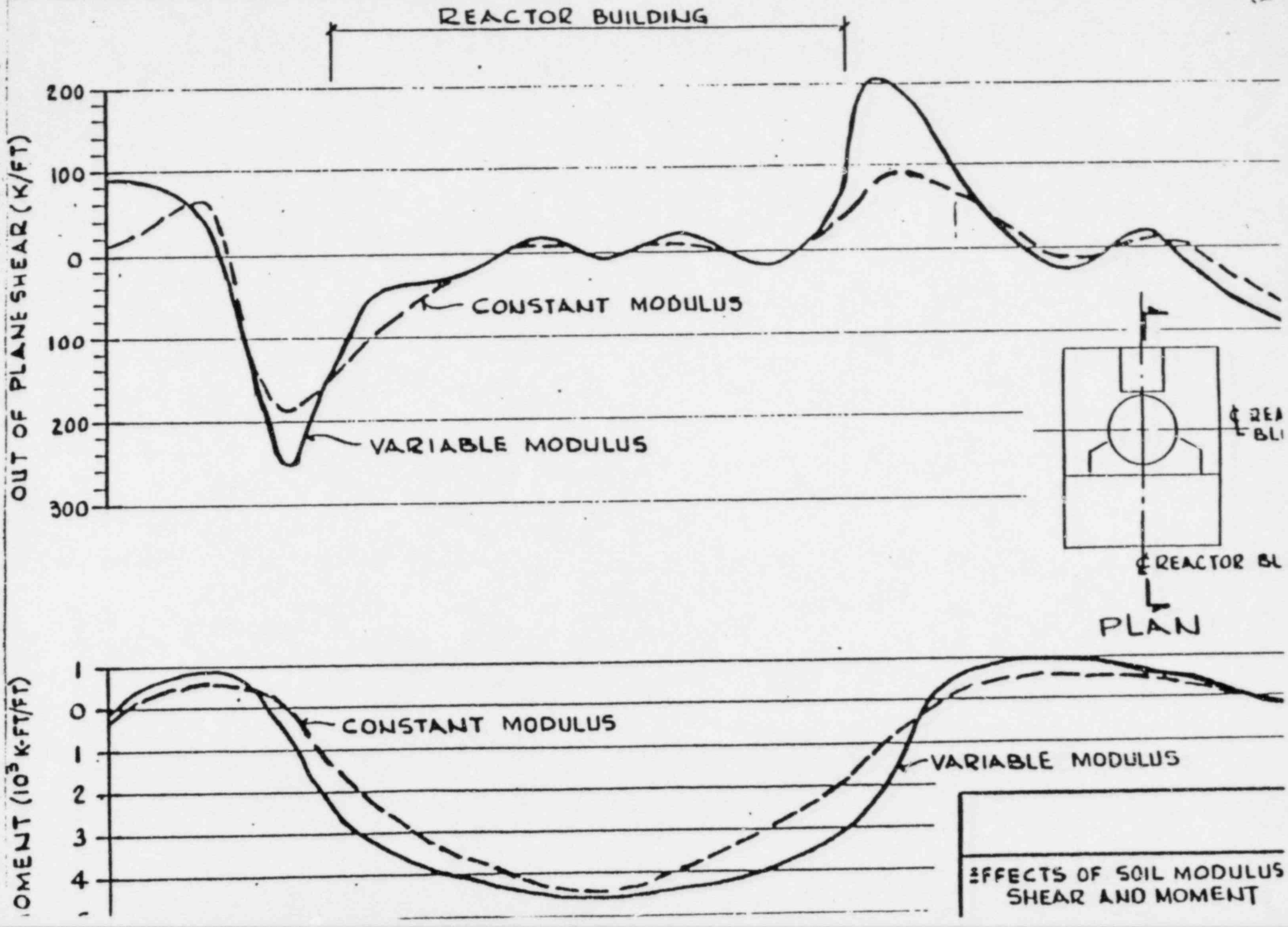
[1] Cons. Civ. Engr., H. Q. Golder and Assocs. Ltd., Toronto, Canada.

[2] Terzaghi, Karl, discussion of "Application of Soil Mechanics in Designing Building Foundations," by A. Casagrande and R. E. Fadum, Transactions, ASCE, Vol. 109, 1944, p. 427.

[3] Hagen, G., "Handbuchder Wasserbaukunst," Ernst U. Korn, Berlin, 1870.

APPENDIX E

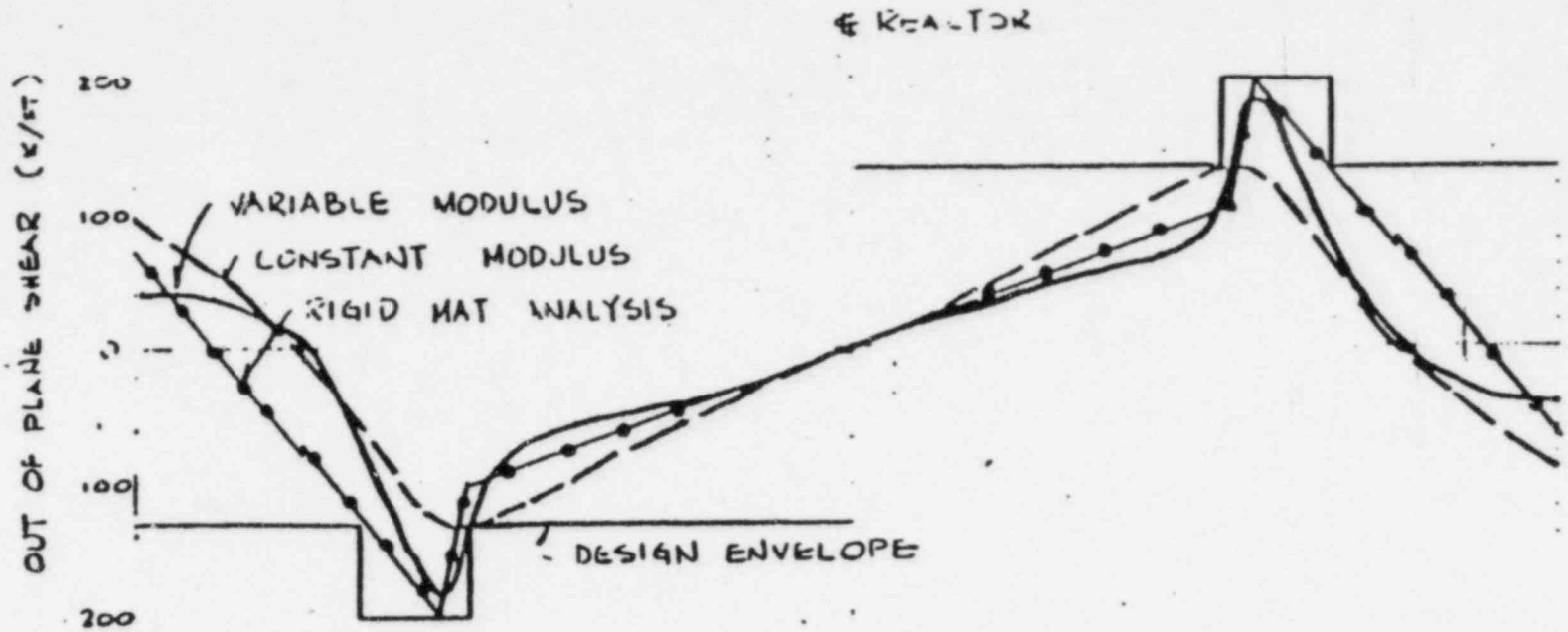
Effects of Soil Modulus on Shear and Moment

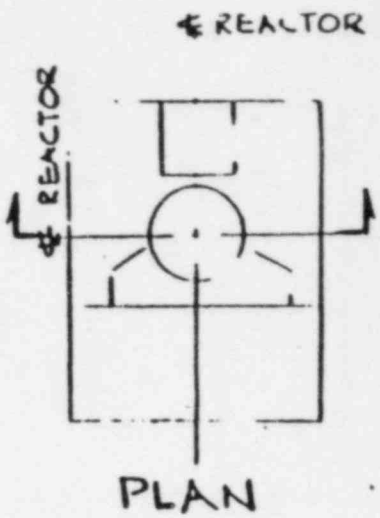

REACTOR BUILDING
200
100
0
100
200
300
OUT OF PLANE SHEAR (K/FT)
CONSTANT MODULUS
VARIABLE MODULUS
℄ REACTOR BL
PLAN
1
0
1
2
3
4
OMENT (10^3 K-FT/FT)
CONSTANT MODULUS
VARIABLE MODULUS
EFFECTS OF SOIL MODULUS
SHEAR AND MOMENT

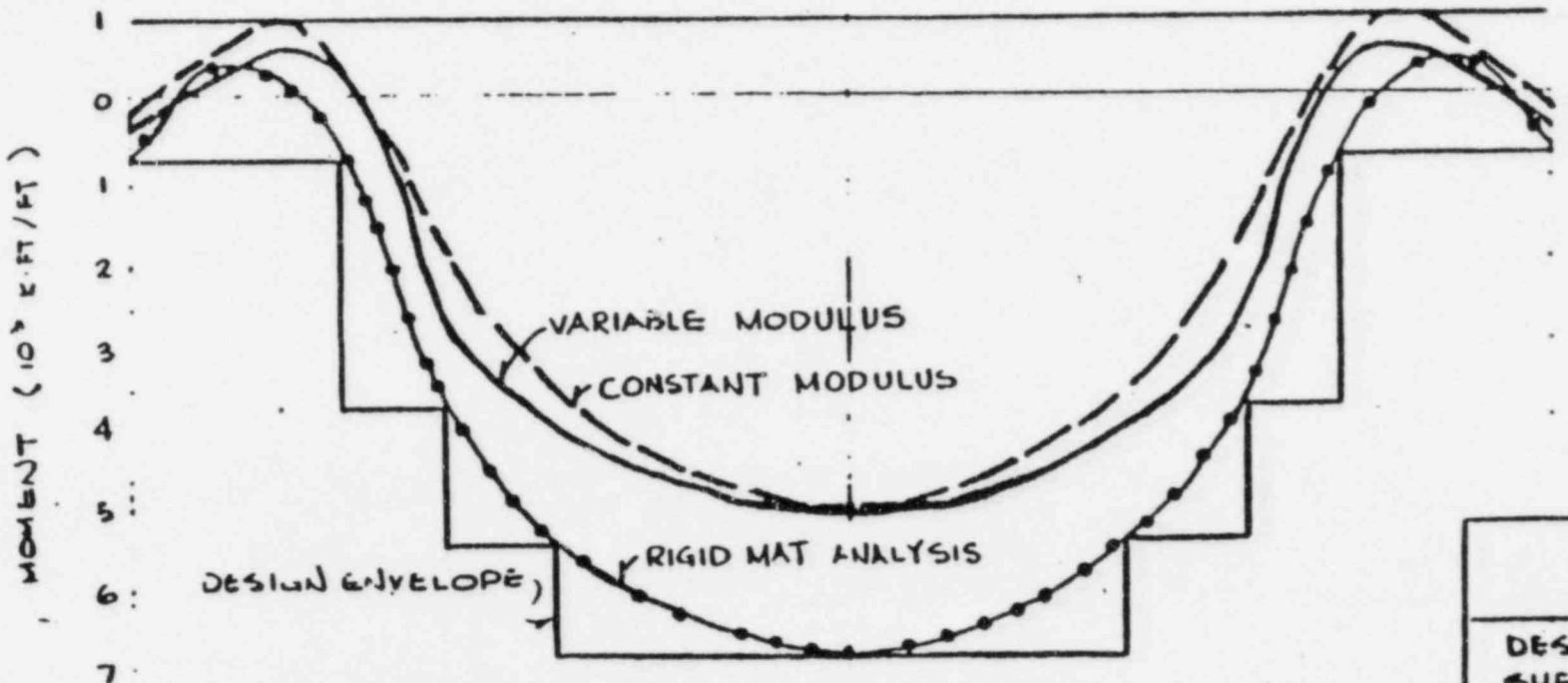
APPENDIX F

Design Envelopes of Mat

Shear and Moment







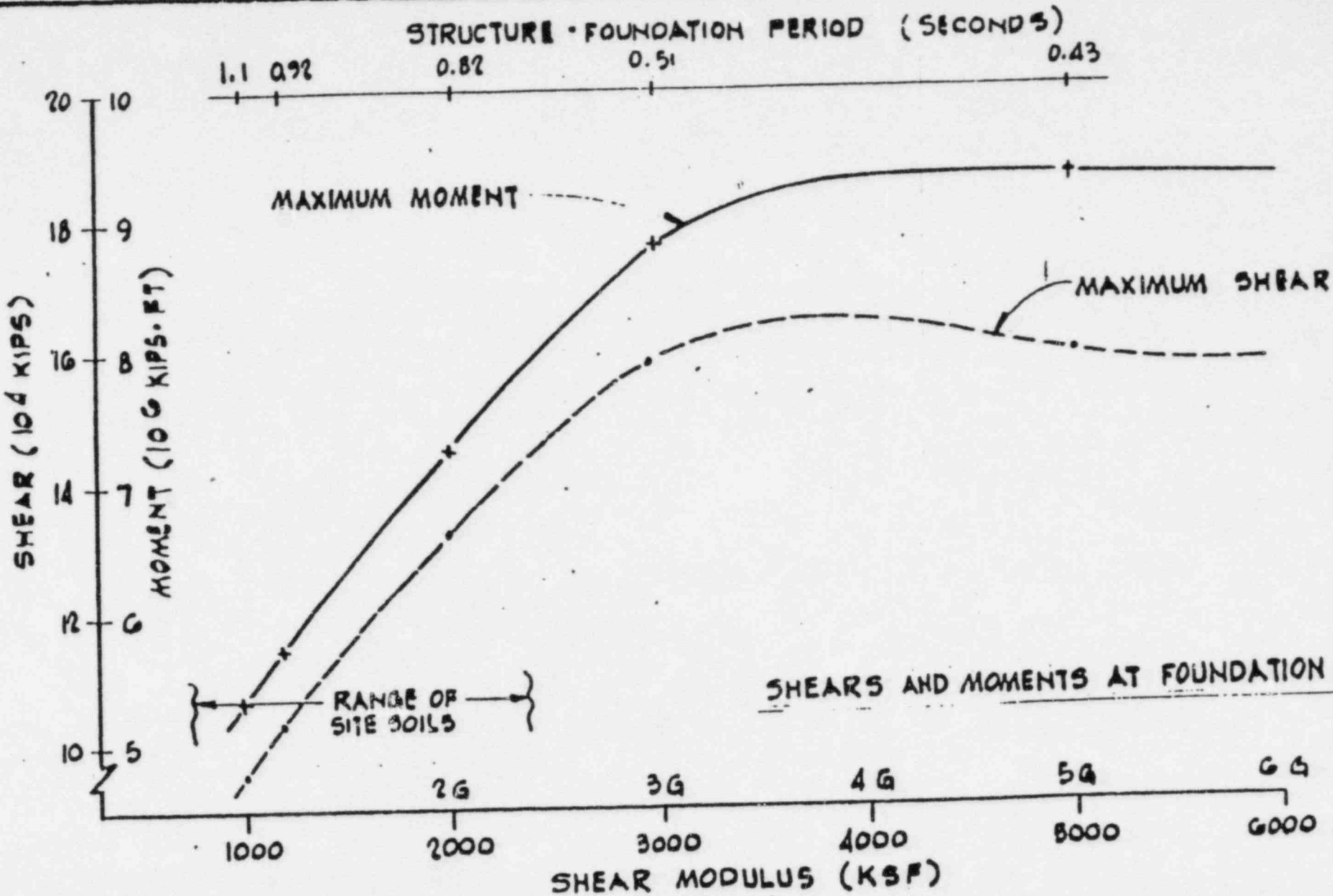
NOTE
SHEARS AND MOMEN
INCLUDE LOAD FAC

DESIGN ENVELOPES OF M
SHEAR AND MOMENT

FIGURE

APPENDIX G

Effects of Foundation Stiffness on Dynamic Shears and Moments

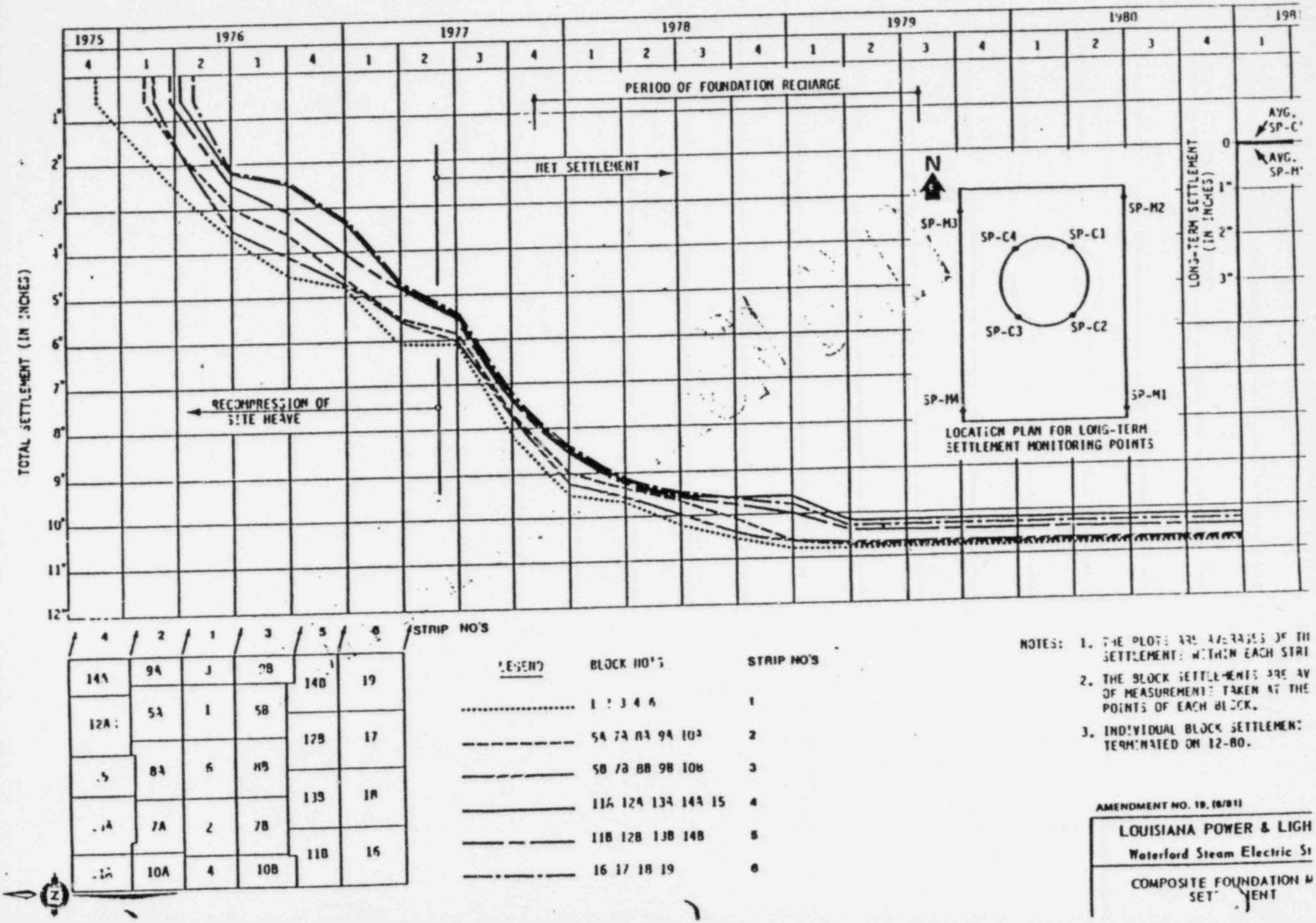


EFFECTS OF FOUNDATION STIFFNI
DYNAMIC SHEARS AND MOME

APPENDIX J

Composite Foundation Mat

Settlement



NOTES:
1. THE PLOTS ARE AVERAGES OF TH SETTLEMENT WITHIN EACH STRI
2. THE BLOCK SETTLEMENTS ARE AV OF MEASUREMENTS TAKEN AT THE POINTS OF EACH BLOCK.
3. INDIVIDUAL BLOCK SETTLEMENT TERMINATED ON 12-80.

AMENDMENT NO. 19, (8/81)

LOUISIANA POWER & LIGH
Waterford Steam Electric St

COMPOSITE FOUNDATION M
SET ENT

APPENDIX K

Crack Width Calculation

169 KINDERKAMACK ROAD, PARK RIDGE, N. J. 07656

C- 1 - 2 - 1
SUBJ. SUBDIV. SHEET

PROJECT WATERFORD 3 SES
CLIENT LP&L
SUBJECT CRACK WIDTH

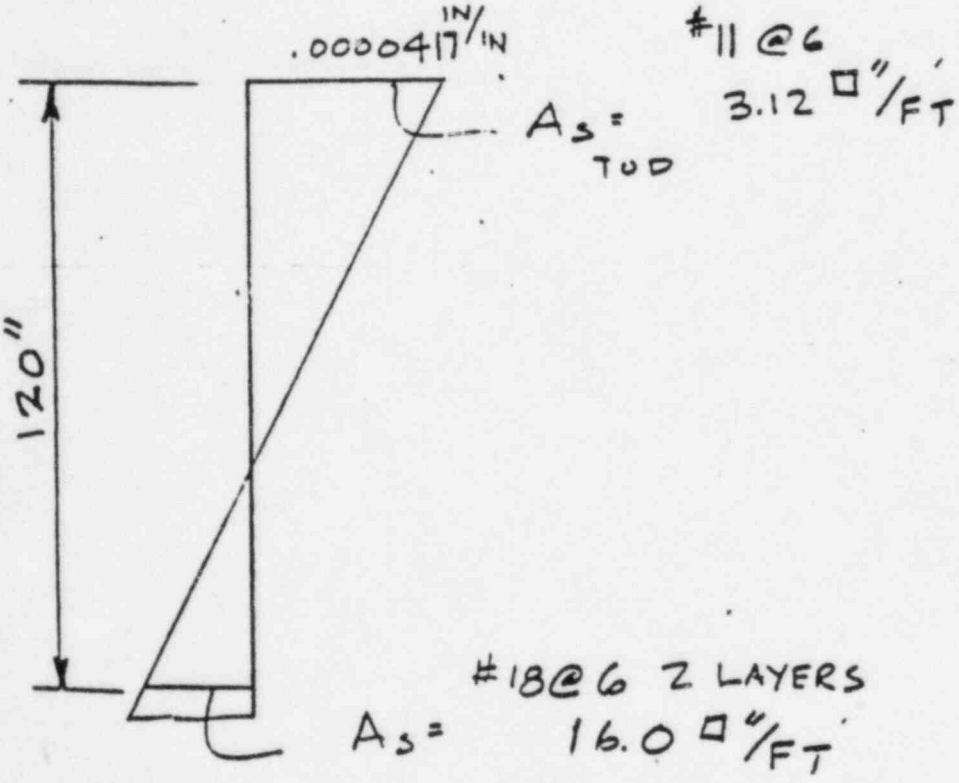
PREP. BY GH DATE 9-12-83
CHCKD. BY [illegible] DATE [illegible]

CRACK SPACING ≥ 10 FT RCB
CONSERVATISM USE 10 FT

CRACKS FOR 2 TO 5 MILS IN WIDTH
CONSERVATISM USE 5 MILS

$$\epsilon = \frac{.005}{120} = 0.0000417$$

$$\sigma_{STEEL} = 29 \times 10^6 (40 \times 10^{-6}) = 1208 \text{ PSI}$$



NEGLECT CONCRETE IN TENSION & COMPRESSION
REASONABLE SINCE BOTT STL >> TOP STL

HEA .08

BOTT $\varepsilon = .00004^{17}\left(\frac{3.12}{16.0}\right) = 0.00000813$

ANGLE CHANGE PER INCH

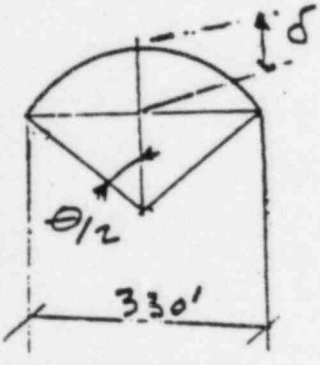
$$\phi = \frac{.00004^{17} \; .00000813}{120} = {}^{IN}/_{IN}/_{IN}$$

$$= 0.413 \times 10^{-6} = {}^{1}/_{IN}$$

TOTAL ANGLE CHANGE IF CONSTANT OVER ENTIRE LENGTH OF MAT

$$\theta = 330(12)\,\phi = 0.001634 \text{ RAD}$$

$$= 0.0907565$$



$$\sin\frac{\theta}{2} = \frac{\frac{330}{2}}{R}$$

$$R = \frac{165(12)}{\sin(.0453783)} = 2.42424269 \times 10^{6}$$

$$R\cos(.0453783^{\circ}) = 2.42424189 \times 10^{6} \text{ "}$$

$$\delta = R - R\cos(.0453783) = 0.81 \text{ "}$$

APPENDIX L

Steel Containment Stability Calculation

EA HANSTEAD ENGINEERING ASSOCIATES INC.
169 KINDERKAMACK ROAD. PARK RIDGE, N. J. 07656

C-1 - 1 - 1
SUBJ. SUBDIV. SHEET

PROJECT W3 - MAT
CLIENT LOUISIANA POWER & LIGHT
SUBJECT STEEL CONTAINMENT STABILITY

PREP. BY AdB DATE 08/05/83
CHCKD. BY GH DATE 9/08/83

INTRODUCTION

THIS CALCULATION COMPUTES THE SAFETY FACTOR AGAINST TIPPING OF THE STEEL CONTAINMENT SHOWN ON BECHTEL DRAWING LOU-1564-G-817, REV. 13, DATED 02/03/83 (REFERENCE 1).

THE STABILITY OF THE STEEL CONTAINMENT/SHIELD BUILDING WITH RESPECT TO THE TOP OF THE MAT IS ALSO CALCULATED.

ADDITIONAL INFORMATION IS ACCESSED FROM BECHTEL CALCULATION ENTITLED 'STEEL CONTAINMENT STABILITY, DFS NO. 1352-063, DEPT. NO. 650, DATED 05/10/83, 7 PP. (REFERENCE 2).

AT A MEETING HELD AT BECHTEL'S OFFICE ON 07/27/83 IT WAS AGREED THAT THE MAGNITUDES OF THE E-W DIR ACCELERATIONS TABULATED ON PAGE 5 OF THE REFERENCE 2 CALCULATION WOULD BE MULTIPLIED BY $\sqrt{2}$ AS A CONSERVATIVE ROUND TO THE SIZE OF THE E-W AND N-S HORIZONTAL RESPONSE SPECTRA.

FROM P.4 OF THE REF. 2 SDASCO CALCULATION, THE SHEAR AND BENDING MOMENT DUE TO E-W DLE AT EL -1.5 IS:

$$F = 12551 \text{ k}$$

$$M = 659032 \text{ k-ft}$$

MULTIPLYING BY $\sqrt{2}$ AS A CONSERVATIVE UPPER BOUND TO THE SUM OF E-W AND N-S DLE:

$$F = \sqrt{2} \times 12551 = 17750 \text{ k}$$

$$M = \sqrt{2} \times 466009 = 659032 \text{ k-ft}$$

ESTABLISHING THE ELEVATION OF POINT 'ℓ' ON THE SKETCH:

$$\text{EL. } '\ell' = 105' \times \cos 40^\circ - 7.50'$$

$$= \text{EL. } 72.9'$$

COMPUTING THE STATICALLY EQUIVALENT MOMENT @ EL. 'ℓ':

$$M_\ell = 659032 - 17750 \times (72.9 + 1.5)$$

$$= -661568 \text{ (CCW SENSE)}.$$

EA 169 KINDERKAMACK ROAD, PARK RIDGE, N. J. 07656

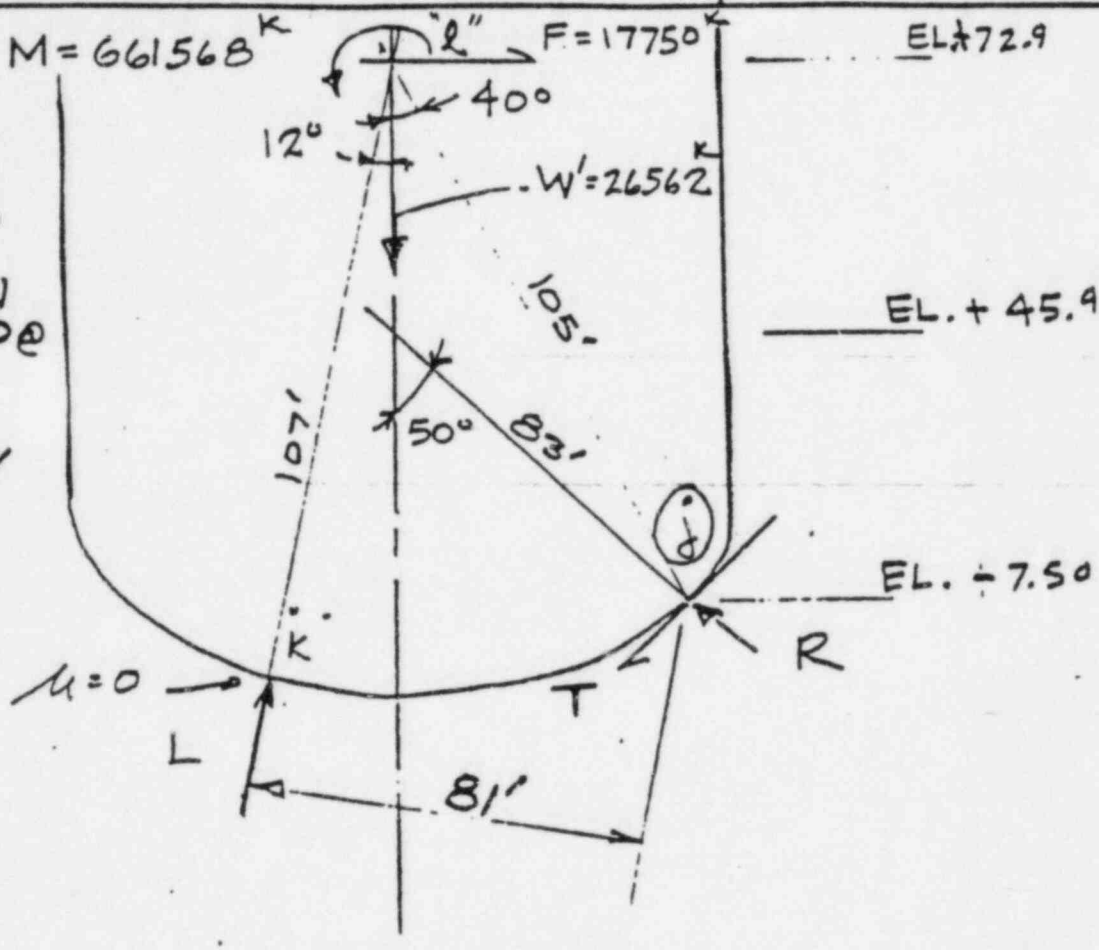
C- 1 - 1 - ÷
SUBJ. SUBDIV. SHEET

PROJECT W3 - MAT
CLIENT L P & L
SUBJECT STABILITY

PREP. BY GH DATE 8/5/83
CHCKD. BY ADL DATE 8/08/83

IF STEEL VESSEL WAS MOVED HORIZ. WITHOUT TIPPING, TWO POINTS OF CONTACT CAN BE IDEALIZED @ "j" & "K".

PT K is CONSERVATIVELY ASSUMED AS FRICTIONLESS



① $\Sigma M_j = -M + 81L + F\cos 40°(105) - W\sin 40°(105) = 0$

$-661568 + 81L + 1{,}427{,}715 - 1{,}792{,}741 = 0$

$L = 12674$

② $\Sigma V = W' - L\cos 12° - R\cos 50° + T\sin 50°$

$26562 - 12675(.9781) - R(.6428) + T(.766) = 0$

$14164 - .6428R + .766T = 0$ ②'

③ $\Sigma H = F + L\sin 12° - R\sin 50° - T\cos 50° = 0$

$17750 + (12675)(.2079) - .766R + .6428T = 0$

$20385 - .766R - .6428T = 0$ ③'

$14164 - .6428R + .766T = 0$ (2)'

$20385 - .766R - .6428T = 0$ (3)'

(2)'$\left(\frac{.6428}{.766}\right)$ $11886 - .5394R + .6428T = 0$ (2)''

(2)'' + (3)' $32271 - 1.3054R = 0$

$R = 24721^{k}$

R INTO (2)'

$14164 - 15890 + .766T = 0$

$T = +2254$ $\mu = \frac{2254}{24721} = .09 < 0.7$

∴ VESSEL IS HORIZONTALLY STABLE, TIPPING OCCURS WHEN L=0

FIND $K(M + 80.43F)$ FOR $L = 0$ IN (1)

$$K = \frac{1,792,741}{(1427715 - 661568)} = 2.34$$

INCREASE F IN EQ (3)

(3)'' $2.34(17750) - R(.766) - T(.6428) = 0$

$41534 - .766R - .6428T = 0$

(2) $26562 - .6428R + .766T = 0$

(3)''' $49494 - .9128R - 766T = 0$

(2) + (3)''' $76056 - 1.5556R = 0$

$R = 48892$

(2) $26562 - 31422 + .766T = 0$

$T = +6346$

IF K=2.34 TIPPING STARTS
STILL NO SLIDING SINCE $\frac{T}{F} = \frac{6346}{48892} = .13 < 0.7$

NEXT CALCULATE THE FACTORS OF SAFETY AGAINST UPLIFT, SLIDING AND OVERTURNING AT TOP OF MAT, AT EL -35.0 FT. CALCULATE THE ADDITIONAL SHEAR AND MOMENT DUE TO DLE ACTING ON SHIELD BUILDING. (SEE PP. 2, 5 & 6 OF REF. 2 CALC).

PT.	WEIGHT (K)	E-W DLE (G)	FORCE (K)	√2* x FORCE (K)	ELEV (FT)	ELEV+35.0 (FT)	M @ TOP MAT (K FT)
1	7010	0.494021	3463.09	4898	200.13	235.1	1,151,520
2	4959	0.453282	2247.83	3179	172.4	207.4	659,325
3	4312	0.422525	1824.46	2580	150.7	185.7	479,106
4	4104	0.394001	1616.98	2287	131.0	166.0	379,642
5	4446	0.364952	1622.52	2295	111.0	146.0	335,070
6	6242	0.329367	2055.91	2907	86.0	121.0	351,747
7	4446	0.295310	1312.95	1857	61.0	96.0	178,272
8	4104	0.270141	1108.66	1568	41.0	76.0	119,168
9	5301	0.245203	1299.22	1838	19.0	54.0	99,252
10	2822	0.226192	638.31	903	0.0	35.0	31,605
11	10173	0.210660	2143.04	3031	-18.0	17.0	51,527
			Σ:	27343.		Σ:	3,836,234

* SRSS (CONSERVATIVE) OF E-W & N-S DLE

FROM P.4 OF THE REF. 2 CALC,

F = √2 x 12551 = 17750 K

M @ EL-1.5 = √2 x 466008.6 = 659036 K FT

TRANSFERRING THIS MOMENT TO TOP OF MAT:

M @ TOP MAT = 659036 + 17750 x (35 - 1.5)
= 1,253,661 K FT

THE TOTAL SHEAR AND MOMENT ACTING AT THE TOP OF THE MAT IS :.

$$F = 17750 + 27343$$
$$= 45093 \text{ K}$$

$$M = 3,830,234 + 1,253,661$$
$$= 5089895 \text{ K FT}$$

THE BUOYANT PRESSURE AT THE TOP OF THE MAT IS :

$$p = \gamma h = 0.0624(35.00 - 1.50)$$
$$= 2.09 \text{ KSF}$$

THE TOTAL BUOYANT FORCE IS

$$B = 2.09 \times \pi \times 77^2$$
$$= 38729 \text{ K}$$

FROM P. 3 OF THE REF. 2 CALC, THE TOTAL VOLUME OF CONCRETE IS 35218 CY. FROM P. 4 OF THE REF. 2 CALC, THE TOTAL WEIGHT OF STEEL IS 9007 K.

THE TOTAL DEAD WEIGHT IS :.

$$W = 35218 \times 27 \times 0.150 + 9007$$
$$= 151640 \text{ K}$$

FACTOR OF SAFETY AGAINST UPLIFT*

$$= \frac{(1.0 - 0.17) \times 151640}{38729}$$

$$= 3.23$$

* BUOYANT FORCE NOT REDUCED BY VERTICAL DEE

FACTOR OF SAFETY AGAINST SLIDING*

$$= \frac{[0.83 \times 151640 - 38929] \times 0.7}{45093}$$

$$= 1.35$$

COMPUTE THE FACTOR OF SAFETY AGAINST OVERTURNING*

RIGHTING MOMENT = $(0.83 \times 151640 - 38929) \times 77$

$$= 6.694 \times 86 \cdot KFT$$

FACTOR OF SAFETY AGAINST OVERTURNING

$$= \frac{6.694\ 86}{5.090\ 86}$$

$$= 1.32$$

* BUOYANT FORCE NOT REDUCED BY VERTICAL DLD.

05/22/84

Received 5/9/84

EVALUATION OF CONCRETE IN THE BASEMAT
WATERFORD UNIT NO. 3

In one paragraph or less a sentence — Explain how you were brought in on this project, and the scope of your review. Also, indicate that construction records were considered while loading conditions were not considered.

Robert E. Philleo, Consulting Engineer

It is apparent that there were several violations of specification requirements during the placing of the basemat. The purpose of this report is not to document specification violations but to evaluate their effect on the structural integrity and safety of the mat. It is based primarily on observations of the first three blocks placed (Blocks 6, 1, and 2). There were sufficient violations on these three blocks to cause a stop-work order to be issued. By the time work was resumed, control and supervision had been tightened.

this is unclear ① what is based on these observations? ② whose observations? LP&L people, NRC inspectors your own documentation review? Explain this

Non-conformance with specifications were noted in the following areas

a. Air content outside permitted range
b. Slump outside permitted range
c. Concrete accepted when too long a period had elapsed after adding cement to water
d. Inadequate mixing after adding retempering water
e. Too many mixer revolutions permitted
f. Number of mixer revolutions not recorded
g. Discrepancy in records of added water
h. Discrepancy in air content readings
i. Error in recording time of batching or discharging
j. Use of an unapproved concrete mix design
k. Deficiencies in curing in maintenance of both moisture and temperature
l. Concrete dropped vertically more than 5 feet
m. A variety of irregularities in Cadweld inspection including inspections before inspectors were certified, missing records, discrepancies in inspector initials, and activity by inspectors before eye examinations were on file
n. Waterstop inspectors not certified
o. Vertical cracks and rock pockets in vertical surfaces of hardened blocks
p. Incorrect testing frequency
q. Incorrect placement practices
r. Irregularities in placing and handling reinforcing steel

The impact of each is discussed below.

a. AIR CONTENT OUTSIDE PERMITTED RANGE

Probably the largest number of specification violations were concerned with air content measurements. For the 1-inch maximum aggregate size concrete used in the mat the specifications mandated that the air content should be between 3.5 and 6.5%. While entrained air improves workability in all concrete, it is actually needed only in those concretes exposed to freezing in a saturated condition. In the basemat, which will not be exposed to freezing, quality of concrete does not depend on the air content unless the air content becomes excessively high, in which case strength, density, and permeability are adversely affected. Most of the non-conforming air contents were on the low side. The highest value for which concrete was accepted was 7.0%. This half percent extra air has a negligible effect on structural integrity; the low air contents have no effect.

normally

NOTE- THERE WAS AN ICE STORM LAST YEAR, WASN'T THERE?

b. SLUMP OUTSIDE PERMITTED RANGE

Single-batch limits for slump were a minimum of 1 inch and a maximum of 5 inches. Portions of batches with slumps as high as 6.5 inches were placed. After the slump had been determined, the remainder of each non-conforming batch was rejected. It is likely that some untested batches with a slump this high were placed completely. The concrete was proportioned somewhat below the required water-cement ratio so that there was some leeway in adding retempering water. Thus, even in the high-slump batches it is unlikely that the maximum water-cement ratio was exceeded. Since the actual average strength exceeded the design strength of 4000 psi by a large margin (6128 psi in the case of Block 6 where the highest slumps were recorded), some violations of the limiting value could be tolerated without adverse effect. The mat has no adverse environmental exposure. High slump has a greater effect on placeability of the concrete than on its ultimate quality. Thus, the structural integrity of the mat was not impaired by inclusion of small amounts of moderately high-slump concrete. The inspection personnel are to be commended for diligently rejecting parts of batches of concrete after it was discovered that the slump was out of specification limits.

Do we know how much may have occurred and whether it exceeded the tolerance level? We should say something here about the fact likely to have been exceeded, if that's true.

c. CONCRETE ACCEPTED WHEN TOO LONG A PERIOD HAD ELAPSED AFTER ADDING CEMENT TO WATER

The specifications required discharge of the concrete within 60 minutes after the cement and water were combined although, with the approval of the engineer, the time could be extended to as long as 90 minutes. Later the requirement was changed to permit discharge up to 70 minutes if emptying a truck was started within 60 minutes. The concrete is usable as long as it remains workable. The rigid time limit is established at a conservative level in order to provide design information to the concrete supplier in designing the concrete plant and scheduling operations and to provide an easily enforced specification requirement to simplify inspection and acceptance. The two biggest violations noted on the first three blocks were 95 minutes and 71 minutes. It was reported that the concrete was still workable. Thus,

there was no adverse effect on structural integrity.

d. INADEQUATE MIXING AFTER ADDING RETEMPERING WATER AT SITE

The specifications required 30 revolutions of the drum after water is added at the site. On Block 6 there were 8 batches on which the number of revolutions varied from 1 to 28. The value of 1 may be an error in recording since it is unlikely that a mixer would be started and stopped after one revolution. Some of these 8 batches, however, probably had greater within-batch variability than desired since it is unlikely that the added water became uniformly distributed. The vibration of concrete during placing tends to remove some of this variability. The surplus strength tolerates some variability. It is unlikely that there was any significant deleterious effect on the integrity of the mat.

e. TOO MANY MIXER REVOLUTIONS PERMITTED

The specifications limited each batch to 300 revolutions. Again, the workability of the concrete is the important factor. The arbitrary limit on revolutions is for the purpose of guidance to the concrete producer and simplification of specification enforcement. Two cubic yards were placed from the only truck in which overmixing was documented. The rest was rejected. The concrete accepted had been in the mixer only 35 minutes and was probably satisfactory. There should be no impact on structural integrity or safety.

f. NUMBER OF MIXER REVOLUTIONS NOT RECORDED

During the first day's placement in the mat there were 9 batches for which the numbers of revolutions of the mixer drums were not documented. In addition one batch was shown as being rejected on the batch record but accepted on the pump discharge record. Apparently there was some problem getting the records system in place. While this breakdown in record keeping is serious and formed part of the justification for the stop-work order, the concrete had been in the mixer a reasonable period of time and had a reasonable slump. Fortunately, the winter weather is not conducive to premature stiffening. It is unlikely that there was any adverse effect on structural integrity.

g. DISCREPANCY IN RECORDS OF ADDED WATER

For one batch on the first day of placement the truck discharge record and pump discharge record show different quantities of added water. This again demonstrates inadequate record keeping, but since both figures were within the allowable limit, there was no adverse effect on structural integrity.

h. DISCREPANCY IN AIR CONTENT READINGS

For one batch on the first day of placement, air content was measured as 2.5% at the truck discharge and 4.8% at the pump discharge. For another the results were 3.3 and 3.9% respectively. This apparent increase is an unlikely occurence. Since either result produces satisfactory concrete for the application, although the first is outside the specification limit, the integrity of the concrete is unimpaired.

i. ERROR IN RECORDING TIME OF BATCHING OR DISCHARGING

One truck on the first day of placement was recorded as discharging 21 minutes before leaving the plant. One time was obviously in error. Since the concrete was satisfactory and the truck was in a sequence of trucks for which the batching and discharge times were reasonable, the concrete was accepted with no detrimental effect on the integrity of the structure.

j. USE OF AN UNAPPROVED CONCRETE MIX DESIGN

There are documented cases of mixes being adjusted and used before formal approval was received. Adjustments were made to improve workability. The only alleged such violation during placing of the first three blocks was one in which incorrect batch weights were cited; they were not adjusted for moisture in the aggregates. The adjusted weights conformed to an approved mix within permitted tolerances. There was, thus, no impact on structural integrity.

k. DEFICIENCIES IN CURING

Curing is particularly important in thin structures of concrete since they can dry out quickly and lose so much water that hydration of cement stops before the required strength is achieved. In a 12-foot thick mat losing moisture only from the top surface, all but the top 3 or 4 inches will maintain sufficient moisture to gain adequate strength even if there is no moist curing. Such structures should be cured so that the top surface, which receives all the wear, will be durable and resistant to abrasion. Otherwise, there may be maintenance and operations problems if not safety problems. The maintenace of a temperature of 50F for 7 days is important for thin structural members whose support is to be removed early. In a 12-foot mass hydration of cement generates large amounts of heat, which raise the temperature far above levels needed for adequate strength gain. Cooling the top surface would actually be a good procedure for removing heat from the mass rapidly in order to minimize thermal cracking. Thus, the one documented example of a curing temperature of 37F had, if anything, a favorable effect on safety. The few cases in which moist curing could not be verified throughout the required time period had no effect on safety and probably a minimum effect on operation and maintenance problems since ambient weather conditions were not conducive to rapid drying.

l. CONCRETE DROPPED VERTICALLY MORE THAN 5 FEET

This requirement is intended primarily for dry large-aggregate concrete to prevent segregation which might occur when the large particles roll away from the rest of the concrete. It is much less important for 1-inch maximum size aggregate concrete of a consistency capable of being pumped. The few violations should have no effect on structural integrity.

m. IRREGULARITIES IN CADWELD INSPECTION

It is apparent that there was an administrative breakdown in the operation of the Cadweld inspection process. Such items as permitting inspectors to function before they were certified, discrepancies in initials, failure to have eye examinations on file, and incomplete records were noted. However, no significant number of deficient welds were noted in the basemat. Since all inspectors were ultimately found to be qualified, there appears to have been no technical breakdown paralleling the administrative breakdown. Safety does not appear to be an issue.

Is this true?

n. WATERSTOP INSPECTORS NOT CERTIFIED

Waterstops do not contribute to the safety of the basemat. For operational convenience they should be intact. In addition to administrative certificate problems there were technical problems in placing concrete around the waterstops. Since waterstops are in formed surfaces, the first half of each installation is subject to 100% inspection. All observed deficiencies were repaired. It cannot be said with complete assurance that the second half of each installation was carried out successfully since it is buried in concrete and cannot be inspected. It may be assumed that after first half troubles placing crews are more sensitive to the necessity of careful placing techniques during the second half. After several years under hydrostatic head there are no known waterstop failures. There is no safety issue and probably no operational issue.

o. VERTICAL CRACKS AND ROCK POCKETS IN VERTICAL SURFACES OF HARDENED BLOCKS

The vertical cracks which formed early cannot be said to have resulted from a violation of specification requirements. They resulted from thermal contraction when the surface was put into tension as a result of a much higher temperature in the interior, which is produced by cement hydration. They were shallow and were successfully eliminated by jackhammers. Rock pockets are the result of inadequate consolidation adjacent to forms. They were properly patched. Neither phenemenom impacts safety.

p. INCORRECT TESTING FREQUENCY

Certain tests had a required frequency of once every 50 cubic yards, and some had a frequency of once every 150 cubic yards. The interpretation of records auditors was that no more than 50 (or 150) cubic yards should be placed between consecutive tests. When such was the case, a deficiency was noted. The most enlightened specification enforcement requires sampling on a random basis with the average rate equal to the specified rate but with considerable variation in the intervals between tests. Such a procedure eliminates judgment on the part of the inspector in selecting batches for sampling, eliminates any effect which may be occuring with a fixed frequency, and makes it impossible for the producer to anticipate when samples will be taken. The correct numbers of samples were taken on an overall basis. The fact that some intervals between samples exceeded the average specified interval should not be interpreted as a violation of the specifications.

Didn't LPPL's method eliminate this protection? If so why isn't this discussed and resolved?

q. INCORRECT PLACING PRACTICES

The approved placing procedure required the establishment and maintenance of steps of concrete throughout each placement and the vertical insertion of vibrators at intervals of about 2 feet. Both were violated. The step placement is intended to minimize the area of exposed concrete and thus to minimize the probability of cold joints. The vibrator technique is intended to minimize the occurence of internal voids. Because the first three blocks were placed in the winter, the cold joint hazard was minimal and the necessity for maintaining the step placement relatively unimportant. Proper vibrator technique is more important. However, concrete of pumpable consistency with a maximum aggregate size of 1 inch is very easy to place with relatively little vibration. The fact that rock pockets were evident on formed surfaces does not necessarily infer that internal voids are present. Formed surfaces, particularily in corners and around keyways, present special problems which frequently are not well handled by inexperienced crews. The reluctance to get the vibrator too close to the form (the specifications specifically prohibited hitting the forms with the vibrator spud) causes incomplete consolidation at the form. Available construction photographs demonstrate the wide open forms with plenty of space between reinforcing bars, conditions which make for easy placing. While ~~for~~ cannot be said with assurance that the mat is free of internal voids, the very workable concrete and the number of vibrators in use make voids unlikely. A few small voids would have little effect on the performance of the mat. There should be no safety problem attributable to placing practices.

what were the weather conditions?

mean

totally

stet

the existence presumes voids, and especially the existence of significant

r. IRREGULARITIES IN PLACING AND HANDLING REINFORCING STEEL

Throughout the mat construction there were cases of nicks or bends in bars or misplaced bars. Except for minor nicks, adequate corrections were made. The only item noted during the first three blocks was an incident when a bar was struck by a sledgehammer to make room for a concrete-placing elephant trunk. The blows vibrated previously placed concrete. This was a single occurrence. Thereafter provision was made

state the safety significance of this occurrence.

during placing of steel for insertion of elephant trunks. Mishandling of steel had no significant effect on structural integrity of the mat.

Add paragraph to conclusion re ① concrete strength meets design intent, ② no significant voids, ③ no significant cold joints; and ④ remaining question is whether the concrete design is adequate in view of the actual loading to be addressed in another Staff report (Mat's)

CONCLUSION

The construction of the basemat was adequate to insure the safety of the structure. While there were several violations of specification requirements or missing records, none were of a nature which would impair structural integrity. Most of the violations or omissions pertained to provisions intended to preserve the workability of the concrete, such as air content, slump, temperature, age of concrete at time of discharge, and number of revolutions of the mixer drum. Because the mat was placed during the winter and early spring when workability problems are not critical and because a large part of the concrete was passed through pumps, which constitute a good inspection tool for assessing workability, the lack of documentation of some of the backup workability data is relatively unimportant. For the same reason the concrete was easy to consolidate, and departure from ideal placing procedures should not prove significant. Failure to document moist curing is not significant because of the massiveness of the structure; and the occasional failure to maintain the required curing temperature was probably an advantage in removing heat from the structure. Irregularities in Cadweld inspection were administrative rather than technical, and errors in handling reinforcing steel were inconsequential. Waterstop problems apparently were adequately dealt with; but in any event they do not affect safety.

While more attention might have been paid to controlling temperature stresses resulting from cement hydration, there is sufficient reinforcing steel in the mat to prevent safety-related problems associated with thermal cracking.

Denny- I sense a danger here. If we're relying on the rebar for this type of crack, as well as for flexure and shear stress, have all these factors been considered as a whole to judge whether the mat's capacity is adequate?

May 8, 1984

-7-

Also, at our meeting on 5/10, Phillips said that the thermal cracks may, possibly, go all the way through the mat. Why does this report try so hard to paint a rosy picture, with that possibility lurking in the mat? If the answer is "because that's outside the scope of the review", how become the last paragraph was inserted here? Also, Phillips said that ACI believes water cannot contribute to cracking in a mass [illegible]