

DESIGN CALCULATION APPROVAL SHEET

ENRICO FERMI UNIT 2

DC No. 886 Rev. A

PIS No. Y13-01

No. of Pages 147

Title SLOPE STABILITY ANALYSES OF THE SHORE BARRIER

Description of Revision 1-Documentation of soil characteristics,
2-Translatory slide check, 3-effect of phreatic surface and perched water.

Assigned Engineer M. L. Hunter *MLH* Date 7/10/81

Second Engineer J. R. Decator, P.E. *RPD* Date 10 July 81

Approved by:
Supervising Engineer W. M. Street, P.E. *WMS* Date 7-10-81

WM Street

/jj

SLOPE STABILITY ANALYSIS
OF THE
SHORE BARRIER
ENRICO FERMI ATOMIC POWER PLANT UNIT 2
JUNE, 1981

INDEX

| | Page |
|--|------|
| Statement of Problem | 1 |
| Assumptions | 2 |
| Method of Analysis | 3 |
| Soil Description | 4 |
| Analysis | 7 |
| Summary of Analysis | 27 |
| Conclusion | 31 |
| Appendix A - Soil Borings | 32 |
| Appendix B - Troxler Test Results for Clay Seal | 39 |
| Appendix C - CBF Test Results for Clay Seal | 71 |
| Appendix D - Unconfined Compression Test Results at Elevation 568 Ft. | 80 |
| Appendix E - Unconfined Compression Test Results at Elevation 562 Ft. | 114 |
| Appendix F - EF-2 FSAR, Vaolum 1, Table 2.5-5 | 138 |
| Appendix G - Sliding Wedge Analysis | 139 |
| References | 147 |

STATEMENT OF PROBLEM

To perform a stability analysis to determine the factor of safety against sliding for the shore barrier for the Enrico Fermi Atomic Power Plant Unit 2.

ASSUMPTIONS

For the shore barrier under consideration, the following assumptions were made in the performance of the stability analysis:

1. The failure surface of the shore barrier will be in the form of a circular arc. Alternative failure surfaces can occur. These will be investigated in separate cases in the report.
2. The load due to seismic excitation is assumed to be horizontal and equal to 15% of the weight of the soil above the failure surface. This represents the peak ground motion at the site.
3. The minimum factor of safety for a slope stability failure is assumed at 1.50. The term "factor of safety" of a slope represents an index of stability with regards to a sudden failure. The ratio of the potential resisting forces to the forces tending to cause movement is determined for innumerable potential failure surfaces. The factor of safety of the slope as a whole, is the one for which the computed ratio is a minimum.

The seismic event has a low probability of occurrence and therefore should not require higher factor of safety than that used in standard practice.

4. The Fellenius and Bishop Methods are assumed applicable to this soil cross-section for analysis.
5. The strength of the sheet piling in resisting stability failures has not been included.
6. A small local surface stone stability failure is not considered significant.

METHOD OF ANALYSIS

The slope stability analysis was performed using the SLOPE subsystem of Integrated Civil Engineering System (ICES), available through McDonnell Douglas Automation Company.

The SLOPE subsystem utilizes the theory of equilibrium forces to determine the factor of safety against sliding of any embankment. Three alternative methods of analysis are available, two of which were used in this analysis:

1. Fellenius Method:

Under this method, the factor of safety is estimated for a circular failure arc, with the assumption that the resultant of all forces on the sides of a slice acts parallel to the bottom of the slice.

2. Bishop Method:

Under this method, the factor of safety is estimated for a circular failure arc, with the assumption that the resultant of all forces on the sides of a slice acts horizontally.

As a check against the rotational slide analyses described above, a sliding wedge analysis was performed to check against a translatory slide. This analysis is presented entirely in Appendix G, Pages 139 through 146, of this report.

SOIL DESCRIPTION

The characteristics of the soils follow:

SOIL 1: Very Loose Gray, Silty, Fine Sand.

The soil description is based upon boring log nos. 11, 16, 49 and 54, included as Appendix A. The standard penetration number for this sand was generally found to be less than 2. Therefore, density and the angle of internal friction are assumed to be 80 pounds/cubic foot and 25 degrees, respectively.

SOIL 2: Stone Blanket.

The stone blanket consists of varieties of stone shown on Detroit Edison drawing 6C721-40. The void ratio in the large stones is assumed to be 40%, and in the smaller stones is assumed at 25%. Density of stone is assumed to be 150 pcf. The two types of stone are averaged for the combined properties.

$$\text{Stone}_1; (1-.4) (150) = 90$$

$$\text{Stone}_2; (1-.25) (150) = 112.5$$

$$\text{Average} = 101.5 \text{ use } \underline{100 \text{ pcf}}$$

The angle of internal friction is usually high for stone; therefore, 40° is assumed. Cohesion in stones is assumed to be zero.

SOIL 3: Clay Seal Layer.

Properties of the clay seal layer are indicated by Troxler test results, included as Appendix B. The average in-place soil density is 120 pounds/cubic foot.

CBR tests on the clay seal layer are included as Appendix C. A conservative value for the unconfined compressive strength (q_u) of the clay seal layer of 2300 pounds/square foot was selected, along with a cohesion value (C) of 1150 pounds/square foot.

SOIL 4: Medium Brown Silty Clay.

The soil borings generally recorded a standard penetration number for the medium clay of 10. See Appendix A.

Unconfined compressive strength test results indicated a value for q_u of between 2000 psf and 3700 psf at elevation 568 feet. See Appendix D.

The unconfined compressive strength for the medium clay is assumed to be 2500 psf, and the cohesion is assumed to be 1250 psf, for this stability analysis. Soil density is assumed to be 120 pounds/cubic foot.

SOIL 5: Hard/Very Hard Brown and Gray Clay.

The soil borings generally recorded a standard penetration number for the hard-to-very-hard brown and gray clay of 30. See Appendix A.

Unconfined compressive strength test results indicated a value for q_u of between 5800 psf and 18,000 psf at elevation 562 feet, with a typical value of about 8000 psf.

The unconfined compressive strength for the hard-to-very-hard clay is assumed to be 7000 psf, and the cohesion is assumed to be 3500 psf, for this analysis. Soil density is assumed to be 130 pounds/cubic foot.

SOIL 6: Hard Gray Dolomite.

The soil borings indicated hard gray dolomite rock approximately at elevation 550 feet. See Appendix A.

FSAR Table 2.5-5 on pg. 2.5-65 indicates an average density of 152 pcf (See Appendix F). A conservative value for ultimate compressive strength is 1.0×10^6 psf, therefore, cohesion is assumed as 500,000 psf.

| SOIL # | UNIT WEIGHT (pcf) | COHESION (psf) | ANGLE OF INT. FRICTION (deg) |
|--------|----------------------|----------------|---------------------------------|
| 1 | 80 | 0 | 25 |
| 2 | 100 | 0 | 40 |
| 3 | 120 | 1150 | 0 |
| 4 | 120 | 1250 | 0 |
| 5 | 130 | 3500 | 0 |
| 6 | 152 | 500,000 | 0 |

FIGURE 1
SOIL DATA SUMMARY

ANALYSIS

- Case 1: A grid covering a large area was chosen to allow for an accurate search for a minimum safety factor. No restrictions were placed on the radius. The failure surface with the minimum factor was a small, local failure in the stone. This was not critical, so it was neglected. (Pages 8 to 11)
- Case 2: This run also possessed a large grid, and the radius was restricted to a minimum tangent to the line at elevation 567. This failure surface cut deep into the stone layer so it was not negligible. However, it did produce a safety factor greater than 1.5. (Pages 12 to 14)
- Case 3: Again a large grid was used to locate the minimum safety factor and its origin. The minimum radius was established tangent to the bottom of the stone layer (Elev. 562). This produced a failure surface through the entire stone layer. Since the safety factor for this occurrence is greater than that of Case 2, it did not govern. (Pages 15 to 18)
- Case 4: A large grid was chosen along with a minimum radius tangent to the bottom of the medium clay layer at Elevation 558. Minimum safety factors were higher than the other cases so the failure surface did not govern. (Pages 19 to 22)
- Case 5: This run is similar to Case 2 except that a phreatic surface is considered. The water table is assumed at elevation 572 ft. on the lake side of the slope and at elevation 576 ft. on the building side of the slope. (Pages 23 to 26).

MC AUTO SLOPE
RELEASE 3.1
MAY 1981

CASE 1

POINT 1 X 475 Y 572

POINT 2 530 572

POINT 3 570 572

POINT 4 592 583

POINT 5 630 583

POINT 6 640 583

POINT 7 475 567

POINT 8 549 567

POINT 9 550 562

POINT 10 581 562

POINT 11 591 567

POINT 12 603 573

POINT 13 621 573

POINT 14 640 567

POINT 15 475 558

POINT 16 640 558

POINT 17 475 550

POINT 18 640 550

LINE 1 POINT 1 POINT 2 SOIL 1

LINE 2 2 3 2

LINE 3 3 4 2

LINE 4 4 5 2

LINE 5 5 6 3

LINE 6 7 8 4

LINE 7 2 8 2

LINE 8 8 9 4

LINE 9 9 10 4

LINE 10 10 11 4

LINE 11 11 12 3

LINE 12 12 13 3

LINE 13 13 5 3

LINE 14 11 14 4

LINE 15 15 16 5

LINE 16 17 18 6

SOIL 1 DENSITY 80 COHESION 0 PHI 25 RU 0

SOIL 2 100 0 40 0

SOIL 3 120 1150 0 0

SOIL 4 150 1250 0 0

SOIL 5 150 3500 0 0

SOIL 6 152 500000 0 0

NUMBER OF SLICES 100

GRID 1 X 545 Y 658 2 X 560 Y 598 3 X 585 Y 598 4 5 EAR .15

SOIL PROFILE FOLLOWS.

| X-LEFT | Y-LEFT | X-RIGHT | Y-RIGHT | SLOPE | PT | PT | SOIL |
|--------|--------|---------|---------|--------|----|----|------|
| 475.00 | 572.00 | 530.00 | 572.00 | 0.0 | 1 | 2 | 1 |
| 550.00 | 572.00 | 570.00 | 572.00 | 0.0 | 2 | 3 | 2 |
| 570.00 | 572.00 | 592.00 | 583.00 | 0.500 | 3 | 4 | 2 |
| 592.00 | 583.00 | 630.00 | 583.00 | 0.0 | 4 | 5 | 2 |
| 630.00 | 583.00 | 640.00 | 583.00 | 0.0 | 5 | 6 | 3 |
| 640.00 | 583.00 | 549.00 | 567.00 | 0.0 | 6 | 7 | 4 |
| 549.00 | 567.00 | 550.00 | 550.00 | 5.000 | 7 | 8 | 4 |
| 549.00 | 567.00 | 550.00 | 562.00 | -5.000 | 8 | 9 | 4 |
| 550.00 | 567.00 | 581.00 | 562.00 | 0.0 | 9 | 10 | 4 |

| | | | | | | | |
|--------|--------|--------|--------|-------|----|----|---|
| 603.00 | 573.00 | 543.00 | 513.00 | 0.0 | 12 | 13 | |
| 621.00 | 573.00 | 530.00 | 503.00 | 1.111 | 13 | 5 | |
| 591.00 | 567.00 | 540.00 | 507.00 | 0.0 | 11 | 14 | 4 |
| 475.00 | 558.00 | 540.00 | 558.00 | 0.0 | 15 | 16 | 5 |
| 475.00 | 550.00 | 540.00 | 550.00 | 0.0 | 17 | 18 | 6 |

NUMBER OF LINKS ON THE TOPLINE EQUAL 5

THE BISHOP METHOD WILL NOT CONVERGE AT R = 91.92
 FELLENIUS METHOD =***** AT R = 91.92
 THE BISHOP METHOD WILL NOT CONVERGE AT R = 89.17
 FELLENIUS METHOD =***** AT R = 89.17
 THE BISHOP METHOD WILL NOT CONVERGE AT R = 86.41
 FELLENIUS METHOD =***** AT R = 86.41
 THE BISHOP METHOD WILL NOT CONVERGE AT R = 83.66
 FELLENIUS METHOD =***** AT R = 83.66
 THE BISHOP METHOD WILL NOT CONVERGE AT R = 80.90
 FELLENIUS METHOD =***** AT R = 80.90
 THE BISHOP METHOD WILL NOT CONVERGE AT R = 78.15
 FELLENIUS METHOD =***** AT R = 78.15
 THE BISHOP METHOD WILL NOT CONVERGE AT R = 75.39
 FELLENIUS METHOD =***** AT R = 75.39
 THE BISHOP METHOD WILL NOT CONVERGE AT R = 68.69
 FELLENIUS METHOD =***** AT R = 68.69

*** SUMMARY FACTOR OF SAFETY ***

THE 6 BY 5 GRID HAS PRODUCED 42 TRIAL CIRCLE CENTERS.

| | | | | | | | |
|-----------|---|--------|--------|--------|--------|--------|--------|
| X-COORD | = | 545.00 | 550.00 | 555.00 | 560.00 | 565.00 | 570.00 |
| Y-COORD | = | 658.00 | 658.00 | 658.00 | 658.00 | 658.00 | 658.00 |
| BISHOP | = | 2.526 | 2.205 | 1.311 | 1.472 | 1.629 | 1.848 |
| RADIUS | = | 90.73 | 88.69 | 84.82 | 82.67 | 80.77 | 79.14 |
| FELLENIUS | = | 2.410 | 2.110 | 1.362 | 1.470 | 1.628 | 1.847 |
| RADIUS | = | 90.73 | 88.69 | 84.82 | 82.67 | 80.77 | 79.14 |

| | | | | | | | |
|-----------|---|--------|--------|--------|--------|--------|--------|
| X-COORD | = | 547.50 | 552.50 | 557.50 | 562.50 | 567.50 | 572.50 |
| Y-COORD | = | 648.00 | 648.00 | 648.00 | 648.00 | 648.00 | 648.00 |
| BISHOP | = | 2.525 | 2.132 | 1.337 | 1.437 | 1.596 | 1.831 |
| RADIUS | = | 80.65 | 78.09 | 74.82 | 72.57 | 70.58 | 68.90 |
| FELLENIUS | = | 2.396 | 2.030 | 1.332 | 1.434 | 1.594 | 1.830 |
| RADIUS | = | 80.65 | 78.09 | 74.82 | 72.57 | 70.58 | 68.90 |

| | | | | | | | |
|-----------|---|--------|--------|--------|--------|--------|--------|
| X-COORD | = | 550.00 | 565.00 | 560.00 | 565.00 | 570.00 | 575.00 |
| Y-COORD | = | 638.00 | 638.00 | 638.00 | 638.00 | 638.00 | 638.00 |
| BISHOP | = | 2.519 | 2.069 | 1.308 | 1.402 | 1.558 | 1.809 |
| RADIUS | = | 70.92 | 67.69 | 64.85 | 62.54 | 60.43 | 58.67 |
| FELLENIUS | = | 2.371 | 1.955 | 1.300 | 1.397 | 1.555 | 1.807 |
| RADIUS | = | 70.92 | 67.69 | 64.85 | 62.54 | 60.43 | 58.67 |

| | | | | | | | |
|-----------|---|--------|--------|--------|--------|--------|--------|
| X-COORD | = | 552.50 | 557.50 | 562.50 | 567.50 | 572.50 | 577.50 |
| Y-COORD | = | 628.00 | 628.00 | 628.00 | 628.00 | 628.00 | 628.00 |
| BISHOP | = | 2.597 | 2.065 | 1.279 | 1.367 | 1.516 | 1.783 |
| RADIUS | = | 60.56 | 57.78 | 54.89 | 52.57 | 50.33 | 48.47 |
| FELLENIUS | = | 2.431 | 1.933 | 1.266 | 1.358 | 1.511 | 1.779 |
| RADIUS | = | 60.56 | 57.78 | 54.89 | 52.57 | 50.33 | 48.47 |

| | | | | | | | |
|-----------|---|--------|--------|--------|--------|--------|--------|
| X-COORD | = | 555.00 | 560.00 | 565.00 | 570.00 | 575.00 | 580.00 |
| Y-COORD | = | 618.00 | 618.00 | 618.00 | 618.00 | 618.00 | 618.00 |
| BISHOP | = | 2.628 | 2.008 | 1.256 | 1.330 | 1.471 | 1.750 |
| RADIUS | = | 51.28 | 47.98 | 44.95 | 42.63 | 40.31 | 38.30 |
| FELLENIUS | = | 2.119 | 1.865 | 1.235 | 1.314 | 1.461 | 1.744 |
| RADIUS | = | 51.28 | 47.98 | 44.95 | 42.63 | 40.31 | 38.30 |

| | | | | | | |
|------------|--------|--------|--------|--------|--------|--------|
| Y-COORD | 603.00 | 608.00 | 608.00 | 608.00 | 608.00 | 608.00 |
| BISHOP | 2.287 | 2.010 | 1.253 | 1.295 | 1.425 | 1.705 |
| RADIUS | 41.77 | 37.39 | 35.05 | 32.72 | 30.38 | 28.18 |
| FELLENIOUS | 2.499 | 1.853 | 1.220 | 1.267 | 1.405 | 1.697 |
| RADIUS | 41.77 | 37.39 | 35.05 | 32.72 | 30.38 | 28.18 |
| X-COORD | 560.00 | 565.00 | 570.00 | 575.00 | 580.00 | 585.00 |
| Y-COORD | 598.00 | 598.00 | 598.00 | 598.00 | 598.00 | 598.00 |
| BISHOP | 3.016 | 2.624 | 1.287 | 1.292 | 1.380 | 1.661 |
| RADIUS | 32.37 | 27.53 | 25.19 | 22.85 | 20.51 | 18.17 |
| FELLENIOUS | 2.642 | 1.840 | 1.235 | 1.238 | 1.334 | 1.631 |
| RADIUS | 32.37 | 27.53 | 25.19 | 22.85 | 20.51 | 18.17 |

1.253 IS THE MINIMUM BISHOP FACTOR OF SAFETY

AT X = 567.50 Y = 608.00 RADIUS = 35.05 EARTHQUAKE LOAD = 0.15

1.220 IS THE MINIMUM FELLENIOUS FACTOR OF SAFETY

AT X = 567.50 Y = 608.00 RADIUS = 35.05 EARTHQUAKE LOAD = 0.15

PLOT SLOPE

WARNING. NO PIEZOMETRIC SURFACE EXIST

MCDONNELL DOUGLAS AUTOMATION COMPANY

ICES SLOPE

NUMERALS INDICATE SOIL LINES
P=PIEZOMETRIC SURFACE

X=CENTER OF ARC FOR MINIMUM FACTOR OF SAFETY
-FAILURE SURFACE

603.

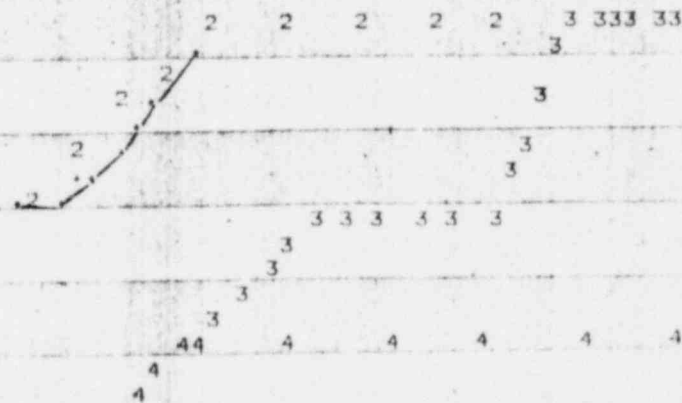
595.

588.

580.

573.

565.



558. 5

5

5

5

5

5

550. 6

6

6

6

6

6

+ 475.

+ 506.

+ 536.

+ 567.

+ 597.

+ 628.

FINISH

* R.I.P. NEWS *

* COMPLEX B TELEPHONE SERVICE INTERRUPTION *

THE MCAUTO ST. LOUIS CENTER HAS BEEN NOTIFIED THAT THE ESS SWITCH
AT THE TELEPHONE COMPANY OFFICE IN HAZELWOOD, MISSOURI WILL BE
UPGRADED TO INCORPORATE A NEW PROCESSOR. THIS WILL OCCUR AT
7:00 P.M. (CDT) ON 7 JULY 1981. THERE WILL BE AN INTERRUPTION OF ALL
SERVICE THROUGH THE HAZELWOOD OFFICE OF ABOUT ONE MINUTE'S DURATION,
WHICH WILL CAUSE ALL CONNECTIONS THROUGH THAT OFFICE TO BE BROKEN.

WE HAVE BEEN INFORMED THAT THE FOLLOWING TYPES OF SERVICE WILL
BE AFFECTED:

- . LOCAL DIAL-UP
- . OUT-WATTS

IT IS SUGGESTED THAT NON-LEASED LINE TERMINAL USERS PLAN TO SIGNOFF
SHORTLY BEFORE 7:00 P.M. SIGNON CAN THEN BE DONE SHORTLY AFTER THE
HOUR.

MCDONNELL DOUGLAS AUTOMATION COMPANY -- SAINT LOUIS

JOBNAME = JDEW0316

COMPUTER SYSTEM ID = CP40

M

B- *DEL*

BYE

#OLD SHORE

#00520 RMIN TAN LINE 15

#00530 GRID 1 X 540 Y 628 2 X 570 Y 585 3 X 620 Y 585 6 5 EAR .15

#SAVE

#HOST

ST LOUIS JES C IS NO LONGER AVAILABLE.

TYPE DOC FOR DETAILS.

+LANG SHLOPE

+LEANS SHORE (NLTH RMES)

ENTER JOB CARD PARAMETERS FOR SLB

MCAUTO AC, JOB ID

#1587196,JDEW

CLIENT SUBACCOUNTING

CASE 2

POINT 1 X 475 Y 572

POINT 2 550 572

POINT 3 570 572

POINT 4 592 583

POINT 5 630 583

POINT 6 640 583

POINT 7 475 567

POINT 8 549 567

POINT 9 550 562

POINT 10 581 562

POINT 11 591 567

POINT 12 603 573

POINT 13 621 573

POINT 14 640 567

POINT 15 475 558

POINT 16 640 558

POINT 17 475 550

POINT 18 640 550

LINE 1 POINT 1 POINT 2 SOIL 1

LINE 2 2 3 2

LINE 3 3 4 2

LINE 4 4 5 2

LINE 5 5 6 3

LINE 6 7 8 4

LINE 7 2 8 2

LINE 8 8 9 4

LINE 9 9 10 4

LINE 10 10 11 4

LINE 11 11 12 3

LINE 12 12 13 3

LINE 13 13 5 3

LINE 14 11 14 4

LINE 15 15 16 5

LINE 16 17 18 6

SOIL 1 DENSITY 80 COHESION 0 PHI 25 RU 0

SOIL 2 100 0 40 0

SOIL 3 120 1150 0 0

SOIL 4 120 1250 0 0

SOIL 5 130 3500 0 0

SOIL 6 152 500000 0 0

NUMBER OF SLICES 100

RMIN TAN LINE 14

GELOW 1 X 545 Y 628 2 X 560 Y 578 3 X 590 Y 578 5 6 EAR .15

SOIL PROFILE FOLLOWS.

| X-LEFT | Y-LEFT | X-RIGHT | Y-RIGHT | SLOPE | PT | PT | SOIL |
|--------|--------|---------|---------|--------|----|----|------|
| 475.00 | 572.00 | 550.00 | 572.00 | 0.0 | 1 | 2 | 1 |
| 550.00 | 572.00 | 570.00 | 572.00 | 0.0 | 2 | 3 | 2 |
| 570.00 | 572.00 | 592.00 | 583.00 | 0.500 | 3 | 4 | 2 |
| 592.00 | 583.00 | 630.00 | 583.00 | 0.0 | 4 | 5 | 2 |
| 630.00 | 583.00 | 640.00 | 583.00 | 0.0 | 5 | 6 | 3 |
| 475.00 | 567.00 | 549.00 | 567.00 | 0.0 | 7 | 8 | 4 |
| 549.00 | 567.00 | 550.00 | 572.00 | 5.0 | 8 | 9 | 4 |
| 550.00 | 567.00 | 581.00 | 562.00 | -5.000 | 9 | 10 | 4 |
| 581.00 | 562.00 | 591.00 | 567.00 | 0.0 | 10 | 11 | 4 |
| 591.00 | 567.00 | 603.00 | 573.00 | 0.500 | 11 | 12 | 3 |
| 603.00 | 573.00 | 621.00 | 573.00 | 0.0 | 12 | 13 | 3 |
| 621.00 | 573.00 | 630.00 | 583.00 | 1.111 | 13 | 14 | 3 |
| 630.00 | 583.00 | 640.00 | 567.00 | 0.0 | 14 | 15 | 4 |
| 640.00 | 567.00 | 640.00 | 558.00 | 0.0 | 15 | 16 | 5 |
| 640.00 | 558.00 | 640.00 | 550.00 | 0.0 | 16 | 17 | 5 |
| 640.00 | 550.00 | 640.00 | 550.00 | 0.0 | 17 | 18 | 6 |

THE BISHOP METHOD WILL NOT CONVERGE AT R = 83.17
 FELLENIUS METHOD =***** AT R = 83.17
 THE BISHOP METHOD WILL NOT CONVERGE AT R = 79.74
 FELLENIUS METHOD =***** AT R = 79.74
 THE BISHOP METHOD WILL NOT CONVERGE AT R = 76.31
 FELLENIUS METHOD =***** AT R = 76.31
 THE BISHOP METHOD WILL NOT CONVERGE AT R = 72.88
 FELLENIUS METHOD =***** AT R = 72.88
 THE BISHOP METHOD WILL NOT CONVERGE AT R = 69.45
 FELLENIUS METHOD =***** AT R = 69.45
 THE BISHOP METHOD WILL NOT CONVERGE AT R = 66.02
 FELLENIUS METHOD =***** AT R = 66.02
 THE BISHOP METHOD WILL NOT CONVERGE AT R = 62.59
 FELLENIUS METHOD =***** AT R = 62.59
 THE BISHOP METHOD WILL NOT CONVERGE AT R = 59.16
 FELLENIUS METHOD =***** AT R = 59.16

**** SUMMARY FACTOR OF SAFETY ****

THE 5 BY 6 GRID HAS PRODUCED 42 TRIAL CIRCLE CENTERS.

| | | | | | | | | |
|-----------|---|--------|--------|--------|--------|--------|--------|--------|
| X-COORD | = | 545.00 | 550.00 | 555.00 | 560.00 | 565.00 | 570.00 | 575.00 |
| Y-COORD | = | 628.00 | 628.00 | 628.00 | 628.00 | 628.00 | 628.00 | 628.00 |
| BISHOP | = | 4.463 | 2.933 | 2.369 | 2.228 | 2.216 | 2.261 | 2.334 |
| RADIUS | = | 69.96 | 61.00 | 61.00 | 61.00 | 61.00 | 61.00 | 61.00 |
| FELLENIUS | = | 4.179 | 2.773 | 2.199 | 2.068 | 2.063 | 2.113 | 2.192 |
| RADIUS | = | 69.96 | 61.00 | 61.00 | 61.00 | 61.00 | 61.00 | 61.00 |

| | | | | | | | | |
|-----------|---|--------|--------|--------|--------|--------|--------|--------|
| X-COORD | = | 548.00 | 553.00 | 558.00 | 563.00 | 568.00 | 573.00 | 578.00 |
| Y-COORD | = | 618.00 | 618.00 | 618.00 | 618.00 | 618.00 | 618.00 | 618.00 |
| BISHOP | = | 4.003 | 2.996 | 2.372 | 2.206 | 2.182 | 2.214 | 2.307 |
| RADIUS | = | 51.00 | 51.00 | 51.00 | 51.00 | 51.00 | 51.00 | 51.00 |
| FELLENIUS | = | 3.374 | 2.806 | 2.166 | 2.011 | 1.998 | 2.042 | 2.142 |
| RADIUS | = | 51.00 | 51.00 | 51.00 | 51.00 | 51.00 | 51.00 | 51.00 |

| | | | | | | | | |
|-----------|---|--------|--------|--------|--------|--------|--------|--------|
| X-COORD | = | 551.00 | 556.00 | 561.00 | 566.00 | 571.00 | 576.00 | 581.00 |
| Y-COORD | = | 608.00 | 608.00 | 608.00 | 608.00 | 608.00 | 608.00 | 608.00 |
| BISHOP | = | 4.182 | 3.094 | 2.412 | 2.181 | 2.117 | 2.164 | 2.311 |
| RADIUS | = | 41.00 | 41.16 | 41.00 | 41.00 | 41.00 | 41.00 | 41.00 |
| FELLENIUS | = | 4.015 | 2.852 | 2.149 | 1.933 | 1.897 | 1.961 | 2.108 |
| RADIUS | = | 41.00 | 41.16 | 41.00 | 41.00 | 41.00 | 41.00 | 41.00 |

| | | | | | | | | |
|-----------|---|--------|--------|--------|--------|--------|--------|--------|
| X-COORD | = | 554.00 | 559.00 | 564.00 | 569.00 | 574.00 | 579.00 | 584.00 |
| Y-COORD | = | 598.00 | 598.00 | 598.00 | 598.00 | 598.00 | 598.00 | 598.00 |
| BISHOP | = | 4.514 | 3.266 | 2.525 | 2.126 | 2.052 | 2.154 | 2.509 |
| RADIUS | = | 31.00 | 31.64 | 31.00 | 31.00 | 31.00 | 31.00 | 31.00 |
| FELLENIUS | = | 4.277 | 2.919 | 2.170 | 1.812 | 1.780 | 1.894 | 2.271 |
| RADIUS | = | 31.00 | 31.64 | 31.00 | 31.00 | 31.00 | 31.00 | 31.00 |

| | | | | | | | | |
|-----------|---|--------|--------|--------|--------|--------|--------|--------|
| X-COORD | = | 557.00 | 562.00 | 567.00 | 572.00 | 577.00 | 582.00 | 587.00 |
| Y-COORD | = | 588.00 | 588.00 | 588.00 | 588.00 | 588.00 | 588.00 | 588.00 |
| BISHOP | = | 4.934 | 3.698 | 2.642 | 2.145 | 2.076 | 2.305 | 2.632 |
| RADIUS | = | 22.71 | 22.22 | 21.00 | 21.00 | 21.00 | 21.00 | 29.51 |
| FELLENIUS | = | 4.428 | 3.113 | 2.157 | 1.719 | 1.689 | 1.896 | 2.372 |
| RADIUS | = | 22.71 | 22.22 | 21.00 | 21.00 | 21.00 | 21.00 | 29.51 |

| | | | | | | | | |
|-----------|---|--------|--------|--------|--------|--------|--------|--------|
| X-COORD | = | 560.00 | 565.00 | 570.00 | 575.00 | 580.00 | 585.00 | 590.00 |
| Y-COORD | = | 578.00 | 578.00 | 578.00 | 578.00 | 578.00 | 578.00 | 578.00 |
| BISHOP | = | 6.386 | 4.684 | 3.072 | 2.584 | 2.813 | 3.080 | 3.379 |
| RADIUS | = | 13.42 | 12.92 | 11.00 | 11.00 | 11.00 | 19.66 | 19.45 |
| FELLENIUS | = | 5.078 | 3.475 | 2.256 | 1.889 | 2.019 | 2.382 | 2.910 |

| | | | | | | |
|--------|---|-----|--------|----------|-------|------------------------|
| 2.052 | IS THE MINIMUM FELLENIUS FACTOR OF SAFETY | | | | | |
| AT X = | 574.00 | Y = | 598.00 | RADIUS = | 31.00 | EARTHQUAKE LOAD = 0.15 |
| 1.689 | IS THE MINIMUM FELLENIUS FACTOR OF SAFETY | | | | | |
| AT X = | 577.00 | Y = | 588.00 | RADIUS = | 21.00 | EARTHQUAKE LOAD = 0.15 |

AT X = 577.00 Y = 588.00 RADIUS = 21.00 EARTHQUAKE LOAD = 0.15

WARNING. NO PIEZOMETRIC SURFACE EXIST

ICES SLOPE

X=CENTER OF ARC FOR MINIMUM FACTOR OF SAFETY

• FAILURE SURFACE

✕

MLH

MODEL 33 VS2 REL 3.8

CASE 3

| LINE | 1 | POINT | 1 | POINT | 2 | SOIL | 1 |
|------|----|-------|----|-------|---|------|---|
| LINE | 2 | 2 | 3 | 2 | | | |
| LINE | 3 | 3 | 4 | 2 | | | |
| LINE | 4 | 4 | 5 | 2 | | | |
| LINE | 5 | 5 | 6 | 3 | | | |
| LINE | 6 | 7 | 8 | 4 | | | |
| LINE | 7 | 2 | 8 | 2 | | | |
| LINE | 8 | 8 | 9 | 4 | | | |
| LINE | 9 | 9 | 10 | 4 | | | |
| LINE | 10 | 10 | 11 | 4 | | | |
| LINE | 11 | 11 | 12 | 3 | | | |
| LINE | 12 | 12 | 13 | 3 | | | |

| RADIUS | 57.00 | 58.00 | 59.00 | 60.00 | 61.00 | 62.00 | 63.00 | 64.00 | 65.00 | 66.00 |
|------------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
| FELLENIOUS | 4.185 | 3.892 | 3.103 | 2.747 | 2.572 | 2.51 | 2.468 | 2.443 | 2.443 | 2.647 |
| RADIUS | 59.70 | 56.00 | 56.00 | 56.00 | 56.00 | 56.00 | 56.00 | 56.00 | 56.00 | 59.80 |

| | | | | | | | | | | |
|------------|---|--------|--------|--------|--------|--------|--------|--------|--------|--------|
| X-COORD | = | 551.00 | 556.00 | 561.00 | 566.00 | 571.00 | 576.00 | 581.00 | 586.00 | 591.00 |
| Y-COORD | = | 608.00 | 608.00 | 608.00 | 608.00 | 608.00 | 608.00 | 608.00 | 608.00 | 608.00 |
| BISHOP | = | 4.635 | 3.873 | 3.197 | 2.793 | 2.630 | 2.653 | 2.587 | 2.520 | 2.743 |
| RADIUS | = | 49.47 | 46.00 | 46.00 | 46.00 | 46.00 | 46.00 | 46.00 | 49.37 | 49.61 |
| FELLENIOUS | = | 4.257 | 3.501 | 2.846 | 2.455 | 2.378 | 2.470 | 2.406 | 2.355 | 2.645 |
| RADIUS | = | 49.47 | 46.00 | 46.00 | 46.00 | 46.00 | 46.00 | 46.00 | 49.37 | 49.61 |

| | | | | | | | | | | |
|------------|---|--------|--------|--------|--------|--------|--------|--------|--------|--------|
| X-COORD | = | 554.00 | 559.00 | 564.00 | 569.00 | 574.00 | 579.00 | 584.00 | 589.00 | 594.00 |
| Y-COORD | = | 598.00 | 598.00 | 598.00 | 598.00 | 598.00 | 598.00 | 598.00 | 598.00 | 598.00 |
| BISHOP | = | 5.108 | 3.811 | 2.981 | 2.617 | 2.663 | 2.631 | 2.562 | 2.527 | 2.832 |
| RADIUS | = | 38.58 | 36.00 | 36.00 | 36.00 | 36.00 | 36.00 | 38.30 | 39.53 | 36.37 |
| FELLENIOUS | = | 4.659 | 3.354 | 2.525 | 2.165 | 2.338 | 2.406 | 2.353 | 2.325 | 2.591 |
| RADIUS | = | 38.58 | 36.00 | 36.00 | 36.00 | 36.00 | 36.00 | 38.30 | 39.53 | 36.37 |

| | | | | | | | | | | |
|------------|---|--------|--------|--------|--------|--------|--------|--------|--------|--------|
| X-COORD | = | 557.00 | 562.00 | 567.00 | 572.00 | 577.00 | 582.00 | 587.00 | 592.00 | 597.00 |
| Y-COORD | = | 588.00 | 588.00 | 588.00 | 588.00 | 588.00 | 588.00 | 588.00 | 588.00 | 588.00 |
| BISHOP | = | 5.443 | 3.802 | 3.007 | 2.739 | 2.701 | 2.689 | 2.676 | 2.919 | 3.201 |
| RADIUS | = | 26.00 | 26.00 | 26.00 | 26.00 | 26.00 | 28.65 | 28.11 | 27.49 | 29.51 |
| FELLENIOUS | = | 4.850 | 3.139 | 2.309 | 2.092 | 2.264 | 2.419 | 2.397 | 2.585 | 2.840 |
| RADIUS | = | 26.00 | 26.00 | 26.00 | 26.00 | 26.00 | 28.65 | 28.11 | 27.49 | 28.36 |

| | | | | | | | | | | |
|------------|---|--------|--------|--------|--------|--------|--------|--------|--------|--------|
| X-COORD | = | 560.00 | 565.00 | 570.00 | 575.00 | 580.00 | 585.00 | 590.00 | 595.00 | 600.00 |
| Y-COORD | = | 578.00 | 578.00 | 578.00 | 578.00 | 578.00 | 578.00 | 578.00 | 578.00 | 578.00 |
| BISHOP | = | 5.857 | 4.688 | 3.696 | 3.212 | 3.123 | 3.080 | 3.379 | 4.230 | 4.958 |
| RADIUS | = | 16.00 | 16.00 | 16.00 | 16.00 | 16.00 | 19.66 | 19.45 | 18.13 | 18.56 |
| FELLENIOUS | = | 4.598 | 3.317 | 2.542 | 2.208 | 2.426 | 2.738 | 2.910 | 3.456 | 3.971 |
| RADIUS | = | 16.00 | 16.00 | 16.00 | 16.00 | 16.00 | 19.66 | 19.45 | 18.13 | 18.56 |

2.520 IS THE MINIMUM BISHOP FACTOR OF SAFETY

AT X = 586.00 Y = 608.00 RADIUS = 49.37 EARTHQUAKE LOAD = 0.15

2.092 IS THE MINIMUM FELLENIOUS FACTOR OF SAFETY

AT X = 572.00 Y = 588.00 RADIUS = 26.00 EARTHQUAKE LOAD = 0.15

PLOT SLOPE

WARNING, NO PIEZOMETRIC SURFACE EXIST

MCDONNELL DOUGLAS AUTOMATION COMPANY

ICES SLOPE

NUMERALS INDICATE SOIL LINES

X=CENTER OF ARC FOR MINIMUM FACTOR OF SAFETY

P=PIEZOMETRIC SURFACE

=FAILURE SURFACE

608.

X

603.

595.

588.

580.

573.

565.

558. 5

550. 6

475.

506.

536.

567.

597.

628.

FINISH

18

* RJP NEWS *

B-DEL*

BYE

+



17:48:17 IAT5400 JOB 2483 (JDEW0350) IN SETUP ON MAIN=CF12
 17:48:17 IAT5400 JOB 2483 (JDEW0350) USING D CSTR01 ON B1A DLS.0P50.10 DB
 17:48:17 IAT2000 JOB 2483 (JDEW0350) SELECTED CF12 GRP=JS3BATCH
 17:48:17 CP12-R= JDEW0350 IEF4031 JDEW0350 - STARTED - TIME=17.48.16
 17:49:02 CP12-R= JDEW0350 MDC0011 -----M=012 S=00000 E=00015
 17:49:02 CP12-R= JDEW0350 MACRCDE JOB JDEW0350 STEP 00 RC=0000
 17:49:02 IAT5110 JOB 2483 (JDEW0350) USES D WK1251 SYS81188.T174901.RA000.JDEW0350.R0000001
 17:49:03 CP12-R= JDEW0350 IEF4041 JDEW0350 - ENDED - TIME=17.49.01
 17:49:03 IAT5400 JOB 2483 (JDEW0350) IN BREAKDOWN

CYBER JDEW0350 2483 SYSMSG 17.49.05 7 JUL 81 MLH MLH

MDC0011 -----M=012 S=00000 E=00015

IEF142I JDEW0350 00 - STEP WAS EXECUTED - COND CODE 0000

IEF373I STEP /GO / START 81188.1748

IEF374I STEP /GO / STOP 81188.1749 VIRT 304K SYS 220K

IEF375I JOB /JDEW0350/ START 81188.1748

IEF376I JOB /JDEW0350/ STOP 81188.1749

CYBER JDEW0350 2483 00,FT06F001 17.49.05 7 JUL 81 MLH MLH

```

*
*
*
*
*      MCAUTO ICES EXECUTIVE SYSTEM
*
*      RELEASE 3.5 - 14 AUG 1980
*
*      TIME- 17:48:26      DATE- JUL 07, 1981
*
*      MODEL 33      VS2 REL 3.8
*
*
*
*
*

```

SLOPE

MCAUTO SLOPE

RELEASE 3.1

MAY 1981

CASE 4

POINT 1 X 475 Y 572

POINT 2 550 572

POINT 3 570 572

POINT 4 592 583

POINT 5 630 583

POINT 6 640 583

POINT 7 475 567

POINT 8 549 567

POINT 9 550 562

POINT 10 581 562

POINT 11 591 567

POINT 12 603 573

POINT 13 621 573

POINT 14 640 567

POINT 15 475 558

POINT 16 640 558

POINT 17 475 550

POINT 18 640 550

LINE 11 POINT 1 POINT 2 SOIL 1

LINE 1
 LINE 2
 LINE 3
 LINE 4
 LINE 5
 LINE 6
 LINE 7
 LINE 8
 LINE 9
 LINE 10
 LINE 11
 LINE 12
 LINE 13
 LINE 14
 LINE 15
 LINE 16
 LINE 17
 LINE 18
 LINE 19
 LINE 20
 LINE 21
 LINE 22
 LINE 23
 LINE 24
 LINE 25
 LINE 26
 LINE 27
 LINE 28
 LINE 29
 LINE 30
 LINE 31
 LINE 32
 LINE 33
 LINE 34
 LINE 35
 LINE 36
 LINE 37
 LINE 38
 LINE 39
 LINE 40
 LINE 41
 LINE 42
 LINE 43
 LINE 44
 LINE 45
 LINE 46
 LINE 47
 LINE 48
 LINE 49
 LINE 50
 LINE 51
 LINE 52
 LINE 53
 LINE 54
 LINE 55
 LINE 56
 LINE 57
 LINE 58
 LINE 59
 LINE 60
 LINE 61
 LINE 62
 LINE 63
 LINE 64
 LINE 65
 LINE 66
 LINE 67
 LINE 68
 LINE 69
 LINE 70
 LINE 71
 LINE 72
 LINE 73
 LINE 74
 LINE 75
 LINE 76
 LINE 77
 LINE 78
 LINE 79
 LINE 80
 LINE 81
 LINE 82
 LINE 83
 LINE 84
 LINE 85
 LINE 86
 LINE 87
 LINE 88
 LINE 89
 LINE 90
 LINE 91
 LINE 92
 LINE 93
 LINE 94
 LINE 95
 LINE 96
 LINE 97
 LINE 98
 LINE 99
 LINE 100

SOIL 1 DENSITY 80 COHESION 0 PHI 25 RU 0
 SOIL 2 100.0 40.0
 SOIL 3 120.1150 0.0
 SOIL 4 120.1250 0.0
 SOIL 5 130.3500 0.0
 SOIL 6 152.500000 0.0
 NUMBER OF SLICES 100
 MAIN TAN LINE 15

GRID 1 X 560 Y 628 2 X 570 Y 585 3 X 620 Y 585 6 5 EAR .15

SOIL PROFILE FOLLOWS.

| X-LEFT | Y-LEFT | X-RIGHT | Y-RIGHT | SLOPE | PT | PT | SOIL |
|--------|--------|---------|---------|-------|----|----|------|
| 475.00 | 572.00 | 550.00 | 572.00 | 0.0 | 1 | 2 | 1 |
| 550.00 | 572.00 | 570.00 | 572.00 | 0.0 | 2 | 3 | 2 |
| 570.00 | 572.00 | 583.00 | 583.00 | 0.500 | 3 | 4 | 2 |
| 592.00 | 583.00 | 630.00 | 583.00 | 0.0 | 4 | 5 | 2 |
| 630.00 | 583.00 | 640.00 | 583.00 | 0.0 | 5 | 6 | 3 |
| 475.00 | 567.00 | 549.00 | 567.00 | 0.0 | 7 | 8 | 4 |
| 549.00 | 567.00 | 550.00 | 567.00 | 5.000 | 8 | 2 | 2 |
| 549.00 | 567.00 | 550.00 | 567.00 | 5.000 | 8 | 9 | 4 |
| 550.00 | 567.00 | 581.00 | 567.00 | 0.0 | 9 | 10 | 4 |
| 581.00 | 567.00 | 600.00 | 567.00 | 0.500 | 10 | 11 | 4 |
| 591.00 | 567.00 | 621.00 | 573.00 | 0.500 | 11 | 12 | 3 |
| 603.00 | 573.00 | 621.00 | 573.00 | 0.0 | 12 | 13 | 3 |
| 621.00 | 573.00 | 630.00 | 583.00 | 1.111 | 13 | 5 | 3 |
| 591.00 | 567.00 | 640.00 | 567.00 | 0.0 | 11 | 14 | 4 |
| 475.00 | 558.00 | 640.00 | 558.00 | 0.0 | 15 | 16 | 5 |
| 475.00 | 550.00 | 640.00 | 550.00 | 0.0 | 17 | 18 | 6 |

NUMBER OF LINES ON THE TOPLINE EQUAL 5

THE BISHOP METHOD WILL NOT CONVERGE AT R = 75.13
 FELLENIUS METHOD =***** AT R = 75.13
 THE BISHOP METHOD WILL NOT CONVERGE AT R = 72.18
 FELLENIUS METHOD =***** AT R = 72.18
 THE BISHOP METHOD WILL NOT CONVERGE AT R = 69.23
 FELLENIUS METHOD =***** AT R = 69.23
 THE BISHOP METHOD WILL NOT CONVERGE AT R = 66.28
 FELLENIUS METHOD =***** AT R = 66.28

*** SUMMARY FACTOR OF SAFETY ***

THE 6 BY 5 GRID HAS PRODUCED 42 TRIAL CIRCLE CENTERS.

| | | | | | | |
|-----------|--------|--------|--------|--------|--------|--------|
| X-COORD | 560.00 | 570.00 | 580.00 | 590.00 | 600.00 | 610.00 |
| Y-COORD | 628.00 | 628.00 | 628.00 | 628.00 | 627.99 | 627.99 |
| RADIUS | 3.488 | 2.970 | 2.891 | 2.838 | 4.112 | 6.958 |
| FELLENIUS | 3.409 | 2.915 | 2.850 | 2.767 | 4.052 | 6.827 |

| | | | | | | |
|------------|--------|--------|--------|--------|--------|--------|
| Y-COORD | 620.83 | 620.83 | 620.83 | 620.83 | 620.83 | 620.83 |
| BISHOP | 3.432 | 2.917 | 2.799 | 2.751 | 4.073 | 7.30 |
| RADIUS | 62.83 | 62.83 | 62.83 | 61.38 | 53.86 | 47.26 |
| FELLENIOUS | 3.327 | 2.850 | 2.735 | 2.672 | 3.990 | 7.131 |
| RADIUS | 62.83 | 62.83 | 62.83 | 61.38 | 53.86 | 47.26 |

| | | | | | | |
|------------|--------|--------|--------|--------|--------|--------|
| X-COORD | 563.33 | 573.33 | 583.33 | 593.33 | 603.33 | 613.33 |
| Y-COORD | 613.67 | 613.66 | 613.66 | 613.66 | 613.66 | 613.66 |
| BISHOP | 3.358 | 2.850 | 2.776 | 2.677 | 4.099 | 7.599 |
| RADIUS | 55.67 | 55.66 | 55.66 | 55.66 | 47.80 | 40.64 |
| FELLENIOUS | 3.236 | 2.738 | 2.698 | 2.589 | 3.984 | 7.367 |
| RADIUS | 55.67 | 55.66 | 55.66 | 55.66 | 47.80 | 40.64 |

| | | | | | | |
|------------|--------|--------|--------|--------|--------|--------|
| X-COORD | 565.00 | 575.00 | 585.00 | 595.00 | 605.00 | 615.00 |
| Y-COORD | 606.50 | 606.50 | 606.50 | 606.50 | 606.49 | 606.49 |
| BISHOP | 3.311 | 2.724 | 2.516 | 2.732 | 4.075 | 8.232 |
| RADIUS | 48.50 | 48.50 | 48.50 | 48.50 | 42.16 | 34.31 |
| FELLENIOUS | 3.151 | 2.590 | 2.349 | 2.627 | 3.915 | 7.939 |
| RADIUS | 48.50 | 48.50 | 48.50 | 48.50 | 42.16 | 34.31 |

| | | | | | | |
|------------|--------|--------|--------|--------|--------|--------|
| X-COORD | 566.67 | 576.67 | 586.67 | 596.66 | 606.66 | 616.66 |
| Y-COORD | 599.33 | 599.33 | 599.33 | 599.33 | 599.33 | 599.33 |
| BISHOP | 3.289 | 2.667 | 2.513 | 2.874 | 4.049 | 10.478 |
| RADIUS | 41.33 | 41.33 | 41.33 | 41.33 | 37.12 | 28.48 |
| FELLENIOUS | 3.083 | 2.484 | 2.322 | 2.735 | 3.829 | 9.966 |
| RADIUS | 41.33 | 41.33 | 41.33 | 41.33 | 37.12 | 28.48 |

| | | | | | | |
|------------|--------|--------|--------|--------|--------|--------|
| X-COORD | 568.33 | 578.33 | 588.33 | 598.33 | 608.33 | 618.33 |
| Y-COORD | 592.17 | 592.17 | 592.16 | 592.16 | 592.16 | 592.16 |
| BISHOP | 3.280 | 2.714 | 2.561 | 3.205 | 4.050 | 10.109 |
| RADIUS | 34.17 | 34.17 | 34.16 | 34.16 | 32.97 | 23.53 |
| FELLENIOUS | 2.964 | 2.477 | 2.334 | 2.996 | 3.746 | 9.548 |
| RADIUS | 34.17 | 34.17 | 34.16 | 34.16 | 32.97 | 23.53 |

| | | | | | | |
|------------|--------|--------|--------|--------|--------|--------|
| X-COORD | 570.00 | 580.00 | 590.00 | 600.00 | 610.00 | 620.00 |
| Y-COORD | 585.00 | 585.00 | 585.00 | 585.00 | 585.00 | 584.59 |
| BISHOP | 3.322 | 2.805 | 2.761 | 3.705 | 4.786 | 9.376 |
| RADIUS | 27.00 | 27.00 | 27.00 | 27.00 | 27.00 | 20.10 |
| FELLENIOUS | 2.785 | 2.520 | 2.462 | 3.355 | 4.264 | 8.882 |
| RADIUS | 27.00 | 27.00 | 27.00 | 27.00 | 27.00 | 20.10 |

2.513 IS THE MINIMUM BISHOP FACTOR OF SAFETY
 AT X = 586.67 Y = 599.33 RADIUS = 41.33 EARTHQUAKE LOAD = 0.15

2.322 IS THE MINIMUM FELLENIOUS FACTOR OF SAFETY
 AT X = 586.67 Y = 599.33 RADIUS = 41.33 EARTHQUAKE LOAD = 0.15

PLOT SLOPE
 WARNING. NO PIEZOMETRIC SURFACE EXIST

MCDONNELL DOUGLAS AUTOMATION COMPANY ICES SLOPE
 X-CENTER OF ARC FOR MINIMUM FACTOR OF SAFETY
 *FAILURE SURFACE

NUMERALS INDICATE SOIL LINES
 P=PIEZOMETRIC SURFACE
 599.

582.

576.

569.

563.

556.

550. 6

475.

506.

536.

567.

597.

628.

FINISH

* RJF NEWS *

B- *DEL*

BYE

#DMS SHORE4

#LIST SHORE

SHORE 17:56 JUL 07, '81

00100 SLOPE

00110 POINT 1 X 475 Y 572

00120 POINT 2 550 572

00130 POINT 3 570 572

00140 POINT 4 592 583

00150 POINT 5 630 583

00160 POINT 6 640 583

00170 POINT 7 475 567

00180 POINT 8 549 567

00190 POINT 9 550 562

00200 POINT 10 581 562

00210 POINT 11 597 567

00220 POINT 12 628 567

SLOPE

MCAUTO SLOPE
 RELEASE 3.1
 MAY 1981

CASE 5

POINT 1 X 475 Y 572

POINT 2 550 572

POINT 3 570 572

POINT 4 592 583

POINT 5 630 583

POINT 6 640 583

POINT 7 475 567

POINT 8 549 567

POINT 9 550 562

POINT 10 581 562

POINT 11 591 567

POINT 12 603 573

POINT 13 621 573

POINT 14 640 567

POINT 15 475 558

POINT 16 640 558

POINT 17 475 550

POINT 18 640 550

LINE 1 POINT 1 POINT 2 SOIL 1

LINE 2 2 3 2

LINE 3 3 4 2

LINE 4 4 5 2

LINE 5 5 6 3

LINE 6 7 8 4

LINE 7 2 8 2

LINE 8 8 9 4

LINE 9 9 10 4

LINE 10 10 11 4

LINE 11 11 12 3

LINE 12 12 13 3

LINE 13 13 5 3

LINE 14 11 14 4

LINE 15 15 16 5

LINE 16 17 18 6

PIEZ SURFACE 1 POINT 21 X 475 Y 572

PIEZ 1 22 570 572

PIEZ 1 23 598 576

PIEZ 1 24 640 576

SOIL 1 DENSITY 80 COHESION 0 PHI 25 RD 0

SOIL 2 100 0 40 0

SOIL 3 120 1150 0 0

SOIL 4 120 1250 0 0

GRID 1 X 545 Y 678 2 X 560 Y 578 3 X 590 Y 578 5 6 EAR 15
 SOIL PROFILE FOLLOWS.

| X-LEFT | Y-LEFT | X-RIGHT | Y-RIGHT | SLOPE | FI | FT | SOIL |
|--------|--------|---------|---------|--------|----|----|------|
| 4 7.00 | 572.00 | 550.00 | 572.00 | 0.0 | 1 | 2 | 1 |
| 550.00 | 572.00 | 570.00 | 572.00 | 0.0 | 2 | 3 | 2 |
| 570.00 | 572.00 | 592.00 | 563.00 | 0.500 | 3 | 4 | 2 |
| 592.00 | 583.00 | 630.00 | 583.00 | 0.0 | 4 | 5 | 2 |
| 630.00 | 583.00 | 640.00 | 583.00 | 0.0 | 5 | 6 | 3 |
| 640.00 | 583.00 | 597.00 | 587.00 | 0.0 | 7 | 8 | 4 |
| 597.00 | 587.00 | 550.00 | 572.00 | 5.000 | 8 | 2 | 2 |
| 549.00 | 567.00 | 550.00 | 562.00 | -5.000 | 8 | 9 | 4 |
| 549.00 | 567.00 | 550.00 | 562.00 | 0.0 | 9 | 10 | 4 |
| 550.00 | 562.00 | 581.00 | 567.00 | 0.500 | 10 | 11 | 4 |
| 581.00 | 562.00 | 603.00 | 573.00 | 0.500 | 11 | 12 | 3 |
| 603.00 | 573.00 | 621.00 | 573.00 | 0.0 | 12 | 13 | 3 |
| 621.00 | 573.00 | 630.00 | 583.00 | 1.111 | 13 | 5 | 3 |
| 630.00 | 583.00 | 640.00 | 567.00 | 0.0 | 11 | 14 | 4 |
| 640.00 | 567.00 | 640.00 | 558.00 | 0.0 | 15 | 16 | 5 |
| 558.00 | 550.00 | 640.00 | 550.00 | 0.0 | 17 | 18 | 6 |

NUMBER OF LINKS ON THE TUPLINE EQUAL 5

THE BISHOP METHOD WILL NOT CONVERGE AT R = 83.17

FELENIUS METHOD ***** AT R = 83.17

THE BISHOP METHOD WILL NOT CONVERGE AT R = 79.74

FELENIUS METHOD ***** AT R = 79.74

THE BISHOP METHOD WILL NOT CONVERGE AT R = 76.31

FELENIUS METHOD ***** AT R = 76.31

THE BISHOP METHOD WILL NOT CONVERGE AT R = 72.88

FELENIUS METHOD ***** AT R = 72.88

THE BISHOP METHOD WILL NOT CONVERGE AT R = 69.43

FELENIUS METHOD ***** AT R = 69.43

THE BISHOP METHOD WILL NOT CONVERGE AT R = 66.02

FELENIUS METHOD ***** AT R = 66.02

THE BISHOP METHOD WILL NOT CONVERGE AT R = 62.59

FELENIUS METHOD ***** AT R = 62.59

THE BISHOP METHOD WILL NOT CONVERGE AT R = 59.16

FELENIUS METHOD ***** AT R = 59.16

*** SUMMARY FACTOR OF SAFETY ***

THE 5 BY 6 GRID HAS PRODUCED 42 TRIAL CIRCLE CENTERS.

| | | | | | | | |
|------------|--------|--------|--------|--------|--------|--------|--------|
| X-COORD = | 545.00 | 550.00 | 555.00 | 560.00 | 565.00 | 570.00 | 575.00 |
| Y-COORD = | 628.00 | 628.00 | 628.00 | 628.00 | 628.00 | 628.00 | 628.00 |
| BISHOP = | 4.463 | 2.933 | 2.369 | 2.228 | 2.216 | 2.261 | 2.334 |
| RADIUS = | 69.96 | 61.00 | 61.00 | 61.00 | 61.00 | 61.00 | 61.00 |
| FELENIUS = | 4.179 | 2.773 | 2.199 | 2.068 | 2.063 | 2.113 | 2.192 |
| RADIUS = | 69.96 | 61.00 | 61.00 | 61.00 | 61.00 | 61.00 | 61.00 |
| X-COORD = | 548.00 | 553.00 | 558.00 | 563.00 | 568.00 | 573.00 | 578.00 |
| Y-COORD = | 618.00 | 618.00 | 618.00 | 618.00 | 618.00 | 618.00 | 618.00 |
| BISHOP = | 4.003 | 2.996 | 2.472 | 2.206 | 2.182 | 2.214 | 2.307 |
| RADIUS = | 51.00 | 51.00 | 51.00 | 51.00 | 51.00 | 51.00 | 51.00 |
| FELENIUS = | 3.874 | 2.805 | 2.166 | 2.011 | 1.998 | 2.042 | 2.142 |
| RADIUS = | 51.00 | 51.00 | 51.00 | 51.00 | 51.00 | 51.00 | 51.00 |
| X-COORD = | 551.00 | 556.00 | 561.00 | 566.00 | 571.00 | 576.00 | 581.00 |
| Y-COORD = | 608.00 | 608.00 | 608.00 | 608.00 | 608.00 | 608.00 | 608.00 |

| RADIUS | 41.00 | 41.00 | 41.00 | 41.00 | 41.00 | 41.00 | 41.00 |
|-----------|--------|--------|--------|--------|--------|--------|--------|
| X-COORD | 554.00 | 559.00 | 564.00 | 569.00 | 574.00 | 579.00 | 584.00 |
| Y-COORD | 598.00 | 598.00 | 598.00 | 598.00 | 598.00 | 598.00 | 598.00 |
| BISHOP | 4.514 | 3.256 | 2.525 | 2.126 | 2.052 | 2.154 | 2.509 |
| RADIUS | 31.00 | 31.64 | 31.00 | 31.00 | 31.00 | 31.00 | 31.00 |
| FELLENIUS | 4.277 | 2.919 | 2.170 | 1.812 | 1.780 | 1.894 | 2.271 |
| RADIUS | 31.00 | 31.64 | 31.09 | 31.00 | 31.00 | 31.00 | 31.00 |
| X-COORD | 557.00 | 562.00 | 567.00 | 572.00 | 577.00 | 582.00 | 587.00 |
| Y-COORD | 588.00 | 588.00 | 588.00 | 588.00 | 588.00 | 588.00 | 588.00 |
| BISHOP | 4.934 | 3.698 | 2.642 | 2.145 | 2.076 | 2.305 | 2.632 |
| RADIUS | 22.71 | 22.22 | 21.00 | 21.00 | 21.00 | 21.00 | 29.51 |
| FELLENIUS | 4.428 | 3.113 | 2.157 | 1.719 | 1.689 | 1.896 | 2.372 |
| RADIUS | 22.71 | 22.22 | 21.00 | 21.00 | 21.00 | 21.00 | 29.51 |
| X-COORD | 560.00 | 565.00 | 570.00 | 575.00 | 580.00 | 585.00 | 590.00 |
| Y-COORD | 578.00 | 578.00 | 578.00 | 578.00 | 578.00 | 578.00 | 578.00 |
| BISHOP | 6.386 | 4.694 | 3.072 | 2.584 | 2.813 | 3.080 | 3.379 |
| RADIUS | 13.42 | 12.92 | 11.00 | 11.00 | 11.00 | 19.66 | 19.45 |
| FELLENIUS | 5.078 | 3.476 | 2.256 | 1.889 | 2.019 | 2.382 | 2.910 |
| RADIUS | 13.42 | 12.92 | 11.00 | 11.00 | 11.00 | 11.00 | 19.45 |

2.052 IS THE MINIMUM BISHOP FACTOR OF SAFETY

AT X = 574.00 Y = 598.00 RADIUS = 31.00 EARTHQUAKE LOAD = 0.15

1.689 IS THE MINIMUM FELLENIUS FACTOR OF SAFETY

AT X = 577.00 Y = 588.00 RADIUS = 21.00 EARTHQUAKE LOAD = 0.15

PLOT SLOPE

MCDONNELL DOUGLAS AUTOMATION COMPANY

ICES SLOPE

NUMERALS INDICATE SOIL LINES

P=PIEZOMETRIC SURFACE

X=CENTER OF ARC FOR MINIMUM FACTOR OF SAFETY

=FAILURE SURFACE

598.

X

594.

588.

581.

575.

1 P 1 P 1 P 1 P 1 P 2 2 2 2 2 2 3 3 3 3 3 3

2

3

563.

556.

550.

475.

506.

536.

567.

597.

628.

FINISH

* RJP NEWS *

* COMPLEX B TELEPHONE SERVICE INTERRUPTION *

* THE MCAUTO ST. LOUIS CENTER HAS BEEN NOTIFIED THAT THE ESS SWITCH

* AT THE TELEPHONE COMPANY OFFICE IN HAZELWOOD, MISSOURI WILL BE

* UPGRADED TO INCORPORATE A NEW PROCESSOR. THIS WILL OCCUR AT

* 7:00 P.M. (CDT) ON 7 JULY 1981. THERE WILL BE AN INTERRUPTION OF ALL

* SERVICE THROUGH THE HAZELWOOD OFFICE OF ABOUT ONE MINUTE'S DURATION,

* WHICH WILL CAUSE ALL CONNECTIONS THROUGH THAT OFFICE TO BE BROKEN.

* WE HAVE BEEN INFORMED THAT THE FOLLOWING TYPES OF SERVICE WILL

* BE AFFECTED:

* . LOCAL DIAL-UP

* . OUT-WATTS

* IT IS SUGGESTED THAT NON-LEASED LINE TERMINAL USERS PLAN TO SIGNOFF

* SHORTLY BEFORE 7:00 P.M. SIGNON CAN THEN BE DONE SHORTLY AFTER THE

* HOUR.

MCDONNELL DOUGLAS AUTOMATION COMPANY -- SAINT LOUIS

JOBNAME = JOE00372

COMPUTER SYSTEM ID = CP22

MVS RELEASE = 03.8

JES NO. = 2637

PROGRAMMER NAME FIELD = MCH

JOB ENTERED SYSTEM
18.07.08 07/07/81

JOB START ON MAIN
18.07.15 07/07/81

JOB COMPLETE ON MAIN
18.09.11 07/07/81

THIS PAGE PRINTED
18.10.24 07/07/81

SUMMARY OF ANALYSIS

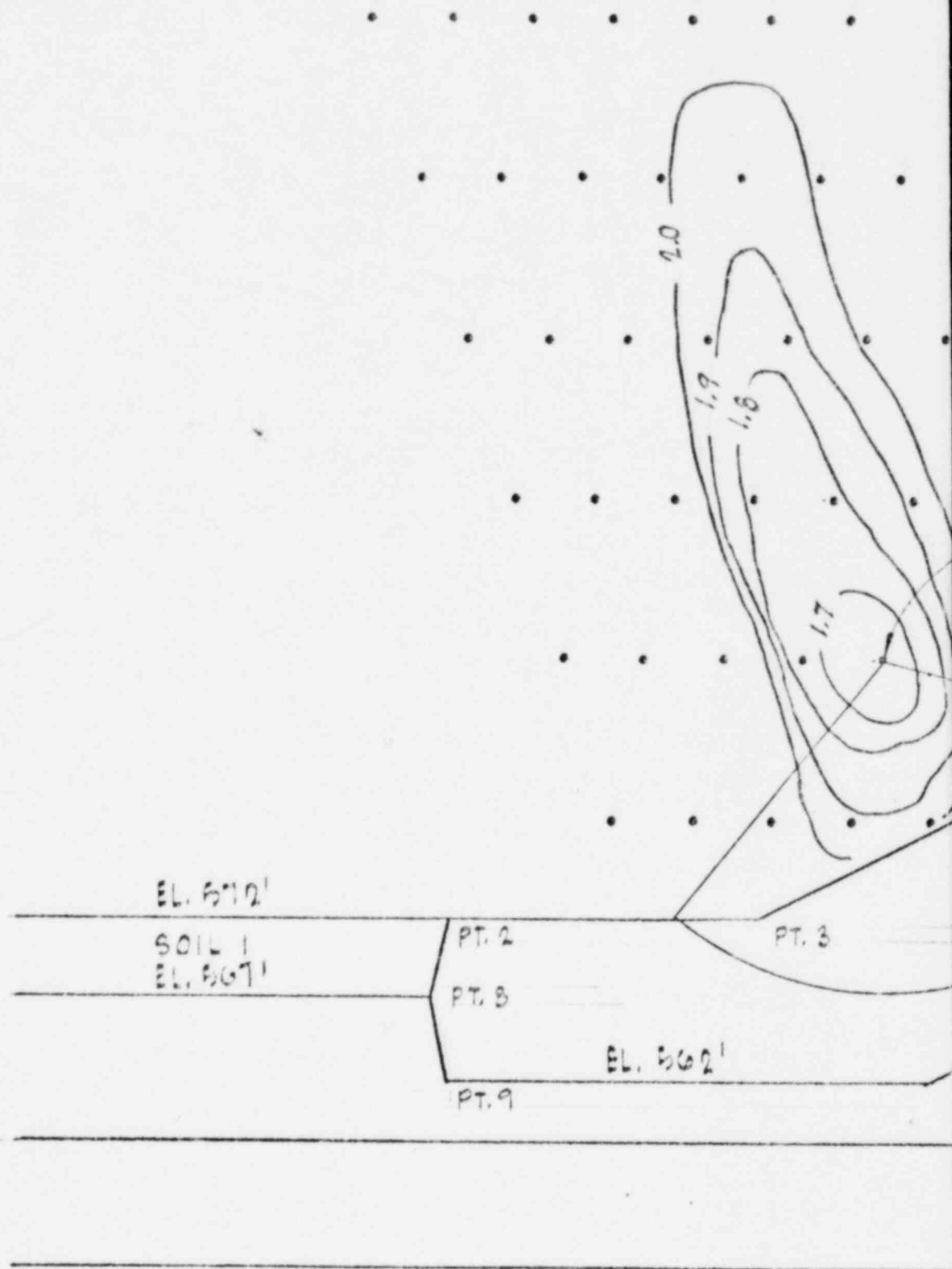
The minimum computed factors of safety for each case are shown in Figure 2. Case 2 best represents the critical failure surface for the shore barrier, since it indicated lower factors of safety than Cases 3 and 4. The local stone failure in Case 1 is not considered significant.

Equipotential lines for the computed factors of safety for Case 2 are shown on Figures 3 and 4 for the Fellenius Method and Bishop Method, respectively. These equipotential lines graphically show the location of the origin point which yielded the minimum factor of safety.

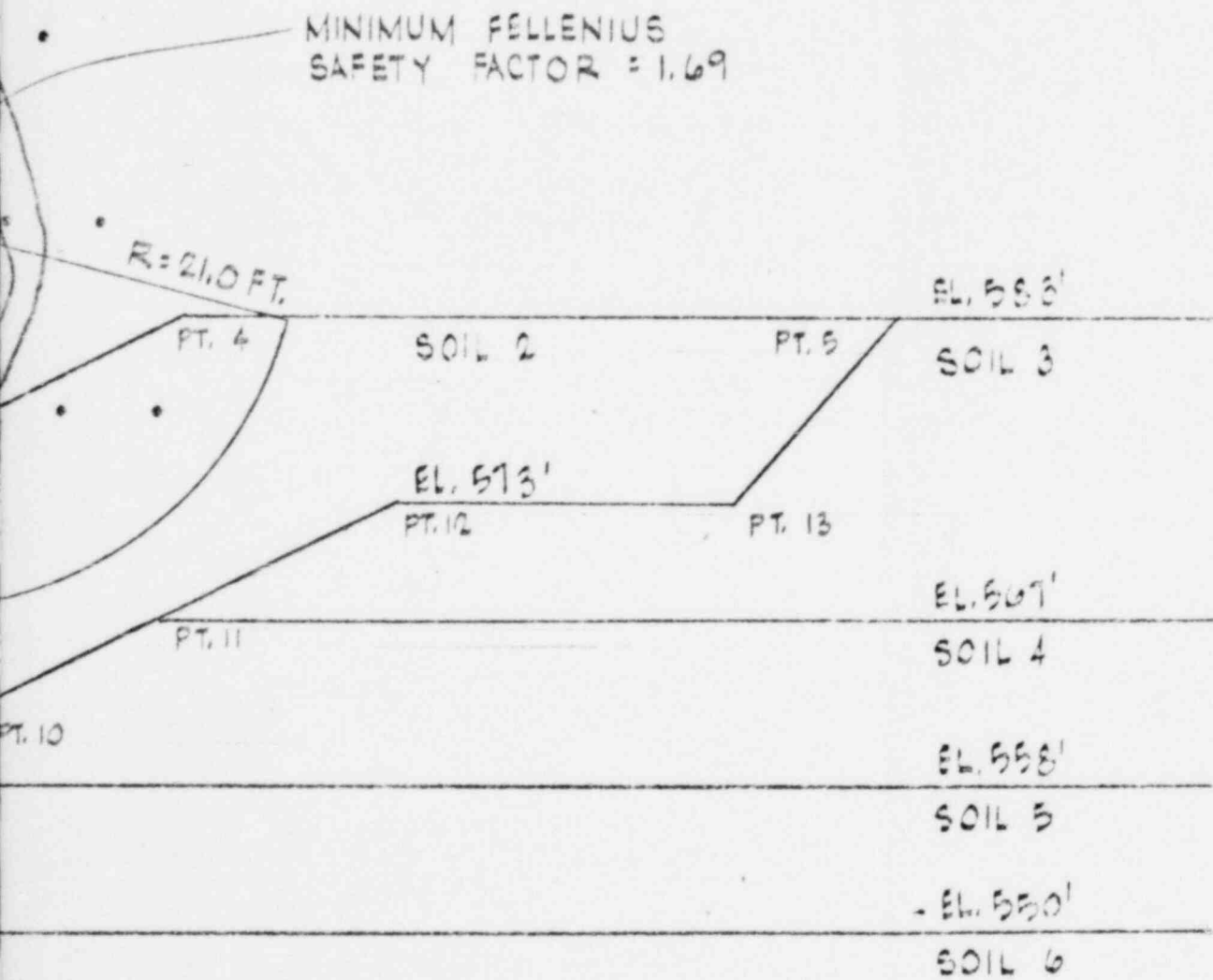
Case 5 results are similar to Case 2. The critical failure surface possesses the same computed factors of safety as Case 2.

| CASE | BISHOP | FELLENIOUS |
|------|--------|------------|
| 1 | 1.253 | 1.220 |
| 2 | 2.052 | 1.689 |
| 3 | 2.739 | 2.092 |
| 4 | 2.513 | 2.322 |
| 5 | 2.052 | 1.689 |

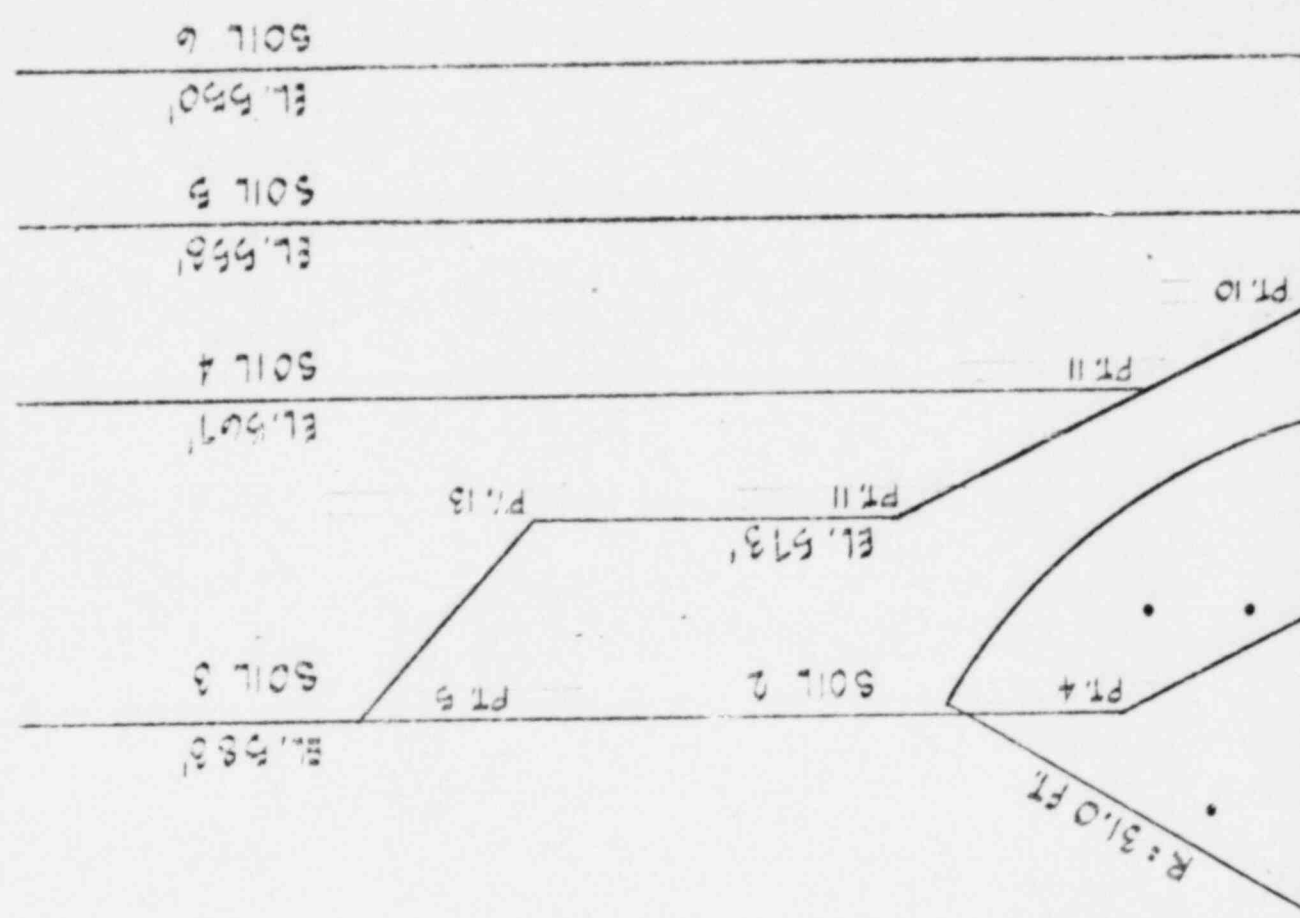
FIGURE 2
MINIMUM FACTORS OF SAFETY



CASE 2
MINIMUM FACTORS OF
(FELLENIOUS METHOD)
SCALE: 1" = 10'



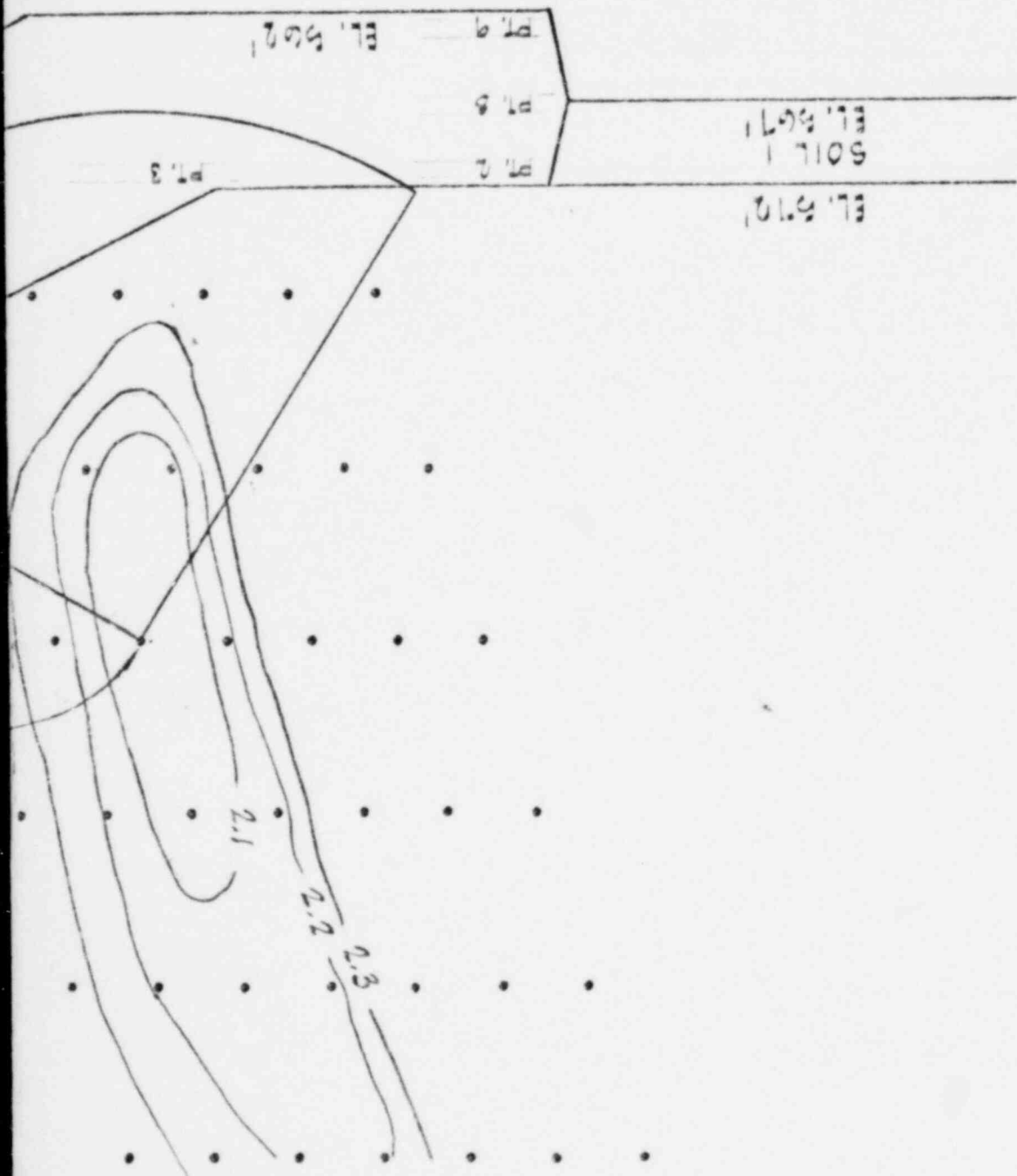
SAFETY



MINIMUM BISHOP
SAFETY FACTOR = 2.05

(BISHOP METH
SCALE: 1" = 10'

CASE 2 MINIMUM FACTORS



CONCLUSION

It is concluded that the Enrico Fermi Atomic Power Plant Unit 2 shore barrier has a sufficient factor of safety with regard to a sliding failure occurring in any soil layer.

N 7000

N 7200

N 7300

N 7400

N 7500

N 7600

N 7700

N 7800

N 7900

N 8000

68

67

66

65

LAGOON

64

63

62

61

60

57

56

55

54

53

52

51

50

49

48

47

46

45

44

43

42

41

40

39

38

37

36

35

34

33

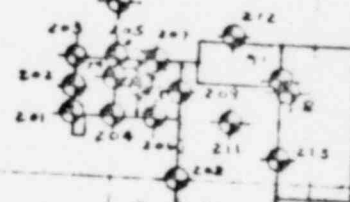
32

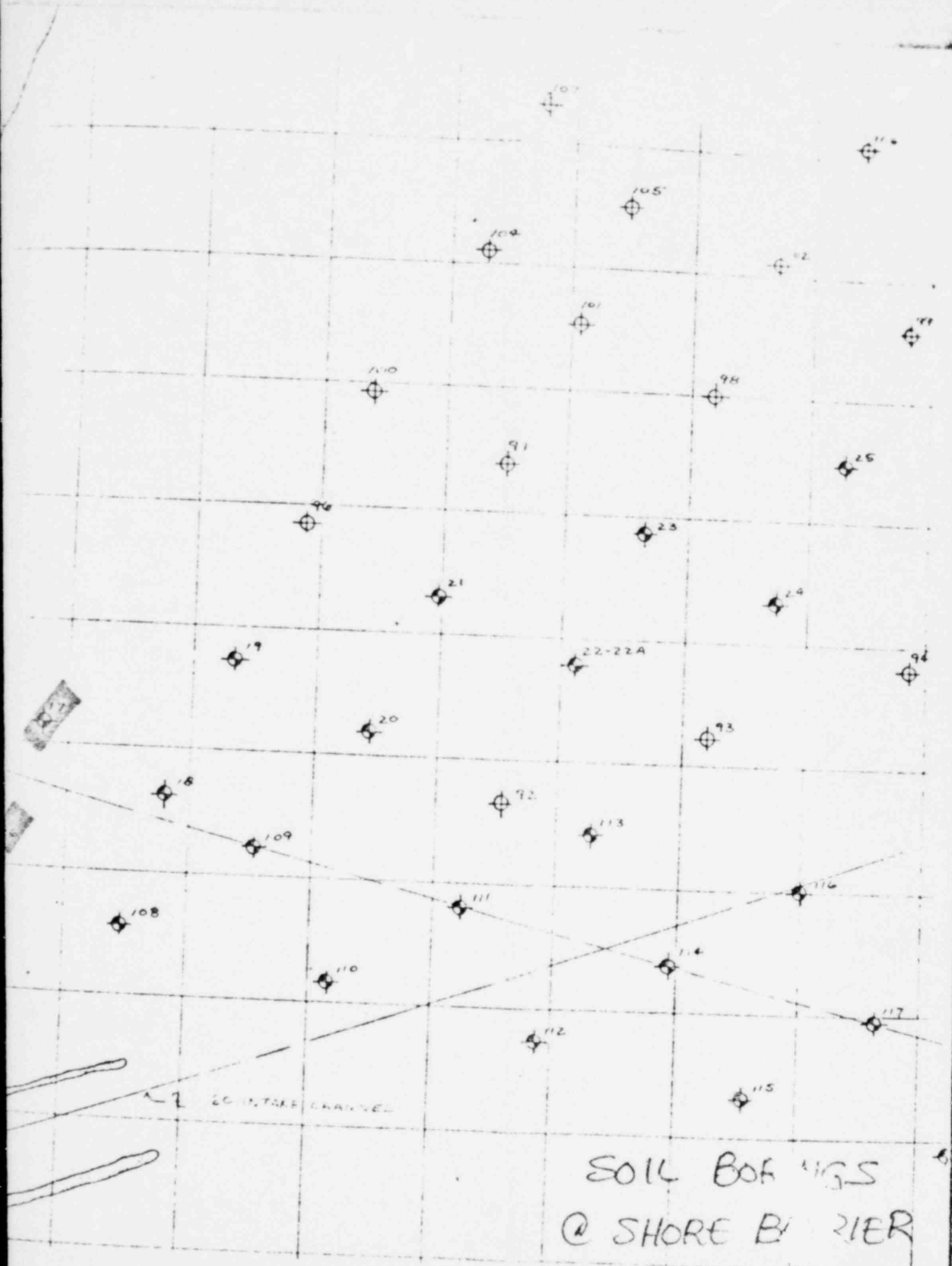
31

30

29

28





| |
|---------------------------------|
| LOG OF SURFACE PROFILE |
| CLASSIFICATIONS BY: SAFA (Soil) |
| Ground Surface Elev = 573.8 Ft. |

| |
|--|
| PENETRATION RESISTANCE & CORE RECOVERY |
|--|

PENETRATION RESISTANCE*

570 Loose Brn. & Gr. SILTY PEATY F-M SAND, to w/Layers of Black Silty Peat. (PT)

560 Medium Brown & Gray SILTY CL Y. w/Tr. of Sand & Decayed Roots. (SOIL 4) (CL)

Stiff to Hard Brown V. SILTY CLAY, w/Some Sand & Gravel. (CL-ML) (SOIL 5)

Hard Gr. SANDY V. SILTY CLAY, w/R. Med. Hard Gr. DOL. MITE, Vugs, 30%, 1/16-1/8" from COLITE Solutions. Hard Lt. Gr. Cemented BRECCIATED DOL. MITE, w/Tr. SHALE. Hard Gray DOL. MITE, w/Many Thin Blk. SHALE Seams.

550 Hard Gray Cemented BRECCIATED DOL. MITE, w/Calcite & brn. Clay Deposits in Vert. Fissures Vugs, <5%, 1/16-1/4". Few SHALE Seams.

540

TOP/ROCK EL. 554.8

19' NX casing used.
Hole grouted; 2 bags cement.

NOTE:

50% Drill Water Lost. El. 553.8 to end of boring.

LOCATION: N-6780; E-5850
TOTAL DEPTH: 39' 0"

BORING STARTED: 1-11-59
BORING COMPLETED: 1-13-59

INSPECTOR: B.S. Imber (SAFA)
DRILLER: F. Raidl

CONTRACTOR: Raymond Concrete Pile Div.
WATER LEVEL: in hole at indicated number

of hours after completion of boring
9 feet of casing in place

* PENETRATION RESISTANCE

Number of blows required to drive 2 1/2 inch OD soil sampler

4 inches, using 140 lb weight with 30 inch free fall

NOTE: % ROCK CORE RECOVERY
ALL ROCK DESCRIPTIONS ARE AS NOTED BY BRANDON & JOHNSON (U/M), BASED UPON THEIR VISUAL EXAMINATION OF ROCK CORES.

ALL REVIEWED BY
DR. L. BROWN
(PURDUE)

SOIL AND FOUNDATIONS ASSOCIATES
29563 NORTHWESTERN HIGHWAY
SOUTHFIELD, MICHIGAN 48075

LOG OF TEST BORING NO 11

ENRICO FERMI ATOMIC POWER PLANT
UNIT NO. 2
LAGOONA BEACH, MICHIGAN

THE DETROIT EDISON COMPANY

APP. GAO DATE Rev. 110

ELEVATION IN FEET

Water Surface Elev. = 571.8 Ft.

PENETRATION RESISTANCE *

ELONGATION IN FEET

② inches, using 192 lb weight with 20 inch free fall
ROCK CORE DIAMETER: 1 1/2" No. 1

ASPR. GAO DATE Rev. JOB N. 110

LOG OF SURFACE PROFILE
CLASSIFICATIONS BY: S&FA (Soil)
Platform Elev = 573.1 Ft.

PENETRATION RESISTANCE & CORE RECOVERY

PENETRATION RESISTANCE *

| ELEVATION IN FEET | DESCRIPTION | CLASSIFICATION | PENETRATION RESISTANCE * | RECOVERY |
|-------------------|--|----------------|--------------------------|----------|
| 570 | PLATFORM. | W.S. EL. 570.0 | | |
| | WATER. | G.S. EL. 567.0 | | Ne |
| | SAND & GRAVEL. | | | |
| | PEAT. | | | <1 |
| 560 | Soft to Medium Gray VERY SILTY CLAY. | CL-MI | | 5 |
| | (SOIL 4) | | | 4 |
| | Stiff Brown & Gray VERY SILTY CLAY. | CL-MI | | 17 |
| | W/Little Sand, Trace Gravel. | | | 21 |
| 550 | Hard Gray VERY SILTY CLAY, | CL-MI | | 19 |
| | w/Some Sand, Little Gravel. | | | 16 |
| | Stiff Gray VERY SILTY CLAY, | CL-MI | | |
| | w/Some Sand & Gravel. | | | |
| | V. Hard Gray VERY SILTY CLAY, | CL-MI | | |
| | w/Some Sand & Rock Frags. | | | |
| 540 | Hard Gray DOLOMITE, w/Some CLAY Seams, | | | |
| | CALCITE., Some Vert. Fract., Mod. Close. | | | |
| | Hard Gray DOLOMITE, w/SHALE Seams. | | | |
| | Vugs, <1/10-3/10 Fractures, V. Close, Horiz. | | | |
| | Hard Gray DOLOMITE, | | | |
| | w/Trace of SHALE. | | | |
| 530 | Hard Gray DOLOMITE, w/Some BRECCIA. | | | |
| | Hard Gray ARGILLACEOUS DOLOMITE, | | | |
| | w/Some Fractures, Close & Horiz. | | | |
| 520 | Hard Gray DOLOMITE, | | | |
| | w/Some Vertical Fractures, Wide; | | | |
| | Some 60° Fractures, Close. | | | |
| 510 | Hard Gray DOLOMITE, w/Some BRECCIA. | | | |
| | Hard, Dr. Gr. Cemented BRECCIATED DOLOMITE. | | | |
| | Vugs, <10%, <1/10-3/10 | | | |

LOCATION: N-7676; E-6315
TOTAL DEPTH: 62'6"

BORING STARTED: 10-16-68
BORING COMPLETED: 10-18-68

INSPECTOR: J.C. Wanzock (S&FA)
DRILLER: J. Pugh
CONTRACTOR: Raymond Concrete Pile Div.
WATER LEVEL in hole at indicated number

of hours after completion of boring
feet of casing in place Not observed.

* PENETRATION RESISTANCE

Number of blows required to drive 20 inch OD soil sampler
② inches using 140 lb weight with 30 inch free fall

ALL ROCK DESCRIPTIONS BASED UPON THEIR VISUAL EXAMINATION OF ROCK CORES.
ALL REVIEWED BY DR. L. BROWN (PURDUE)

SOIL AND FOUNDATIONS ASSOCIATES

29563 NORTHWESTERN HIGHWAY
SOUTHFIELD, MICHIGAN 48075

LOG OF TEST BORING NO. 17

ENRICO FERRI ATOMIC POWER PLANT
UNIT NO. 2

LINGGONA, ECH, MICHIGAN

THE DETROIT EDISON COMPANY

APPR. GAO DATE Rev. JOB NO. 110

| |
|---------------------------------|
| LOG OF SUBSURFACE PROFILE |
| CLASSIFICATIONS BY: S&FA (Soil) |
| Ground Surface Elev = 574.1 Ft. |

| | |
|--|--|
| PENETRATION RESISTANCE & CORE RECOVERY | |
| PENETRATION RESISTANCE # | |

| ELEVATION IN FEET | | | PENETRATION RESISTANCE # | | | | | | | | | | Run No. |
|-------------------|---|------|--------------------------|----|----|----|----|----|----|----|----|----|---------|
| | | | 0 | 10 | 20 | 30 | 40 | 50 | 60 | 70 | 80 | 90 | |
| 70 | Loose Brown MEDIUM SAND. | (SP) | | | | | | | | | | | Ne |
| 67 | Loose Gray SILTY MEDIUM SAND. | (SP) | | | | | | | | | | | 6 |
| 64 | Loose Brown MEDIUM SAND. | (SP) | | | | | | | | | | | 4 |
| 61 | Soft FIBROUS PEAT. | (SP) | | | | | | | | | | | 4 |
| 58 | Soft to Medium Brown & Gray SILTY CLAY. | (CL) | | | | | | | | | | | |
| 560 | (SOIL 4) | | | | | | | | | | | | |
| 550 | Stiff Brown & Gray VERY SILTY CLAY, w/Some Sand, Little Gravel. | (CL) | | | | | | | | | | | 20 |
| 540 | V. Hard Gray VERY SILTY CLAY, w/Some Sand, Little Gravel & Rock Frags. | (CL) | | | | | | | | | | | 57 |
| 530 | TOP/ROCK EL. 544.1 | | | | | | | | | | | | |
| 520 | Soft to Med. Hd. V. Lt. Brn. Gr. DOLOMITE, w/Few Thin Blk. Irreg. Partings, CLAY S.S. | | | | | | | | | | | | 1 |
| 510 | Yell. CALCITE at EL. 543.6. | | | | | | | | | | | | |
| 500 | CLAY SEAM. | | | | | | | | | | | | |
| 30 | 13.5' 4-inch casing used. Hole grouted; 1 bag cement. | | | | | | | | | | | | |

LOCATION: N-7680; E-6000
 TOTAL DEPTH: 35' 0"
 BORING STARTED: 12-16-68
 BORING COMPLETED: 12-17-68

INSPECTOR: B. S. Imber (S&FA)
 DRILLER: M. Suig
 CONTRACTOR: Raymond Concrete Pile Div.
 WATER LEVEL in hole at indicated number

NOTE: ON ROCK CORE RECOVERY
 ALL ROCK DESCRIPTIONS ARE AS NOTED BY BRANDON & JOSEPHSON (U/M), BASED UPON THEIR VISUAL EXAMINATION OF ROCK CUBES.
 ALL REVIEWED BY
 DR. L. BROWN (PURDUE)

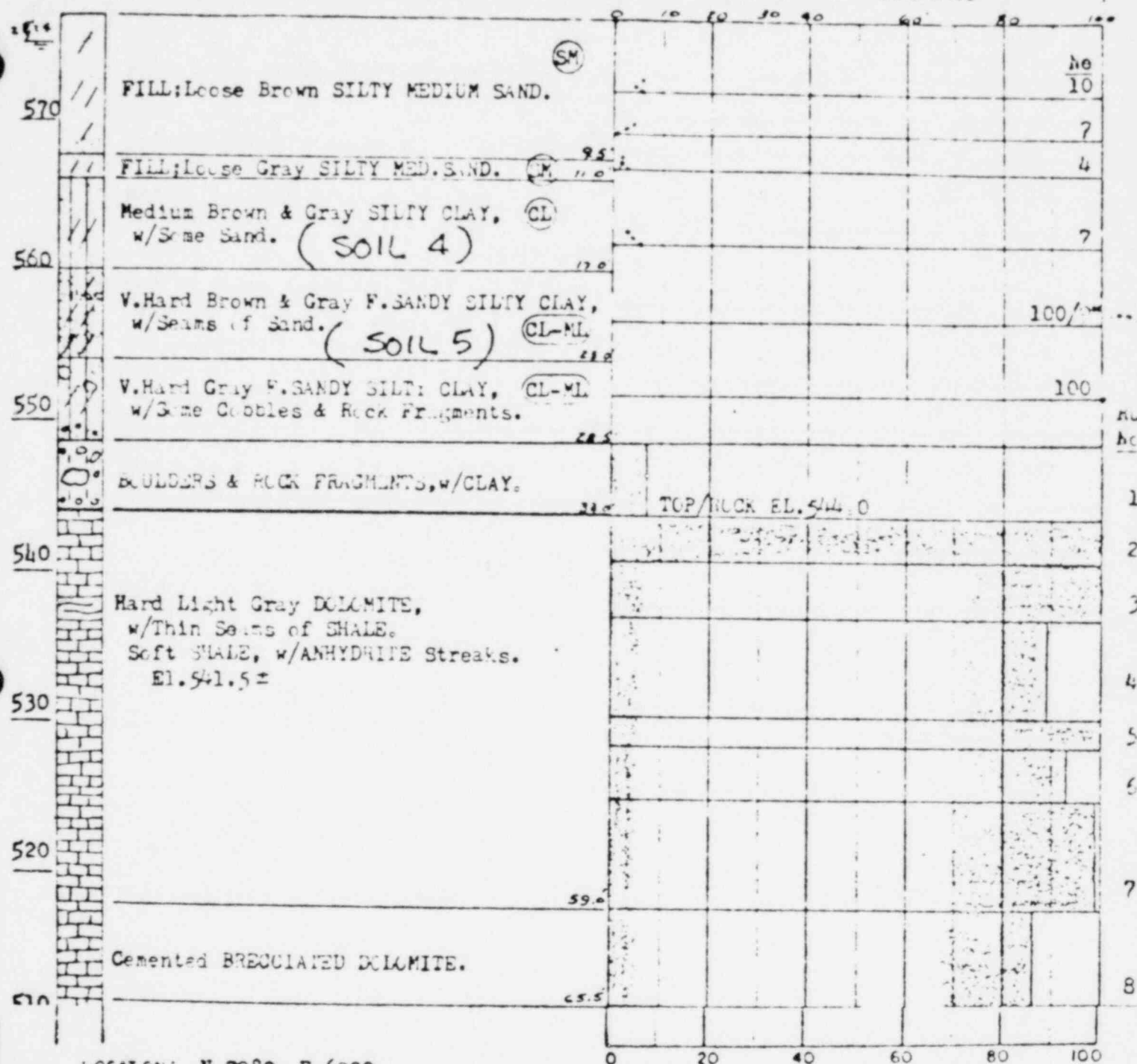
| | | |
|---------------------------------|-----------|------------|
| SOIL AND FOUNDATIONS ASSOCIATES | | |
| 29563 NORTHWESTERN HIGHWAY | | |
| SOUTHFIELD, MICHIGAN 48075 | | |
| LOG OF TEST BORING NO. 47 | | |
| ENRICO FERMI ATOMIC POWER PLANT | | |
| UNIT NO. 2 | | |
| LAGUNA BEACH, MICHIGAN | | |
| THE DETROIT EDISON COMPANY | | |
| APPR. GAC | DATE REV. | OR NO. 110 |

of hours after completion of boring
 feet of casing in place Not observed

* PENETRATION RESISTANCE
 Number of blows required to drive 2.0 inch OD soil sampler
 inches, using 140 lb weight with 30 inch free fall
 ROCK CORE DIAMETER 3.0
 No is evaluated blows/foot.

| LOG OF SUBSURFACE PROFILE |
|--|
| CLASSIFICATIONS BY: <u>SAFE (Soil)</u> |
| Ground Surface Elev - <u>577.0 Ft.</u> |

PENETRATION RESISTANCE & CORE RECOVERY



LOCATION: N-7980; E-6000

TOTAL DEPTH: 82' 4"

BORING STARTED: 12-17-68

BORING COMPLETED: 12-26-68

Dames & Moore

INSPECTOR: 54A-P. Gohran

DRILLER: W.C. Sugg & B. Singleton

CONTRACTOR: Raymond Concrete Pile Div.

WATER LEVEL in hole at indicated number of hours after completion of boring, 0 feet of casing in place.

* PENETRATION RESISTANCE: (before grouting)

Number of blows required to drive 1.5 inch O.D. soil sampler

② inches using 140 lb weight with 30 inch free fall.

N. is evaluated blows/foot.

ROCK CORE DIAMETER: 1.5 inch

ALL ROCK DESCRIPTIONS ARE AS EDITED BY BRANDON & JOSEPHSON (U/M), BASED UPON THEIR VISUAL EXAMINATION OF ROCK CORES.

ALL REVIEWED BY

DR. L. BROWN (PURDUE)

NOTE: % ROCK CORE RECOVERY

SOIL AND FOUNDATIONS ASSOCIATES

29563 NORTHWESTERN HIGHWAY
SOUTHFIELD, MICHIGAN 48075

LOG OF TEST BORING NO. 54A

ENRICO FERMI ATOMIC POWER PLANT

UNIT NO. 2

LAGUNA BEACH, MICHIGAN

THE DETROIT EDISON COMPANY

APPR. GAO DATE: Rev. BOX NO 110

| | | | |
|---|--|-----------------|-----------|
| Project Quality Assurance Procedure | Title INSPECTION AND TESTING OF SHORE BARRIER CONSTRUCTION | Number 9.513 | Rev. 0 |
| | | EXHIBIT 9.513.3 | |

III

METHOD OF TEST TROXLER

| Lab | Location & Remarks | Elev. | Probe Depth | Moist. Count | Moist. Count Ratio | Moist. pcf | Percent Moist. Troxler | Percent Moist. Cont. Ck | Density Count | Dens. Count Ratio | Wet Dens. pcf | Dry Dens. Troxler | Dry Dens. Cont. * | % Comp |
|-----|--------------------|-------|-------------|--------------|--------------------|------------|------------------------|-------------------------|---------------|-------------------|---------------|-------------------|-------------------|--------|
| 148 | N6825 E5455 | 567.7 | 6" | 1148 | .827 | 22.81 | 17.8 11.4 | TESTED SEE #176 | 396 | 2.371 | 120.3 | 107.1 pcf | 95.0 | 99.8 |
| 149 | N7000 | 569.3 | | 1332 | .960 | 27.12 | 25.3 23.7 | | 455 | 2.725 | 120.3 | 94.8 | | 99.8 |
| 150 | N7025 | 569.3 | | 1316 | .949 | 26.75 | 23.9 26.4 | | 435 | 2.605 | 123.2 | 98.0 | | 103.2 |
| 151 | N7075 | 569.3 | | 1343 | .968 | 27.42 | 24.5 | | 427 | 2.557 | 124.2 | 98.4 | | 103.6 |
| 152 | N7125 | 569.3 | | 1314 | .947 | 26.69 | 24.2 | | 444 | 2.659 | 122.0 | 96.9 | | 102.1 |
| 153 | N7175 | 569.5 | | 1313 | .947 | 26.69 | 24.9 | | 463 | 2.772 | 119.7 | 94.6 | | 99.6 |
| 154 | N7225 | 569.5 | | 1347 | .971 | 27.47 | 25.9 | | 460 | 2.754 | 120.1 | 94.2 | | 99.2 |
| 155 | N7275 | 568.9 | | 1475 | 1.063 | 30.44 | 29.0 26.6 | | 448 | 2.683 | 121.5 | 92.7 | | 97.6 |
| 156 | N7325 | 568.9 | | 1530 | 1.103 | 31.72 | 32.1 28.0 | | 460 | 2.754 | 120.1 | 90.0 | 93.0 | 96.8 |
| 157 | N7375 | 569.4 | | 1369 | .987 | 27.97 | 25.9 | | 442 | 2.647 | 122.3 | 95.9 | 95.0 | 100.9 |
| 158 | N7425 | 569.4 | | 1353 | .975 | 27.59 | 26.1 | | 462 | 2.766 | 119.8 | 93.8 | | 98.7 |
| 159 | N7475 | 569.5 | | 1365 | .984 | 27.87 | 25.5 | | 437 | 2.617 | 122.9 | 96.6 | | 101.7 |
| 160 | N7525 | 569.5 | | 1377 | .993 | 28.18 | 26.1 | | 434 | 2.599 | 122.3 | 95.7 | | 100.7 |
| 161 | N7575 | 569.8 | | 1364 | .983 | 27.84 | 26.6 | | 466 | 2.790 | 119.4 | 93.2 | | 98.2 |
| 162 | N7625 | 569.8 | | 1361 | .981 | 27.78 | 26.0 | | 452 | 2.707 | 121.0 | 94.8 | | 99.8 |

ONLY NOTATION INFORMATION

APPENDIX B

DENSITY OF SOIL IN PLACE

CONTROL DATA

Proctor Curve No. *

Optimum moisture %

Acceptable Moisture Content Range to

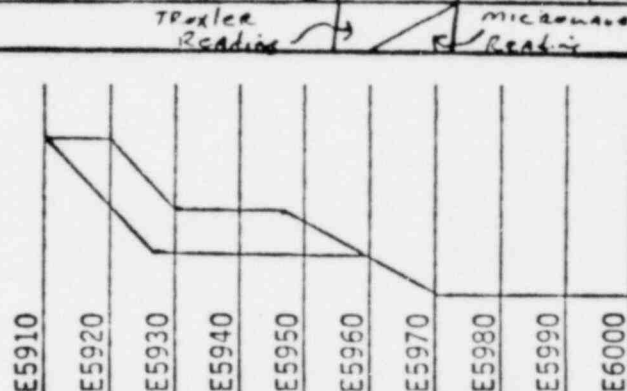
Maximum Density pcf

TROXLER No. 2339

STANDARD COUNT

| Density | Moisture | Time |
|---------|----------|---------|
| 167 | 1387 | 7:15 AM |

Approximate
Grid Line
N
E
Elev.



PROJECT FERMILII SHORE BARRIER

Contractor HOLLAWAY

Source of Material ON SITE

Type of Material CL

Weather & Temp. SUNNY, WARM

Inspector MW Date 10-8-80

Checked By Mike Perkins Date 10-8-80

Project
Quality Assurance
Procedure

Title

INSPECTION AND TESTING OF
SHORE BARRIER CONSTRUCTION

Number

9.513

Rev.

0

EXHIBIT 9.513.3

METHOD OF TEST TROXLER

| Location & Remarks | Elev. | Probe Depth | Moist. Count | Moist. Count Ratio | Moist. pcf | Percent Moist. Troxler | Percent Moist. Cont. Ck | Density Count | Dens. Count Ratio | Wet Dens. pcf | Dry Dens. Troxler | Dry Dens. Cont. * | % Comp |
|--------------------|-------|-------------|--------------|--------------------|------------|------------------------|--|---------------|-------------------|---------------|-------------------|-------------------|--------------|
| 163 N7675 E5955 | 569.8 | 6" | 1396 | 1.006 | 28.62 | 27.4 | | 457 | 2.737 | 120.4 | 93.4 pcf | 93.0 | 98.3 |
| 164 N6850 E5934 | 568.0 | | 1384 | 1.015 | 28.80 | 27.0 | | 440 | 2.635 | 122.4 | 95.2 | 95.0 | 100.2 |
| 165 N7000 | 570.0 | | 1364 | 1.000 | 28.42 | 26.8 | | 449 | 2.689 | 121.2 | 94.4 | | 99.4 |
| 166 N7050 | | | 1385 | 1.015 | 28.88 | 27.3 | | 459 | 2.749 | 120.2 | 92.9 | | 97.8 |
| 167 N7100 | | | 1374 | 1.007 | 28.62 | 27.2 | | 452 | 2.707 | 121.0 | 94.0 | | 98.9 |
| 168 N7150 | | | 1388 | 1.018 | 29.00 | 27.3 | | 444 | 2.659 | 122.0 | 94.6 | | 99.6 |
| 169 N7200 | | | 1388 | 1.018 | 29.00 | 26.7 | TESTED SECT 175 | 474 | 2.838 | 118.4 | 91.0 | | FAIL M.C. |
| 170 N7250 | | | 1346 | .987 | 27.96 | 26.2 | | 454 | 2.719 | 121.2 | 94.8 | | 99.8 |
| 171 N7300 | | | 1414 | 1.037 | 29.60 | 27.2 | | 450 | 2.695 | 121.2 | 93.2 | | 98.1 |
| 172 N7350 | | | 1344 | .985 | 27.88 | 25.4 | | 434 | 2.599 | 123.3 | 97.0 | | 102.1 |
| 173 N7400 | | | 1308 | .959 | 27.08 | 25.9 | | 475 | 2.844 | 118.3 | 92.8 | | 97.7 |
| 174 N7450 | | | 1336 | .979 | 27.71 | 25.5 | | 442 | 2.647 | 122.4 | 96.3 | | 101.4 |
| 175 N7200 | | | 1418 | 1.040 | 29.67 | 27.9 | TEST OF #169 2nd TEST OF #148 | 434 | 2.600 | 123.3 | 95.2 | 93.0 | 100.4 |
| 176 N6825 E5955 | 567.5 | | 1191 | .873 | 24.29 | 18.8 | | 386 | 2.311 | 129.3 | 106.6 | 106.7 | 99.4 |

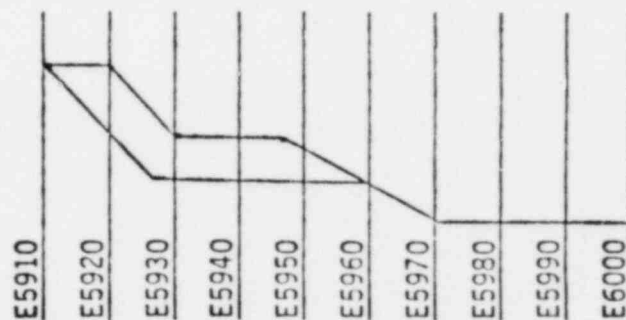
CONTROL DATA

Proctor Curve No. *
Optimum moisture %
Acceptable Moisture
Content Range
to
Maximum Density pcf
TROXLER No. 2339

STANDARD COUNT

| Density | Moisture | Time |
|---------|----------|---------|
| 167 | 1387 | 7:30 AM |

Approximate
Grid Line
N
E
Elev.



PROJECT FERM II SHORE BARRIER

Contractor HOLLAWAY

Source of Material ON SITE

Type of Material CL

Weather & Temp. SUNNY WARM

Inspector C.C. Date 10-8-80

Checked By Date 10-9-80

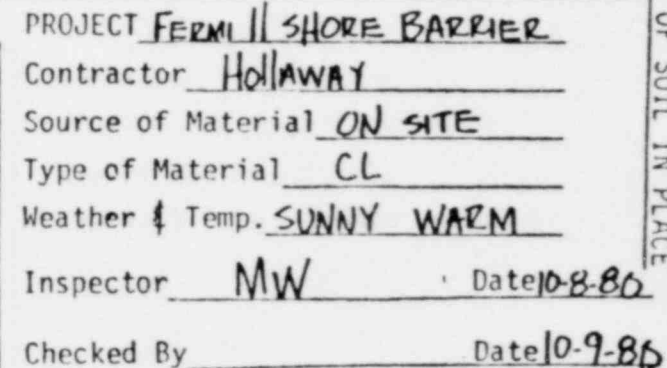
DENSITY OF SOIL IN PLACE

A

● B (13)

DENSITY OF SOIL IN PLACE41

Approximate
Grid Line
N _____
E _____
Elev. _____



DATE 10-8-80 42

DANIEL INTERNATIONAL
FERMI II NUCLEAR PROJECT

MICROWAVE MOISTURE
READINGS

LAB #

LOCATION

TARE #

1. Wet Weight of Sample and
TareDry Weight of Sample and
Tare

3. Weight of Loss (1-2)

4. Weight of Tare

5. Weight of Dry Sample (2-4)

6. % Total Moisture (3-5) X 100

7. Technicians Initials

10-15-80
MTP

| | | | | | | | | | |
|-------|-------|-------|-------|-------|------------|-------|-------|-------|--|
| 148 | 150 | 149 | 156 | 155 | 163 162 | 169 | 171 | 176 | |
| N6825 | N7025 | N7000 | N7325 | N7275 | N7675 | N7200 | N7300 | N6925 | |
| D-1 | D-15 | D-14 | D-1 | D-12 | D-14 | D-15 | D-7 | D-11 | |
| 257.7 | 235.6 | 243.0 | 195.9 | 213.0 | 244.9 | 270.2 | 243.0 | 242.1 | |
| 216.0 | 207.1 | 215.4 | 173.1 | 189.0 | 212.3 | 232.1 | 212.3 | 219.4 | |
| 21.7 | 28.5 | 27.6 | 22.8 | 24.0 | 32.6 | 38.1 | 30.7 | 22.8 | |
| 91.6 | 99.3 | 98.9 | 91.6 | 98.8 | 98.8 | 99.3 | 99.4 | 97.9 | |
| 124.4 | 107.8 | 116.5 | 81.5 | 90.2 | 113.5 | 132.8 | 112.9 | 121.5 | |
| 17.4 | 26.4 | 23.7 | 28.0 | 26.6 | 28.7 | 28.7 | 27.2 | 18.8 | |
| MP | MP | MP | MP | MP | MP | MP | MP | MP | |

NOTE: RESULTS FOR #166 ARE ON THE NEXT PG.

11C

Project
Quality Assurance
Procedure

INSPECTION AND TESTING OF
SHORE BARRIER CONSTRUCTION

Number 9.513 Rev 0
EXHIBIT 9.513.3

INFORMATION ONLY

METHOD OF TEST TROXLER

| Ab* | Location & Remarks | Elev. | Probe Depth | Moist. Count | Moist. Count Ratio | Moist. pcf | Percent Moist. Troxler | Percent Moist. Cont. Ck | Density Count | Dens. Count Ratio | Wet Dens. pcf | Dry Dens. Troxler | Dry Dens. Cont. * | % Comp |
|-----|--------------------|-------|-------------|--------------|--------------------|------------|------------------------|-------------------------|---------------|-------------------|---------------|-------------------|-------------------|-----------|
| 83 | N7600 E 5934 | 570.5 | 6" | 1280 | .920 | 25.82 | 22.7 / 24.8 | | 434 | 2.599 | 123.3 | 99.1 pcf | 95.0 | 104.3 |
| 84 | N6975 E 5960 | 570.5 | | 1346 | .967 | 27.37 | 25.0 | | 439 | 2.629 | 122.4 | 96.6 | | 101.7 |
| 85 | N7025 | 570.5 | | 1386 | .996 | 28.29 | 25.0 | | 434 | 2.599 | 123.3 | 96.6 | | 101.7 |
| 86 | N7075 | 570.5 | | 1380 | .991 | 28.12 | 26.1 | | 442 | 2.647 | 122.3 | 95.8 | | 100.8 |
| 87 | N7125 | 570.7 | | 1230 | .884 | 24.66 | 21.1 / 22.5 | REF TEST SEE SEC # 209 | 433 | 2.593 | 123.4 | 100.3 | | MC FAILED |
| 88 | N6850 | 570.3 | | 1282 | .921 | 25.84 | 24.3 | | 480 | 2.874 | 117.7 | 93.5 | | 98.4 |
| 89 | N7175 | 570.8 | | 1238 | .889 | 24.81 | 21.6 / 22.6 | REF TEST SEE SEC # 208 | 440 | 2.635 | 122.5 | 97.3 | | MC FAILED |
| 90 | N7225 | 570.5 | | 1233 | .886 | 24.72 | 21.1 / 20.4 | REF TEST SEE SEC # 207 | 430 | 2.575 | 123.8 | 100.7 | | MC FAILED |
| 91 | N7275 | 570.2 | | 1288 | .925 | 25.97 | 24.2 | REF TEST SEE SEC # 206 | 472 | 2.826 | 118.6 | 94.2 | | 99.2 |
| 92 | N7325 | 570.5 | | 1240 | .891 | 24.88 | 21.4 / 22.6 | REF TEST SEE SEC # 205 | 461 | 2.760 | 120.0 | 96.7 | | MC FAILED |
| 93 | N7700 E 5934 | 570.4 | | 1270 | .912 | 25.56 | 23.5 | REF TEST SEE SEC # 204 | 468 | 2.802 | 119.1 | 95.1 | | 100.1 |
| 94 | N7375 E 5960 | 570.8 | | 1312 | .943 | 26.56 | 24.0 | REF TEST SEE SEC # 203 | 443 | 2.653 | 122.1 | 97.1 | | 102.2 |
| 95 | N7425 | 570.5 | | 1274 | .915 | 25.66 | 22.8 / 23.6 | REF TEST SEE SEC # 202 | 442 | 2.647 | 122.3 | 98.2 | | MC FAILED |
| 96 | N7475 | 570.9 | | 1308 | .940 | 26.47 | 25.1 | | 476 | 2.850 | 118.1 | 93.2 | | 98.1 |

CONTROL DATA

Proctor Curve No. *

Optimum moisture %

Acceptable Moisture Content Range to

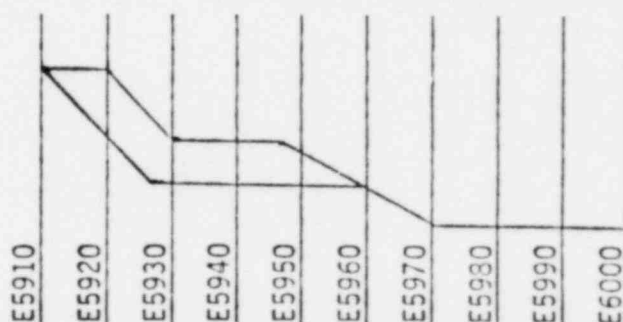
Maximum Density pcf

TROXLER No. 2339

STANDARD COUNT

| Density | Moisture | Time |
|---------|----------|------|
| 1167 | 1392 | 7:00 |

Approximate
Grid Line
N
E
Elev.



PROJECT FERM II SHORE BARRIER

Contractor HOLLWAY

Source of Material ON SITE

Type of Material CL

Weather & Temp. SUNNY

Inspector B.C.

Date 10-9-80

Checked By Mike Perkins

Date 10-9-80

DENSITY OF SOIL IN PLACE

Project
Quality Assurance
Procedure

INSPECTION AND TESTING OF
SHORE BARRIER CONSTRUCTION

Number
9.513
Rev.
0
EXHIBIT 9.513.3

METHOD OF TEST TROXLER

| Location & Remarks | Elev. | Probe Depth | Moist. Count | Moist. Count Ratio | Moist. pcf | Percent Moist. Troxler | Percent Moist. Cont. Ck | Density Count | Dens. Count Ratio | Wet Dens. pcf | Dry Dens. Troxler | Dry Dens. Cont. Ck | % Comp |
|--------------------|-------|-------------|--------------|--------------------|------------|------------------------|-------------------------|---------------|-------------------|---------------|-------------------|--------------------|--------|
| 198 N7525 E 5960 | 570.9 | 6" | 1370 | .983 | 27.85 | 26.1 | | 454 | 2.719 | 120.8 | 94.6 pcf | 95.0 | 99.6 |
| 199 N7575 | 570.8 | | 1318 | .946 | 26.66 | 22.8 / 25.2 | | 406 | 2.431 | 127.0 | 101.9 | | 107.2 |
| 200 N7625 | 570.8 | | 1293 | .928 | 26.06 | 24.0 | | 462 | 2.766 | 119.8 | 95.3 | | 100.3 |
| 201 N7675 | 570.9 | | 1338 | .961 | 27.16 | 26.5 | | 488 | 2.922 | 116.8 | 91.2 | | 96.0 |
| 202 N7475 | 571.4 | | 1324 | .950 | 26.88 | 26.9 | RETEST OF # 196 | 508 | 3.042 | 114.5 | 89.2 | 93.0 | 95.9 |
| 203 N7425 | 571.0 | | 1276 | .916 | 25.69 | 23.9 | RETEST OF # 195 | 475 | 2.844 | 118.3 | 94.2 | 95.0 | 99.2 |
| 204 N7375 | 571.0 | | 1306 | .938 | 26.41 | 24.6 | RETEST OF # 194 | 466 | 2.790 | 119.3 | 94.5 | | 99.5 |
| 205 N7325 | 570.8 | | 1343 | .964 | 27.25 | 25.0 | RETEST OF # 192 | 446 | 2.671 | 121.8 | 96.2 | | 101.3 |
| 206 N7275 | 570.5 | | 1341 | .963 | 27.22 | 26.3 | RETEST OF # 191 | 482 | 2.886 | 117.5 | 91.2 | | 96.7 |
| 207 N7225 | 570.9 | | 1242 | .892 | 24.91 | 21.7 / 22.0 | RETEST OF # 190 | 440 | 2.635 | 122.5 | 99.2 | 104.2 | 95.2 |
| 208 N7175 | 571.0 | | 1229 | .882 | 24.59 | 20.1 / 21.9 | RETEST OF # 189 | 401 | 2.401 | 127.6 | 104.6 | 104.2 | 100.4 |
| 209 N7125 | 571.0 | | 1271 | .912 | 25.56 | 23.4 | RETEST OF # 187 | 466 | 2.790 | 119.4 | 95.4 | 95.0 | 100.4 |

① E = E 5945

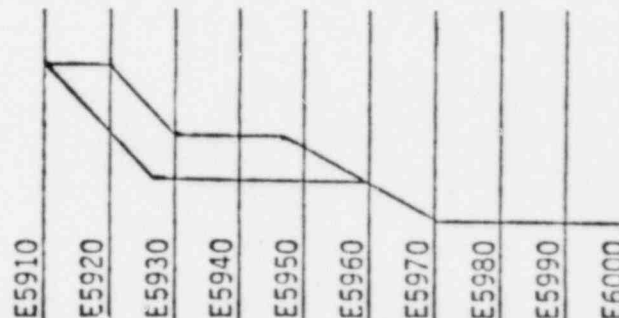
CONTROL DATA

Proctor Curve No. X
Optimum moisture %
Acceptable Moisture Content Range to
Maximum Density pcf
TROXLER No. 2339

STANDARD COUNT

| Density | Moisture | Time |
|---------|----------|--------|
| 167 | 139.3 | 1:00PM |

Approximate
Grid Line
N
E
Elev.



PROJECT FERMI II SHORE BARRIER

Contractor HOLLAWAY

Source of Material ON SITE

Type of Material CL

Weather & Temp. SUNNY WARM

Inspector M.W.

Date 10-9-80

Checked By

Date 10-10-80

DENSITY OF SOIL IN PLACE

DANIEL INTERNATIONAL
FERMI II NUCLEAR PROJECT

MICROWAVE MOISTURE
READINGS

LAB #

LOCATION

TARE #

| | | | | | | | | | |
|-------|-------|-------|-------|-------|-------|-------|-------|-------|--|
| 182 | 166 | 183 | 187 | 189 | 190 | 192 | 195 | 199 | |
| N7700 | N7050 | N7600 | N7185 | N7175 | N7225 | N7325 | N7425 | 7575 | |
| D-6 | D-8 | D-1 | D-11 | D-14 | D-9 | D-10 | D-9 | D-5 | |
| 258.9 | 243.6 | 240.9 | 264.8 | 259.5 | 265.0 | 242.0 | 214.1 | 254.7 | |
| 231.1 | 214.1 | 211.2 | 234.1 | 230.0 | 236.8 | 215.6 | 192.1 | 223.4 | |
| 27.8 | 29.5 | 29.7 | 30.7 | 29.5 | 28.2 | 26.4 | 22.0 | 31.5 | |
| 98.2 | 98.0 | 91.6 | 97.8 | 99.1 | 98.6 | 99.0 | 98.8 | 99.4 | |
| 132.9 | 116.1 | 119.6 | 136.3 | 130.4 | 138.2 | 116.6 | 93.3 | 124.0 | |
| 20.9 | 25.4 | 24.8 | 22.5 | 22.6 | 20.4 | 22.6 | 23.6 | 25.2 | |
| MP | MP | MP | MP | MP | MP | MP | MP | MP | |

1. Wet Weight of Sample and Tare

Dry Weight of Sample and Tare

3. Weight of Loss (1-2)

4. Weight of Tare

5. Weight of Dry Sample (2-4)

6. % Total Moisture (3-5) X 100

7. Technicians Initials

DATE 10-9-80

DANIEL INTERNATIONAL
FERMI II NUCLEAR PROJECT

MICROWAVE MOISTURE
READINGS

LAB #

LOCATION

TARE #

1. Wet Weight of Sample and
Tare2. Dry Weight of Sample and
Tare

3. Weight of Loss (1-2)

4. Weight of Tare

5. Weight of Dry Sample (2-4)

6. % Total Moisture (3+5) X 100

7. Technicians Initials

| | | | | |
|-------|-------|--|--|--|
| 207 | 208 | | | |
| N7225 | N7175 | | | |
| D-14 | D-10 | | | |
| 246.2 | 261.7 | | | |
| 219.6 | 232.5 | | | |
| 26.6 | 29.2 | | | |
| 98.9 | 99.0 | | | |
| 120.7 | 133.5 | | | |
| 22.0 | 21.9 | | | |
| mp | mp | | | |

DANIEL INTERNATIONAL
FERMI II NUCLEAR PROJECT

MICROWAVE MOISTURE
READINGS

LAB #

LOCATION

TARE #

1. Wet Weight of Sample and Tare
2. Dry Weight of Sample and Tare
3. Weight of Loss (1-2)
4. Weight of Tare
5. Weight of Dry Sample (2-4)
6. % Total Moisture (3+5) X 100
7. Technicians Initials

| | | | | |
|-------|-------|--|--|--|
| 212 | 226 | | | |
| N7000 | N7700 | | | |
| D-1 | D-11 | | | |
| 255.8 | 270.2 | | | |
| 225.1 | 236.9 | | | |
| 30.7 | 33.3 | | | |
| 98.1 | 98.0 | | | |
| 127.0 | 138.9 | | | |
| 24.2 | 24.0 | | | |
| MP | MP | | | |

Project
Quality Assurance
Procedure

Title

INSPECTION AND TESTING OF
SHORE BARRIER CONSTRUCTION

Number

9.513

Rev.

0

EXHIBIT 9.513.3

METHOD OF TEST TROXLER

| Lab | Location & Remarks | Elev. | Probe Depth | Moist. Count | Moist. Count Ratio | Moist. pcf | Percent Moist. Troxler | Percent Moist. Cont. Ck | Density Count | Dens. Count Ratio | Wet Dens. pcf | Dry Dens. Troxler | Dry Dens. Cont. * | % Comp | |
|-----|--------------------|-------|-------------|--------------|--------------------|------------|------------------------|-------------------------|---------------|-------------------|---------------|-------------------|-------------------|--------|-------|
| 267 | N6825 E 5935 | 573.0 | 6" | 1305 | .934 | 26.28 | 22.2 | | 400 | 2.410 | 127.4 | 102.7 pcf | 104.2 | 128 | 98.6 |
| 268 | N6875 | | | 1168 | .836 | 23.09 | 17.8 | 21.2 | 381 | 2.295 | 130.1 | 108.6 | 106.7 | 072A | 101.8 |
| 269 | N6925 | | | 1218 | .872 | 24.25 | 19.7 | | 400 | 2.410 | 127.4 | 104.8 | 104.2 | 128 | 100.6 |
| 270 | N6975 | | | 1223 | .875 | 24.34 | 18.6 | | 360 | 2.169 | 133.1 | 110.4 | 106.7 | 072A | 103.5 |
| 271 | N7025 | | | 1278 | .915 | 25.66 | 21.8 | | 411 | 2.476 | 126.0 | 101.9 | 104.2 | 128 | 97.8 |
| 272 | N7075 | | | 1292 | .925 | 25.97 | 22.5 | | 420 | 2.530 | 124.8 | 100.4 | | | 96.4 |
| 273 | N7125 | | | 1294 | .926 | 26.00 | 21.9 | | 402 | 2.422 | 127.1 | 102.7 | | | 98.6 |
| 274 | N7175 | | | 1270 | .909 | 25.47 | 21.0 | | 396 | 2.386 | 128.0 | 104.1 | | | 99.9 |
| 275 | N7225 | | | 1354 | .969 | 27.41 | 23.7 | 24.2 | 404 | 2.434 | 126.9 | 101.1 | | | 99.9 |
| 276 | N7275 | | | 1276 | .913 | 25.60 | 21.0 | | 390 | 2.349 | 128.9 | 104.9 | | | 100.7 |
| 277 | N7325 | | | 1277 | .914 | 25.62 | 21.1 | | 392 | 2.361 | 128.6 | 104.6 | | | 100.4 |
| 278 | N7375 | | | 1300 | .931 | 26.20 | 22.1 | | 399 | 2.404 | 127.5 | 102.9 | | | 98.8 |
| 279 | N7425 | | | 1286 | .921 | 25.84 | 21.4 | | 394 | 2.373 | 128.3 | 104.1 | | | 99.9 |
| 280 | N7475 | | | 1222 | .875 | 24.34 | 20.2 | | 412 | 2.482 | 125.9 | 103.2 | | | 99.0 |
| 281 | N7525 | | | 1268 | .908 | 25.44 | 21.7 | | 418 | 2.518 | 125.0 | 101.2 | | | 97.1 |

INFORMATION ONLY

SEE ENTRY # 307

Troxler Reading

micron and reading

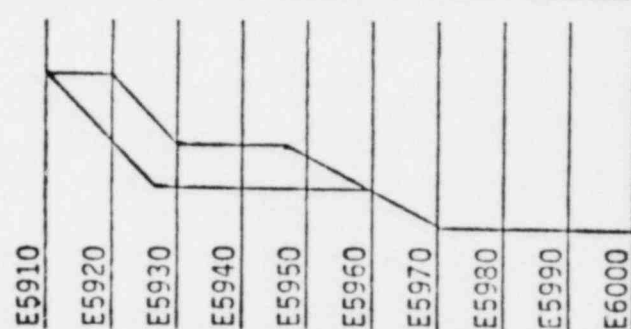
CONTROL DATA

Proctor Curve No. *
Optimum moisture %
Acceptable Moisture Content Range
to
Maximum Density pcf
TROXLER No.

STANDARD COUNT

Density Moisture Time
116 1397 7:00AM

Approximate Grid Line
N
E
Elev.



PROJECT FERMI SHORE BARRIER

Contractor HOLLAWAY

Source of Material ON SITE

Type of Material CL

Weather & Temp. SUNNY, COLD

Inspector BOB CARTER Date 10/28/01

Checked By M. L. Lush Date 10/29/01

DENSITY OF SOIL IN PLACE

DATE 10/28/80

DANIEL INTERNATIONAL
FERMI II NUCLEAR PROJECT

MICROWAVE MOISTURE
READINGS

LAB #

LOCATION

TARE #

1. Wet Weight of Sample and
Tare

Dry Weight of Sample and
Tare

3. Weight of Loss (1-2)

4. Weight of Tare

5. Weight of Dry Sample (2-4)

6. % Total Moisture (3-5) X 100

7. Technicians Initials

| | | | | |
|-------|-------|--|--|--|
| 268 | 275 | | | |
| N6875 | N7275 | | | |
| D 10 | D 1 | | | |
| 272.8 | 281.8 | | | |
| 242.4 | 244.7 | | | |
| 30.4 | 37.1 | | | |
| 99.2 | 91.6 | | | |
| 143.2 | 153.1 | | | |
| 21.2 | 24.2 | | | |
| CLC | CLC | | | |

1103

Project
Quality Assurance
Procedure

Title

INSPECTION AND TESTING OF
SHORE BARRIER CONSTRUCTION

Number
9.513

Rev.
0

EXHIBIT 9.513.3

X

METHOD OF TEST TROXLER

| Location & Remarks | Elev. | Probe Depth | Moist. Count | Moist. Count Ratio | Moist. pcf | Percent Moist. Troxler | Percent Moist. Cont. Ck | Density Count | Dens. Count Ratio | Wet Dens. pcf | Dry Dens. Troxler | Dry Dens. Cont. * | % Comp |
|--------------------|-------|-------------|--------------|--------------------|------------|------------------------|-------------------------|---------------|-------------------|---------------|-------------------|-------------------|--------|
| 295 N7725 E 5940 | 573.0 | 6" | 1301 | .941 | 26.50 | 22.7 | 23.7 | 408 | 2.458 | 126.4 | 101.5 pcf | 95.0 | 106.8 |
| 296 N7775 | 573.0 | | 1339 | .969 | 27.41 | 25.4 | | 448 | 2.699 | 121.4 | 95.6 | | 100.6 |
| 297 N7250 | 574.0 | | 1234 | .893 | 24.94 | 22.6 | 22.8 | 463 | 2.789 | 119.4 | 96.1 | | 100.6 |
| 298 N7050 | | | 1240 | .897 | 25.07 | 22.7 | 21.1 | 460 | 2.771 | 119.7 | 96.3 | | 100.6 |
| 299 N6850 | | | 1334 | .965 | 27.25 | 24.4 | | 426 | 2.567 | 123.9 | 98.3 | | 103.5 |
| 300 N7450 | | | 1274 | .902 | 25.25 | 23.0 | 23.9 | 464 | 2.795 | 119.3 | 95.7 | | 100.7 |
| 301 N7650 | | | 1311 | .928 | 26.06 | 24.1 | | 463 | 2.789 | 119.4 | 94.9 | | 99.9 |
| 302 N7250 | | | 1130 | .780 | 21.26 | 16.8 | 19.0 | 421 | 2.536 | 124.7 | 105.0 | 106.7 | 98.4 |
| 303 N7050 | | | 1154 | .817 | 22.50 | 19.4 | 20.7 | 460 | 2.771 | 119.6 | 97.7 | 104.2 | 95.5 |
| 304 N6900 E 5920 | 575.0 | | 1136 | .804 | 22.10 | 18.2 | | 438 | 2.639 | 122.4 | 101.9 | 106.7 | 95.5 |
| 305 N7100 E 5925 | 575.0 | | 1230 | .870 | 24.19 | 20.1 | | 415 | 2.500 | 125.4 | 102.8 | 104.2 | 98.7 |

** FAILED A SECOND TIME SEE RETEST # 806

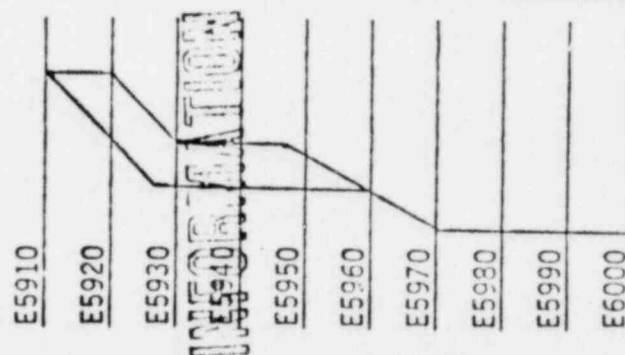
CONTROL DATA

Proctor Curve No. *
Optimum moisture %
Acceptable Moisture Content Range
to
Maximum Density pcf
Troxler No.

STANDARD COUNT

Density Moisture Time
1382 7:00

Approximate
Grid Line
N
E
Elev.



PROJECT FERMIL II SHORE BARRIER

Contractor Hollaway

Source of Material ON SITE

Type of Material CL

Weather & Temp. CLEAR, COLD

Inspector Bob Carter Date 10/30/80

Checked By M. L. L. L. Date 10/30/80

DENSITY OF SOIL IN PLACE

56
DATE 10-30-8DANIEL INTERNATIONAL
FERMI II NUCLEAR PROJECTMICROWAVE MOISTURE
READINGS

| LAB # | 295 | 297 | 298 | 299 - | 302 |
|----------------------------------|----------------------------|-------|--------|-------|---------------------|
| LOCATION | N7725 E 5940 ELE 523 | N7250 | N7050 | N7450 | N7250 |
| TARE # | D-12 | D13 | D2 | D13 | D12 |
| 1. Wet Weight of Sample and Tare | 218.4 | 295.3 | 263.7 | 206.3 | 257.4 |
| 2. Dry Weight of Sample and Tare | 195.5 | 258.8 | 232.8 | 185.6 | 232.1 |
| 3. Weight of Loss (1-2) | 22.9 | 36.5 | 30.9 | 20.7 | 25.3 CLC 10-30-8 |
| 4. Weight of Tare | 98.9 | 99.0 | 91.7 | 99.0 | 98.9 |
| 5. Weight of Dry Sample (2-4) | 96.6 | 159.8 | 141.1 | 86.6 | 133.2 |
| 6. % Total Moisture (3+5) X 100 | 23.7 | 22.8 | 21.9 ✓ | 23.9 | 19.0 |
| 7. Technicians Initials | MLS | CLC | MTD | MLS | CLC |

DATE 10/30/6

DANIEL INTERNATIONAL
FERMI II NUCLEAR PROJECT

MICROWAVE MOISTURE
 READINGS

LAB #

LOCATION

TARE #

1. Wet Weight of Sample and
Tare2. Dry Weight of Sample and
Tare

3. Weight of Loss (1-2)

4. Weight of Tare

5. Weight of Dry Sample (2-4)

6. % Total Moisture (3-5) X 100

7. Technicians Initials

| | | | | |
|-------------------------|--|--|--|--|
| 303 N7050 | | | | |
| N7050 | | | | |
| D5 | | | | |
| 263.4 | | | | |
| 235.0 | | | | |
| 28.4 | | | | |
| 98.1 | | | | |
| 136.9 | | | | |
| 20.7 | | | | |
| CLC | | | | |

DATE 10-20-60

DANIEL INTERNATIONAL
FERMI II NUCLEAR PROJECT

MICROWAVE MOISTURE
READINGS

| LAB # | 287 | 288 | 289 | 290 | 292 |
|----------------------------------|-------|-------|-------|-------|-------|
| LOCATION | N725 | N725 | N7250 | N7800 | N775 |
| TARE # | D-9 | D-10 | D5 | D-6 | D-17 |
| 1. Wet Weight of Sample and Tare | 279.4 | 287.5 | 257.8 | 271.1 | 267.5 |
| 2. Dry Weight of Sample and Tare | 244.2 | 249.1 | 224.0 | 227.0 | 233.8 |
| 3. Weight of Loss (1-2) | 35.2 | 38.4 | 30.8 | 33.3 | 33.7 |
| 4. Weight of Tare | 99.5 | 99.3 | 98.1 | 98.0 | 97.8 |
| 5. Weight of Dry Sample (2-4) | 144.7 | 149.8 | 125.9 | 139.8 | 136.0 |
| 6. % Total Moisture (3+5) X 100 | 24.3 | 25.6 | 24.5 | 23.8 | 24.8 |
| 7. Technicians Initials | MTP | OMP | MTP | MTP | MTP |

11
4

DATE 10-29-90 60

DANIEL INTERNATIONAL
FERNI II NUCLEAR PROJECT

MICROWAVE MOISTURE
READINGS

LAB #

LOCATION

TARE #

1. Wet Weight of Sample and Tare

2. Dry Weight of Sample and Tare

3. Weight of Loss (1-2)

4. Weight of Tare

5. Weight of Dry Sample (2-4)

6. % Total Moisture (3+5) X 100

7. Technicians Initials

| | | | | |
|-------|--|--|--|--|
| 294 | | | | |
| W7800 | | | | |
| D-3 | | | | |
| 207.6 | | | | |
| 184.2 | | | | |
| 23.4 | | | | |
| 90.1 | | | | |
| 94.1 | | | | |
| 24.9 | | | | |
| MTP | | | | |

118 B

Project
Quality Assurance
Procedure

Title

INSPECTION AND TESTING OF
SHORE BARRIER CONSTRUCTION

Number

9.513

Rev.

0

EXHIBIT 9.513.3

XI

METHOD OF TEST TROXLER

| Location & Remarks | Elev. | Probe Depth | Moist. Count | Moist. Count Ratio | Moist. pcf | Percent Moist. Troxler | Percent Moist. Cont. Ck | Density Count | Dens. Count Ratio | Wet Dens. pcf | Dry Dens. Troxler | Dry Dens. Cont. * | % Comp |
|--------------------|-------|-------------|--------------|--------------------|------------|------------------------|-------------------------|---------------|-------------------|---------------|-------------------|-------------------|--------|
| 306 N7050 E 5935 | 574.0 | 6" | 1175 | .845 | 23.38 | 18.3 | | 387 | 2.331 | 129.3 | 107.5 pcf | 106.7 072A | 100.7 |
| 307 N7225 E 5945 | 573.0 | | 1352 | .973 | 27.50 | 24.1 | Wetst at # 275 | 410 | 2.470 | 126.1 | 100.2 | 95.0 091A | 105.6 |
| 308 N7300 E 5935 | 575.0 | | 1174 | .845 | 23.38 | 18.8 | | 404 | 2.434 | 126.9 | 105.1 | 106.7 072A | 98.5 |
| 309 N7500 E 5935 | 575.0 | | 1184 | .852 | 23.63 | 17.1 / 18.2 | | 336 | 2.024 | 136.9 | 114.9 | | 107.7 |
| 310 N7700 | 575.0 | | 1215 | .874 | 24.31 | 19.5 | | 390 | 2.350 | 128.8 | 106.1 | | 99.4 |
| 311 N7400 | 576.0 | | 1207 | .868 | 24.12 | 19.7 | | 404 | 2.434 | 126.9 | 104.4 | 104.2 128 | 100.2 |
| 312 N7200 | 576.0 | | 1216 | .875 | 24.34 | 20.3 | | 416 | 2.506 | 125.3 | 102.6 | 104.2 128 | 98.5 |
| 313 N7000 | 576.0 | | 1236 | .878 | 24.50 | 19.6 | | 388 | 2.337 | 129.2 | 106.3 | 106.7 072A | 99.6 |
| 314 N7600 | 576.0 | | 1228 | .872 | 24.25 | 19.5 | | 394 | 2.373 | 128.3 | 105.6 | 104.2 128 | 101.3 |
| 315 N7800 | 576.0 | | 1230 | .874 | 24.31 | 19.3 | | 385 | 2.319 | 129.5 | 106.8 | 104.2 128 | 102.5 |
| 316 N7300 | 577.0 | | 1222 | .868 | 24.12 | 19.1 | | 386 | 2.325 | 129.4 | 106.9 | 106.7 072A | 100.2 |
| 317 N7100 | 577.0 | | 1212 | .861 | 23.91 | 18.1 / 19.8 | | 360 | 2.169 | 133.1 | 110.8 | | 103.0 |
| 318 N6900 E 5925 | 577.0 | | 1218 | .865 | 24.00 | 19.8 | | 413 | 2.488 | 125.7 | 103.3 | | 96.8 |

CONTROL DATA

Proctor Curve No. *
Optimum moisture _____ %
Acceptable Moisture
Content Range _____
to _____
Maximum Density _____ pcf
TROXLER No. _____

STANDARD COUNT

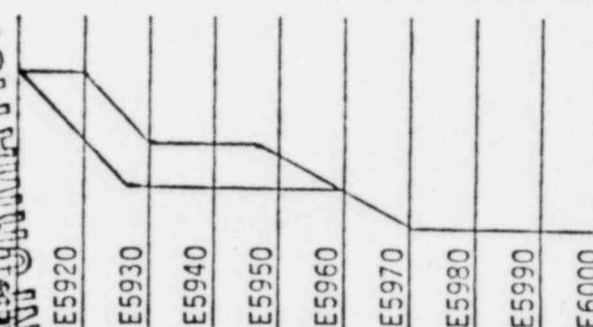
| Density | Moisture | Time |
|---------|----------|-------|
| 166 | 1390 | 7:00 |
| 111 | 1400 | 12:00 |

Approximate
Grid Line
N _____
E _____
Elev. _____

INFORMATION ONLY

TROXLER READING

MIKROWAVE READING



PROJECT FERMI II SHORE BARRIER

Contractor HOLLAWAY

Source of Material ON SITE

Type of Material CL

Weather & Temp. SUNNY, COLD

Inspector M.W.

Date 10/31/80

Checked By m. Parker

Date 10/31/80

DENSITY OF SOIL IN PLACE

DATE 10-30-8

62

DANIEL INTERNATIONAL
FERMI II NUCLEAR PROJECT

MICROWAVE MOISTURE
 READINGS

LAB #

LOCATION

TARE #

| | | | | |
|-------|-------|--|--|--|
| 309 | 317 | | | |
| N7500 | N7100 | | | |
| D3 | D16 | | | |
| 202.5 | 259.9 | | | |
| 185.2 | 233.3 | | | |
| 17.3 | 26.6 | | | |
| 90.1 | 99.2 | | | |
| 95.1 | 134.1 | | | |
| 18.2 | 19.8 | | | |
| CLC | MTP | | | |

1. Wet Weight of Sample and Tare

2. Dry Weight of Sample and Tare

3. Weight of Loss (1-2)

4. Weight of Tare

5. Weight of Dry Sample (2-4)

6. % Total Moisture (3+5) X 100

7. Technicians Initials

Project
Quality Assurance
Procedure

Title

INSPECTION AND TESTING OF
SHORE BARRIER CONSTRUCTION

Number

9.513

Rev.

0

EXHIBIT 9.513.3

XII

(15)

METHOD OF TEST TROXLER

| Location & Remarks | Elev. | Probe Depth | Moist. Count | Moist. Count Ratio | Moist. pcf | Percent Moist. Troxler | Percent Moist. Cont. Ck | Density Count | Dens. Count Ratio | Wet Dens. pcf | Dry Dens. Troxler | Dry Dens. Cont. * | % Comp |
|--------------------|-------|-------------|--------------|--------------------|------------|------------------------|-------------------------|---------------|-------------------|---------------|-------------------|-------------------|--------|
| 321 N7500 E 5920 | 577.0 | 6" | 1185 | .846 | 23.43 | 19.2 | | 414 | 2.494 | 125.4 | 103.6 pcf | 106.7 | 97.1 |
| 322 N7700 | 577.0 | | 1273 | .909 | 25.47 | 21.0 | | 392 | 2.361 | 128.4 | 104.5 | 104.2 | 100.3 |
| 23 N6800 | 578.0 | | 1285 | .918 | 25.75 | 21.3 | | 392 | 2.361 | 128.4 | 104.3 | | 100.1 |
| 324 N7000 | | | 1239 | .881 | 24.56 | 20.1 | | 400 | 2.410 | 127.4 | 104.4 | | 100.2 |
| 325 N7200 | | | 1232 | .880 | 24.53 | 19.5 | | 383 | 2.307 | 129.8 | 106.9 | 106.7 | 100.2 |
| 326 N7800 | | | 1044 | .746 | 20.19 | 13.5 | 18.4 | 336 | 2.024 | 137.0 | 118.4 | 113.2 | 104.6 |
| 327 N7600 | | | 1156 | .826 | 22.78 | 16.6 | 17.9 | 352 | 2.120 | 134.5 | 113.3 | | 100.1 |
| 328 N7400 | 578.0 | | 1132 | .809 | 22.22 | 16.1 | 19.4 | 355 | 2.139 | 134.0 | 113.4 | | 100.2 |
| 329 N7300 | 579.0 | | 1182 | .844 | 23.34 | 17.6 | 17.3 | 364 | 2.193 | 132.6 | 110.9 | | 98.0 |
| 330 N7100 | | | 1244 | .889 | 24.81 | 17.9 | | 323 | 1.946 | 139.0 | 115.8 | | 102.3 |
| 331 N6900 | | | 1139 | .814 | 22.40 | 16.2 | | 352 | 2.120 | 134.4 | 113.6 | | 100.4 |
| 332 N7500 | | | 1113 | .795 | 21.78 | 15.6 | 17.7 | 355 | 2.139 | 134.0 | 113.8 | | 100.5 |
| 333 N7700 | | | 1344 | .960 | 27.09 | 23.1 | 24.7 | 398 | 2.398 | 127.7 | 102.2 | 99.9 | 107.3 |

Troxler Reading

microwave reading

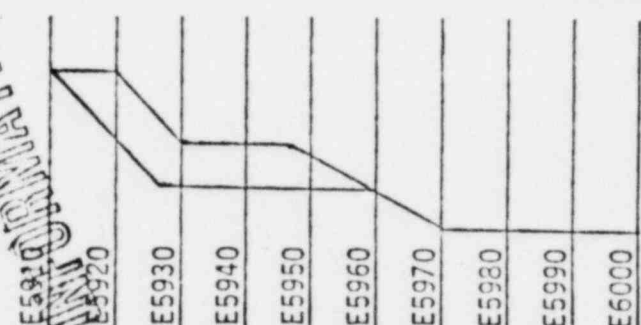
CONTROL DATA

Proctor Curve No. *
Optimum moisture %
Acceptable Moisture Content Range
to
Maximum Density pcf
TROXLER No.

STANDARD COUNT

| Density | Moisture | Time |
|---------|----------|-------|
| Note | 1400 | 730AM |

Approximate
Grid Line
N
E
Elev.



PROJECT FERMII SHORE BARRIER

Contractor Hollaway

Source of Material ON SITE

Type of Material CL

Weather & Temp. CLEAR, cold

Inspector M. Parker

Date 11/1/80

Checked By M. Parker

Date

DENSITY OF SOIL IN PLACE

DATE 11-1-80

6A

DANIEL INTERNATIONAL
FERMI II NUCLEAR PROJECT

MICROWAVE MOISTURE
READINGS

LAB #

LOCATION

TARE #

1. Wet Weight of Sample and
Tare2. Dry Weight of Sample and
Tare

3. Weight of Loss (1-2)

4. Weight of Tare

5. Weight of Dry Sample (2-4)

6. % Total Moisture (3÷5) X 100

7. Technicians Initials

| | | | | | |
|-------|-------|-------|-------|-------|-------|
| 329 | 332 | 333 | 326 | 327 | 328 |
| N7300 | N7500 | N7700 | N7800 | N7900 | N7400 |
| D-9 | D-8 | D-2 | D-15 | D-5 | D-70 |
| 2445 | 2642 | 257.3 | 252.0 | 2520 | 2409 |
| 221.0 | 239.2 | 224.5 | 228.8 | 2288 | 2179 |
| 23.5 | 25.0 | 32.8 | 23.2 | 230 | 23.0 |
| 99.0 | 98.2 | 91.9 | 99.4 | 99.9 | 99.1 |
| 122.0 | 141.0 | 132.6 | 129.4 | 1294 | 1188 |
| 19.3 | 17.7 | 24.7 | 17.9 | 179 | 19.4 |
| MP | MP | MP | MP | MP | MP |

| Tale | Page |
|------|------|
| 1 | |
| 2 | |
| 3 | |
| 4 | |
| 5 | |
| 6 | |
| 7 | |
| 8 | |
| 9 | |
| 10 | |
| 11 | |
| 12 | |
| 13 | |
| 14 | |
| 15 | |
| 16 | |
| 17 | |
| 18 | |
| 19 | |
| 20 | |
| 21 | |
| 22 | |
| 23 | |
| 24 | |
| 25 | |
| 26 | |
| 27 | |
| 28 | |
| 29 | |
| 30 | |
| 31 | |
| 32 | |
| 33 | |
| 34 | |
| 35 | |
| 36 | |
| 37 | |
| 38 | |
| 39 | |
| 40 | |
| 41 | |
| 42 | |
| 43 | |
| 44 | |
| 45 | |
| 46 | |
| 47 | |
| 48 | |
| 49 | |
| 50 | |
| 51 | |
| 52 | |
| 53 | |
| 54 | |
| 55 | |
| 56 | |
| 57 | |
| 58 | |
| 59 | |
| 60 | |
| 61 | |
| 62 | |
| 63 | |
| 64 | |
| 65 | |
| 66 | |
| 67 | |
| 68 | |
| 69 | |
| 70 | |
| 71 | |
| 72 | |
| 73 | |
| 74 | |
| 75 | |
| 76 | |
| 77 | |
| 78 | |
| 79 | |
| 80 | |
| 81 | |
| 82 | |
| 83 | |
| 84 | |
| 85 | |
| 86 | |
| 87 | |
| 88 | |
| 89 | |
| 90 | |
| 91 | |
| 92 | |
| 93 | |
| 94 | |
| 95 | |
| 96 | |
| 97 | |
| 98 | |
| 99 | |
| 100 | |

INSPECTION AND TESTING OF SHORE BARRIER CONSTRUCTION

Number

9.513

Rev.

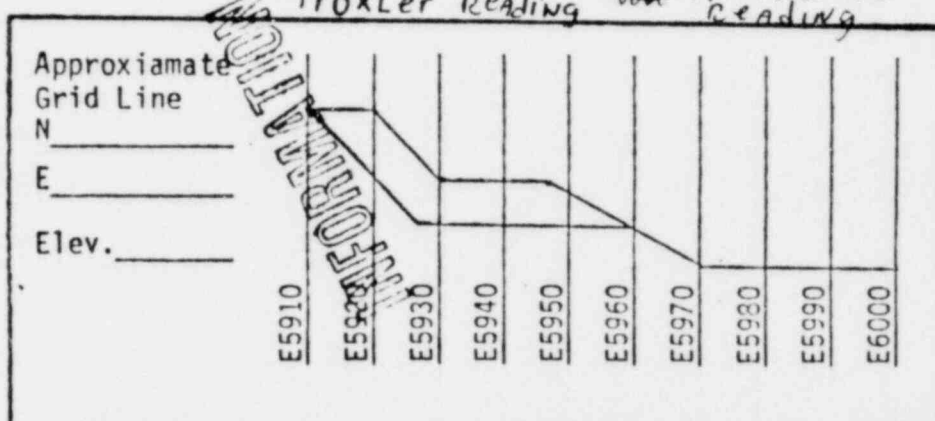
C

EXHIBIT 9.513.3

METHOD OF TEST TROXLER

[illegible]

| | | |
|---------------------|----------|--------|
| CONTROL DATA | | |
| Proctor Curve No. * | | |
| Optimum moisture | | % |
| Acceptable Moisture | | |
| Content Range | | |
| to | | |
| Maximum Density | | pcf |
| TROLER No. | | |
| STANDARD COUNT | | |
| Density | Moisture | Time |
| 1166 | 1389 | 7:00AM |



PROJECT FERMI II SHORE BARRIER
Contractor Hollaway
Source of Material ON SITE
Type of Material CL
Weather & Temp. cloudy, cool
Inspector Bob Caplee Date 11/1/77
Checked By Mike Parker Date 11/1/77

DENSITY OF SOIL IN PLACE

DATE 11-3-80
66

DANIEL INTERNATIONAL
FERMI II NUCLEAR PROJECT

MICROWAVE MOISTURE
READINGS

LAB #

LOCATION

TARE #

1. Wet Weight of Sample and
Tare

2. Dry Weight of Sample and
Tare

3. Weight of Loss (1-2)

4. Weight of Tare

5. Weight of Dry Sample (2-4)

6. % Total Moisture $(3+5) \times 100$

7. Technicians Initials

| | | | | |
|--------|--------|--|--|--|
| | | | | |
| 107800 | 107000 | | | |
| D-5 | D-13 | | | |
| 276.8 | 276.7 | | | |
| 2484 | 2490 | | | |
| 284 | 27.7 | | | |
| 97.9 | 99.0 | | | |
| 1505 | 150.0 | | | |
| 18.9 ✓ | 18.5 | | | |
| MTP | MA | | | |

[illegible]

INSPECTION AND TESTING OF SHORE BARRIER CONSTRUCTION

| Number |
|--------|
|--------|

9.513

Fig. 5.

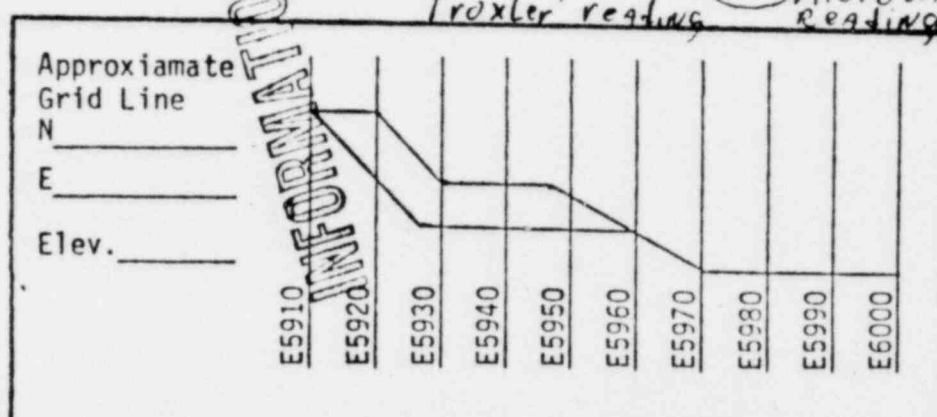
C

EXHIBIT 9.513.3

METHOD OF TEST TROXLER

[illegible]

| | | |
|---------------------|----------|---------|
| CONTROL DATA | | |
| Proctor Curve No. * | | |
| Optimum moisture | | % |
| Acceptable Moisture | | |
| Content Range | | |
| to | | |
| Maximum Density | | pcf |
| ROXLER No. | | |
| STANDARD COUNT | | |
| Density | Moisture | Time |
| 1166 | 13A2 | 7:00 AM |



PROJECT FERMI II SHORE BARRIER
Contractor HOLLAWAY
Source of Material ON SITE
Type of Material CL
Weather & Temp. OVERCAST, COLD
Inspector BOB CARTER Date 11/4/80
Checked By M. Perkins Date 11/4/80

DENSITY OF SOIL IN PLACE

DATE 11-4-90

DANIEL INTERNATIONAL
FERMI II NUCLEAR PROJECT

MICROWAVE MOISTURE
 READINGS

LAB #

LOCATION

TARE #

| 339 | 340 | 341 | 342 | 343 |
|-------|-------|-------|-------|-------|
| N7000 | N7500 | N7300 | N6900 | N7100 |
| D-5 | D-14 | D-13 | D-11 | D-11 |
| 231.3 | 227.8 | 274.3 | 256.4 | 247.7 |
| 210.0 | 204.0 | 246.1 | 231.2 | 222.0 |
| 21.3 | 23.8 | 28.2 | 25.2 | 25.7 |
| 98.0 | 98.8 | 99.0 | 98.0 | 98.0 |
| 112.0 | 105.2 | 147.1 | 133.2 | 124.0 |
| 19.0 | 22.6 | 19.2 | 18.9 | 20.7 |
| | | | | |

1. Wet Weight of Sample and Tare

2. Dry Weight of Sample and Tare

3. Weight of Loss (1-2)

4. Weight of Tare

5. Weight of Dry Sample (2-4)

6. % Total Moisture (3-5) X 100

7. Technicians Initials

XIE
A

Project
Quality Assurance
Procedure

Title

INSPECTION AND TESTING OF
SHORE BARRIER CONSTRUCTION

Number

9.513

Rev.

0

EXHIBIT 9.513.3

XV

METHOD OF TEST TROXLER

| Location & Remarks | Elev. | Probe Depth | Moist. Count | Moist. Count Ratio | Moist. pcf | Percent Moist. Troxler | Percent Moist. Cont. Ck | Density Count | Dens. Count Ratio | Wet Dens. pcf | Dry Dens. Troxler | Dry Dens. Cont. * | % Comp |
|--------------------|-------|-------------|--------------|--------------------|------------|------------------------|-------------------------|---------------|-------------------|---------------|-------------------|-------------------|--------|
| N7000 E5915 | 582.0 | 6" | 1206 | .868 | 24.12 | 19.5 | | 398 | 2.398 | 127.8 | 105.3pcf | 106.7 | 98.7 |
| N7200 | | | 1145 | .824 | 22.72 | 17.2 / 21.3 | | 376 | 2.265 | 130.9 | 109.8 | | 102.9 |
| N7400 | | | 1204 | .866 | 24.06 | 19.1 | | 389 | 2.343 | 129.0 | 106.5 | | 99.8 |
| N7600 | | | 1186 | .853 | 23.66 | 19.3 | | 411 | 2.476 | 126.0 | 103.9 | | 97.4 |
| N7800 | | | 1176 | .846 | 23.43 | 18.4 | | 391 | 2.355 | 128.8 | 107.0 | | 100.3 |

NOT FOR CONSTRUCTION

CONTROL DATA

Operator Curve No. *

Minimum moisture %

Acceptable Moisture Content Range

to

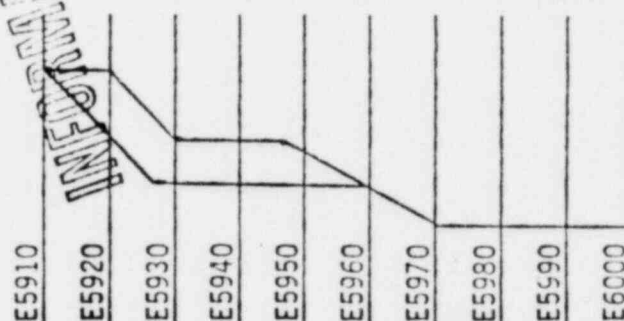
Maximum Density pcf

Troxler No.

STANDARD COUNT

| Density | Moisture | Time |
|---------|----------|---------|
| 1066 | 1390 | 7:00 AM |

Approximate
Grid Line
N
E
Elev.



PROJECT FERMI II SHORE BARRIER

Contractor Hollaway

Source of Material ON SITE

Type of Material CL

Weather & Temp. SUNNY, COOL

Inspector M.P.

Date 11/6/80

Checked By M.S.

Date 11/6/80

DENSITY OF SOIL IN PLACE

DATE 11/6/80 70

DANIEL INTERNATIONAL
FERMI II NUCLEAR PROJECT

MICROWAVE MOISTURE
READINGS

LAB #

LOCATION

TARE #

1. Wet Weight of Sample and Tare

2. Dry Weight of Sample and Tare

3. Weight of Loss (1-2)

4. Weight of Tare

5. Weight of Dry Sample (2-4)

6. % Total Moisture (3÷5) X 100

7. Technicians Initials

| | | | | |
|-------|--|--|--|--|
| 346 | | | | |
| N7200 | | | | |
| D3 | | | | |
| 232.7 | | | | |
| 207.7 | | | | |
| 25.0 | | | | |
| 90.1 | | | | |
| 117.6 | | | | |
| 21.3 | | | | |
| CLC | | | | |

N 5330

E 5915

574'

C.B.K.

APPENDIX C

DATE 10-24-80

265

APPROVAL TO PLACE
FILL: YES ☒ NO ☐moist gray silty GRAVE
w/cobblesPressure on
test AREA = $\left(\frac{\text{Gauge Reading} \times \text{Ram Area}}{\text{Plate Area}} \right)$

INFORMATION ONLY

| (.001") DIAL #1 | (.001") DIAL #2 | PSI Gauge Reading / PSF | TIME, min | (.001") Angle of Ticks |
|--------------------|--------------------|----------------------------|-----------|---------------------------|
| .014 | .009 | 180 ↑ 1144 | 0 | .012 |
| .015 | .010 | | 3 | .013 |
| .017 | .010 | plus surcharge | 6 | .014 |
| .017 | .011 | 1342 psf | 9 | .014 |
| .018 | .011 | | 12 | .015 |
| .019 | .011 | | 15 | .015 |
| .029 | .021 | 260 ↑ 1652 | 0 | .025 |
| .034 | .024 | | 3 | .029 |
| .034 | .024 | plus surcharge | 6 | .029 |
| .035 | .024 | 1850 psf | 9 | .039 |
| .035 | .024 | | 12 | .030 |
| .035 | .024 | | 15 | .030 |
| .041 | .032 | 340 ↑ 2161 | 0 | .036 |
| .043 | .033 | | 3 | .038 |
| .043 | .034 | plus surcharge | 6 | .039 |
| .045 | .035 | 2359 psf | 9 | .040 |
| .048 | .038 | | 12 | .043 |
| .049 | .039 | | 15 | .044* |
| .058 | .048 | 420 ↑ 2669 | 0 | .053 |
| .059 | .049 | | 3 | .054 |
| .061 | .050 | plus surcharge 2867 psf | 6 | .056 |

Ram Area = 4.9087 in²
test plate Area = 111.22 in², 0.772 ft²

Wt of equipment

JACK — 49.23 lbs.

12" pl. — 33.45

BB 9.10

B 15.68

AA 9.24

C 5.54

CC 9.08

4" pipe 21.73

Surcharge { 153.05 #
198.16 #/ft²

* loading platform raised 1/8"

NOTE: GAUGE

N _____
E _____

C.B. K.

72
DATE 10-24-80

| (.001") DIAL #1 | (.001") DIAL #2 | PSI ROUNDS ON GAUGE | TIME min | (.001") Ag of Dials |
|--------------------|--------------------|------------------------|----------|------------------------|
| .063 | .052 | Gauge 420 2869 | 9 | .058 |
| .063 | .052 | plus surcharge 2867 | 12 | .058 |
| .075 | .053 | ↓ | 15 | .064 |
| .074 | .063 | 500 3177 | 0 | .068 * |
| .079 | .067 | ↓ | 3 | .073 |
| .081 | .068 | plus surcharge | 6 | .074 |
| .083 | .070 | 3375 psf | 9 | .076 |
| .085 | .071 | ↓ | 12 | .078 |
| .086 | .071 | ↓ | 15 | .078 |
| .091 | .076 | 586 3724 | 0 | .084 |
| .097 | .081 | ↓ | 3 | .084 |
| .100 | .082 | plus surcharge | 6 | .091 |
| .102 | .083 | 3922 psf | 9 | .092 |
| .104 | .084 | ↓ | 12 | .094 |
| .105 | .085 | ↓ | 15 | .095 |
| .097 | .079 | 370 2549* 2351 | 1 min | .088 |
| .081 | .063 | 185 1374* 1176 | 2 min | .072 |
| .055 | .049 | 0 198* surcharge | 3 min | .052 |

Wt of equipment

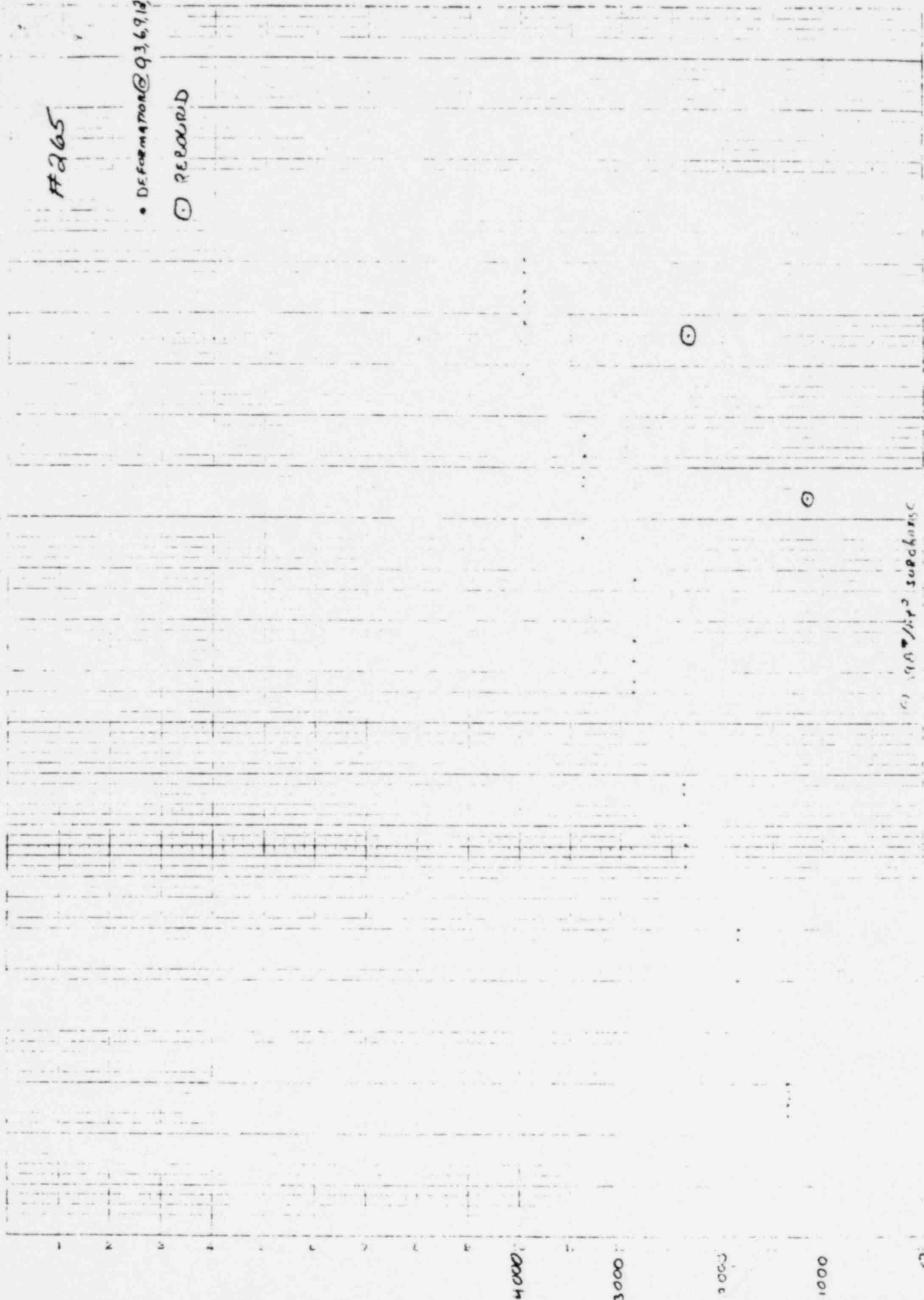
JACK — 49.23
12" pl. —

* 1/4" Rise in loading platform
* Surcharge included

#265

• DEFLECTION @ 93, 6, 9, 13, 15 in

○ RECORD



93, 6, 9, 13, 15 in

N. 6450

C.B.K.

E. 5919

DATE 10/24/80

#264.

573'

APPROVAL TO PLACE
FILL: YES ☒ NO ☐

| (.001") DIAL #1 | (.001") DIAL #2 | (psi) POUNDS ON GAUGE | TIME (min) | (.001") Avg 30 sec |
|--------------------|--------------------|--|------------|-----------------------|
| .008 | .003 | 180 / 1194 psf <small>(Pressure on test AREA)</small> | 0 | .006 |
| .010 | .004 | | 3 | .007 |
| .011 | .005 | | 6 | .008 |
| .013 | .005 | plus surcharge 1383 psf | 9 | .009 |
| .014 | .006 | | 12 | .010 |
| .015 | .007 | | 15 | .011 |
| .023 | .010 | 260 / 1652 psf | 0 | .016 |
| .024 | .012 | | 3 | .018 |
| .025 | .012 | | 6 | .018 |
| .026 | .013 | plus surcharge 1891 psf | 9 | .020 |
| .027 | .013 | | 12 | .020 |
| .029 | .015 | | 15 | .022 |
| .043 | .024 | 340 / 2161 psf | 0 | .034 |
| .046 | .025 | | 3 | .036 |
| .047 | .026 | | 6 | .036 |
| .048 | .027 | plus surcharge 2400 psf | 9 | .038 |
| .049 | .027 | | 12 | .038 |
| .049 | .028 | | 15 | .038 |
| .054 | .031 | 420 / 2669 psf | 0 | .042 |
| .057 | .033 | | 3 | .045 |
| .058 | .034 | plus surcharge 2908 psf | 6 | .046 |

well-graded sand

PRESSURE ON TEST AREA = $\frac{\text{Gauge Reading} \times \text{Ram Face Area}}{\text{Plate Area in}^2}$ Ram Area = 4.9087 in²test plate AREA = 111.22 in²

Wt of equipment

JACK — 49.23

12" pl. — 33.45

BB — 9.10

E — 13.30

CC — 9.08

A — 9.90

D — 7.84

9" plate — 21.54

AA — 9.25

4" pipe — 21.73

NOTE: GAUGE NOT CALIBRATED

N. 6450

E 5919

573

C.B. K.

DATE 10/29/80

75

| (001") DIAL #1 | (001") DIAL #2 | psi ROUNDS ON GAUGE Gauge Reading / pressure on + test AREA | TIME min | (001") Avg of Dials |
|-------------------|-------------------|--|----------|------------------------|
| .059 | .034 | plus surcharge | 9 | .046 |
| .059 | .034 | 2908 psf | 12 | .046 |
| .060 | .035 | ↓ | 15 | .048 |
| .071 | .042 | 500 / 3178 psf | 0 | .056 |
| .074 | .045 | ↑ | 3 | .060 |
| .076 | .046 | plus surcharge | 6 | .061 |
| .077 | .046 | 3417 psf | 9 | .062 |
| .078 | .047 | | 12 | .062 |
| .079 | .048 | ↓ | 15 | .064 |
| .089 | .055 | 580 / 3686 psf | 0 | .072 |
| .093 | .057 | ↑ | 3 | .075 |
| .096 | .059 | plus surcharge | 6 | .078 |
| .098 | .060 | 3925 psf | 9 | .079 |
| .099 | .061 | ↑ | 12 | .080 |
| .100 | .061 | ↓ | 15 | .081 |
| .110 | .068 | 656 / 4169 psf | 0 | .089 |
| .114 | .071 | ↑ | 3 | .092 |
| .118 | .073 | plus surcharge | 6 | .096 |
| .120 | .075 | 4408 psf | 9 | .098 |
| .120 | .075 | ↓ | 12 | .098 |
| .121 | .076 | ↓ | 15 | .099 |

Wt of equipment:

JACK — 49.23

12" pl. —

573

DATE 10/24/80 76

12th pl. —

#267

- D=FORMAT, 0, 3, 6, 9, 12, 15
- REBOUND



155/27

| | | | |
|---|---|--------|------|
| Project Quality Assurance Procedure | INSPECTION AND TESTING OF SHORE BARRIER CONSTRUCTION | Number | Rev |
| | | 9.513 | 0 |
| | | Page | |
| | | 1 | of 2 |

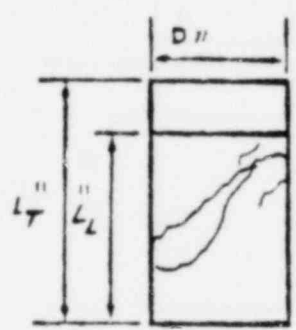
EXHIBIT 9.513.5 UNCONFINED COMPRESSIVE STRENGTH TEST RESULTS ASTM D2166-66

Test Location
 Grid Line N 6867
 Grid Line E 5937
 Elevation 568'
 Sample No. #070
 Equip. S/N DELUC-01

Date 9-24-80
 Compressive Strength 1930 p.s.f.
 Approved to place fill Yes: ☒ No: ☒
 Inspector [Signature]
 Total 20% ☒
 PASS AS PER DCN 4588

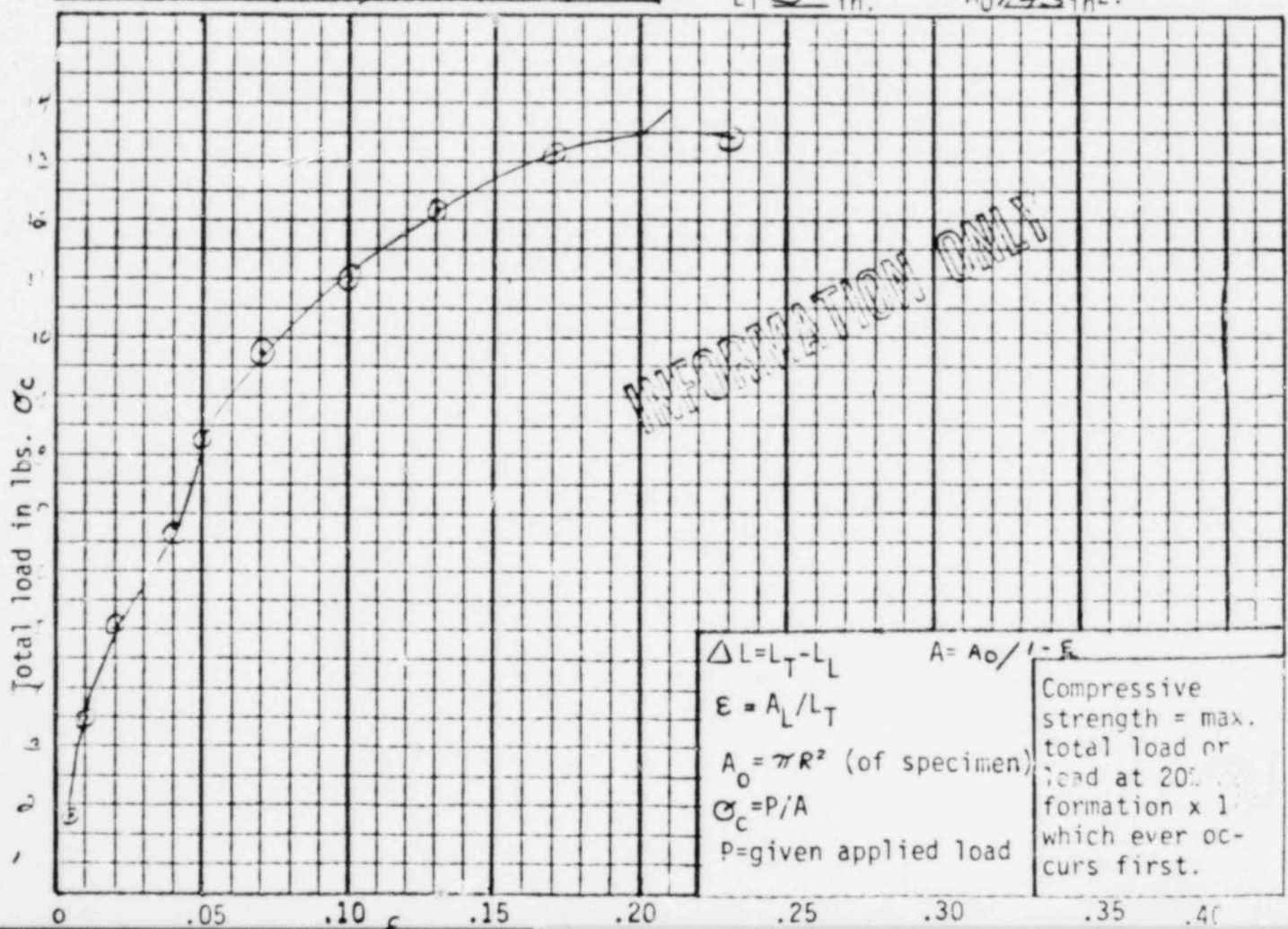
| Δ L(in) | Load P (lbs) | E | Area A ₀ | σ_c | Check By |
|-------------------|-----------------|------|------------------------|------------|-------------|
| .016 | 25 | .005 | 1.44 | 1.7 | |
| .030 | 50 | .01 | 1.44 | 3.5 | |
| .060 | 75 | .02 | 1.46 | 5.1 | |
| .106 | 1000 | .04 | 1.49 | 6.7 | |
| .155 | 125 | .05 | 1.51 | 8.3 | |
| .215 | 150 | .07 | 1.54 | 9.7 | |
| .298 | 175 | .10 | 1.59 | 11.0 | |
| .401 | 200 | .13 | 1.64 | 12.2 | |
| .518 | 225 | .17 | 1.72 | 13.1 | |
| .678 | 250 | .23 | 1.86 | 13.4 | |

Sketch of Sample



Description of failure: _____

LT 3 in. A₀ 1.43 in².



$\Delta L = L_T - L_L$
 $E = A_L / L_T$
 $A_0 = \pi R^2$ (of specimen)
 $\sigma_c = P / A$
 $P =$ given applied load
 $A = A_0 / (1 - E)$
 Compressive strength = max. total load or load at 20% formation x 1 whichever occurs first.

| | | | |
|---|--|-----------------|----------|
| Project Quality Assurance Procedure | Title INSPECTION AND TESTING OF SHORE BARRIER CONSTRUCTION | Number 9.513 | Rev 0 |
| | | Exhibit 9.513.5 | |
| | | | |

BORING LOG

Page 2 of 2

Location of Sampling:

Date:

Elevation of Sampling:

A.S.T.M. D 1587-74

Sample lab number 070

Depth of sample 0.5 (ft) %Recovery 85%

Method of advancing sampler Constant force Hammer (circle one)

Type and size of sampler Shelby Tube 2" x 11.6"

Sampler S/N DES PH02

Hammer weight and drop 21.7 lbs. 2.83 ft.

Number of blows per 6" of drop 6

Thickness of soil layer ~~Light Gray Clay with silts~~ N/A

Description of soil Light Gray Clay with silts

Depth of water to surface N/A (ft)

FF₁ CALCULATIONS FOR % MOISTURE

| | | |
|---|--------------------------------|--------|
| 1 | Can No. | |
| 2 | Wt. Wet Sample and Can (gm.) | 150.4 |
| 3 | Wt. Dry Sample and Can (gm) | 120.1 |
| 4 | Wt. Water (gm) (2)-(3) | 30.3 |
| 5 | Wt. Can (gm) | 6.00 |
| 6 | Wt. Dry Sample (3)-(5) | 114.1 |
| 7 | Moisture Content % (4)-(6)x100 | 26.6 ✓ |

| | | | |
|-----------------------------|------------------------|-------------------|-----------|
| Technician (signature) Date | Computed by: Date: | Checked by: Date: | Scale S/N |
| <i>M. Pahr</i> 9-25-00 | <i>M. Pahr</i> 9-25-00 | <i>M. W.</i> | TBB-1 |

material unacceptable @ this ele. Retested @ Ele. 567 see
Test # 082

APPENDIX D

80

| | | | |
|---|--|-----------------|-----------|
| Project Quality Assurance Procedure | Title INSPECTION AND TESTING OF SHORE BARRIER CONSTRUCTION | Number 9.513 | Rev. 0 |
| | | Page 1 of 2 | |
| | | | |

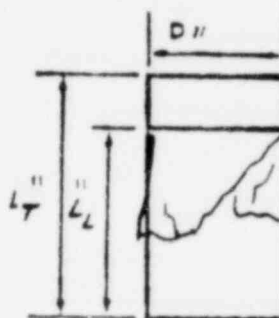
EXHIBIT 9.513.5 UNCONFINED COMPRESSIVE STRENGTH TEST RESULTS ASTM D2166-66

Test Location
Grid Line N 7200
Grid Line E 5945
Elevation 567.3
Sample No. 096
Equip. S/N DELUC-01

Date 9-27-80
Compressive Strength 2013 p.s.f.
Approved to place fill (Yes: ☒ No: ☐
Inspector [Signature]
Total ☒
@20% ☐
PASS AS PER
DCN-4568

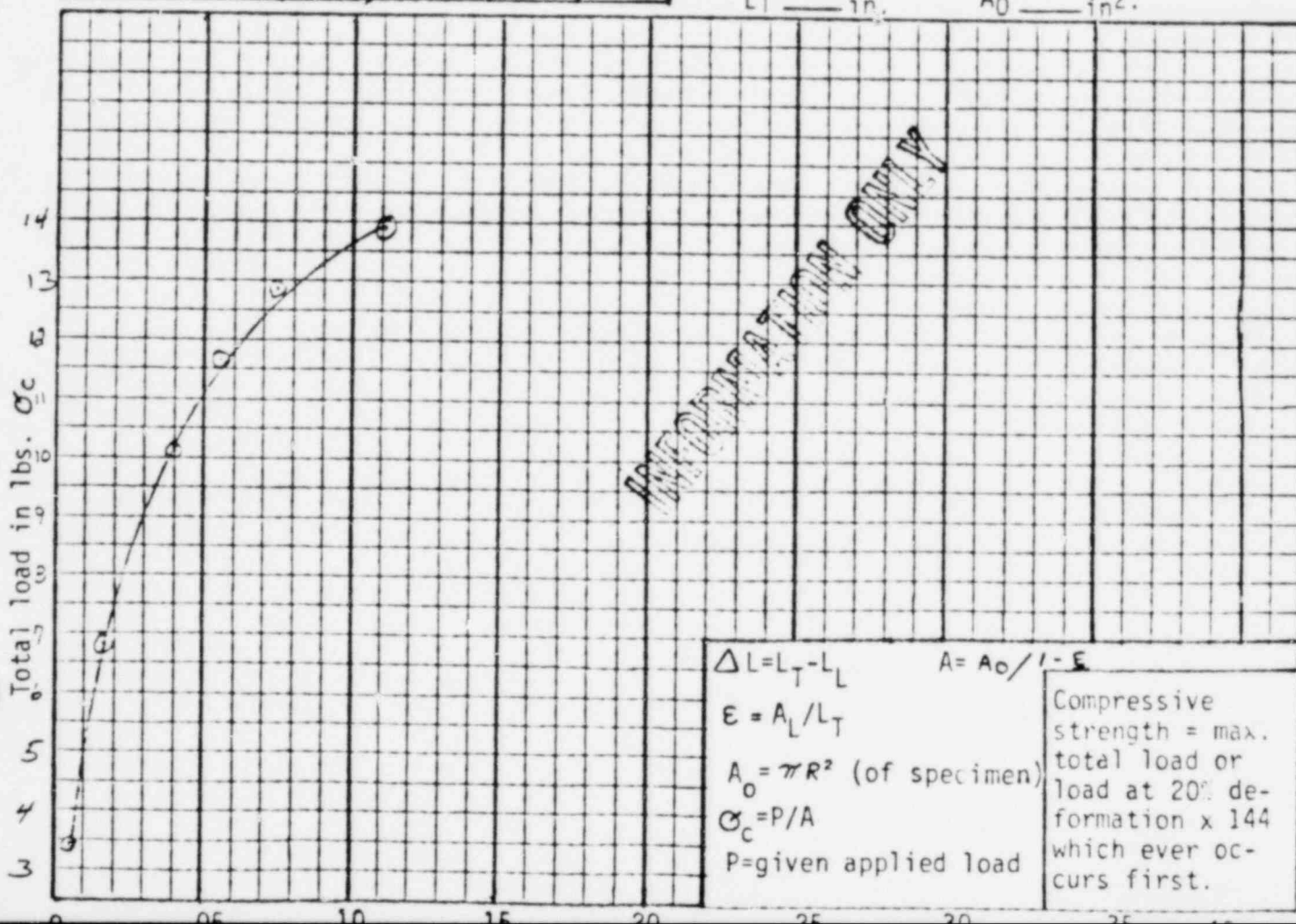
| Δ L (in) | Load P (lbs) | E | Area A ₀ | σ_c | Check By |
|--------------------|-----------------|--------|------------------------|------------|-------------|
| 0.0 | 5.0 | .005 | 1.44 | 3.47 | |
| .053 | 10.0 | .018 | 1.46 | 6.85 | |
| .120 | 15.0 | .040 | 1.49 | 10.07 | |
| .167 | 17.5 | .056 | 1.51 | 11.59 | |
| .225 | 20.0 | .075 | 1.55 | 12.90 | |
| .333 | 22.5 | .111 | 1.61 | 13.98 | |
| | 25.0 | FAILED | | | |

Sketch of Sample



Description of failure: _____

LT — in. A₀ — in².



$\Delta L = L_T - L_L$ $A = A_0 / (1 - E)$
 $E = \Delta L / L_T$
 $A_0 = \pi R^2$ (of specimen)
 $\sigma_c = P / A$
 $P =$ given applied load
 Compressive strength = max. total load or load at 20% deformation x 144 which ever occurs first.

| | | | |
|---|--|-----------------|----------|
| Project Quality Assurance Procedure | Title INSPECTION AND TESTING OF SHORE BARRIER CONSTRUCTION | Number 9.513 | Rev 0 |
| | | Exhibit 9.513.5 | |

Page 2 of 2

BORING LOG

Location of Sampling:

Date: 9.27.80

Elevation of Sampling:

A.S.T.M. D 1587-74

Sample lab number 096

Depth of sample 0.5 (ft) %Recovery 80

Method of advancing sampler Constant force Hammer (circle one)

Type and size of sampler Shelby Tube 2" x 11.6"

Sampler S/N DES PH02

Hammer weight and drop 21.7 lbs. 2.83 ft.

Number of blows per 6" of drop 7

Thickness of soil layer _____

Description of soil _____

Depth of water to surface _____ (ft)

CALCULATIONS FOR % MOISTURE #5

| | | |
|---|--------------------------------|--------|
| 1 | Can No. | C-2 |
| 2 | Wt. Wet Sample and Can (gm.) | 151.7 |
| 3 | Wt. Dry Sample and Can (gm) | 120.3 |
| 4 | Wt. Water (gm) (2)-(3) | 31.4 |
| 5 | Wt. Can (gm) | 6.2 |
| 6 | Wt. Dry Sample (3)-(5) | 114.1 |
| 7 | Moisture Content % (4)-(6)x100 | 27.5 ✓ |

| | | | |
|-----------------------------|--------------------|-------------------|-----------|
| Technician (signature) Date | Computed by: Date: | Checked by: Date: | Scale S/N |
| M. Perdue 9-29-80 | M.W. 9-29-80 | M.H. 9-29-80 | T13 B-1 |

EXHIBIT 9.513.5 UNCONFINED COMPRESSIVE STRENGTH TEST RESULTS ASTM D2166-66

Test Location
Grid Line N 7370
Grid Line E 5945
Elevation 567.0
Sample No. 101
Equip. S/N DELUC-01

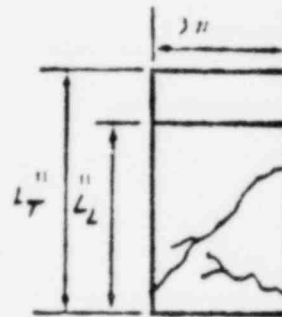
Date 9-29-80
Compressive Strength 2131 p.s.f.
Approved to place fill Yes: ☒ No: ☐

Total
920% ☒

B. Carter
Inspector

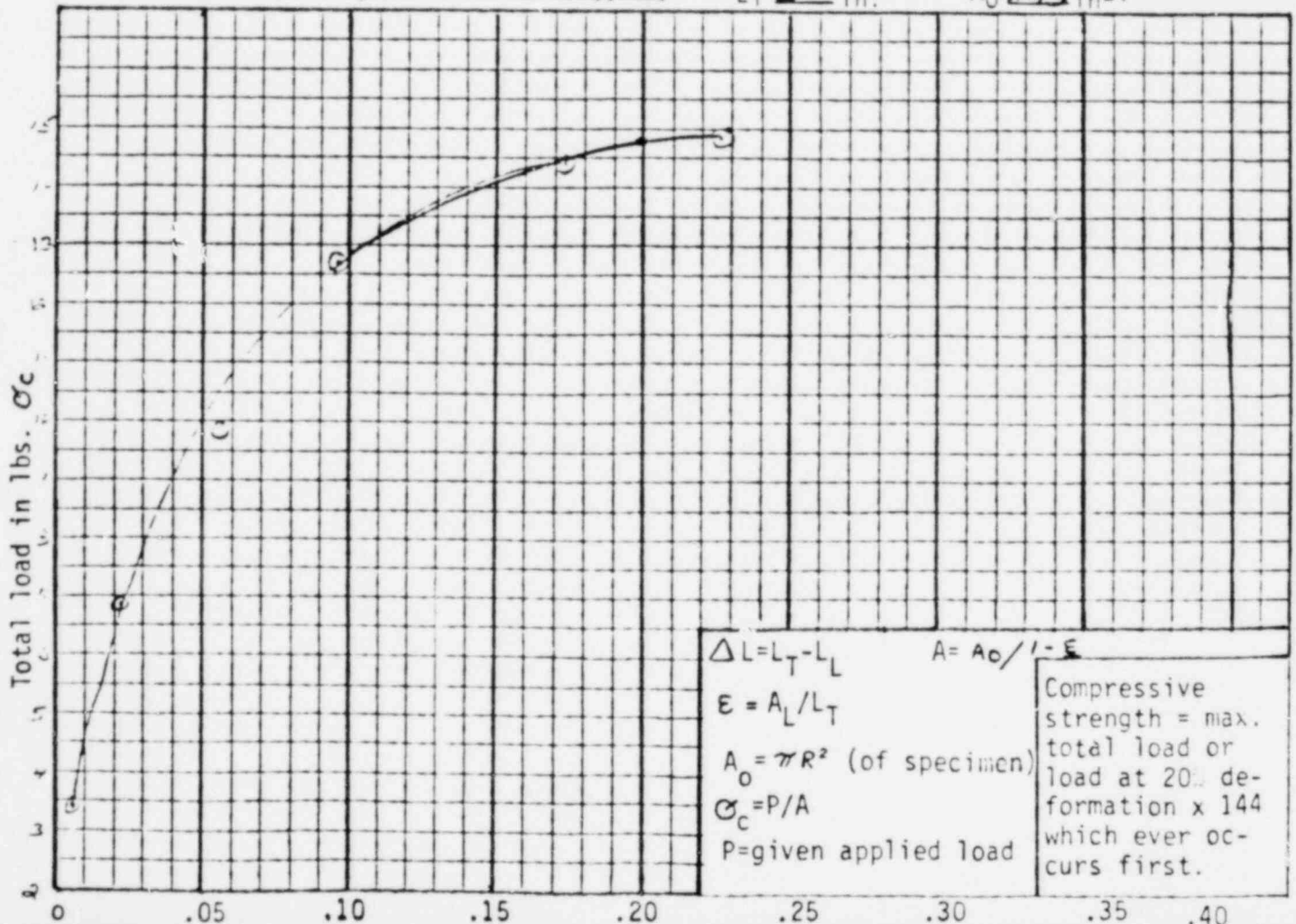
| Δ L(in) | load P (lbs) | ϵ | Area A_0 | σ_c | Check By |
|--------------------------|-----------------|------------|---------------|------------|-------------|
| .020 | 5 | .007 | 1.44 | 3.47 | |
| .070 | 10 | .023 | 1.46 | 6.85 | |
| .167 | 15 | .056 | 1.51 | 9.93 | |
| .294 | 20 | .098 | 1.59 | 12.58 | |
| .524 | 25 | .175 | 1.73 | 14.45 | |
| .680 | 27.5 | .227 | 1.85 | 14.86 | |
| - | FAIL | - | - | - | - |
| @ 20% $\sigma_c = 14.80$ | | | | | |

Sketch of Sample



Description of failure: _____

LT 3 in. A0 1.43 in²



| | | | |
|---|--|-----------------|----------|
| Project Quality Assurance Procedure | Title INSPECTION AND TESTING OF SHORE BARRIER CONSTRUCTION | Number 9.513 | Rev 0 |
| | | Exhibit 9.513.5 | |

Page 2 of 2

BORING LOG

Location of Sampling: N 7370 E 5945Date: 9-29-30Elevation of Sampling: 567'

A.S.T.M. D 1587-74

Sample lab number 101Depth of sample 3" (ft)%Recovery 70Method of advancing sampler Constant force Hammer (circle one)Type and size of sampler Shelby Tube 2" x 11.6"Sampler S/N DES PH02Hammer weight and drop 21.7 lbs. 2.83 ft.Number of blows per 6" of drop 6Thickness of soil layer N/ADescription of soil Sand Seam located in sampleDepth of water to surface N/A (ft)

#3 CALCULATIONS FOR % MOISTURE

| | | |
|---|--------------------------------|---------------|
| 1 | Can No. | <u>D-5</u> |
| 2 | Wt. Wet Sample and Can (gm.) | <u>149.3</u> |
| 3 | Wt. Dry Sample and Can (gm) | <u>119.6</u> |
| 4 | Wt. Water (gm) (2)-(3) | <u>29.7</u> |
| 5 | Wt. Can (gm) | <u>7.2</u> |
| 6 | Wt. Dry Sample (3)-(5) | <u>112.4</u> |
| 7 | Moisture Content % (4)-(6)x100 | <u>26.4</u> ✓ |

| | | | | | | |
|---|---------------------|-------------------------------|----------------------|------------------------------|----------------------|------------------------|
| Technician (signature) <u>M. L. ...</u> | Date <u>9-30-80</u> | Computed by: <u>M. L. ...</u> | Date: <u>9-30-80</u> | Checked by: <u>M. L. ...</u> | Date: <u>9-30-80</u> | Scale S/N <u>TBB-1</u> |
|---|---------------------|-------------------------------|----------------------|------------------------------|----------------------|------------------------|

EXHIBIT 9.513.5 UNCONFINED COMPRESSIVE STRENGTH TEST RESULTS ASTM D2166-66

Test Location

Grid Line N 7670

Grid Line E 5945

Elevation 567

Sample No. 116

Equip. S/N DELUC-01

Date 10/2/80

Compressive Strength 2160 p.s.f.

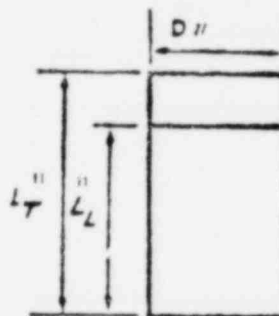
Approved to place fill Yes: ☒ No: ☐

Total
920% ☒

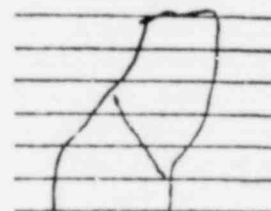
DM Withers
Inspector

| Δ L(in) | Load P (lbs) | E | Area A ₀ | σ_c | Check By |
|-------------------|-----------------|------|------------------------|------------|-------------|
| .041 | 5.0 | .014 | 1.45 | 3.45 | — |
| .095 | 10.0 | .032 | 1.48 | 6.76 | — |
| .190 | 15.0 | .063 | 1.53 | 9.80 | — |
| .307 | 20.0 | .110 | 1.61 | 12.42 | — |
| .428 | 22.5 | .143 | 1.67 | 13.47 | — |
| .519 | 25.0 | .173 | 1.73 | 14.45 | — |
| .654 | 27.5 | .218 | 1.83 | 15.03 | CML |

Sketch of Sample

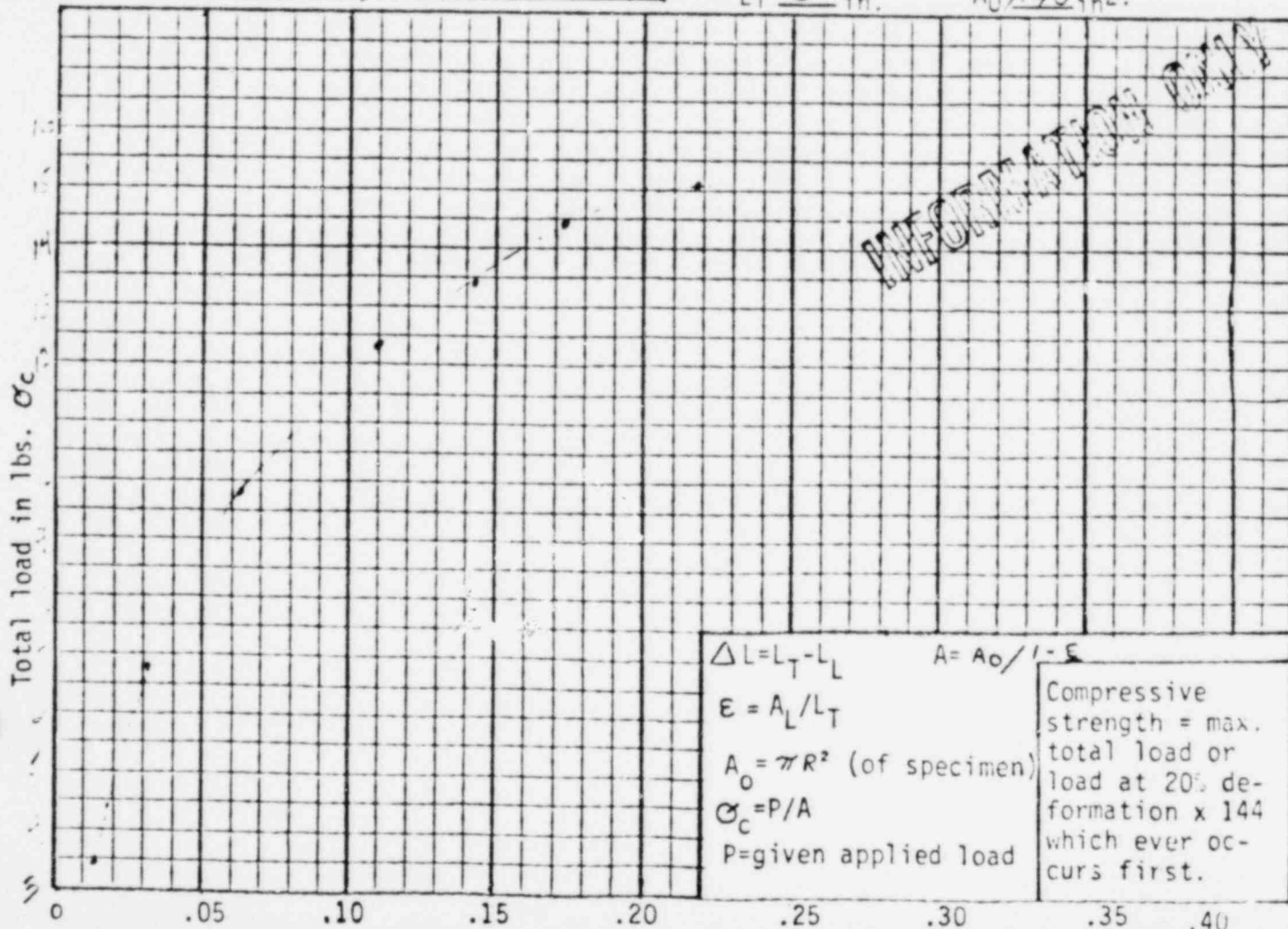


Description of failure:



LT 3 in.

A₀ 1.43 in².



| | | | |
|---|--|-----------------|----------|
| Project Quality Assurance Procedure | Title INSPECTION AND TESTING OF SHORE BARRIER CONSTRUCTION | Number 9.513 | Rev 0 |
| | | Exhibit 9.513.5 | |
| | | | |

BORING LOG

Page 2 of 2

Location of Sampling M 670 E 5945Date: 10/2/80Elevation of Sampling: 567'

A.S.T.M. D 1587-74

Sample lab number 116Depth of sample 05 (ft)%Recovery 70Method of advancing sampler Constant force Hammer (circle one)Type and size of sampler Shelby Tube 2" x 11.6"Sampler S/N DES PH02Hammer weight and drop 21.7 lbs. 2.83 ft.Number of blows per 6" of drop 5Thickness of soil layer N/ADescription of soil GRAY PLASTIC CLAYDepth of water to surface N/A (ft)

#1 CALCULATIONS FOR % MOISTURE

| | | |
|---|--------------------------------|--------------|
| 1 | Can No. | <u>C-0</u> |
| 2 | Wt. Wet Sample and Can (gm.) | <u>148.6</u> |
| 3 | Wt. Dry Sample and Can (gm) | <u>117.4</u> |
| 4 | Wt. Water (gm) (2)-(3) | <u>31.2</u> |
| 5 | Wt. Can (gm) | <u>6.0</u> |
| 6 | Wt. Dry Sample (3)-(5) | <u>111.4</u> |
| 7 | Moisture Content % (4)-(6)x100 | <u>28.0</u> |

| | | | | | | |
|--|---------------------|------------------------|----------------------|-----------------------|----------------------|-------------------------|
| Technician (signature) <u>M. L. L...</u> | Date <u>10-3-80</u> | Computed by: <u>MP</u> | Date: <u>10-3-80</u> | Checked by: <u>MP</u> | Date: <u>10-3-80</u> | Scale S/N <u>TB13-1</u> |
|--|---------------------|------------------------|----------------------|-----------------------|----------------------|-------------------------|

| | | | |
|---|--|--------|--------|
| Project Quality Assurance Procedure | Title INSPECTION AND TESTING OF SHORE BARRIER CONSTRUCTION | Number | Rev |
| | | 9.513 | 0 |
| | | Page | 1 of 2 |

EXHIBIT 9.513.5 UNCONFINED COMPRESSIVE STRENGTH TEST RESULTS ASTM D2166-66

Test Location
Grid Line N 6465
Grid Line E 5933
Elevation 568
Sample No. 074
Equip. S/N DELUC-01

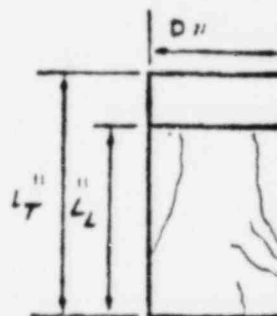
Date 9/24/00
Compressive Strength 2217.6 p.s.f.
Approved to place fill Yes: ✓ No: ✗
Inspector slat wihus

| | |
|-------|---|
| Total | ✓ |
| @20% | |

FAIL
PASS AS FOR
SCN 4568

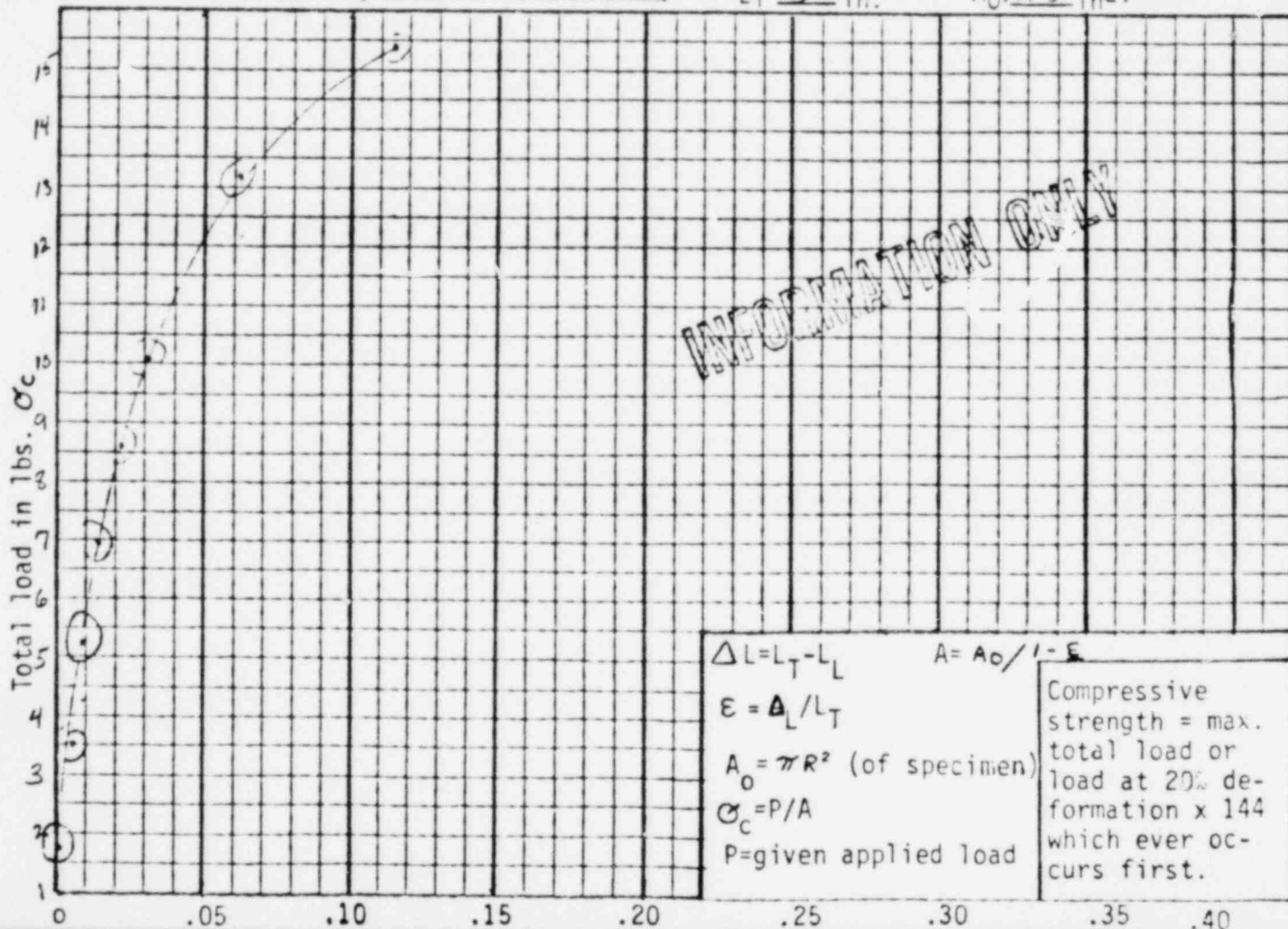
| Δ L(in) | Load P (lbs) | E | Area A ₀ | σ_c | Check By |
|-------------------|-----------------|------|------------------------|------------|-------------|
| .004 | 2.5 | .001 | 1.44 | 2.5 | |
| .014 | 5.0 | .005 | 1.44 | 3.5 | |
| .027 | 7.5 | .009 | 1.44 | 5.2 | |
| .041 | 10.0 | .014 | 1.45 | 6.9 | |
| .065 | 12.5 | .022 | 1.46 | 8.6 | |
| .093 | 15.0 | .031 | 1.48 | 10.1 | |
| .185 | 20.0 | .062 | 1.52 | 13.2 | |
| .345 | 25.0 | .115 | 1.62 | 15.4 | |
| | 30.0 | | FAIL | | ✓ |

Sketch of Sample



Description of failure:

LT 3 in. A₀ 1.43 in².



| | | | |
|---|--|-----------------|----------|
| Project Quality Assurance Procedure | Title INSPECTION AND TESTING OF SHORE BARRIER CONSTRUCTION | Number 9.513 | Rev 0 |
| | | Exhibit 9.513.5 | |

BORING LOG

Page 2 of 2

Location of Sampling: N 6965 E 5935

Date: 9/24/80

Elevation of Sampling: 568'

A.S.T.M. D 1587-74

Sample lab number 074

Depth of sample 0.5 (ft)

%Recovery 80%

Method of advancing sampler Constant force Hammer (circle one)

Type and size of sampler Shelby Tube 2" x 11.6"

Sampler S/N DES PH02

Hammer weight and drop 21.7 lbs. 2.83 ft.

Number of blows per 6" of drop 6

Thickness of soil layer N/A

Description of soil GRAY SILTY CLAY

Depth of water to surface N/A (ft)

516 CALCULATIONS FOR % MOISTURE

| | | |
|---|--------------------------------|--------------|
| 1 | Can No. | <u>C-4</u> |
| 2 | Wt. Wet Sample and Can (gm.) | <u>148.6</u> |
| 3 | Wt. Dry Sample and Can (gm) | <u>119.5</u> |
| 4 | Wt. Water (gm) (2)-(3) | <u>29.1</u> |
| 5 | Wt. Can (gm) | <u>6.1</u> |
| 6 | Wt. Dry Sample (3)-(5) | <u>113.4</u> |
| 7 | Moisture Content % (4)-(6)x100 | <u>25.7</u> |

| | | | | | | |
|---|---------------------|-------------------------------|----------------------|-------------|-------|------------------------|
| Technician (signature) <u>M. R. ...</u> | Date <u>9-25-80</u> | Computed by: <u>M. R. ...</u> | Date: <u>9-25-80</u> | Checked by: | Date: | Scale S/N <u>TEB-1</u> |
|---|---------------------|-------------------------------|----------------------|-------------|-------|------------------------|

Material unacceptable @ this elev. Retest @ elev 564' see test # 083

EXHIBIT 9.513.5 UNCONFINED COMPRESSIVE STRENGTH TEST RESULTS ASTM D2166-66

Test Location
Grid Line N 7400
Grid Line E E 4
Elevation 567' 1"
Sample No. 111
Equip. S/N DELUC-01

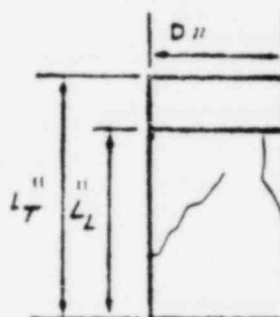
Date 10/1/80
Compressive Strength 2251 p.s.f.
Approved to place fill Yes: ☒ No: ☐

Total ☒
920%

Carol L. Calhoun
Inspector

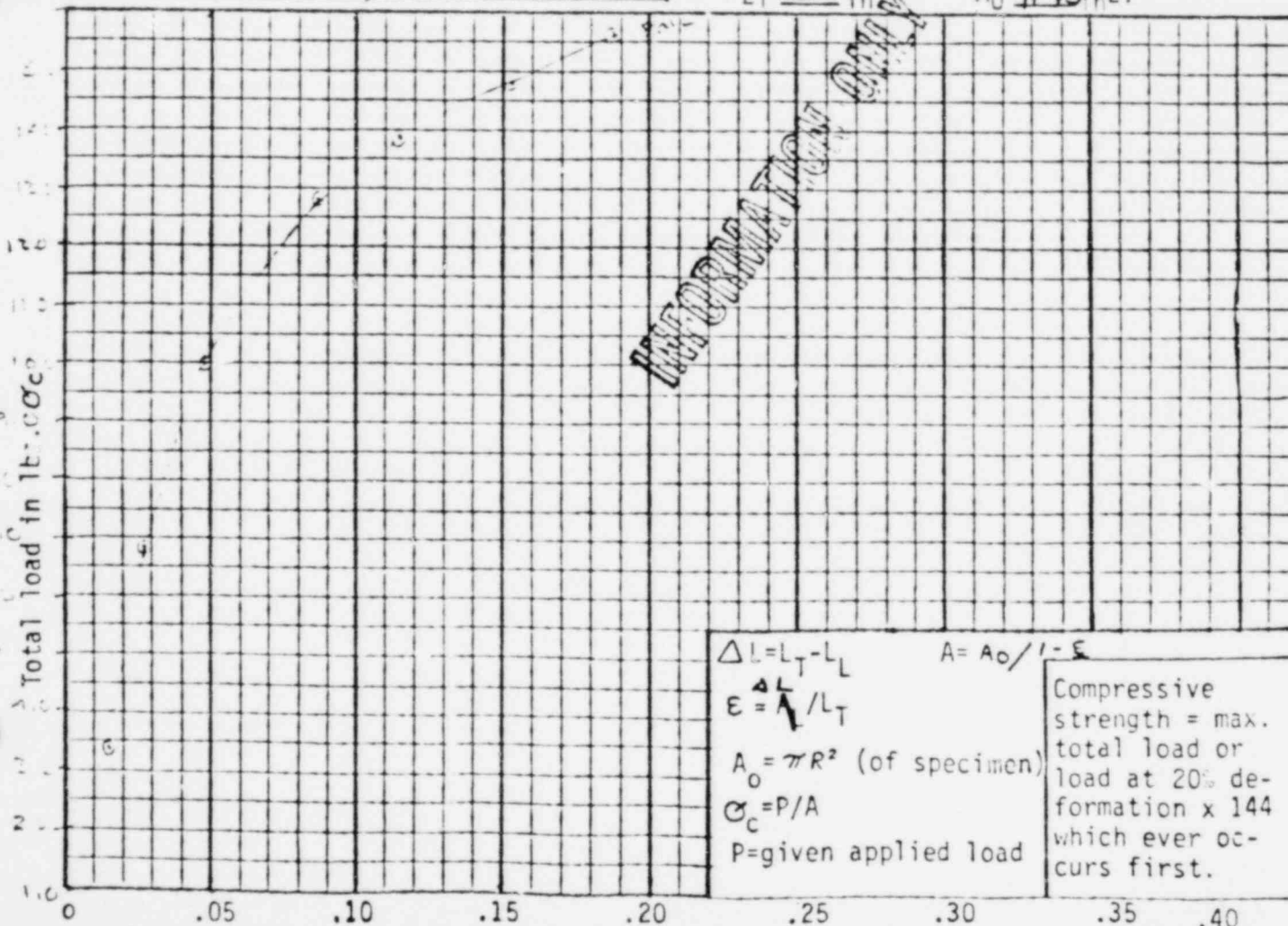
| Δ L(in) | Load P (lbs) | ϵ | Area A_0 | σ_c | Check By |
|-------------------|-----------------|------------|---------------|------------|-------------|
| 0.045 | 5.0 | 0.015 | 1.45 | 3.45 | |
| 0.084 | 10.0 | 0.028 | 1.47 | 6.80 | |
| 0.148 | 15.0 | 0.049 | 1.50 | 10.00 | |
| 0.254 | 20.0 | 0.086 | 1.56 | 12.82 | |
| 0.345 | 22.5 | 0.115 | 1.62 | 13.89 | |
| 0.457 | 25.0 | 0.152 | 1.69 | 14.79 | |
| 0.567 | 27.5 | 0.189 | 1.76 | 15.63 | |
| | 30.0 | | Fail | | |

Sketch of Sample



Description of failure:

LT 3 in. A0 1.43 in²



| | | | |
|---|--|-----------------|----------|
| Project Quality Assurance Procedure | Title INSPECTION AND TESTING OF SHORE BARRIER CONSTRUCTION | Number 9.513 | Rev 0 |
| | | Exhibit 9.513.5 | |

BORING LOG

Location of Sampling: N 7400 E &

Date: 10/1/80

Elevation of Sampling: 567' 1"

A.S.T.M. D 1587-74

Sample lab number 111

Depth of sample 0.5 (ft) %Recovery 65%

Method of advancing sampler Constant force Hammer (circle one)

Type and size of sampler Shelby Tube 2" x 11.6"

Sampler S/N DES PH02

Hammer weight and drop 21.7 lbs. 2.83 ft.

Number of blows per 6" of drop 7

Thickness of soil layer N/A

Description of soil GRAY/BLUE W/ SOME BROWN

Depth of water to surface N/A (ft)

7.4 CALCULATIONS FOR % MOISTURE

| | | |
|---|--------------------------------|-------|
| 1 | Can No. | C-3 |
| 2 | Wt. Wet Sample and Can (gm.) | 149.1 |
| 3 | Wt. Dry Sample and Can (gm) | 117.6 |
| 4 | Wt. Water (gm) (2)-(3) | 31.5 |
| 5 | Wt. Can (gm) | 6.1 |
| 6 | Wt. Dry Sample (3)-(5) | 111.5 |
| 7 | Moisture Content % (4)-(6)x100 | 28.3 |

| | | | |
|-----------------------------|--------------------------|--------------------------|--------------|
| Technician (signature) Date | Computed by: Date: | Checked by: Date: | Scale S/N |
| <u>M. Parker 10-2-80</u> | <u>M. Parker 10-2-80</u> | <u>M. Parker 10-2-80</u> | <u>TBB-1</u> |

| | | | |
|---|--|-----------------|----------|
| Project Quality Assurance Procedure | Title INSPECTION AND TESTING OF SHORE BARRIER CONSTRUCTION | Number 9.513 | Rev 0 |
| | | Page 1 of 2 | |
| | | | |

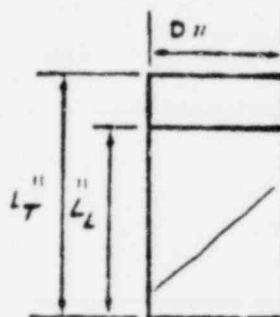
EXHIBIT 9.513.5 UNCONFINED COMPRESSIVE STRENGTH TEST RESULTS ASTM D2166-66

Test Location
 Grid Line N 6945
 Grid Line E 5935
 Elevation 568
 Sample No. 075
 Equip. S/N DELUC-01

Date 9/24/80
 Compressive Strength 2275.2 p.s.f.
 Approved to place fill Yes ☒ No ☐
 Inspector Calhoun
 Total ☒
 @20% ☐
 PASS AS PER DCN-4568

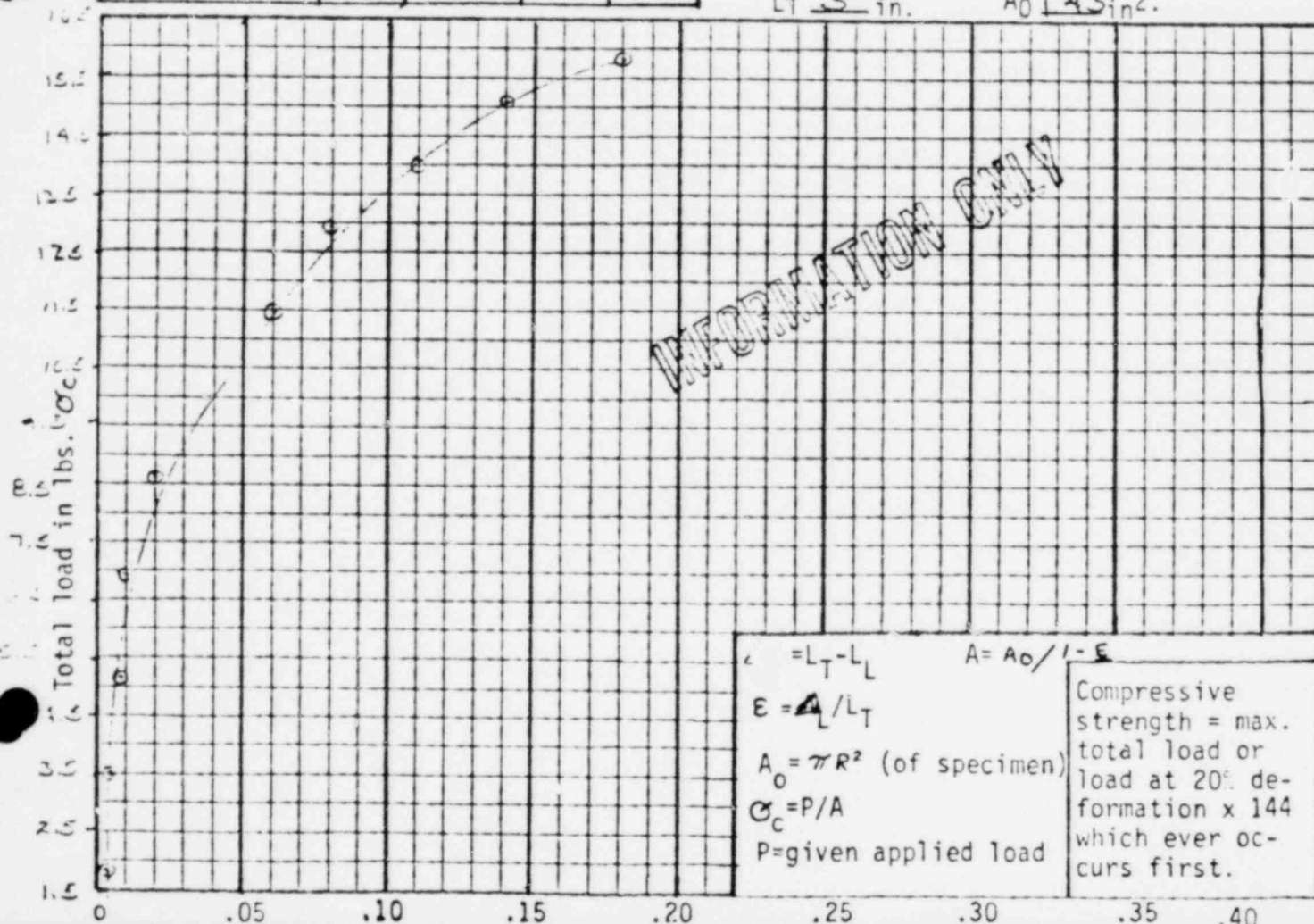
| Δ L(in) | Load P (lbs) | E | Area A_0 sq in | σ_c | Check By |
|-------------------|-----------------|------|---------------------|------------|-------------|
| 0.11 | 2.5 | .004 | 1.44 | 1.7 | |
| 0.14 | 5.0 | .005 | 1.44 | 3.5 | |
| 0.28 | 7.5 | .009 | 1.44 | 5.2 | |
| 0.31 | 10.0 | .01 | 1.44 | 6.9 | |
| 0.50 | 12.5 | .02 | 1.46 | 8.6 | |
| 0.95 | 17.5 | .06 | 1.52 | 11.5 | |
| 1.20 | 20.0 | .08 | 1.55 | 12.9 | |
| 1.31 | 22.5 | .11 | 1.61 | 14.0 | |
| 1.45 | 25.0 | .14 | 1.66 | 15.1 | |
| 1.54 | 27.5 | .18 | 1.74 | 15.8 | |
| | 30.0 | | Fail | | |

Sketch of Sample



Description of failure:

LT 3 in. A_0 1.43 in².



Project
Quality Assurance
Procedure

Title
INSPECTION AND TESTING OF
SHORE BARRIER CONSTRUCTION

Number
9.513

Rev
0

Exhibit 9.513.5

BORING LOG

Page 2 of 2

Location of Sampling: N 6995

Date: 9/24/80

Elevation of Sampling: 568'

A.S.T.M. D 1587-74

Sample lab number 075

Depth of sample 0.5 (ft)

%Recovery 100%

Method of advancing sampler Constant force Hammer (circle one)

Type and size of sampler Shelby Tube 2" x 11.6"

Sampler S/N DES PH02

Hammer weight and drop 21.7 lbs. 2.83 ft.

Number of blows per 6" of drop 8

Thickness of soil layer N/A

Description of soil GRAY, SILTY CLAY

Depth of water to surface N/A (ft)

#3 3 4 CALCULATIONS FOR % MOISTURE

| | | |
|---|--------------------------------|--------------|
| 1 | Can No. | <u>C-5</u> |
| 2 | Wt. Wet Sample and Can (gm.) | <u>150.3</u> |
| 3 | Wt. Dry Sample and Can (gm) | <u>120.9</u> |
| 4 | Wt. Water (gm) (2)-(3) | <u>29.4</u> |
| 5 | Wt. Can (gm) | <u>6.0</u> |
| 6 | Wt. Dry Sample (3)-(5) | <u>114.9</u> |
| 7 | Moisture Content % (4)-(6)x100 | <u>25.6</u> |

| | | | | | | |
|---|---------------------|---------------------------|----------------------|--------------------------|----------------------|--------------------------|
| Technician (signature) <u>M. H. 9-25-80</u> | Date <u>9-25-80</u> | Computed by: <u>M. H.</u> | Date: <u>9-25-80</u> | Checked by: <u>M. H.</u> | Date: <u>9-25-80</u> | Scale S/N <u>T/3/B-1</u> |
|---|---------------------|---------------------------|----------------------|--------------------------|----------------------|--------------------------|

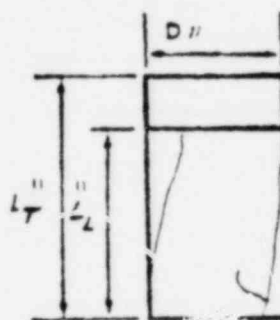
Material unacceptable @ this elev. Retested @ elev 565 see test # 084

Test Location
Grid Line N 7560
Grid Line E 8
Elevation 567' 1"
Sample No. 112
Equip. S/N DELUC-01

Date 10/1/80
Compressive Strength 2386 p.s.f.
Approved to place fill Yes: ☒ No: ☐
M. Perkins
Inspector

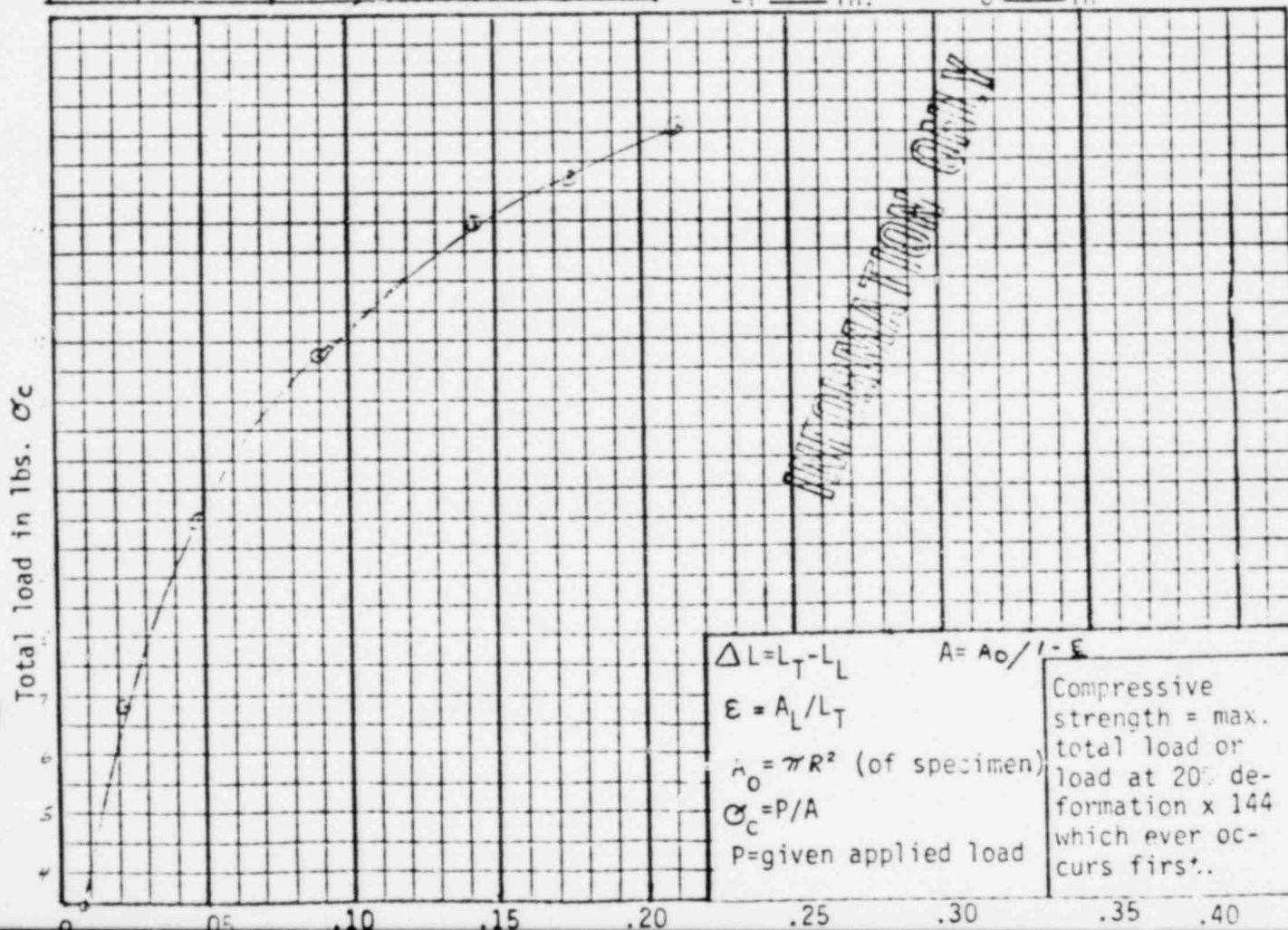
| | |
|-------|---|
| Total | |
| @20% | ✓ |

Sketch of Sample



Description of failure:

LT _____ in. A_0 _____ in².



| | | | |
|---|--|-----------------|----------|
| Project Quality Assurance Procedure | Title INSPECTION AND TESTING OF SHORE BARRIER CONSTRUCTION | Number 9.513 | Rev 0 |
| | | Exhibit 9.513.5 | |

BORING LOG

Page 2 of 2

Location of Sampling: N 7560 E &

Date: 10/1/80

Elevation of Sampling: 567' 1"

A.S.T.M. D 1587-74

Sample lab number 112

Depth of sample 0.5 (ft) %Recovery 55%

Method of advancing sampler Constant force Hammer (circle one)

Type and size of sampler Shelby Tube 2" x 11.6"

Sampler S/N DES PH02

Hammer weight and drop 21.7 lbs. 2.83 ft.

Number of blows per 6" of drop 5

Thickness of soil layer N/A

Description of soil GRAY BLUE STREAKED w/ BROWN

Depth of water to surface N/A (ft)

#5 CALCULATIONS FOR % MOISTURE

| | | |
|---|--------------------------------|--------|
| 1 | Can No. | C-4 |
| 2 | Wt. Wet Sample and Can (gm.) | 151.5 |
| 3 | Wt. Dry Sample and Can (gm) | 120.9 |
| 4 | Wt. Water (gm) (2)-(3) | 30.6 |
| 5 | Wt. Can (gm) | 6.1 |
| 6 | Wt. Dry Sample (3)-(5) | 114.8 |
| 7 | Moisture Content % (4)-(6)x100 | 26.7 ✓ |

| | | | |
|-----------------------------|-------------------------|-------------------------|-----------|
| Technician (signature) Date | Computed by: Date: | Checked by: Date: | Scale S/: |
| <i>M. L. H.</i> 10-2-80 | <i>M. L. H.</i> 10-2-80 | <i>M. L. H.</i> 10-2-80 | TBB-1 |

| | | | |
|---|--|--------|------|
| Project Quality Assurance Procedure | Title INSPECTION AND TESTING OF SHORE BARRIER CONSTRUCTION | Number | rev |
| | | 9.513 | 0 |
| | | Page | |
| | | 1 | of 2 |

EXHIBIT 9.513.5 UNCONFINED COMPRESSIVE STRENGTH TEST RESULTS ASTM D2166-66

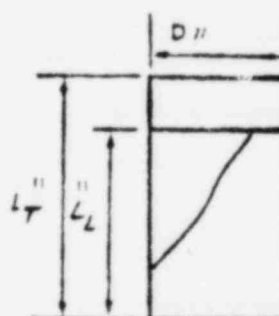
Test Location
Grid Line N 7250
Grid Line E 5945
Elevation 567.0
Sample No. 099
Equip. S/N DELUC-01

Date 9-29-80
Compressive Strength 2483 p.s.f.
Approved to place fill Yes: ☒ No: ☐
RWCarter
Inspector

| | |
|-------|-------------------------------------|
| Total | <input checked="" type="checkbox"/> |
| 920% | |

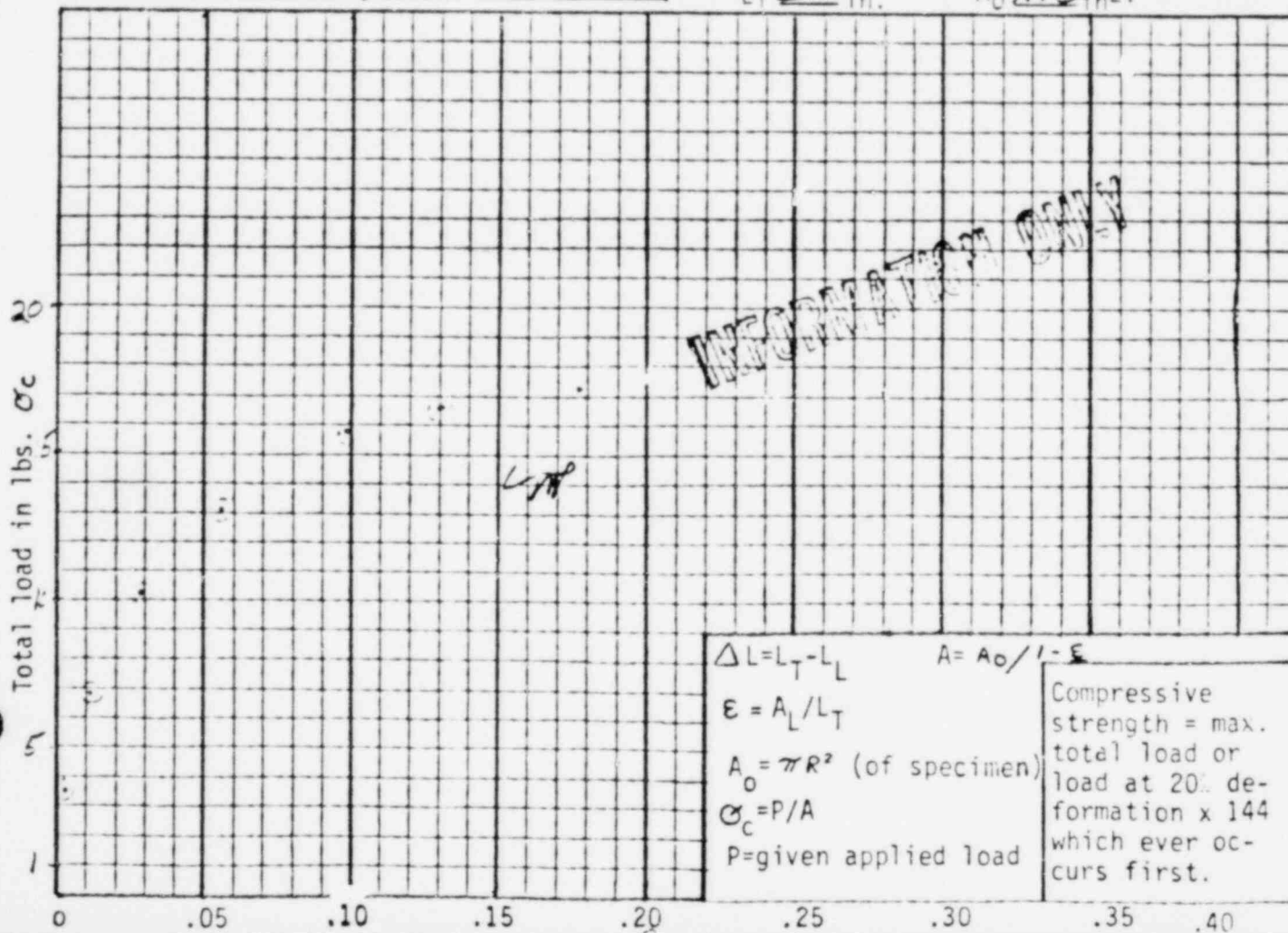
| Δ L(in) | Load P (lbs) | ϵ | Area A_0 | σ_c | Check By |
|-------------------|-----------------|------------|---------------|------------|-------------|
| .009 | 5 | .003 | 1.43 | 3.50 | |
| .037 | 10 | .012 | 1.45 | 6.90 | |
| .088 | 15 | .029 | 1.47 | 10.20 | |
| .168 | 20 | .056 | 1.51 | 13.25 | |
| .295 | 25 | .099 | 1.59 | 15.72 | |
| .391 | 27.5 | .130 | 1.64 | 16.77 | |
| .531 | 30 | .177 | 1.74 | 17.24 | |
| .763 | 32.5 | .254 | 1.92 | 16.93 | Fail |
| FAIL | | | | | |
| -mp | | | | | |

Sketch of Sample



Description of failure: _____

LT 3 in. A0 1.43 in².



| | | | |
|---|--|-----------------|----------|
| Project Quality Assurance Procedure | Title INSPECTION AND TESTING OF SHORE BARRIER CONSTRUCTION | Number 9.513 | Rev 0 |
| | | Exhibit 9.513.5 | |

BORING LOG

Page 2 of 2

Location of Sampling: N7250C5945

Date: 9/29/80

Elevation of Sampling: 567

A.S.T.M. D 1587-74

Sample lab number 099

Depth of sample 3" (ft)

%Recovery 60

Method of advancing sampler Constant force Hammer (circle one)

Type and size of sampler Shelby Tube 2" x 11.6"

Sampler S/N DES PH02

Hammer weight and drop 21.7 lbs. 2.83 ft.

Number of blows per 6" of drop 6

Thickness of soil layer N/A

Description of soil gray plastic clay

Depth of water to surface N/A (ft)

#1 CALCULATIONS FOR % MOISTURE

| | | |
|---|--------------------------------|--------------|
| 1 | Can No. | <u>C-17</u> |
| 2 | Wt. Wet Sample and Can (gm.) | <u>149.7</u> |
| 3 | Wt. Dry Sample and Can (gm) | <u>119.8</u> |
| 4 | Wt. Water (gm) (2)-(3) | <u>29.9</u> |
| 5 | Wt. Can (gm) | <u>6.0</u> |
| 6 | Wt. Dry Sample (3)-(5) | <u>113.8</u> |
| 7 | Moisture Content % (4)-(6)x100 | <u>26.3</u> |

| | | | | | | |
|---|---------------------|-------------------------------|----------------------|------------------------------|----------------------|------------------------|
| Technician (signature) <u>M. P. ...</u> | Date <u>9-30-80</u> | Computed by: <u>M. P. ...</u> | Date: <u>9-30-80</u> | Checked by: <u>M. P. ...</u> | Date: <u>9-30-80</u> | Scale S/N <u>TBB-1</u> |
|---|---------------------|-------------------------------|----------------------|------------------------------|----------------------|------------------------|

EXHIBIT 9.513.5 UNCONFINED COMPRESSIVE STRENGTH TEST RESULTS ASTM D2166-66

Test Location
Grid Line N 7340
Grid Line E 4
Elevation 567' 1"
Sample No. 110
Equip. S/N DELUC-01

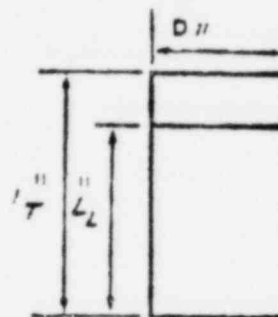
Date 10/1/80
Compressive Strength 2511 p.s.f.
Approved to place fill Yes: ☒ No: ☐

Total 1
620%

Inspector *[Signature]*

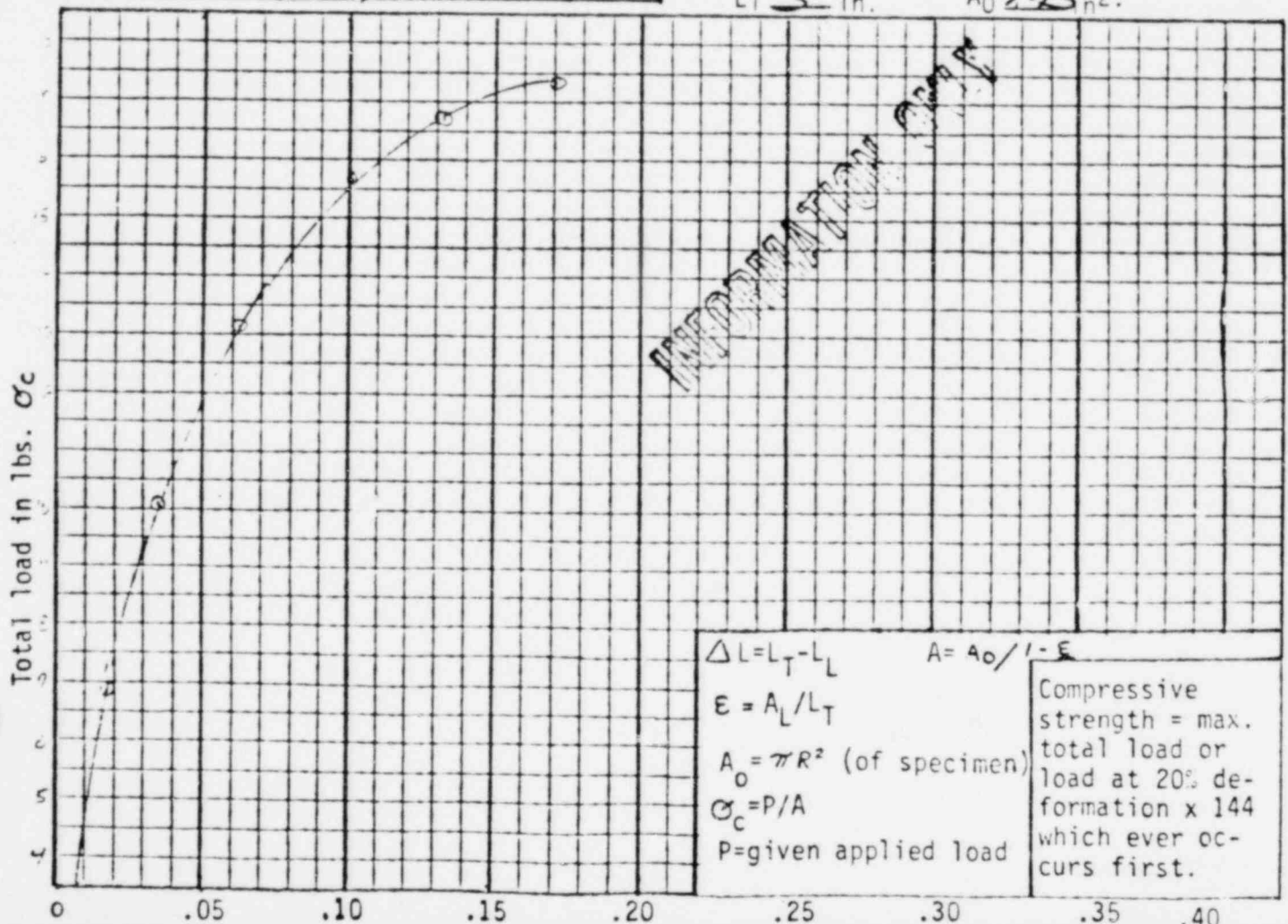
| Δ L (in) | Load P (lbs) | E | Area A ₀ | σ_c | Check By |
|--------------------|-----------------|------|------------------------|------------|-------------|
| .028 | 5.0 | .009 | 1.44 | 3.47 | — |
| .050 | 10.0 | .017 | 1.45 | 6.90 | — |
| .104 | 15.0 | .035 | 1.48 | 10.14 | — |
| .185 | 20.0 | .062 | 1.52 | 13.16 | — |
| .238 | 22.5 | .079 | 1.55 | 14.52 | — |
| .315 | 25.0 | .105 | 1.60 | 15.63 | — |
| .398 | 27.5 | .133 | 1.65 | 16.67 | — |
| .510 | 30.0 | .170 | 1.72 | 17.44 | CLC |
| | 32.5 | | Fail | | |

Sketch of Sample



Description of failure: _____

LT 3 in. A₀ 143 in²



| | | | |
|---|--|-----------------|----------|
| Project Quality Assurance Procedure | Title INSPECTION AND TESTING OF SHORE BARRIER CONSTRUCTION | Number 9.513 | Rev 0 |
| | | Exhibit 9.513.5 | |

BORING LOG

Page 2 of 2

Location of Sampling: N 7340 E 4

Date: 10/1/80

Elevation of Sampling: 567' 1"

A.S.T.M. D 1587-74

Sample lab number 110

Depth of sample 0.5 (ft)

%Recovery 50%

Method of advancing sampler Constant force Hammer (circle one)

Type and size of sampler Shelby Tube 2" x 11.6"

Sampler S/N DES PH02

Hammer weight and drop 21.7 lbs. 2.83 ft.

Number of blows per 6" of drop 6

Thickness of soil layer N/A

Description of soil MOTTLED GRAY w/ SOME BROWN

Depth of water to surface N/A (ft)

#3 CALCULATIONS FOR % MOISTURE

| | | |
|---|--------------------------------|-------|
| 1 | Can No. | C-2 |
| 2 | Wt. Wet Sample and Can (gm.) | 149.4 |
| 3 | Wt. Dry Sample and Can (gm) | 118.9 |
| 4 | Wt. Water (gm) (2)-(3) | 30.5 |
| 5 | Wt. Can (gm) | 6.1 |
| 6 | Wt. Dry Sample (3)-(5) | 112.8 |
| 7 | Moisture Content % (4)-(6)x100 | 27.0 |

| | | | | | | |
|---------------------------------------|---------------------|-----------------------------|----------------------|----------------------------|----------------------|------------------------|
| Technician (signature) <u>M. Lake</u> | Date <u>10-2-80</u> | Computed by: <u>M. Lake</u> | Date: <u>10-2-80</u> | Checked by: <u>M. Lake</u> | Date: <u>10-2-80</u> | Scale S/n <u>TBB-1</u> |
|---------------------------------------|---------------------|-----------------------------|----------------------|----------------------------|----------------------|------------------------|

EXHIBIT 9.513.5 UNCONFINED COMPRESSIVE STRENGTH TEST RESULTS ASTM D2166-66

Test Location

Grid Line N 7750

Grid Line E 5945

Elevation 56.7

Sample No. 11A

Equip. S/N DELUC-01

Date 10/2/80

Compressive Strength 2750 p.s.f.

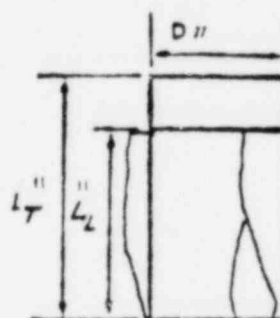
Approved to place fill Yes: No:

Total
@20%

Inspector

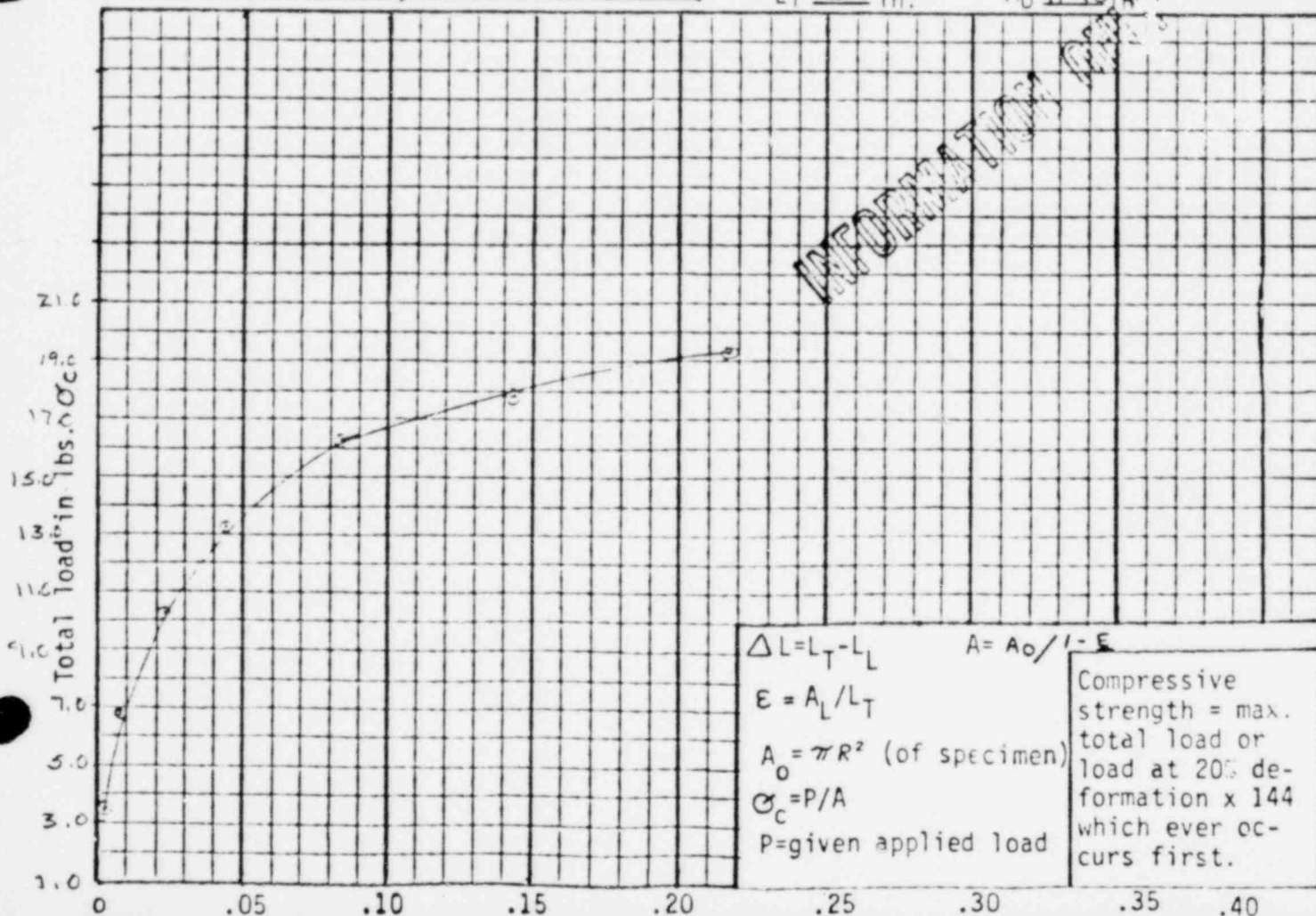
| Δ L(in) | load P (lbs) | E | Area A ₀ | σ_c | Check By |
|-------------------|-----------------|------|------------------------|------------|-------------|
| .010 | 5.0 | .003 | 1.43 | 3.50 | |
| .025 | 10.0 | .008 | 1.44 | 6.94 | |
| .065 | 15.0 | .023 | 1.46 | 10.27 | |
| .131 | 20.0 | .044 | 1.50 | 13.33 | |
| .245 | 25.0 | .082 | 1.56 | 16.03 | |
| .425 | 30.0 | .142 | 1.67 | 17.96 | |
| .645 | 35.0 | .216 | 1.82 | 19.23 | |
| | FAIL | | | | |

Sketch of Sample



Description of failure:

LT 3 in. A0 1.43 in²



| | | | |
|---|--|-----------------|----------|
| Project Quality Assurance Procedure | Title INSPECTION AND TESTING OF SHORE BARRIER CONSTRUCTION | Number 9.513 | Rev 0 |
| | | Exhibit 9.513.5 | |

BORING LOG

Page 2 of 2

Location of Sampling: M750 E5945Date: 10-2-80Elevation of Sampling: 567'

A.S.T.M. D 1587-74

Sample lab number 110
 Depth of sample 0.5 (ft) %Recovery 100
 Method of advancing sampler Constant force Hammer (circle one)
 Type and size of sampler Shelby Tube 2" x 11.6"
 Sampler S/N DES PH02
 Hammer weight and drop 21.7 lbs. 2.83 ft.
 Number of blows per 6" of drop 9
 Thickness of soil layer N/A
 Description of soil GRAY Plastic clay
 Depth of water to surface N/A (ft)

#3 CALCULATIONS FOR % MOISTURE

| | | |
|---|--------------------------------|-------|
| 1 | Can No. | C-1 |
| 2 | Wt. Wet Sample and Can (gm.) | 148.8 |
| 3 | Wt. Dry Sample and Can (gm) | 118.6 |
| 4 | Wt. Water (gm) (2)-(3) | 30.2 |
| 5 | Wt. Can (gm) | 5.9 |
| 6 | Wt. Dry Sample (3)-(5) | 112.7 |
| 7 | Moisture Content % (4)-(6)x100 | 26.8 |

| | | | |
|-----------------------------|-------------------------|----------------------|-----------|
| Technician (signature) Date | Computed by: Date: | Checked by: Date: | Scale S/N |
| <u>P. Perkins</u> 10-3-80 | <u>M. L. L.</u> 10-2-80 | <u>M. F.</u> 10-2-80 | JB B-1 |

EXHIBIT 9.513.5 UNCONFINED COMPRESSIVE STRENGTH TEST RESULTS ASTM D2166-66

Test Location

Grid Line N 7425
Grid Line E 4
Elevation 567' 8" 1"
Sample No. 104
Equip. S/N DELUC-01

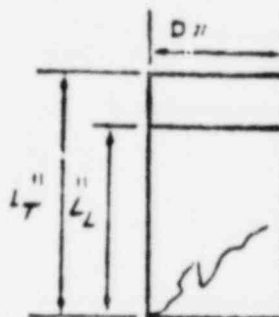
Date 9/30/80
Compressive Strength 2753 p.s.f.
Approved to place fill Yes: No:

Total
920%

Inspector

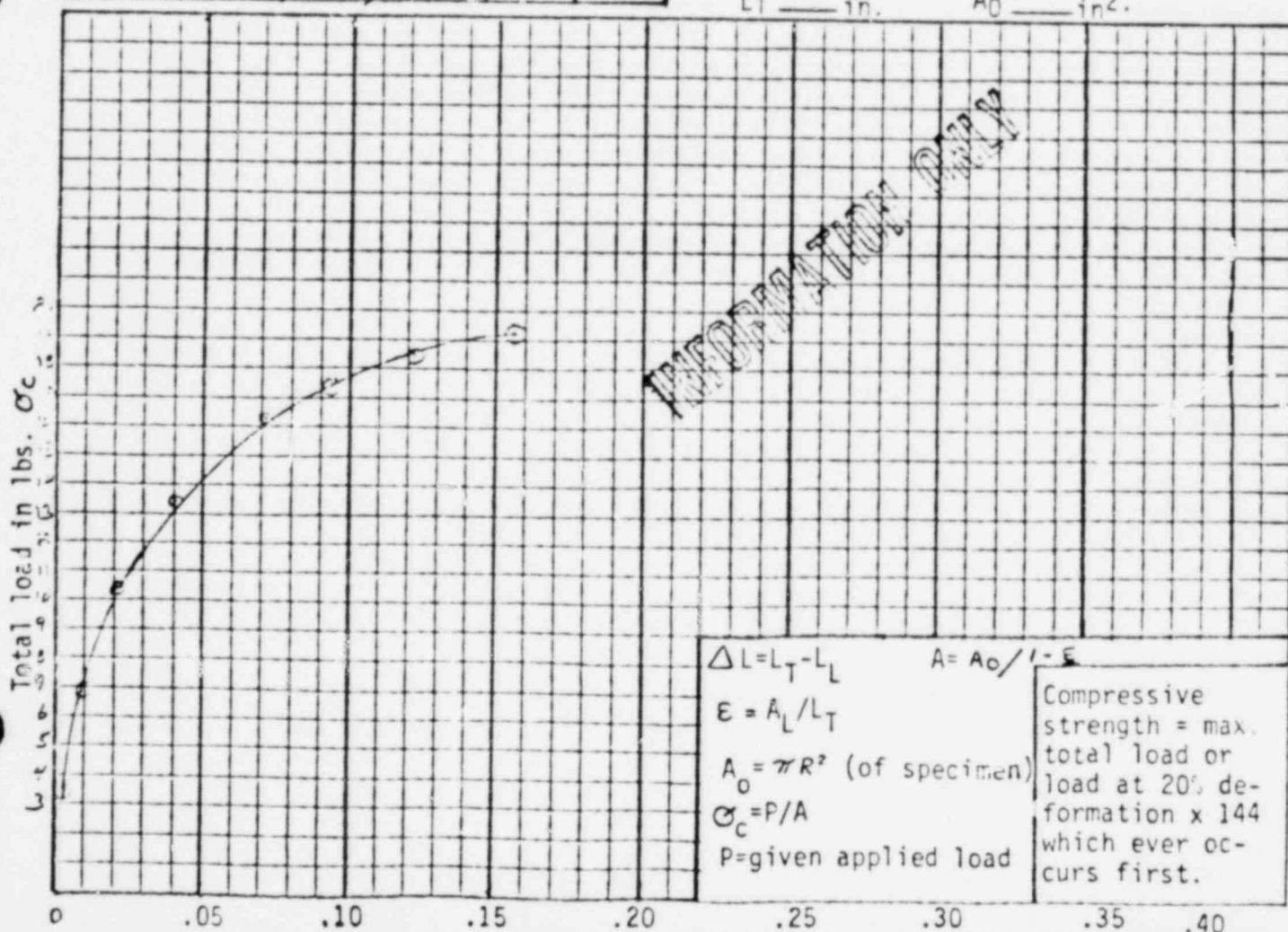
| Δ L(in) | Load P (lbs) | E | Area A ₀ | σ_c | Check By |
|-------------------|-----------------|------|------------------------|------------|-------------|
| 1008 | 5.0 | .003 | 1.43 | 3.50 | |
| 1029 | 10.0 | .010 | 1.44 | 6.94 | |
| 1065 | 15.0 | .022 | 1.46 | 10.27 | |
| 1123 | 20.0 | .041 | 1.49 | 13.42 | |
| 1215 | 25.0 | .072 | 1.54 | 16.23 | |
| 1283 | 27.5 | .094 | 1.58 | 17.41 | |
| 1311 | 30.0 | .124 | 1.63 | 18.40 | |
| 1472 | 33.5 | .157 | 1.70 | 19.12 | |
| | 35.0 | | Fail | | |

Sketch of Sample



Description of failure:

L_T — in. A₀ — in².



| | | | |
|---|--|-----------------|----------|
| Project Quality Assurance Procedure | Title INSPECTION AND TESTING OF SHORE BARRIER CONSTRUCTION | Number 9.513 | Rev 0 |
| | | Exhibit 9.513.5 | |
| | | | |

BORING LOG

Page 2 of 2

Location of sampling: 7425

Date: 9/30/80

Elevation of Sampling: 567'5"

A.S.T.M. D 1587-74

Sample lab number 104

Depth of sample 0.5 (ft) %Recovery 101%

Method of advancing sampler Constant force Hammer (circle one)

Type and size of sampler Shelby Tube 2" x 11.6"

Sampler S/N DES PH02

Hammer weight and drop 21.7 lbs. 2.83 ft.

Number of blows per 6" of drop 7

Thickness of soil layer N/A

Description of soil MOTTLED GREEN/gray/BROWN

Depth of water to surface N/A (ft)

#1 CALCULATIONS FOR % MOISTURE

| | | |
|---|--------------------------------|-------|
| 1 | Can No. | C-14 |
| 2 | Wt. Wet Sample and Can (gm.) | 152.5 |
| 3 | Wt. Dry Sample and Can (gm) | 122.8 |
| 4 | Wt. Water (gm) (2)-(3) | 29.7 |
| 5 | Wt. Can (gm) | 6.2 |
| 6 | Wt. Dry Sample (3)-(5) | 116.6 |
| 7 | Moisture Content % (4)-(6)x100 | 25.5 |

| | | | |
|-----------------------------|--------------------------|------------------------------|-----------|
| Technician (signature) Date | Computed by: Date: | Checked by: Date: | Scale S/N |
| <i>M. Parker 10-1-80</i> | <i>M. Parker 10-1-80</i> | <i>D.M. Williams 10/1/80</i> | T.B.B-1 |

EXHIBIT 9.513.5 UNCONFINED COMPRESSIVE STRENGTH TEST RESULTS ASTM D2166-66

Test Location 6873
Grid Line N 6873
Grid Line E 6873
Elevation 5937
Sample No. 568
Equip. S/N DELUC-01

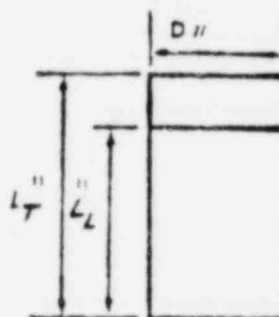
Date 9/23/80
Compressive Strength 2827 p.s.f.
Approved to place fill Yes: ☒ No: ☐

| | |
|-------|-------------------------------------|
| Total | <input checked="" type="checkbox"/> |
| 920% | |

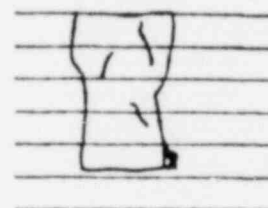
Inspector [Signature]

| Δ L (in) | Load P (lbs) | E | Area A | σ_c | Check By |
|--------------------|-----------------|------|-----------|------------|-------------|
| .025 | 2.5 | .008 | 1.442 | 150 | |
| .039 | 5.0 | .013 | 1.449 | 497 | |
| .060 | 7.5 | .020 | 1.460 | 740 | |
| .080 | 10.0 | .027 | 1.470 | 980 | |
| .104 | 12.5 | .035 | 1.482 | 1215 | |
| .140 | 15.0 | .047 | 1.501 | 1437 | |
| .210 | 20.0 | .070 | 1.538 | 1873 | |
| .309 | 25.0 | .103 | 1.594 | 2258 | |
| .435 | 30.0 | .145 | 1.673 | 2582 | |
| .594 | 35.0 | .198 | 1.783 | 2827 | |
| | 40.0 | | Fail | | |

Sketch of Sample

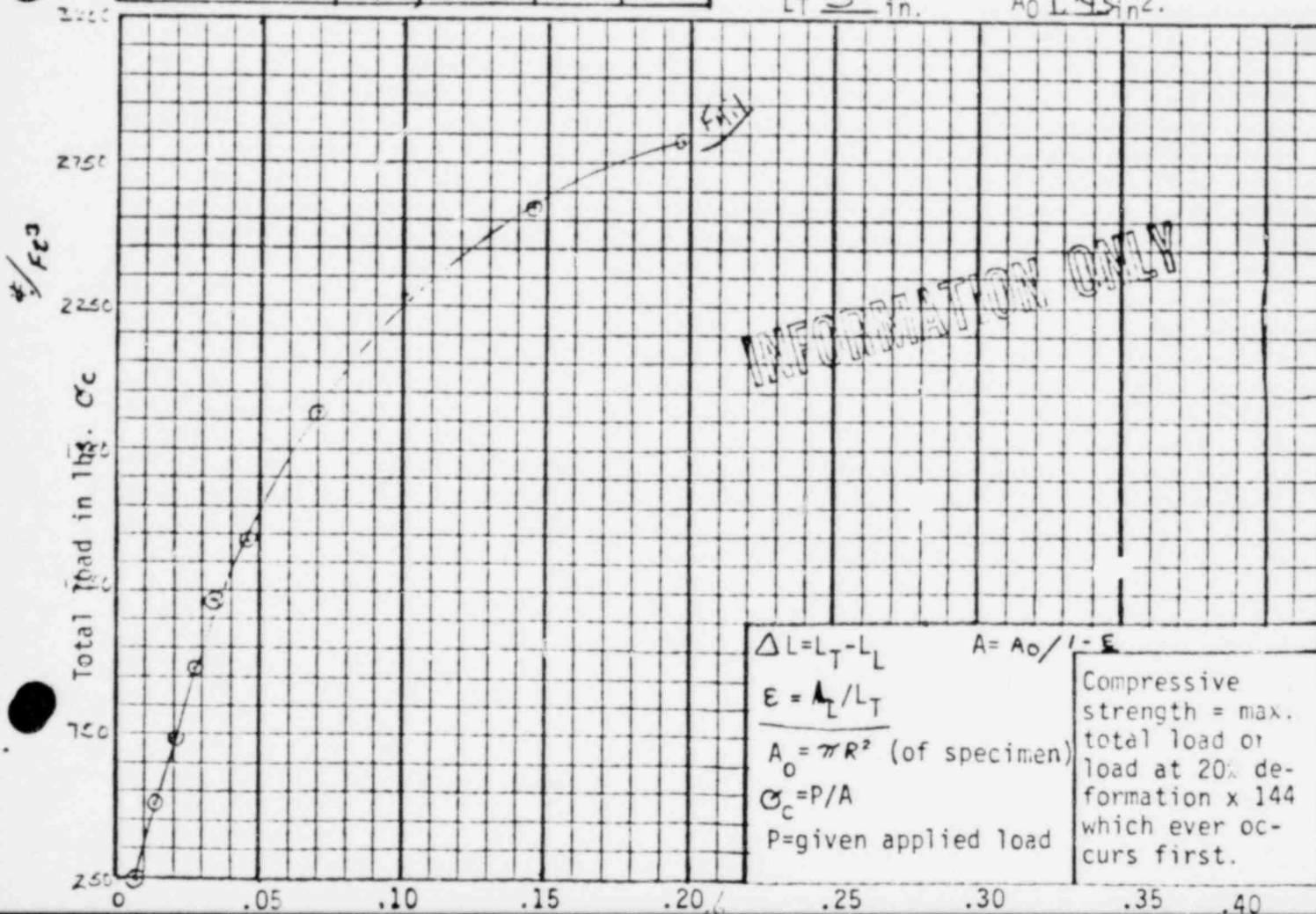


Description of failure:



LT 3 in.

AO 1.43 in².



$$\Delta L = L_T - L_L$$

$$A = A_0 / (1 - E)$$

$$E = \Delta L / L_T$$

$$A_0 = \pi R^2 \text{ (of specimen)}$$

$$\sigma_c = P / A$$

$$P = \text{given applied load}$$

Compressive strength = max. total load or load at 20% deformation x 144 which ever occurs first.

| | | | |
|---|--|-----------------|----------|
| Project Quality Assurance Procedure | Title INSPECTION AND TESTING OF SHORE BARRIER CONSTRUCTION | Number 9.513 | Rev 0 |
| | | Exhibit 9.513.5 | |

BORING LOG

Page 2 of 2

Location of Sampling: 06067 E 5937

Date:

Elevation of Sampling: 565'

A.S.T.M. D 1587-74

Sample lab number 071Depth of sample 0.5 (ft)%Recovery 70Method of advancing sampler constant force Hammer (circle one)Type and size of sampler Shelby Tube 2" x 11.6"Sampler S/N DES PH02Hammer weight and drop 21.7 lbs. 2.83 ft.Number of blows per 6" of drop 7Thickness of soil layer N/ADescription of soil GRAY CLAY w/ SILTSDepth of water to surface N/A (ft)

SAC #2 CALCULATIONS FOR % MOISTURE

| | | |
|---|--------------------------------|--------------|
| 1 | Can No. | <u>C-17</u> |
| 2 | Wt. Wet Sample and Can (gm.) | <u>153.3</u> |
| 3 | Wt. Dry Sample and Can (gm) | <u>125.6</u> |
| 4 | Wt. Water (gm) (2)-(3) | <u>27.7</u> |
| 5 | Wt. Can (gm) | <u>6.1</u> |
| 6 | Wt. Dry Sample (3)-(5) | <u>119.5</u> |
| 7 | Moisture Content % (4)-(6)x100 | <u>23.2</u> |

| | | | | | | |
|--|---------------------|------------------------------|----------------------|-----------------------------|-------|--------------|
| Technician (signature) <u>W. H. H.</u> | Date <u>9-24-80</u> | Computed by: <u>W. H. H.</u> | Date: <u>9-24-80</u> | Checked by: <u>W. H. H.</u> | Date: | Scale S/N |
| | | | | | | <u>TEB-1</u> |

| | | | | | | | | |
|---|---|--|-------|---|------|--|---|------|
| Project Quality Assurance Procedure | INSPECTION AND TESTING OF SHORE BARRIER CONSTRUCTION | <table border="1" style="width:100%; border-collapse: collapse;"> <tr> <td style="width:50%;">9.513</td> <td style="width:50%;">0</td> </tr> <tr> <td colspan="2">Page</td> </tr> <tr> <td>1</td> <td>of 2</td> </tr> </table> | 9.513 | 0 | Page | | 1 | of 2 |
| 9.513 | 0 | | | | | | | |
| Page | | | | | | | | |
| 1 | of 2 | | | | | | | |

EXHIBIT 9.513.5 UNCONFINED COMPRESSIVE STRENGTH TEST RESULTS ASTM D2166-66

Test Location
 Grid Line N 6845
 Grid Line E 4
 Elevation 566.5
 Sample No. 146
 Equip. S/N DELUC-01

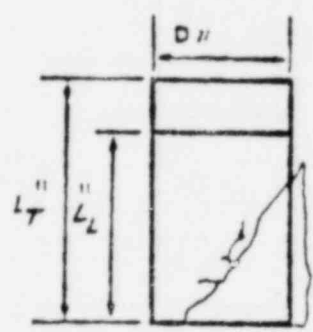
Date 10/17/80
 Compressive Strength 2913 p.s.f.
 Approved to place fill Yes: ☒ No: ☐

| | |
|-------|-------------------------------------|
| Total | <input checked="" type="checkbox"/> |
| 920% | |

RW Carter
 Inspector

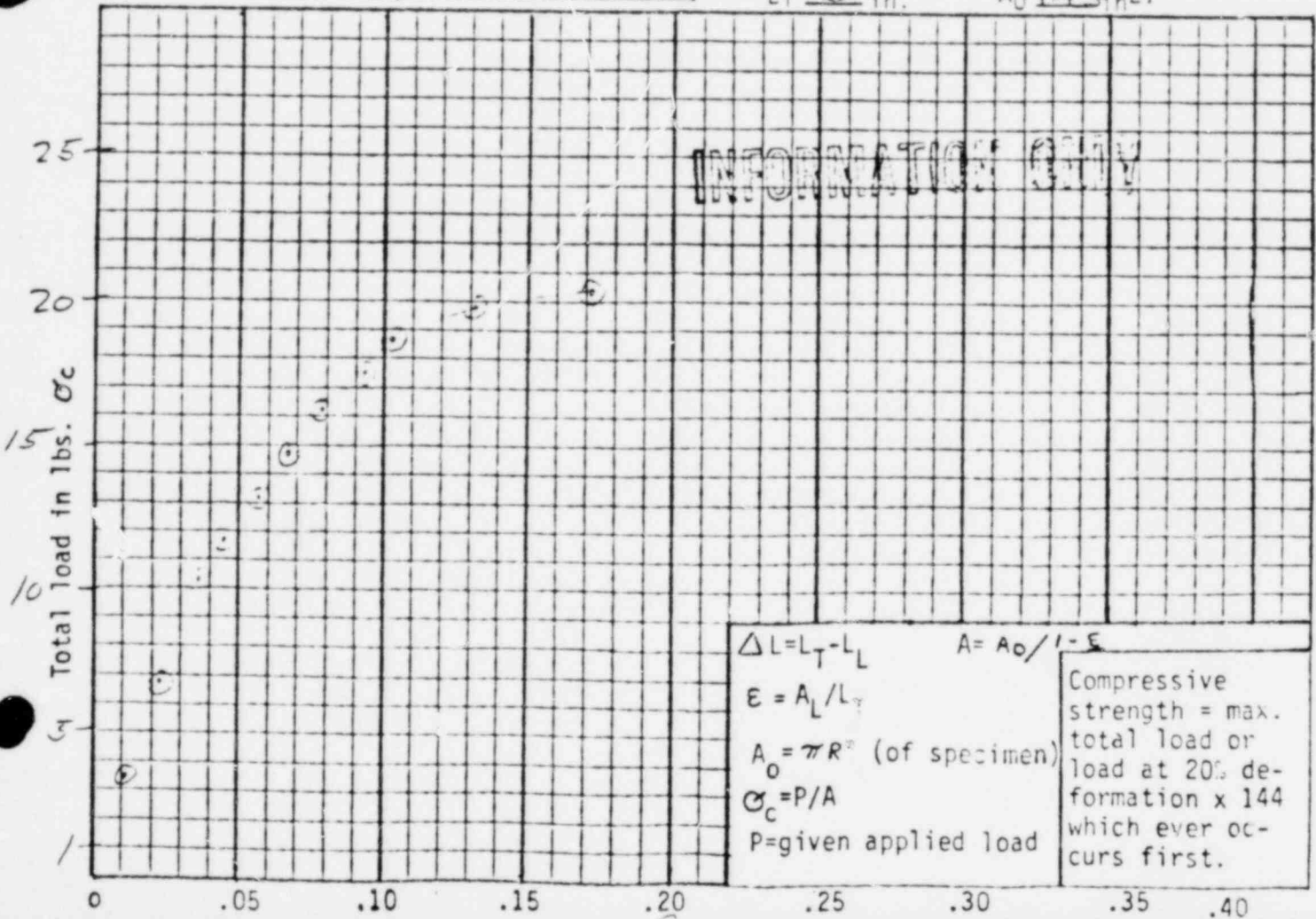
| Δ L (in) | Load P (lbs) | ϵ | Area A_0 | σ_c | Check By |
|--------------------|-----------------|------------|---------------|------------|-------------|
| .034 | 5 | .011 | 1.45 | 3.45 | |
| .069 | 10 | .023 | 1.46 | 6.85 | |
| .113 | 15 | .037 | 1.48 | 10.14 | |
| .136 | 17.5 | .045 | 1.50 | 11.67 | |
| .170 | 30 | .057 | 1.52 | 13.16 | |
| .198 | 22.5 | .066 | 1.53 | 14.71 | |
| .236 | 25 | .079 | 1.55 | 16.13 | |
| .283 | 27.5 | .094 | 1.58 | 17.41 | |
| .328 | 30 | .109 | 1.60 | 18.75 | |
| .393 | 32.5 | .131 | 1.65 | 19.70 | |
| .515 | 35 | .172 | 1.73 | 20.23 | LL |

Sketch of Sample



Description of failure: _____

LT 3 in. A₀ 1.43 in².



| | | | |
|---|--|-----------------|----------|
| Project Quality Assurance Procedure | Title INSPECTION AND TESTING OF SHORE BARRIER CONSTRUCTION | Number 9.513 | Rev 0 |
| | | Exhibit 9.513.5 | |

BORING LOG

Page 2 of 2

Location of Sampling: N 6845Date: 10/7/80

Elevation of Sampling:

A.S.T.M. D 1587-74

Sample lab number 146Depth of sample 0.5 (ft)%Recovery 70%Method of advancing sampler Constant force Hammer (circle one)Type and size of sampler Shelby Tube 2" x 11.6"Sampler S/N DES PH02Hammer weight and drop 21.7 lbs. 2.83 ft.Number of blows per 6" of drop 6Thickness of soil layer N/ADescription of soil Dominant Blue/Gray w/ BrownDepth of water to surface N/A (ft)

#2 CALCULATIONS FOR % MOISTURE

| | | |
|---|--------------------------------|--------------|
| 1 | Can No. | <u>C-44</u> |
| 2 | Wt. Wet Sample and Can (gm.) | <u>154.6</u> |
| 3 | Wt. Dry Sample and Can (gm) | <u>187.0</u> |
| 4 | Wt. Water (gm) (2)-(3) | <u>27.6</u> |
| 5 | Wt. Can (gm) | <u>6.0</u> |
| 6 | Wt. Dry Sample (3)-(5) | <u>121.0</u> |
| 7 | Moisture Content % (4)-(6)x100 | <u>22.8</u> |

| | | | | | | |
|---|---------------------|--------------------------------|----------------------|-------------|-------|-------------------------------|
| Technician (signature) <u>M Witters</u> | Date <u>10/7/80</u> | Computed by: <u>DM Witters</u> | Date: <u>10/7/80</u> | Checked by: | Date: | Scale S/N <u>TBB-1 6/8/81</u> |
|---|---------------------|--------------------------------|----------------------|-------------|-------|-------------------------------|

| | | | |
|---|--|------------------------------|------------------|
| Project Quality Assurance Procedure | Title INSPECTION AND TESTING OF SHORE BARRIER CONSTRUCTION | Number 9.513 | Rev. 0 |
| | | Page 1 of 2 | |
| | | | |

EXHIBIT 9.513.5 UNCONFINED COMPRESSIVE STRENGTH TEST RESULTS ASTM D2166-66

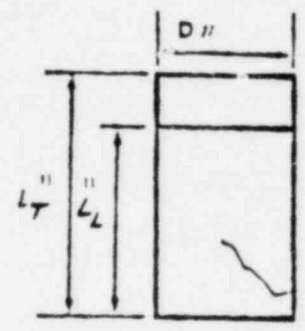
Test Location
 Grid Line **N 7640**
 Grid Line **E 2**
 Elevation **567' 1"**
 Sample No. **113**
 Equip. S/N **D-LUC-01**

Date 10/1/80
 Compressive Strength **3148** p.s.f.
 Approved to place fill Yes: ☒ No: ☐
 Inspector *D. M. Wilkins*

| | |
|-------|-------------------------------------|
| Total | |
| 320% | <input checked="" type="checkbox"/> |

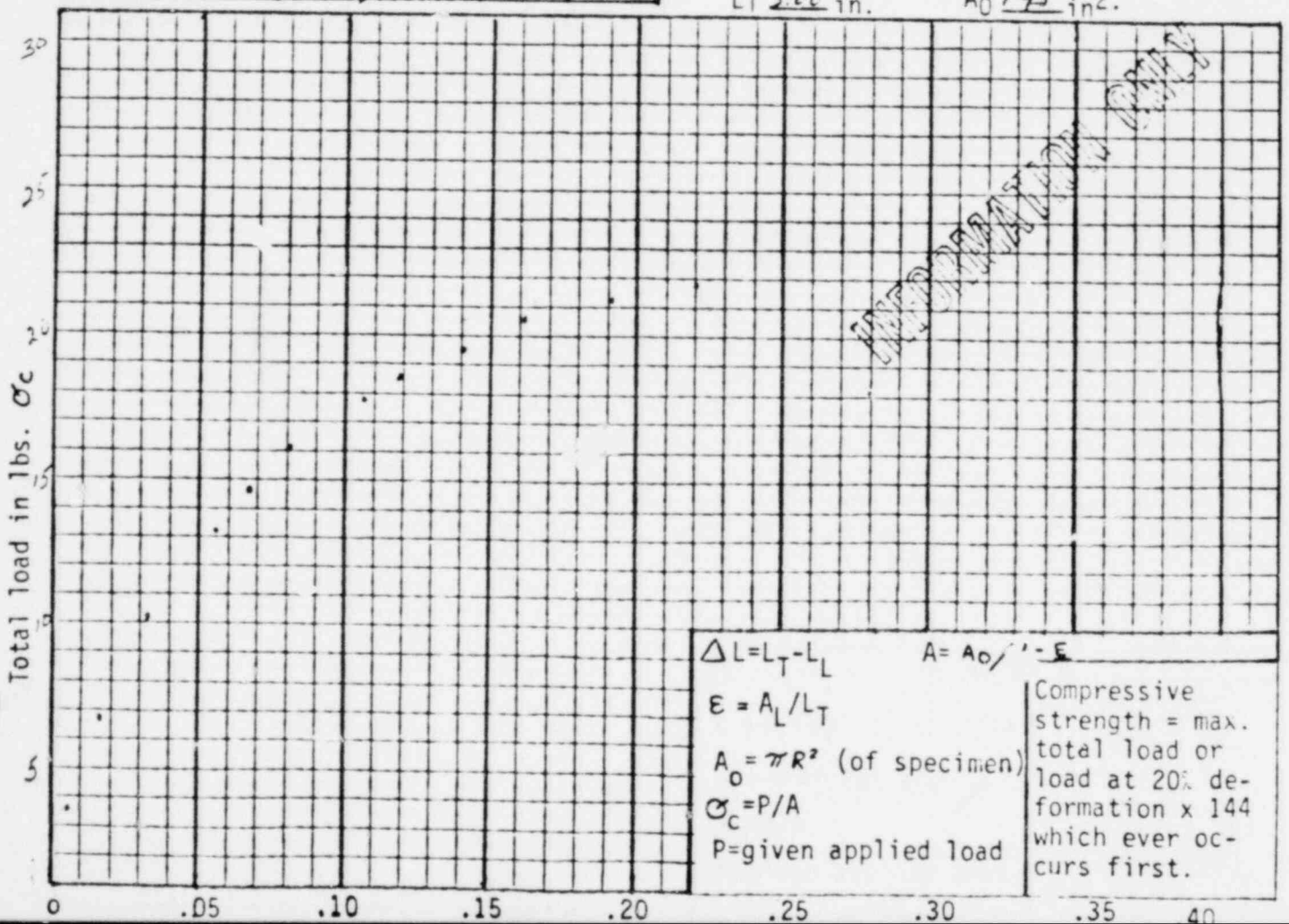
| Δ L(in) | Load P (lbs) | E | Area A ₀ | σ_c | Check By |
|-------------------|-----------------|------|------------------------|------------|-------------|
| 1.017 | 5.0 | .000 | 1.44 | 3.47 | ✓ |
| 1.049 | 10.0 | .010 | 1.45 | 6.90 | ✓ |
| 1.097 | 15.0 | .032 | 1.48 | 10.14 | ✓ |
| 1.166 | 20.0 | .055 | 1.51 | 13.25 | ✓ |
| 1.202 | 22.5 | .067 | 1.53 | 14.71 | ✓ |
| 1.246 | 25.0 | .082 | 1.56 | 16.03 | ✓ |
| 1.318 | 28.5 | .100 | 1.60 | 17.81 | ✓ |
| 1.358 | 30.0 | .119 | 1.62 | 18.52 | ✓ |
| 1.422 | 32.5 | .141 | 1.66 | 19.58 | ✓ |
| 1.484 | 35.0 | .161 | 1.70 | 20.59 | ✓ |
| 1.513 | 37.5 | .191 | 1.77 | 21.19 | ✓ |
| 1.659 | 40.0 | .220 | 1.83 | 21.86 | CLC |

Sketch of Sample



Description of failure: _____

LT 3.66 in. A₀ 1.43 in².



$$\Delta L = L_T - L_L$$

$$E = A_L / L_T$$

$$A_0 = \pi R^2 \text{ (of specimen)}$$

$$\sigma_c = P / A$$

$$P = \text{given applied load}$$

$$A = A_0 / (1 - E)$$

Compressive strength = max. total load or load at 20% deformation x 144 which ever occurs first.

| | | | |
|---|--|-----------------|-----------|
| Project Quality Assurance Procedure | Title INSPECTION AND TESTING OF SHORE BARRIER CONSTRUCTION | Number 9.513 | Rev. 0 |
| | | Exhibit 9.513.5 | |

Page 2 of 2

BORING LOG

Location of Sampling: N 7640 E 4Date: 10/1/80Elevation of Sampling: 567' 1"

A.S.T.M. D 1587-74

Sample lab number 113Depth of sample 0.5 (ft) %Recovery 55%Method of advancing sampler Constant force Hammer (circle one)Type and size of sampler Shelby Tube 2" x 11.6"Sampler S/N DES PH02Hammer weight and drop 11.7 lbs. 2.83 ft.Number of blows per 6" of drop 6Thickness of layer N/ADescription of soil GRAY / BROWN STREAKEDDepth of water to surface N/A (ft)

#6 CALCULATIONS FOR % MOISTURE

| | | |
|---|--------------------------------|---------------|
| 1 | Can No. | <u>C-5</u> |
| 2 | Wt. Wet Sample and Can (gm.) | <u>153.8</u> |
| 3 | Wt. Dry Sample and Can (gm) | <u>124.7</u> |
| 4 | Wt. Water (gm) (2)-(3) | <u>29.1</u> |
| 5 | Wt. Can (gm) | <u>6.0</u> |
| 6 | Wt. Dry Sample (3)-(5) | <u>118.7</u> |
| 7 | Moisture Content % (4)-(6)x100 | <u>24.5</u> ✓ |

| | | | |
|------------------------------|------------------------------|------------------------------|--------------|
| Technician (signature) Date | Computed by: Date: | Checked by: Date: | Scale S/N |
| <u>M. Loh</u> <u>10-2-80</u> | <u>M. Loh</u> <u>10-2-80</u> | <u>M. Loh</u> <u>10-2-80</u> | <u>TBB-1</u> |

| | | | |
|---|--|-----------------|----------|
| Project Quality Assurance Procedure | Title INSPECTION AND TESTING OF SHORE BARRIER CONSTRUCTION | Number 9.513 | Rev 0 |
| | | Exhibit 9.513.5 | |

BORING LOG

Page 2 of 2

Location of Sampling: N 7470

Date: 9/30/80

Elevation of Sampling: 567'5"

A.S.T.M. D 1587-74

Sample lab number 105

Depth of sample 0.5 (ft)

%Recovery 709

Method of advancing sampler Constant force Hammer (circle one)

Type and size of sampler Shelby Tube 2" x 11.6"

Sampler S/N DES PH02

Hammer weight and drop 21.7 lbs. 2.83 ft.

Number of blows per 6" of drop 8

Thickness of soil layer N/A

Description of soil MOTTLED GREEN / GRAY / BROWN

Depth of water to surface N/A (ft)

2 CALCULATIONS FOR % MOISTURE

| | | |
|---|--------------------------------|---------------|
| 1 | Can No. | <u>L-6</u> |
| 2 | Wt. Wet Sample and Can (gm.) | <u>151.1</u> |
| 3 | Wt. Dry Sample and Can (gm) | <u>121.0</u> |
| 4 | Wt. Water (gm) (2)-(3) | <u>30.1</u> |
| 5 | Wt. Can (gm) | <u>6.0</u> |
| 6 | Wt. Dry Sample (3)-(5) | <u>115.0</u> |
| 7 | Moisture Content % (4)-(6)x100 | <u>26.2</u> ✓ |

| | | | | | | |
|---|---------------------|---------------------------------|----------------------|--------------------------------|----------------------|------------------------|
| Technician (signature) <u>M. L. White</u> | Date <u>10-1-80</u> | Computed by: <u>M. L. White</u> | Date: <u>10-1-80</u> | Checked by: <u>NAL Withers</u> | Date: <u>10/1/80</u> | Scale S/N <u>TBB-1</u> |
|---|---------------------|---------------------------------|----------------------|--------------------------------|----------------------|------------------------|

EXHIBIT 9.513.5 UNCONFINED COMPRESSIVE STRENGTH TEST RESULTS ASTM D2166-66

Test Location
Grid Line N 7720
Grid Line E 5945
Elevation 567
Sample No. 117
Equip. S/N DELUC-01

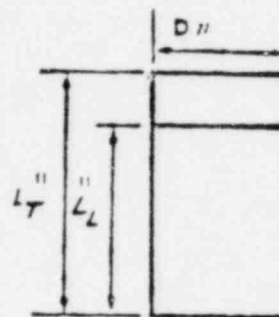
Date 10/2/80
Compressive Strength 3540 p.s.f.
Approved to place fill Yes: ☒ No: ☐

Total
920% ☒

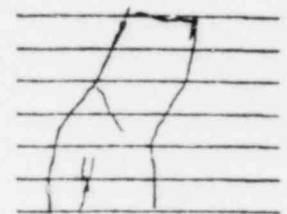
RWCarter
Inspector

| Δ L(in) | Load P (lbs) | E | Area A ₀ | σ_c | Check By |
|-------------------|-----------------|------|------------------------|------------|-------------|
| .016 | 5.0 | .005 | 1.44 | 3.47 | — |
| .031 | 10.0 | .010 | 1.44 | 6.94 | — |
| .033 | 15.0 | .018 | 1.46 | 10.37 | — |
| .090 | 20.0 | .030 | 1.47 | 13.61 | — |
| .142 | 25.0 | .047 | 1.50 | 16.67 | — |
| .225 | 30.0 | .075 | 1.55 | 19.35 | — |
| .340 | 35.0 | .113 | 1.61 | 21.74 | — |
| .479 | 40.0 | .160 | 1.70 | 23.53 | — |
| .650 | 45.0 | .217 | 1.83 | 24.59 | C.L.C. |

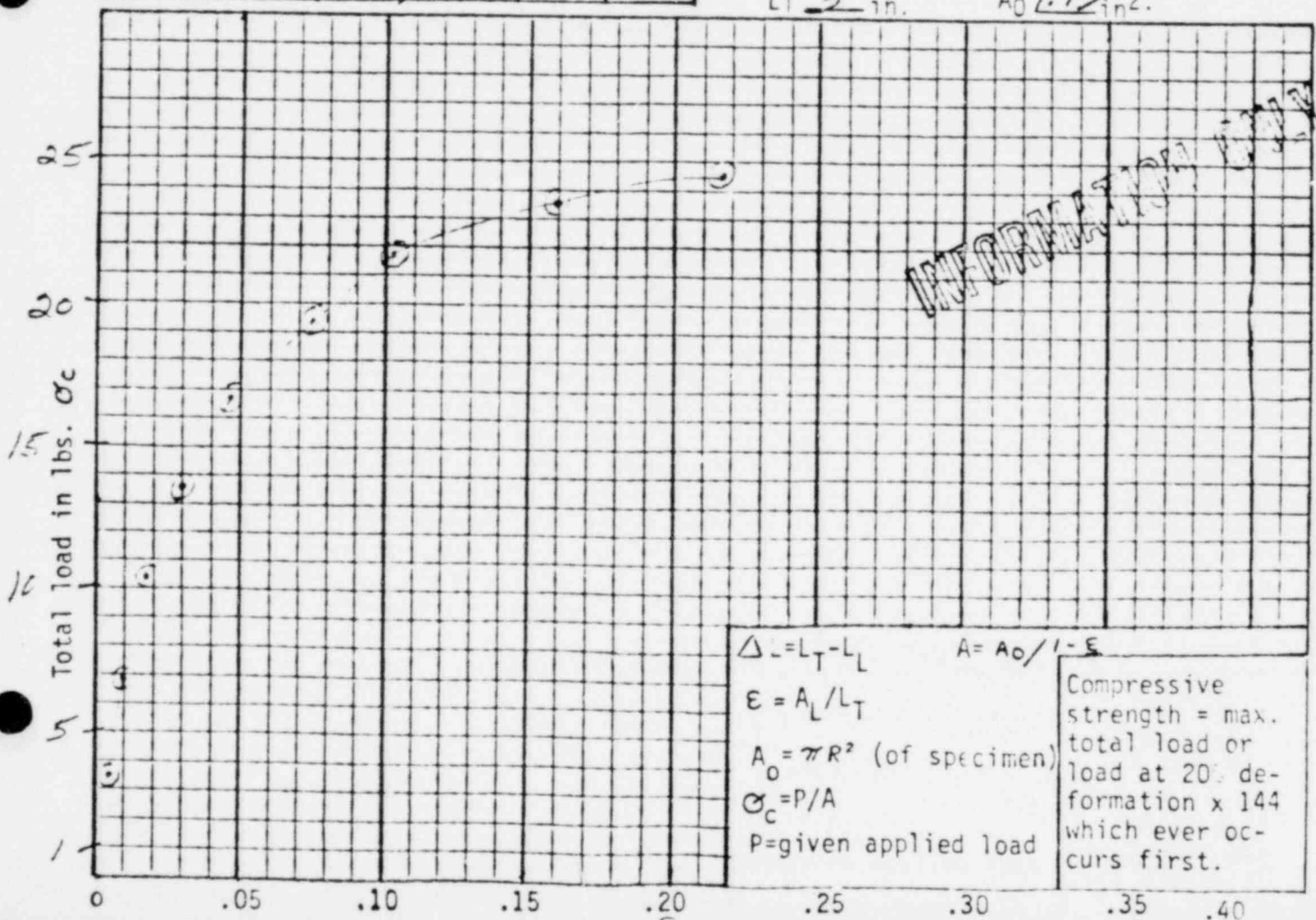
Sketch of Sample



Description of failure:



LT 3 in. A₀ 1.43 in².



Project
Quality Assurance
Procedure

Title
INSPECTION AND TESTING OF
SHORE BARRIER CONSTRUCTION

Number
9.513

Rev
0

Exhibit 9.513.5

BORING LOG

Page 2 of 2

Location of Sampling: N 7720 E 5945

Date: 10-2-80

Elevation of Sampling: 567

A.S.T.M. D 1587-74

Sample lab number 117

Depth of sample 0.5 (ft)

%Recovery 60

Method of advancing sampler Constant force Hammer (circle one)

Type and size of sampler Shelby Tube 2" x 11.6"

Sampler S/N DES PH02

Hammer weight and drop 21.7 lbs. 2.83 ft.

Number of blows per 6" of drop 0

Thickness of soil layer N/A

Description of soil GRAY plastic clay

Depth of water to surface N/A (ft)

#2 CALCULATIONS FOR % MOISTURE

| | | |
|---|--------------------------------|---------------|
| 1 | Can No. | <u>C-2</u> |
| 2 | Wt. Wet Sample and Can (gm.) | <u>150.8</u> |
| 3 | Wt. Dry Sample and Can (gm) | <u>121.7</u> |
| 4 | Wt. Water (gm) (2)-(3) | <u>29.1</u> |
| 5 | Wt. Can (gm) | <u>6.1</u> |
| 6 | Wt. Dry Sample (3)-(5) | <u>115.6</u> |
| 7 | Moisture Content % (4)-(6)x100 | <u>25.2</u> ✓ |

| | | | |
|---------------------------------|----------------------------|----------------------------|--------------|
| Technician (signature) Date | Computed by: Date: | Checked by: Date: | Scale S/N |
| <u>M. Perdue</u> <u>10-3-80</u> | <u>M.P.</u> <u>10-3-80</u> | <u>M.P.</u> <u>10-3-80</u> | <u>TBR-1</u> |

Project
Quality Assurance
Procedure

Title

INSPECTION AND TESTING OF
SHORE BARRIER CONSTRUCTION

Number

9.513

Rev

0

Page

1

of

2

EXHIBIT 9.513.5 UNCONFINED COMPRESSIVE STRENGTH TEST RESULTS ASTM D2166-66

Test Location

Grid Line N 6930Grid Line E 5935Elevation 56.8Sample No. 073Equip. S/N DELUC-01Date 9-24-80Compressive Strength 3715.2 p.s.f.Approved to place fill Yes: ☒ No: ☐R Carter

Inspector

Total

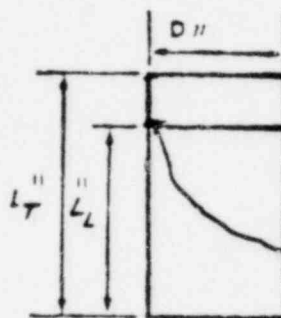
☒

@20%

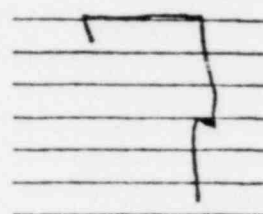
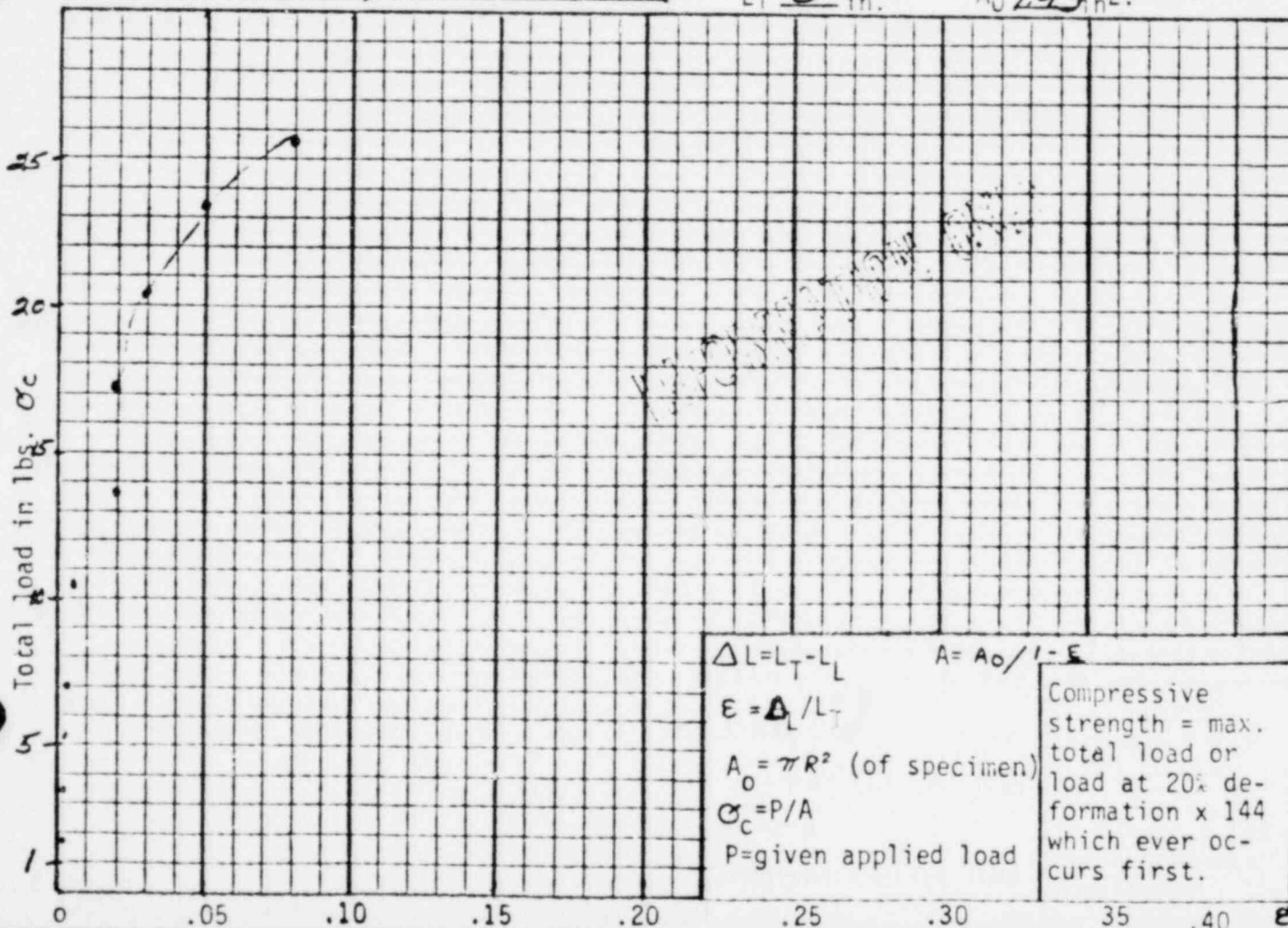
☐

| Δ L(in) | load P (lbs) | E | Area A ₀ | σ_c | Check By |
|-------------------|-----------------|------|------------------------|------------|-------------|
| .003 | 2.5 | .001 | 1.43 | 1.8 | |
| .004 | 5.0 | .001 | 1.43 | 3.5 | |
| .005 | 7.5 | .002 | 1.43 | 5.2 | |
| .010 | 10.0 | .003 | 1.43 | 7.0 | |
| .025 | 15.0 | .008 | 1.44 | 10.4 | |
| .047 | 20.0 | .020 | 1.46 | 13.7 | |
| .070 | 25.0 | .02 | 1.45 | 17.1 | |
| .104 | 30.0 | .03 | 1.47 | 20.4 | |
| .159 | 35.0 | .05 | 1.51 | 23.2 | |
| .243 | 40.0 | .08 | 1.55 | 25.8 | |
| | 45.0 | FAIL | — | — | — |

Sketch of Sample



Description of failure:

LT 3 in.A₀ 1.43 in².

| | | | |
|---|--|-----------------|----------|
| Project Quality Assurance Procedure | Title INSPECTION AND TESTING OF SHORE BARRIER CONSTRUCTION | Number 9.513 | Rev 0 |
| | | Exhibit 9.513.5 | |

BORING LOG

Page 2 of 2

Location of Sampling: N 6930, E 5935

Date: 9/24/80

Elevation of Sampling: 568'

A.S.T.M. D 1587-74

Sample lab number 073

Depth of sample 0.5 (ft) %Recovery 80%

Method of advancing sampler Constant force Hammer (circle one)

Type and size of sampler Shelby Tube 2" x 11.6"

Sampler S/N DES PH02

Hammer weight and drop 21.7 lbs. 2.83 ft.

Number of blows per 6" of drop 8

Thickness of soil layer N/A

Description of soil GRAY SILTY CLAY

Depth of water to surface N/A (ft)

#3 ~~128~~ CALCULATIONS FOR % MOISTURE

| | | |
|---|--------------------------------|---------------|
| 1 | Can No. | <u>C-2</u> |
| 2 | Wt. Wet Sample and Can (gm.) | <u>154.7</u> |
| 3 | Wt. Dry Sample and Can (gm) | <u>126.2</u> |
| 4 | Wt. Water (gm) (2)-(3) | <u>28.5</u> |
| 5 | Wt. Can (gm) | <u>6.2</u> |
| 6 | Wt. Dry Sample (3)-(5) | <u>120.0</u> |
| 7 | Moisture Content % (4)-(6)x100 | <u>23.8</u> ✓ |

| | | | | | | |
|--|---------------------|------------------------------|----------------------|-----------------------------|-------|---------------------------|
| Technician (signature) <u>M. L. W.</u> | Date <u>9-25-80</u> | Computed by: <u>M. L. W.</u> | Date: <u>9-25-80</u> | Checked by: <u>M. L. W.</u> | Date: | Scale S/N <u>T.B.B.-1</u> |
|--|---------------------|------------------------------|----------------------|-----------------------------|-------|---------------------------|

Project
Quality Assurance
Procedure

INSPECTION AND TESTING OF
SHORE BARRIER CONSTRUCTION

| | |
|-------|------|
| 9.513 | 0 |
| Page | |
| 1 | of 2 |

EXHIBIT 9.513.5 UNCONFINED COMPRESSIVE STRENGTH TEST RESULTS ASTM D2166-66

Test Location
Grid Line N 7650
Grid Line E 5480
Elevation 562
Sample No. 260
Equip. S/N DELUC-01

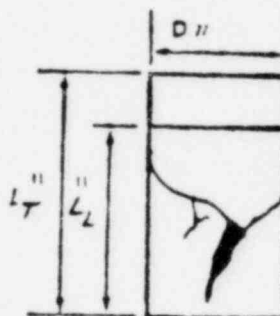
Date 10/21/60
Compressive Strength 5832 p.s.f.
Approved to place fill Yes: ☒ No: ☐

| | |
|-------|-------------------------------------|
| Total | <input checked="" type="checkbox"/> |
| 920% | |

Carol L. Calhoun
Inspector

| Δ L(in) | Load P (lbs) | E | Area A ₀ | σ_c | Check By |
|-------------------|-----------------|------|------------------------|------------|-------------------------------------|
| .003 | 15 | .001 | 1.43 | 10.5 | |
| .033 | 30 | .002 | 1.44 | 20.8 | |
| .060 | 45 | .020 | 1.46 | 30.8 | |
| .099 | 60 | .033 | 1.48 | 40.5 | <input checked="" type="checkbox"/> |
| | 80 | FAIL | | | |

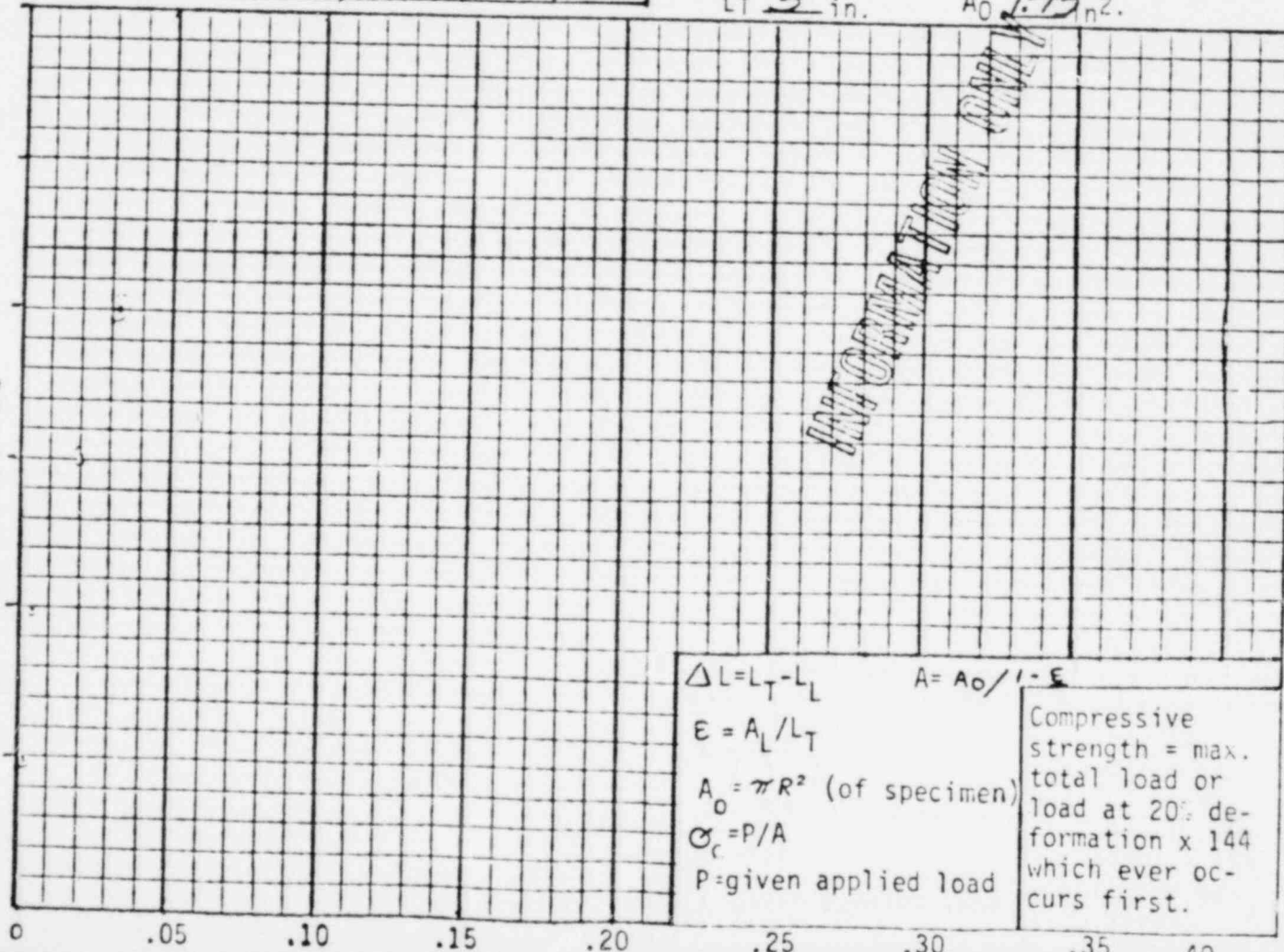
Sketch of Sample



Description of failure: _____

LT 3 in. A₀ 1.43 in².

Total load in lbs. σ_c



$$\Delta L = L_T - L_L \quad A = A_0 / (1 - E)$$

$$E = A_L / L_T$$

$$A_0 = \pi R^2 \text{ (of specimen)}$$

$$\sigma_c = P/A$$

P = given applied load

Compressive strength = max. total load or load at 20% deformation x 144 which ever occurs first.

| | | | |
|---|--|-----------------|-----------|
| Project Quality Assurance Procedure | Title INSPECTION AND TESTING OF SHORE BARRIER CONSTRUCTION | Number 9.513 | Rev. 0 |
| | | Exhibit 9.513.5 | |

BORING LOG

Page 2 of 2

Location of Sampling: N 7650 E 5980Date: 10/21/80Elevation of Sampling: 562.0'

A.S.T.M. D 1587-74

Sample lab number 260Depth of sample 0.5 (ft) %Recovery 70%Method of advancing sampler Constant force Hammer (circle one)Type and size of sampler Shelby Tube 2" x 11.6"Sampler S/N DES PH02Hammer weight and drop 21.7 lbs. 2.83 ft.Number of blows per 6" of drop 17Thickness of soil layer N/ADescription of soil BRN E gear clayDepth of water to surface N/A (ft)# 18 CALCULATIONS FOR % MOISTURE

| | | |
|---|--------------------------------|--------------|
| 1 | Can No. | <u>C-11</u> |
| 2 | Wt. Wet Sample and Can (gm.) | <u>158.3</u> |
| 3 | Wt. Dry Sample and Can (gm) | <u>132.0</u> |
| 4 | Wt. Water (gm) (2)-(3) | <u>26.3</u> |
| 5 | Wt. Can (gm) | <u>6.0</u> |
| 6 | Wt. Dry Sample (3)-(5) | <u>126.0</u> |
| 7 | Moisture Content % (4)-(6)x100 | <u>20.9</u> |

| | | | |
|-----------------------------|----------------------------|---------------------------------|--------------|
| Technician (signature) Date | Computed by: Date: | Checked by: Date: | Scale S/N |
| <u>DM Withers 10/22/80</u> | <u>DM Withers 10/22/80</u> | <u>Carol A. Gilman 10/24/80</u> | <u>TBB-1</u> |

EXHIBIT 9.513.5 UNCONFINED COMPRESSIVE STRENGTH TEST RESULTS ASTM D2166-66

Test Location
Grid Line N 7600
Grid Line E 5480
Elevation 562
Sample No. 259
Equip. S/N DELUC-01

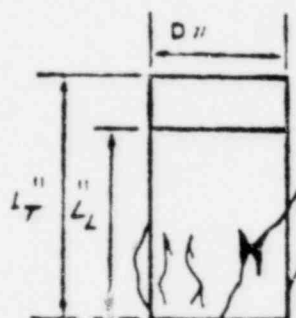
Date 10/21/80
Compressive Strength 6120 p.s.f.
Approved to place fill Yes: ☒ No: ☐

Total ☒
620%

Inspector Carol L. Kalhorn

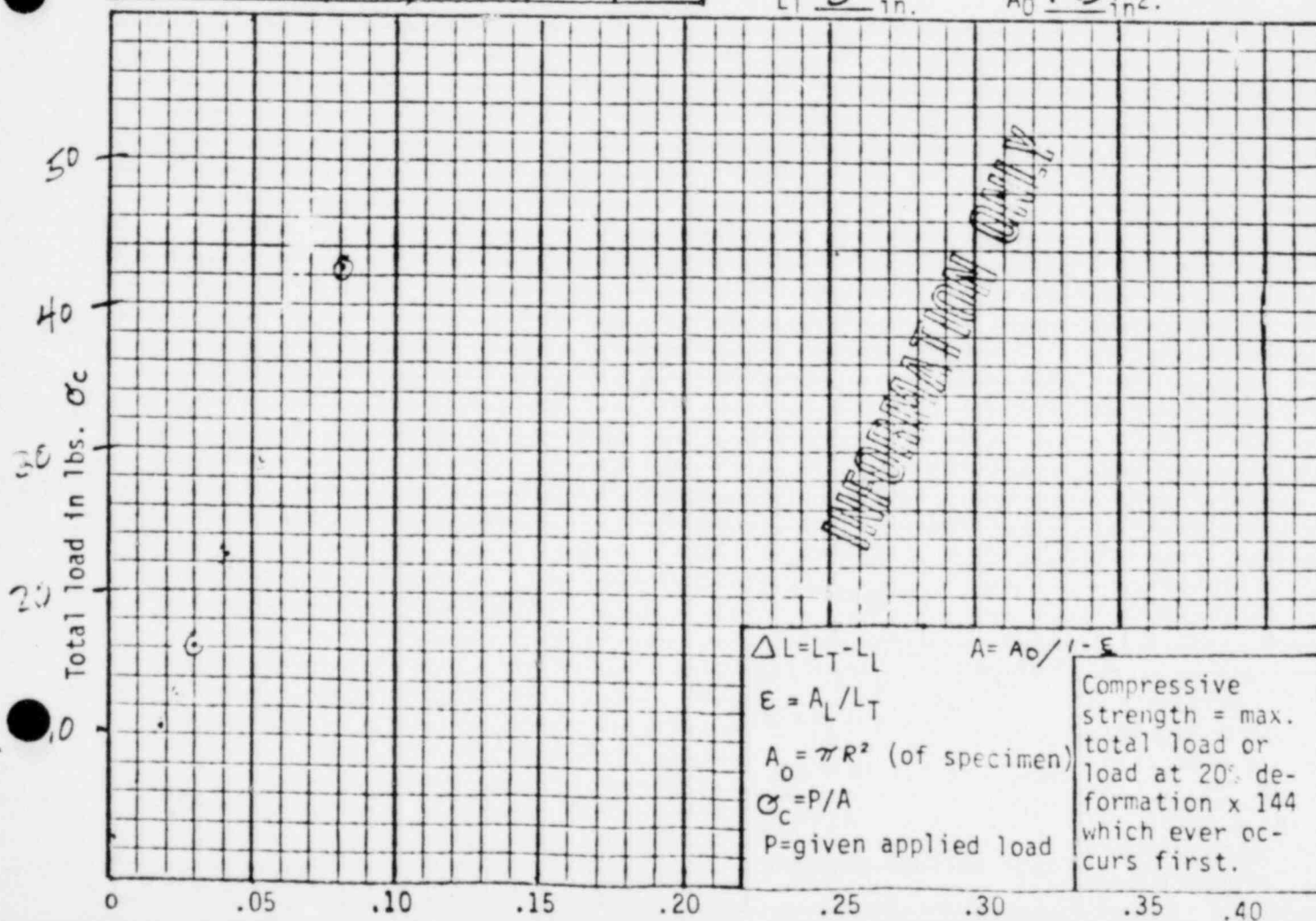
| Δ L(in) | Load P (lbs) | ϵ | Area A_0 | σ_c | Check By |
|-------------------|-----------------|------------|---------------|------------|-------------|
| .006 | 5 | .002 | 1.43 | 3.5 | |
| .058 | 15 | .019 | 1.46 | 10.3 | |
| .076 | 20 | .025 | 1.47 | 13.6 | |
| .097 | 25 | .031 | 1.48 | 16.9 | |
| .125 | 35 | .042 | 1.49 | 23.5 | |
| .158 | 45 | .053 | 1.51 | 29.8 | |
| .192 | 55 | .064 | 1.53 | 35.9 | |
| .242 | 65 | .077 | 1.54 | 42.2 | VRWC |
| | 75 | FAIL | | | |

Sketch of Sample



Description of failure:

LT 3 in. A_0 1.43 in²



| | | | |
|---|--|-----------------|----------|
| Project Quality Assurance Procedure | Title INSPECTION AND TESTING OF SHORE BARRIER CONSTRUCTION | Number 9.513 | Rev 0 |
| | | Exhibit 9.513.5 | |

BORING LOG

Page 2 of 2

Location of Sampling: N 7600 E 5780

Date: 10/21/80

Elevation of Sampling: 262.0'

A.S.T.M. D 1587-74

Sample lab number 259Depth of sample 0.5 (ft)%Recovery 65%Method of advancing sampler Constant force Hammer (circle one)Type and size of sampler Shelby Tube 2" x 11.6"Sampler S/N DES PH02Hammer weight and drop 21.7 lbs. 2.83 ft.Number of blows per 6" of drop 22Thickness of soil layer N/ADescription of soil DK BROWN STREAKED w/gclDepth of water to surface N/A (ft)

#24 CALCULATIONS FOR % MOISTURE

| | | |
|---|--------------------------------|-------|
| 1 | Can No. | C-7 |
| 2 | Wt. Wet Sample and Can (gm.) | 165.9 |
| 3 | Wt. Dry Sample and Can (gm) | 146.3 |
| 4 | Wt. Water (gm) (2)-(3) | 19.6 |
| 5 | Wt. Can (gm) | 5.8 |
| 6 | Wt. Dry Sample (3)-(5) | 140.5 |
| 7 | Moisture Content % (4)-(6)x100 | 14.0 |

| | | | |
|-----------------------------|----------------------------|-----------------------------------|--------------|
| Technician (signature) Date | Computed by: Date: | Checked by: Date: | Scale S/N |
| <u>DM Withers 10/22/80</u> | <u>DM Withers 10/22/80</u> | <u>Carol L. Callahan 10/22/80</u> | <u>TBB-1</u> |

| | | | |
|---|---|-------|------|
| Project Quality Assurance Procedure | INSPECTION AND TESTING OF SHORE BARRIER CONSTRUCTION | 9.513 | 0 |
| | | Page | |
| | | 1 | of 2 |

EXHIBIT 9.513.5 UNCONFINED COMPRESSIVE STRENGTH TEST RESULTS ASTM D2166-66

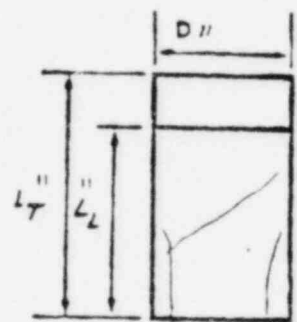
Test Location
 Grid Line N 6850
 Grid Line E 5980
 Elevation 562'
 Sample No. 242
 Equip. S/N DELUC-01

Date 10-14-80
 Compressive Strength 6817 p.s.f.
 Approved to place fill Yes: ☒ No: ☐
DM Withers
 Inspector

| | |
|-------|---|
| Total | ✓ |
| @20% | ✓ |

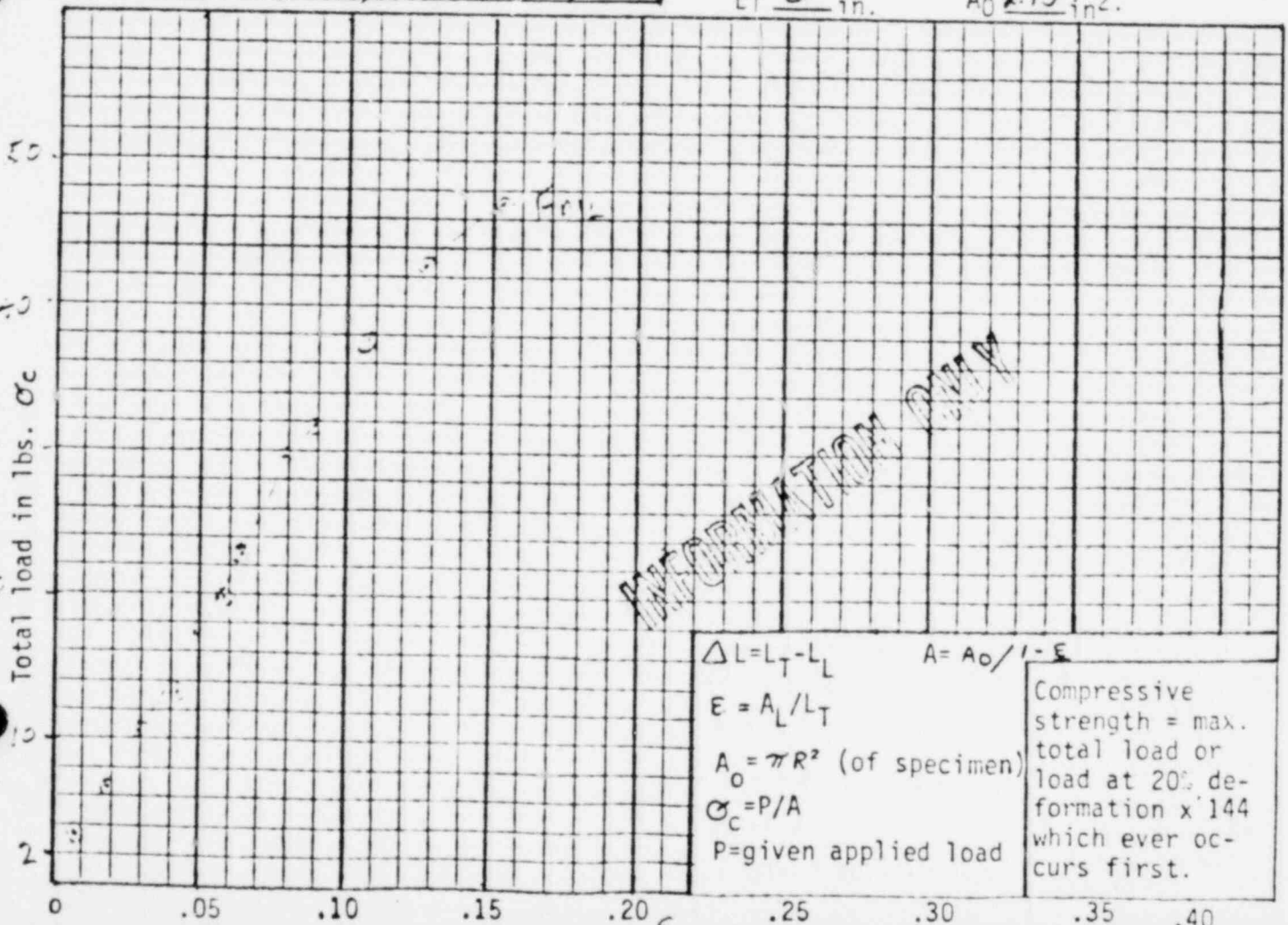
| Δ L(in) | Load P (lbs) | ϵ | Area A ₀ | σ_c | Check By |
|-------------------|-----------------|------------|------------------------|------------|-------------|
| 1.25 | 5 | .008 | 1.44 | 3.47 | |
| 1.26 | 10 | .019 | 1.46 | 6.85 | |
| 1.25 | 15 | .022 | 1.47 | 10.20 | |
| 1.25 | 20 | .042 | 1.49 | 13.42 | |
| 1.40 | 25 | .047 | 1.50 | 16.67 | |
| 1.65 | 30 | .055 | 1.51 | 19.87 | |
| 1.89 | 35 | .063 | 1.53 | 22.88 | |
| 2.38 | 45 | .079 | 1.55 | 29.03 | |
| 2.63 | 50 | .088 | 1.57 | 31.85 | |
| 3.18 | 60 | .100 | 1.60 | 37.50 | |
| 3.86 | 70 | .127 | 1.64 | 42.68 | |
| 4.63 | 80 | .154 | 1.69 | 47.34 | ✓ RWC |
| 90 | | | Fail | | |

Sketch of Sample



Description of failure:

LT 3 in. A₀ 2.43 in².



$\Delta L = L_T - L$ $A = A_0 / (1 - \epsilon)$
 $E = A_L / L_T$
 $A_0 = \pi R^2$ (of specimen)
 $\sigma_c = P/A$
 P = given applied load
 Compressive strength = max. total load or load at 20% deformation x 144 which ever occurs first.

| | | | |
|--|--|-----------------|----------|
| Project: Quality Assurance Procedure | Title INSPECTION AND TESTING OF SHORE BARRIER CONSTRUCTION | Number 9.513 | Rev 0 |
| | | Exhibit 9.513.5 | |

BORING LOG

Page 2 of 2

Location of Sampling: N 6 E-50

Date:

Elevation of Sampling:

A.S.T.M. D 1587-74

Sample lab number _____

Depth of sample 5 (ft)

%Recovery 60%

Method of advancing sampler Constant force Hammer (circle one)

Type and size of sampler Shelby Tube 2" x 11.6"

Sampler S/N DES PH02

Hammer weight and drop 21.7 lbs. 2.83 ft.

Number of blows per 6" of drop 17

Thickness of soil layer N/A

Description of soil lt. brown clay

Depth of water to surface N/A (ft)

1 CALCULATIONS FOR % MOISTURE

| | | |
|---|--------------------------------|--------------|
| 1 | Can No. | <u>C-7</u> |
| 2 | Wt. Wet Sample and Can (gm.) | <u>165.0</u> |
| 3 | Wt. Dry Sample and Can (gm) | <u>144.8</u> |
| 4 | Wt. Water (gm) (2)-(3) | <u>20.2</u> |
| 5 | Wt. Can (gm) | <u>6.0</u> |
| 6 | Wt. Dry Sample (3)-(5) | <u>138.8</u> |
| 7 | Moisture Content % (4)-(6)x100 | <u>14.5</u> |

| | | | |
|---|--|---|---------------------------|
| Technician (signature) Date <u>M. L. L. 10-15-60</u> | Computed by: Date: <u>M. L. L. 10-15-60</u> | Checked by: Date: <u>Carol L. Calhoun 10/15/60</u> | Scale S/N <u>TBB-1</u> |
|---|--|---|---------------------------|

EXHIBIT 9.513.5 UNCONFINED COMPRESSIVE STRENGTH TEST RESULTS ASTM D2166-66

Test Location
Grid Line N 7200
Grid Line E 5980
Elevation 562
Sample No. 250
Equip. S/N DELUC-01

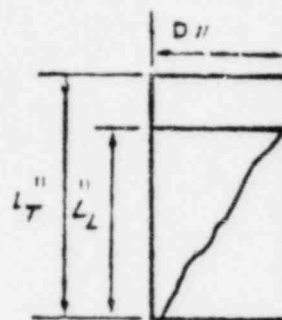
Date 10/16/80
Compressive Strength 7152 p.s.f.
Approved to place fill Yes: ☒ No: ☐

Total 20%

Carol L. Calhoun
Inspector

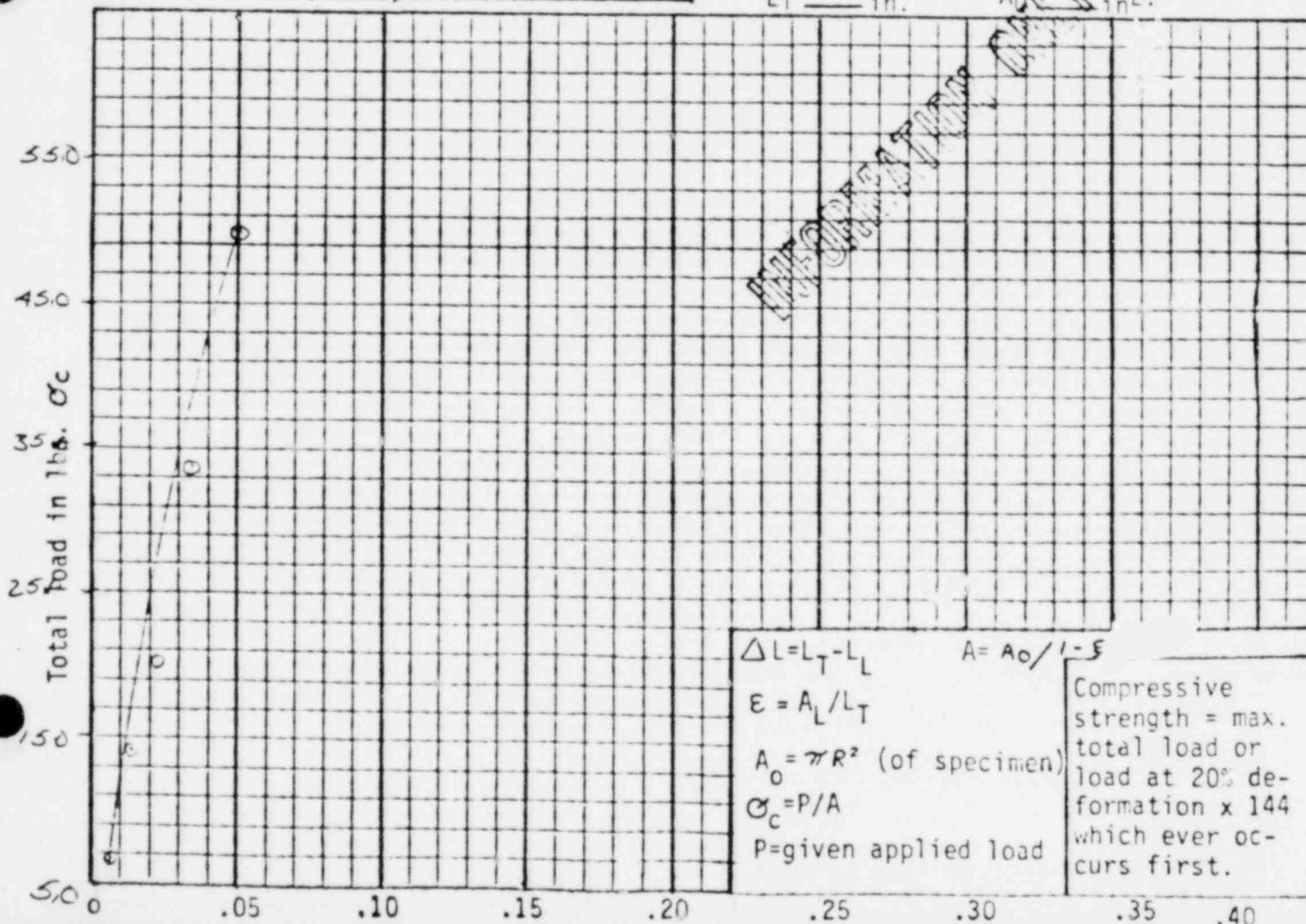
| Δ L (in.) | Load P (lbs) | E | Area A ₀ | σ_c | Check By |
|---------------------|-----------------|-------|------------------------|------------|-------------|
| 0.020 | 10.0 | 0.007 | 1.44 | 6.94 | |
| 0.042 | 20.0 | 0.014 | 1.45 | 13.79 | |
| 0.065 | 30.0 | 0.022 | 1.46 | 20.55 | |
| 0.105 | 50.0 | 0.035 | 1.48 | 33.78 | |
| 0.149 | 75.0 | 0.050 | 1.51 | 49.67 | |
| | 100.0 | | Fail | | |

Sketch of Sample



Description of failure:

L_T — in. A₀ — in².



| | | | |
|---|--|-----------------|-----------|
| Project Quality Assurance Procedure | Title INSPECTION AND TESTING OF SHORE BARRIER CONSTRUCTION | Number 9.513 | Rev. 0 |
| | | Exhibit 9.513.5 | |

BORING LOG

Page 2 of 2

Location of Sampling: N 7200Date: 10/16/80Elevation of Sampling: 562.0

A.S.T.M. D 1587-74

Sample lab number 562250Depth of sample 0.5 (ft) %Recovery 6%Method of advancing sampler Constant force Hammer (circle one)Type and size of sampler Shelby Tube 2" x 11.6"Sampler S/N DES PH02Hammer weight and drop 21.7 lbs. 2.83 ft.Number of blows per 6" of drop 26Thickness of soil layer N/ADescription of soil DARK Brown pebbly CLAYDepth of water to surface N/A (ft)

#5 CALCULATIONS FOR % MOISTURE

| | | |
|---|--------------------------------|--------------|
| 1 | Can No. | <u>C-18</u> |
| 2 | Wt. Wet Sample and Can (gm.) | <u>167.8</u> |
| 3 | Wt. Dry Sample and Can (gm) | <u>146.6</u> |
| 4 | Wt. Water (gm) (2)-(3) | <u>19.2</u> |
| 5 | Wt. Can (gm) | <u>6.0</u> |
| 6 | Wt. Dry Sample (3)-(5) | <u>142.6</u> |
| 7 | Moisture Content % (4)-(6)x100 | <u>13.5</u> |

| | | | | | | |
|------------------------|-----------------|-------------------|-----------------|----------------------------|-----------------|----------------|
| Technician (signature) | Date | Computed by: | Date: | Checked by: | Date: | Scale S/N |
| <u>DM Withers</u> | <u>10/17/80</u> | <u>DM Withers</u> | <u>10/17/80</u> | <u>Carol & LaShawn</u> | <u>10/17/80</u> | <u>TE 15-1</u> |

| | | | |
|---|--|-----------------|----------|
| Project Quality Assurance Procedure | Title INSPECTION AND TESTING OF SHORE BARRIER CONSTRUCTION | Number 9.513 | Rev 0 |
| | | Page 1 of 2 | |
| | | | |

EXHIBIT 9.513.5 UNCONFINED COMPRESSIVE STRENGTH TEST RESULTS ASTM D2166-66

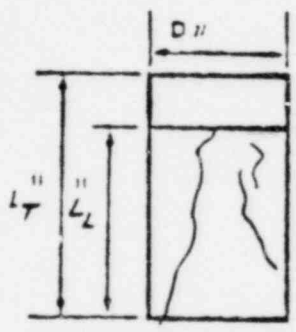
Test Location
Grid Line N 6800
Grid Line E 5950
Elevation 562.0
Sample No. 291
Equip. S/N DELUC-01

Date 10/14/80
Compressive Strength 7530.0 p.s.f.
Approved to place fill Yes: ☒ No: ☐
D.M. Withers
Inspector

| | |
|-------|-------------------------------------|
| Total | <input checked="" type="checkbox"/> |
| 920% | <input type="checkbox"/> |

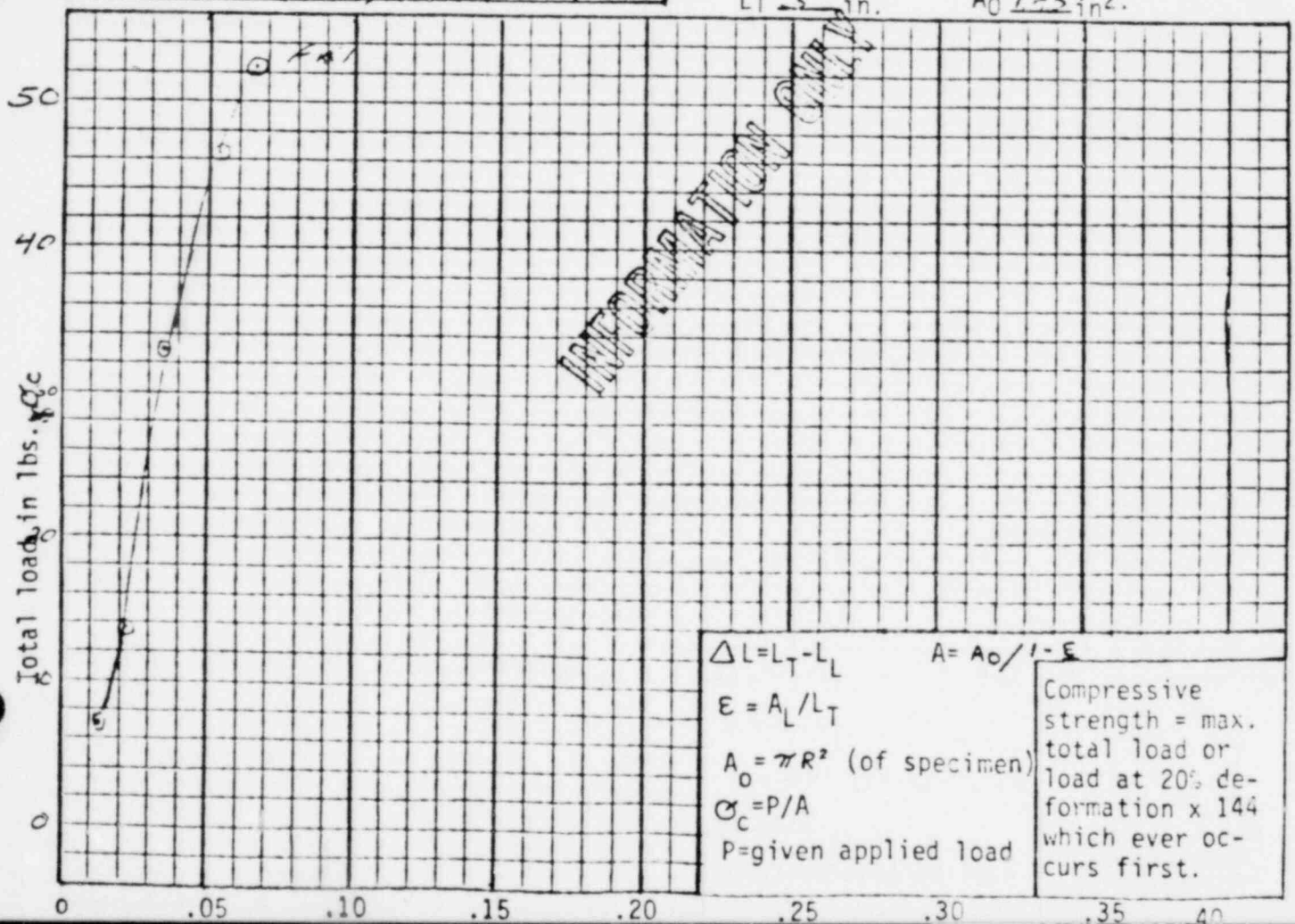
| Δ L(in) | Load P (lbs) | E | Area A ₀ | σ_c | Check By |
|-------------------|-----------------|------|------------------------|------------|-------------|
| .042 | 10 | .014 | 1.45 | 6.90 | |
| .064 | 20 | .021 | 1.46 | 13.70 | |
| .084 | 30 | .028 | 1.47 | 20.41 | |
| .102 | 40 | .034 | 1.48 | 27.03 | |
| .120 | 50 | .040 | 1.50 | 33.33 | |
| .140 | 60 | .047 | 1.50 | 40.00 | |
| .163 | 70 | .054 | 1.51 | 46.26 | |
| .205 | 80 | .068 | 1.53 | 52.29 | |
| | 90 | Fail | | | |

Sketch of Sample



Description of failure: _____

LT 3 in. A0 1.43 in².



| | |
|--|---|
| $\Delta L = L_T - L_L$ $E = A_L / L_T$ $A_0 = \pi R^2$ (of specimen) $\sigma_c = P / A$ P = given applied load | $A = A_0 / (1 - E)$ Compressive strength = max. total load or load at 20% deformation x 144 which ever occurs first. |
|--|---|

| | | | |
|---|--|-----------------|----------|
| Project Quality Assurance Procedure | Title INSPECTION AND TESTING OF SHORE BARRIER CONSTRUCTION | Number 9.513 | Rev 0 |
| | | Exhibit 9.513.5 | |

BORING LOG

Page 2 of 2

Location of Sampling: N 6800 E 5980

Date: 10-14-80

Elevation of Sampling: 562'

A.S.T.M. D 1587-74

Sample lab number 241Depth of sample 0.5 (ft) %Recovery 80%Method of advancing sampler Constant force Hammer (circle one)Type and size of sampler Shelby Tube 2" x 11.6"Sampler S/N DES PH02Hammer weight and drop 21.7 lbs. 2.83 ft.Number of blows per 6" of drop 18Thickness of soil layer N/ADescription of soil dk. brownDepth of water to surface N/A (ft)

#2 CALCULATIONS FOR % MOISTURE

| | | |
|---|--------------------------------|-------|
| 1 | Can No. | C-11 |
| 2 | Wt. Wet Sample and Can (gm.) | 163.7 |
| 3 | Wt. Dry Sample and Can (gm) | 142.0 |
| 4 | Wt. Water (gm) (2)-(3) | 21.7 |
| 5 | Wt. Can (gm) | 6.1 |
| 6 | Wt. Dry Sample (3)-(5) | 135.9 |
| 7 | Moisture Content % (4)-(6)x100 | 16.0 |

| | | | | | | |
|---|----------------------|---------------------------------|-----------------------|--------------------------------|-----------------------|--------------------------|
| Technician (signature) <u>M. L. L. L.</u> | Date <u>10-15-80</u> | Computed by: <u>M. L. L. L.</u> | Date: <u>10-15-80</u> | Checked by: <u>L. L. L. L.</u> | Date: <u>10-15-80</u> | Scale S/N <u>T/B B-1</u> |
|---|----------------------|---------------------------------|-----------------------|--------------------------------|-----------------------|--------------------------|

| | | | |
|---|--|-----------------|----------|
| Project Quality Assurance Procedure | Title INSPECTION AND TESTING OF SHORE BARRIER CONSTRUCTION | Number 9.513 | Rev 0 |
| | | Exhibit 9.513.5 | |

BORING LOG

Page 2 of 2

Location of Sampling: N 7100 E 5900

Date: 10/15/80

Elevation of Sampling: 562.0'

A.S.T.M. D 1587-74

Sample lab number 247Depth of sample 0.5 (ft)%Recovery 60%Method of advancing sampler Constant force Hammer (circle one)Type and size of sampler Shelby Tube 2" x 11.6"Sampler S/N DES PH02Hammer weight and drop 21.7 lbs. 2.83 ft.Number of blows per 6" of drop 29Thickness of soil layer N/ADescription of soil DK brn clay w/ pebblesDepth of water to surface N/A (ft)

CALCULATIONS FOR % MOISTURE

| | | |
|---|--------------------------------|----------------------------|
| 1 | Can No. | <u>C17</u> |
| 2 | Wt. Wet Sample and Can (gm.) | <u>165.5</u> |
| 3 | Wt. Dry Sample and Can (gm) | <u>148.2</u> |
| 4 | Wt. Water (gm) (2)-(3) | <u>17.3</u> |
| 5 | Wt. Can (gm) | <u>6.2</u> |
| 6 | Wt. Dry Sample (3)-(5) | <u>142.0</u> ^{cc} |
| 7 | Moisture Content % (4)-(6)x100 | <u>12.2%</u> |

| | | | | | | |
|--|----------------------|------------------------------|-----------------------|------------------------------------|-----------------------|------------------------|
| Technician (signature) <u>RWCarter</u> | Date <u>10/16/80</u> | Computed by: <u>RWCarter</u> | Date: <u>10/16/80</u> | Checked by: <u>Carolyn Calhoun</u> | Date: <u>10/16/80</u> | Scale S/N <u>TBB-1</u> |
|--|----------------------|------------------------------|-----------------------|------------------------------------|-----------------------|------------------------|

| | | | |
|---|--|--------------------|-----------|
| Project Quality Assurance Procedure | Title INSPECTION AND TESTING OF SHORE BARRIER CONSTRUCTION | Test Unit 9.513 | Size 0 |
| | Page 1 of 2 | | |
| | | | |

EXHIBIT 9.513.5 UNCONFINED COMPRESSIVE STRENGTH TEST RESULTS ASTM D2166-66

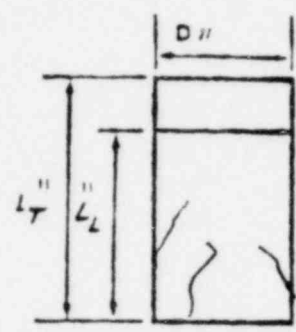
Test Location
 Grid Line N 7000
 Grid Line E 5900
 Elevation 566.0
 Sample No. 245
 Equip. S/N DELUC-01

Date 10/19/80
 Compressive Strength 8100 p.s.f.
 Approved to place fill Yes: ☒ No: ☐
 Inspector Carol A. Gorman

| | |
|-------|---|
| Total | ✓ |
| @20% | ✓ |

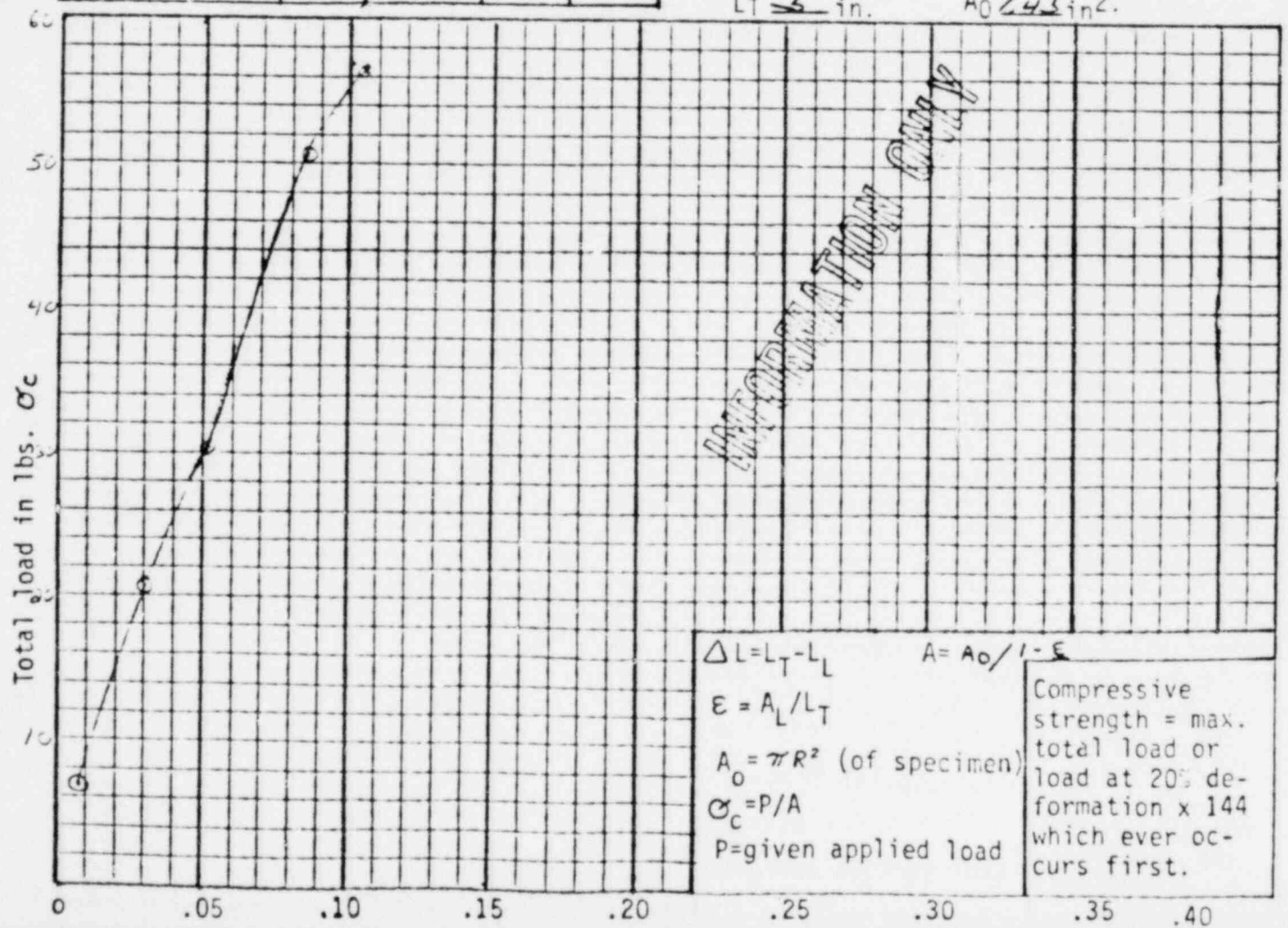
| Δ L(in) | Load P (lbs) | E | Area A ₀ | σ_c | Check By |
|-------------------|-----------------|------|------------------------|------------|-------------|
| .027 | 10.0 | .009 | 1.44 | 6.94 | |
| .056 | 20.0 | .019 | 1.46 | 13.70 | |
| .091 | 30.0 | .030 | 1.47 | 20.41 | |
| .125 | 40.0 | .042 | 1.49 | 26.85 | |
| .146 | 50.0 | .047 | 1.50 | 30.00 | |
| .155 | 50.0 | .052 | 1.51 | 33.11 | |
| .186 | 60.0 | .062 | 1.52 | 39.47 | |
| .218 | 70.0 | .073 | 1.54 | 45.45 | |
| .252 | 80.0 | .086 | 1.56 | 51.28 | |
| .283 | 90.0 | .094 | 1.58 | 53.80 | |
| .325 | 100.0 | .108 | 1.60 | 56.25 | |
| | 100.0 | .111 | | | ✓ |

Sketch of Sample



Description of failure: _____

LT 3 in. A₀ 4.43 in².



| | | | |
|---|--|-----------------|----------|
| Project Quality Assurance Procedure | Title INSPECTION AND TESTING OF SHORE BARRIER CONSTRUCTION | Number 9.513 | Rev 0 |
| | | Exhibit 9.513.5 | |

BORING LOG

Page 2 of 2

Location of Sampling: N 7000 E 5180

Date: 10/14/80

Elevation of Sampling: 542.0'

A.S.T.M. D 1587-74

Sample lab number 245Depth of sample 0.5 (ft)%Recovery 50%Method of advancing sampler Constant force Hammer (circle one)Type and size of sampler Shelby Tube 2" x 11.6"Sampler S/N DES PH02Hammer weight and drop 21.7 lbs. 2.83 ft.Number of blows per 6" of drop 20Thickness of soil layer N/ADescription of soil DK BRN / gray & RockyDepth of water to surface N/A (ft)

#5 CALCULATIONS FOR % MOISTURE

| | | |
|---|--------------------------------|-------|
| 1 | Can No. | C-44 |
| 2 | Wt. Wet Sample and Can (gm.) | 165.2 |
| 3 | Wt. Dry Sample and Can (gm) | 145.8 |
| 4 | Wt. Water (gm) (2)-(3) | 19.4 |
| 5 | Wt. Can (gm) | 6.0 |
| 6 | Wt. Dry Sample (3)-(5) | 139.8 |
| 7 | Moisture Content % (4)-(6)x100 | 13.9 |

| | | | |
|-----------------------------|-----------------------------|--------------------------------|-----------|
| Technician (signature) Date | Computed by: Date: | Checked by: Date: | Scale S/N |
| <i>M. L. L. L.</i> 10-15-80 | <i>M. L. L. L.</i> 10-15-80 | <i>Carol L. L. L.</i> 10/20/80 | 713 B-1 |

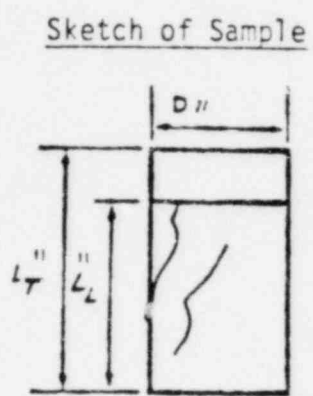
| | | | |
|---|--|-----------------|-----------|
| Project Quality Assurance Procedure | Title INSPECTION AND TESTING OF SHORE BARRIER CONSTRUCTION | Number 9.513 | Rev. 0 |
| | | Page 1 | of 2 |

EXHIBIT 9.513.5 UNCONFINED COMPRESSIVE STRENGTH TEST RESULTS ASTM D2166-66

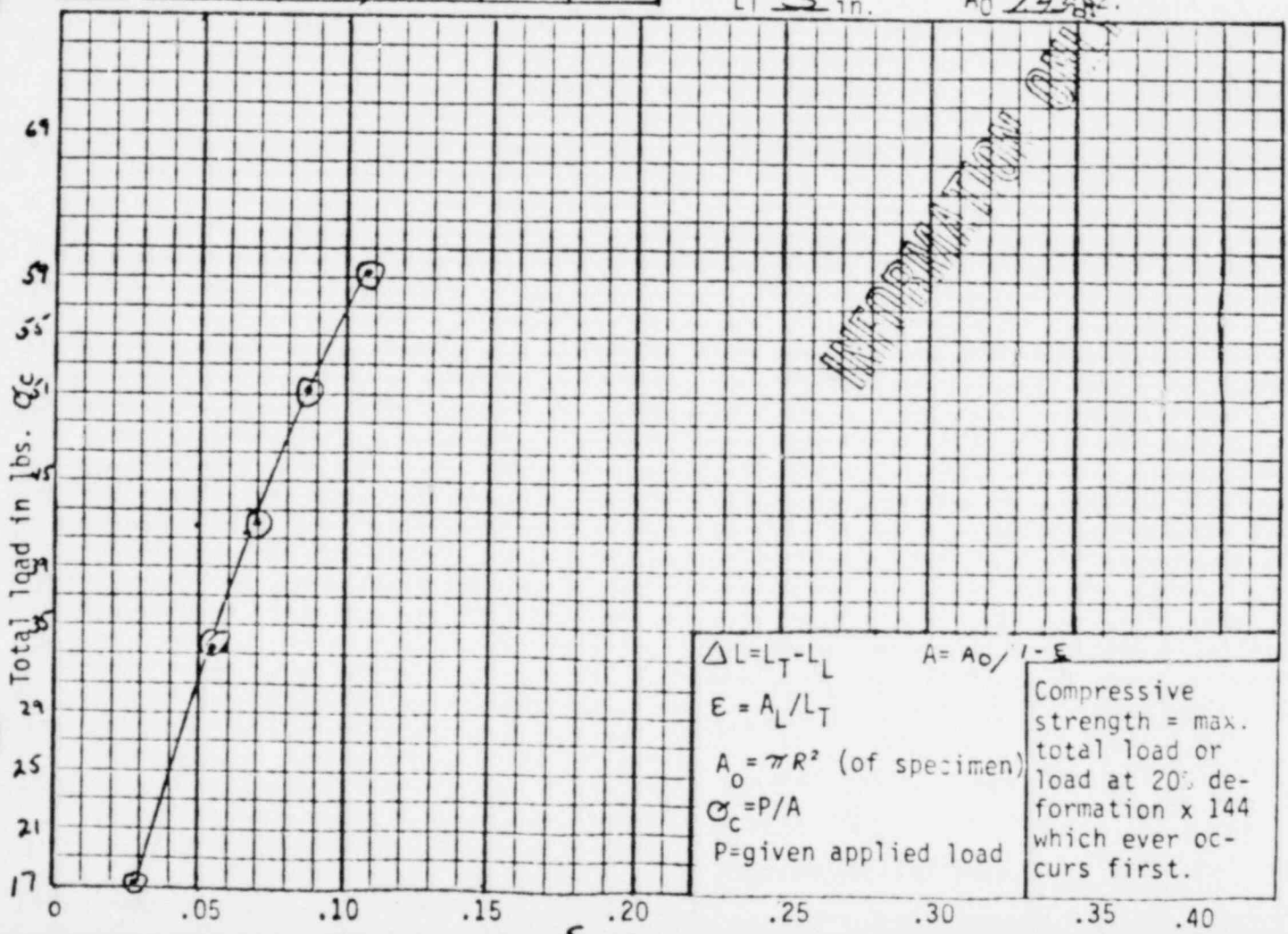
Test Location
Grid Line N 7500
Grid Line E 5780
Elevation 582
Sample No. 256
Equip. S/N DELUC-01

Date 10/25/84
Compressive Strength 8551 p.s.f.
Approved to place fill Yes: ☒ No: ☐
dm wilkes
Inspector

| | |
|-------|---|
| Total | ✓ |
| 920% | |

[illegible]

Description of failure:



| | | | |
|---|--|-----------------|----------|
| Project Quality Assurance Procedure | Title INSPECTION AND TESTING OF SHORE BARRIER CONSTRUCTION | Number 9.513 | Rev 0 |
| | | Exhibit 9.513.5 | |

BORING LOG

Page 2 of 2

Location of Sampling: N 75 20 E 5980Date: 10/20/80Elevation of Sampling: 562.0'

A.S.T.M. D 1587-74

Sample lab number 256Depth of sample 0.5 (ft) %Recovery 60%Method of advancing sampler Constant force Hammer (circle one)Type and size of sampler Shelby Tube 2" x 11.6"Sampler S/N DES PH02Hammer weight and drop 21.7 lbs. 2.83 ft.Number of blows per 6" of drop 28Thickness of soil layer N/ADescription of soil DK. BRN. SILTY SAND w/ gravelDepth of water to surface N/A (ft)

#6 CALCULATIONS FOR % MOISTURE

| | | |
|---|--------------------------------|-----------------------------------|
| 1 | Can No. | <u>C-3</u> |
| 2 | Wt. Wet Sample and Can (gm.) | <u>161.8</u> ^{TOP} 161.8 |
| 3 | Wt. Dry Sample and Can (gm) | <u>139.8</u> |
| 4 | Wt. Water (gm) (2)-(3) | <u>22.0</u> |
| 5 | Wt. Can (gm) | <u>6.1</u> |
| 6 | Wt. Dry Sample (3)-(5) | <u>133.7</u> |
| 7 | Moisture Content % (4)-(6)x100 | <u>16.5</u> ✓ |

| | | | | | | |
|--|----------------------|------------------------------|-----------------------|--------------------------------|-----------------------|--------------------------|
| Technician (signature) <u>M. H. H.</u> | Date <u>10-21-80</u> | Computed by: <u>M. H. H.</u> | Date: <u>10-21-80</u> | Checked by: <u>D. M. W. H.</u> | Date: <u>10/21/80</u> | Scale S/N <u>T13 B-1</u> |
|--|----------------------|------------------------------|-----------------------|--------------------------------|-----------------------|--------------------------|

EXHIBIT 9.513.5 UNCONFINED COMPRESSIVE STRENGTH TEST RESULTS ASTM D2166-66

Test Location

Grid Line N 7750

Grid Line E 5980

Elevation 562.0'

Sample No. 262

Equip. S/N DELUC-01

Date 10-21-80

Compressive Strength 8582 p.s.f.

Approved to place fill Yes: ☒ No: ☐

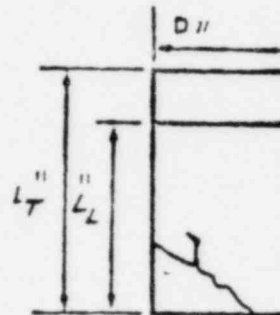
Total ☒

920%

Mike Perkins
Inspector

| Δ L (in) | Load P (lbs) | E | Area A ₀ | σ_c | Check By |
|--------------------|-----------------|------|------------------------|------------|-------------|
| .020 | 10.0 | .007 | 1.44 | 6.9 | |
| .039 | 20.0 | .013 | 1.45 | 13.9 | M.S. |
| .059 | 30.0 | .020 | 1.46 | 20.5 | |
| .095 | 50.0 | .032 | 1.48 | 33.7 | |
| .130 | 70.0 | .043 | 1.49 | 47.0 | |
| .161 | 90.0 | .056 | 1.51 | 59.6 | M.S. |
| | 110.0 | | Fail | | |

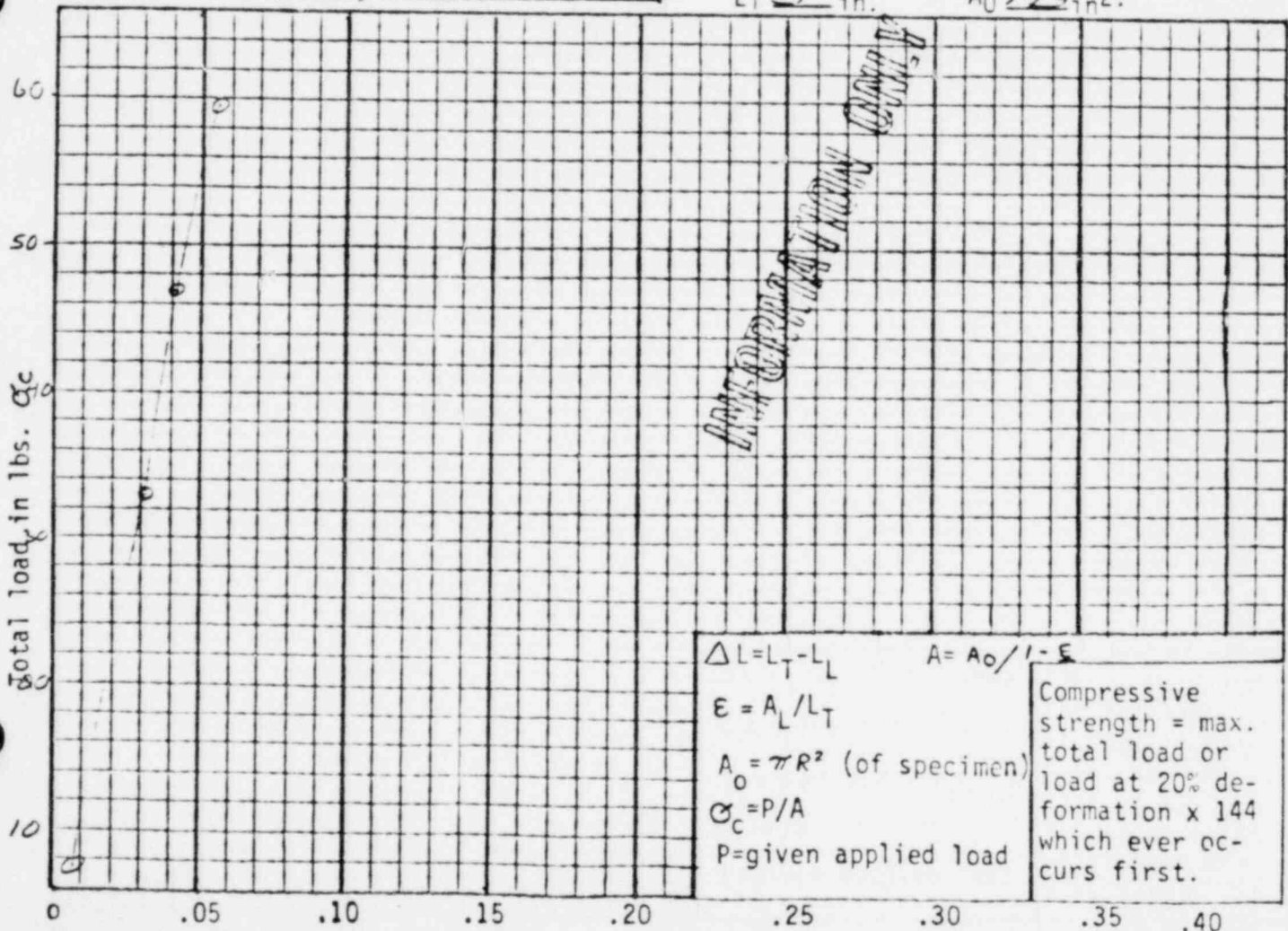
Sketch of Sample



Description of failure:

L_T 3 in.

A₀ 1.43 in².



| | | | |
|---|--|-----------------|-----------|
| Project Quality Assurance Procedure | Title INSPECTION AND TESTING OF SHORE BARRIER CONSTRUCTION | Number 9.513 | Rev. 0 |
| | | Exhibit 9.513.5 | |

BORING LOG

Page 2 of 2

Location of Sampling: N 7750 E 5980Date: 10/21/80Elevation of Sampling: 5620'

A.S.T.M. D 1587-74

Sample lab number 262Depth of sample 0.5 (ft)%Recovery 80%Method of advancing sampler Constant force Hammer (circle one)Type and size of sampler Shelby Tube 2" x 11.6"Sampler S/N DES PH02Hammer weight and drop 21.7 lbs. 2.83 ft.Number of blows per 6" of drop 26Thickness of soil layer N/ADescription of soil DR. WEN. STREASSED w/GRAYDepth of water to surface N/A (ft)

21 CALCULATIONS FOR % MOISTURE

| | | |
|---|--------------------------------|--------------|
| 1 | Can No. | <u>C-E17</u> |
| 2 | Wt. Wet Sample and Can (gm.) | <u>163.8</u> |
| 3 | Wt. Dry Sample and Can (gm) | <u>148.7</u> |
| 4 | Wt. Water (gm) (2)-(3) | <u>15.1</u> |
| 5 | Wt. Can (gm) | <u>6.0</u> |
| 6 | Wt. Dry Sample (3)-(5) | <u>142.7</u> |
| 7 | Moisture Content % (4)-(6)x100 | <u>10.6</u> |

| | | | | | |
|------------------------------------|--------------|-----------------|-----------------|-----------------|----------------|
| Technician (signature) Date | Computed by: | Date: | Checked by: | Date: | Scale S/N |
| <u>Carol L. Galbraith 10/22/80</u> | <u>CLC</u> | <u>10/22/80</u> | <u>RWCarter</u> | <u>10/22/80</u> | <u>713 B-1</u> |

Project
Quality Assurance
Procedure

INSPECTION AND TESTING OF
SHORE BARRIER CONSTRUCTION

SECTION 9.513 REV 0
Page 1 of 2

EXHIBIT 9.513.5 UNCONFINED COMPRESSIVE STRENGTH TEST RESULTS ASTM D2166-66

Test Location

Grid Line N 7450

Grid Line E 5780

Elevation 562

Sample No. 255

Equip. S/N DELUC-01

Date 10/20/80

Compressive Strength 12,072 p.s.f.

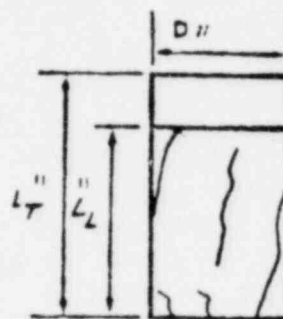
Approved to place fill Yes: ☒ No: ☐

Total ☒
@20% ☐

DM Wilbur
Inspector

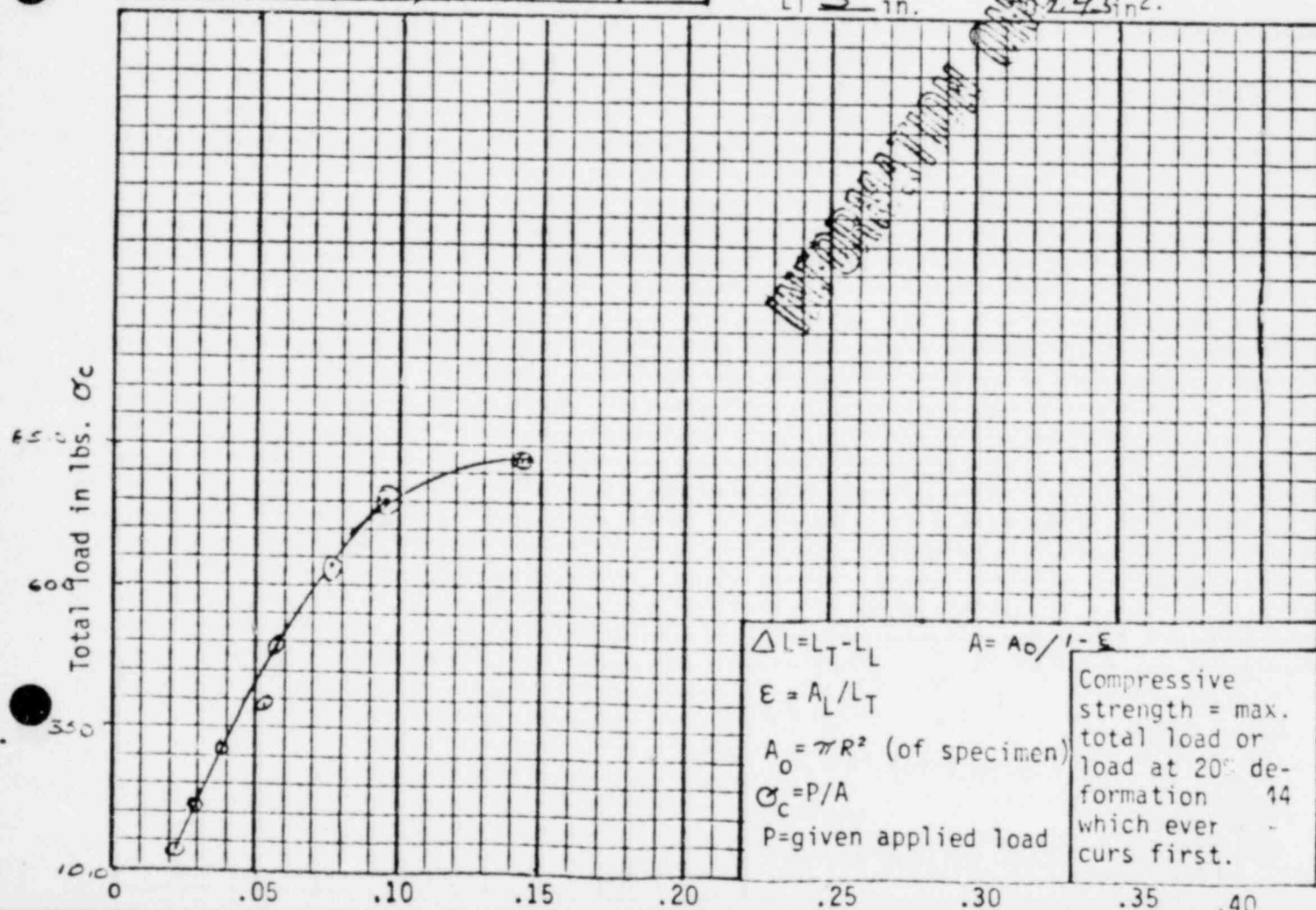
| Δ L(in) | Load P (lbs) | E | Area A ₀ | σ_c | Check By |
|-------------------|-----------------|------|------------------------|------------|-------------|
| .062 | 20.0 | .021 | 1.46 | 13.70 | |
| .086 | 30.0 | .029 | 1.47 | 20.41 | |
| .118 | 45.0 | .039 | 1.49 | 30.20 | |
| .156 | 60.0 | .052 | 1.51 | 39.74 | |
| .174 | 75.0 | .058 | 1.52 | 49.34 | |
| .227 | 100.0 | .076 | 1.55 | 64.52 | |
| .295 | 120.0 | .095 | 1.58 | 75.95 | |
| .430 | 190.0 | .143 | 1.67 | 83.83 | ELC |
| | 150.2 | | Fail | | |

Sketch of Sample



Description of failure: _____

LT 3 in. $A_0 = 2.43 \text{ in}^2$



| | | | |
|---|--|-----------------|----------|
| Project Quality Assurance Procedure | Title INSPECTION AND TESTING OF SHORE BARRIER CONSTRUCTION | Number 9.513 | Rev 0 |
| | | Exhibit 9.513.5 | |

BORING LOG

Page 2 of 2

Location of Sampling: N 74.50 E 5980Date: 10/20/60Elevation of Sampling: 562.0'

A.S.T.M. D 1587-74

Sample lab number 255Depth of sample 0.5 (ft)%Recovery 65%Method of advancing sampler Constant force Hammer (circle one)Type and size of sampler Shelby Tube 2" x 11.6"Sampler S/N DES PH02Hammer weight and drop 21.7 lbs. 2.83 ft.Number of blows per 6" of drop 25Thickness of soil layer N/ADescription of soil DIS ORN STRAKE W/ GRAYDepth water to surface N/A (ft)

#18 CALCULATIONS FOR % MOISTURE

| | | |
|---|--------------------------------|---------------|
| 1 | Can No. | <u>C-18</u> |
| 2 | Wt. Wet Sample and Can (gm.) | <u>170.0</u> |
| 3 | Wt. Dry Sample and Can (gm) | <u>150.6</u> |
| 4 | Wt. Water (gm) (2)-(3) | <u>19.4</u> |
| 5 | Wt. Can (gm) | <u>6.0</u> |
| 6 | Wt. Dry Sample (3)-(5) | <u>144.6</u> |
| 7 | Moisture Content % (4)-(6)x100 | <u>13.4</u> ✓ |

| | | | | | | |
|---|----------------------|---------------------------------------|-----------------------|--------------------------------|-----------------------|------------------------|
| Technician (signature) <u>N. L. L. 10-22-60</u> | Date <u>10-22-60</u> | Computed by: <u>N. L. L. 10-22-60</u> | Date: <u>10-22-60</u> | Checked by: <u>Don Withers</u> | Date: <u>10/22/60</u> | Scale S/N <u>TJB-1</u> |
|---|----------------------|---------------------------------------|-----------------------|--------------------------------|-----------------------|------------------------|

| | | | |
|---|--|-----------------|----------|
| Project Quality Assurance Procedure | Title INSPECTION AND TESTING OF SHORE BARRIER CONSTRUCTION | Number 9.513 | Rev 0 |
| | | Exhibit 9.513.5 | |

BORING LOG

Page 2 of 2

Location of Sampling: N 7150 E 5980

Date: 10/15/80

Elevation of Sampling: 5620'

A.S.T.M. D 1587-74

Sample lab number 248Depth of sample 0.5 (ft)%Recovery 50%Method of advancing sampler Constant force Hammer (circle one)Type and size of sampler Shelby Tube 2" x 11.6"Sampler S/N DES PH02Hammer weight and drop 21.7 lbs. 2.83 ft.Number of blows per 6" of drop 24Thickness of soil layer N/ADescription of soil dk brn w/ pebblesDepth of water to surface N/A (ft)

#17 CALCULATIONS FOR % MOISTURE

| | | |
|---|--------------------------------|-------|
| 1 | Can No. | C-11 |
| 2 | Wt. Wet Sample and Can (gm.) | 169.5 |
| 3 | Wt. Dry Sample and Can (gm) | 150.5 |
| 4 | Wt. Water (gm) (2)-(3) | 19.0 |
| 5 | Wt. Can (gm) | 6.1 |
| 6 | Wt. Dry Sample (3)-(5) | 144.4 |
| 7 | Moisture Content % (4)-(6)x100 | 13.2✓ |

| | | | |
|----------------------------------|----------------------------------|------------------------------|-----------|
| Technician (signature) Date | Computed by: Date: | Checked by: Date: | Scale S/N |
| <u>Carol L. Calhoun</u> 10/16/80 | <u>Carol L. Calhoun</u> 10/16/80 | <u>D.M. Withers</u> 10/16/80 | TBB-1 |

EXHIBIT 9.513.5 UNCONFINED COMPRESSIVE STRENGTH TEST RESULTS ASTM D2156-66

Test Location
Grid Line N 1050
Grid Line E 5780
Elevation 582
Sample No. 246
Equip. S/N DELUC-01

Date 10/15/80
Compressive Strength 18,462 p.s.f.
Approved to place fill Yes: ☒ No: ☐

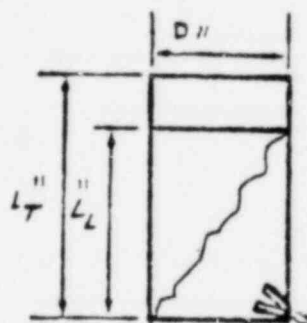
Total ☒
@20% ☐

Inspector Carol A. Galt

Retest of #050

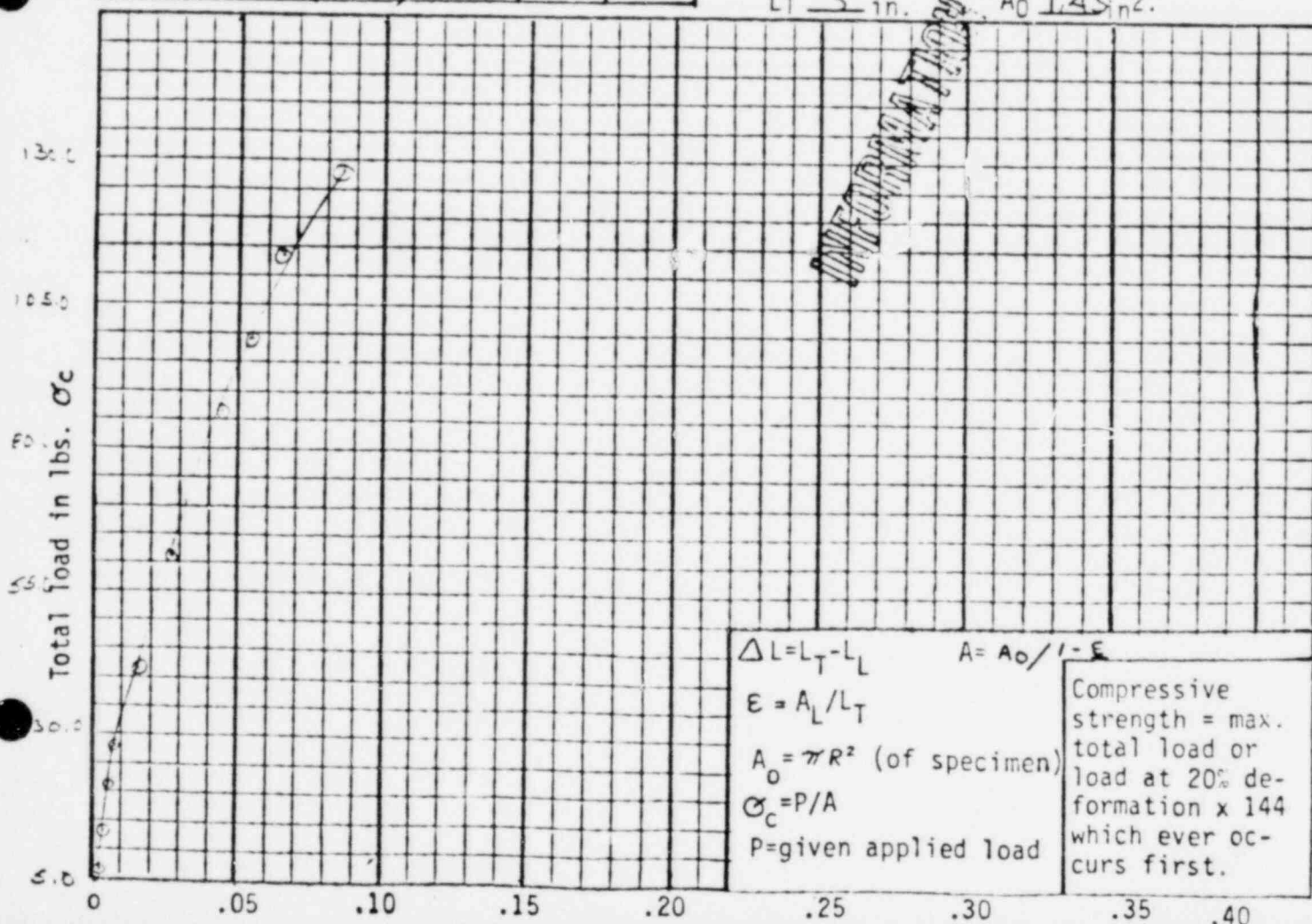
| Δ L(in) | Load P (lbs) | E | Area A ₀ | σ_c | Check By |
|-------------------|-----------------|------|------------------------|------------|-------------|
| .009 | 10.00 | .003 | 1.43 | 6.99 | |
| .013 | 20.00 | .004 | 1.44 | 13.87 | |
| .017 | 30.00 | .006 | 1.44 | 20.83 | |
| .026 | 40.00 | .009 | 1.44 | 27.78 | |
| .052 | 60.00 | .017 | 1.45 | 41.38 | |
| .088 | 90.00 | .029 | 1.47 | 61.22 | |
| .132 | 130.00 | .044 | 1.50 | 86.67 | |
| .159 | 150.0 | .053 | 1.51 | 99.34 | |
| .194 | 175.0 | .065 | 1.53 | 114.38 | |
| .253 | 200.0 | .084 | 1.56 | 128.21 | |
| | 230.0 | | Fail | | |

Sketch of Sample



Description of failure:

LT 3 in. A₀ 1.43 in²



| | | | |
|---|--|-----------------|----------|
| Project Quality Assurance Procedure | Title INSPECTION AND TESTING OF SHORE BARRIER CONSTRUCTION | Number 9.513 | Rev 0 |
| | | Exhibit 9.513.5 | |

BORING LOG

Page 2 of 2

Location of Sampling: N 7050 E 5986

Date: 10/15/80

Elevation of Sampling: 5620'

A.S.T.M. D 1587-74

Sample lab number 246Depth of sample 0.5 (ft) %Recovery 75%Method of advancing sampler Constant force Hammer (circle one)Type and size of sampler Shelby Tube 2" x 11.6"Sampler S/N DES PH02Hammer weight and drop 21.7 lbs. 2.83 ft.Number of blows per 6" of drop 31Thickness of soil layer N/ADescription of soil dk. brn. pebbly clayDepth of water to surface N/A (ft)

#9 CALCULATIONS FOR % MOISTURE

| | | |
|---|--------------------------------|--------------|
| 1 | Can No. | <u>C-44</u> |
| 2 | Wt. Wet Sample and Can (gm.) | <u>170.6</u> |
| 3 | Wt. Dry Sample and Can (gm) | <u>152.0</u> |
| 4 | Wt. Water (gm) (2)-(3) | <u>18.6</u> |
| 5 | Wt. Can (gm) | <u>6.1</u> |
| 6 | Wt. Dry Sample (3)-(5) | <u>145.9</u> |
| 7 | Moisture Content % (4)-(6)x100 | <u>12.7</u> |

| | | | |
|-----------------------------|----------------------------|-------------------|--------------|
| Technician (signature) Date | Computed by: Date: | Checked by: Date: | Scale S/N |
| <u>DM Withers 10/16/80</u> | <u>DM Withers 10/16/80</u> | <u>M. Perkins</u> | <u>7BB-1</u> |

TABLE 2.5-5 ROCK COMPRESSION TEST RESULTS
FERMI 2 REACTOR AND AUXILIARY BUILDING SITE

| Boring Number | Depth Below Original Surface (feet) | Elevation (feet) | Formation (a) | Density (lb/ft ³) | Ultimate Compressive Strength (lb/ft ²) | Modulus of Elasticity (lb/ft ²) |
|---------------|-------------------------------------|------------------|---------------|-------------------------------|---|---|
| 20 | 27.0 | 546.7 | BI | 154 | 2.26×10^6 | 9.0×10^8 |
| 32A | 52.0 | 527.6 | BI | 145 | 1.39×10^6 | 6.28×10^8 |
| 28 | 106.0 | 466.5 | S | 162 | 1.30×10^6 | 3.75×10^8 |
| 4 | 58.0 | 514.5 | BI | 138 | 1.12×10^6 | 6.51×10^8 |
| 201 | 50.7 | 514.3 | BI | 151 | 1.29×10^6 | 5.75×10^8 |
| 201 | 73.2 | 491.8 | BI | 169 | 1.62×10^6 | 5.04×10^8 |
| 202 | 49.2 | 515.1 | BI | 146 | 1.41×10^6 | 3.89×10^8 |
| 203 | 58.2 | 507.2 | BI | 154 | 1.31×10^6 | 3.17×10^8 |
| 208 | 16.2 | 550.7 | BI | 145 | 0.62×10^6 | 3.29×10^8 |
| 210 | 20.6 | 546.0 | BI | 153 | 0.99×10^6 | 2.2×10^8 |
| 211 | 18.4 | 549.0 | BI | 170 | 2.70×10^6 | 1.8×10^8 |
| 211 | 35.1 | 532.3 | BI | 146 | 0.85×10^6 | 2.5×10^8 |
| 213 | 24.6 | 543.4 | BI | 149 | 0.82×10^6 | 7.2×10^8 |

(a) BI = Bass Islands Group
S = Salina Group

APPENDIX F
1 EF-2-FSAR

APPENDIX G

TRANSLATORY SLIDE CHECK OF
SHORE BARRIER

ENRICO FERMI II ATOMIC POWER PLANT

ASSIGNED ENGINEER: J.R. DECATOR PE. JRD
SECOND ENGINEER: W.R. NEAL PE. WRN

APPROVED BY:

SUPERVISING ENGINEER: W.M. STREET P.E. WMS

OBJECTIVE

TO PERFORM A TRANSLATORY SLIDE CHECK TO DETERMINE
THE FACTOR OF SAFETY AGAINST SLIDING FOR THE SHORE
BARRIER FOR THE ENRICO FERMI II ATOMIC POWER PLANT.

CONCLUSION

IT IS CONCLUDED THAT THE SHORE BARRIER HAS A SUFFICIENT
FACTOR OF SAFETY WITH REGARD TO A TRANSLATORY SLIDING
FAILURE OCCURRING IN ANY SOIL LAYER.

8 JUL 81

G-1

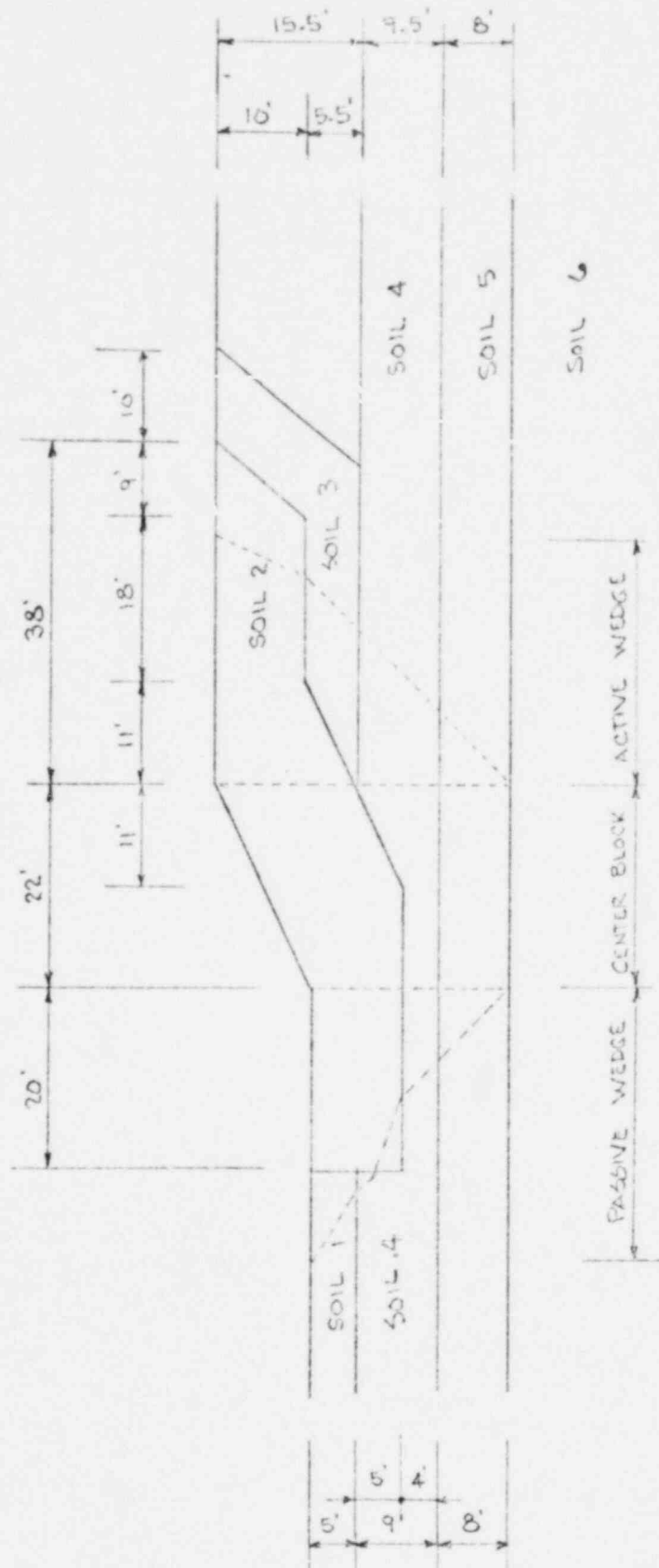
ENRICO FERMI II ATOMIC POWER PLANT

TRANSLATORY SLIDE CHECK OF SHORE BARRIER

(139)

J.R. DECATOR P.E.

William P. Neal



SHORE BARRIER CROSS-SECTION

5: 1" = 20'

APPENDIX G

ENRICO FERMI II ATOMIC POWER PLANT
TRANSLATOR, SLIDE CHECK OF SHORE BARRIER
J.R. DECATOR P.E.

8 JUL 81

G-2

(146)

William R. Neal

SOIL PROPERTIES

| SOIL | UNIT WEIGHT (LB/CU FT) | ϕ | C (LB/SQ FT) | K_a | K_p |
|------|---------------------------|--------|-----------------|-------|-------|
| 1 | 80 | 25° | - | 0.405 | 2.463 |
| 2 | 100 | 40° | - | 0.217 | 4.599 |
| 3 | 120 | - | 1150 | | |
| 4 | 120 | - | 1250 | | |
| 5 | 130 | - | 3500 | | |
| 6 | 152 | - | 500,000 | | |

ENRICO FERMI II ATOMIC POWER PLANT
 TRANSLATORY SLIDE CHECK OF SHORE BARRIER
 J.R. DECATOR P.E.

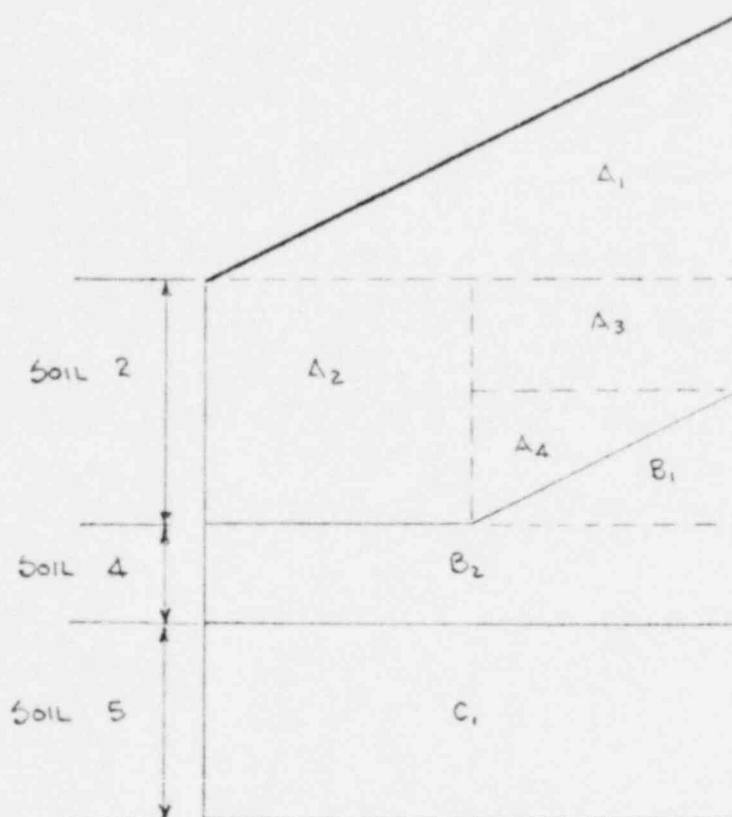
8 JUL 81

G-3

(141)

William L. Neal

CENTER BLOCK



| SOIL | AREA | TOTAL AREA | UNIT WGT | TOTAL WGT |
|------|---|------------------------|-----------|-----------|
| 2 | $A_1 = 0.5(22)(11) = 121$ $A_2 = 10 \times 11 = 110$ $A_3 = 4.5 \times 11 = 49.5$ $A_4 = 0.5(5.5 \times 11) = 30.25$ | 310.75 ft ² | 0.100 kcf | 31.1 klf |
| 4 | $B_1 = A_4 = 30.25$ $B_2 = 22(4) = 88$ | 118.25 ft ² | 0.120 kcf | 14.2 klf |
| 5 | $C = 22 \times 8 =$ | 176 ft ² | 0.13 kcf | 22.9 klf |
| | | | | 68.2 klf |

ENRICO FERMI II ATOMIC POWER PLANT
 TRANSLATORY SLIDE CHECK OF SHORE BARRIER
 J.R. DECATOR PE

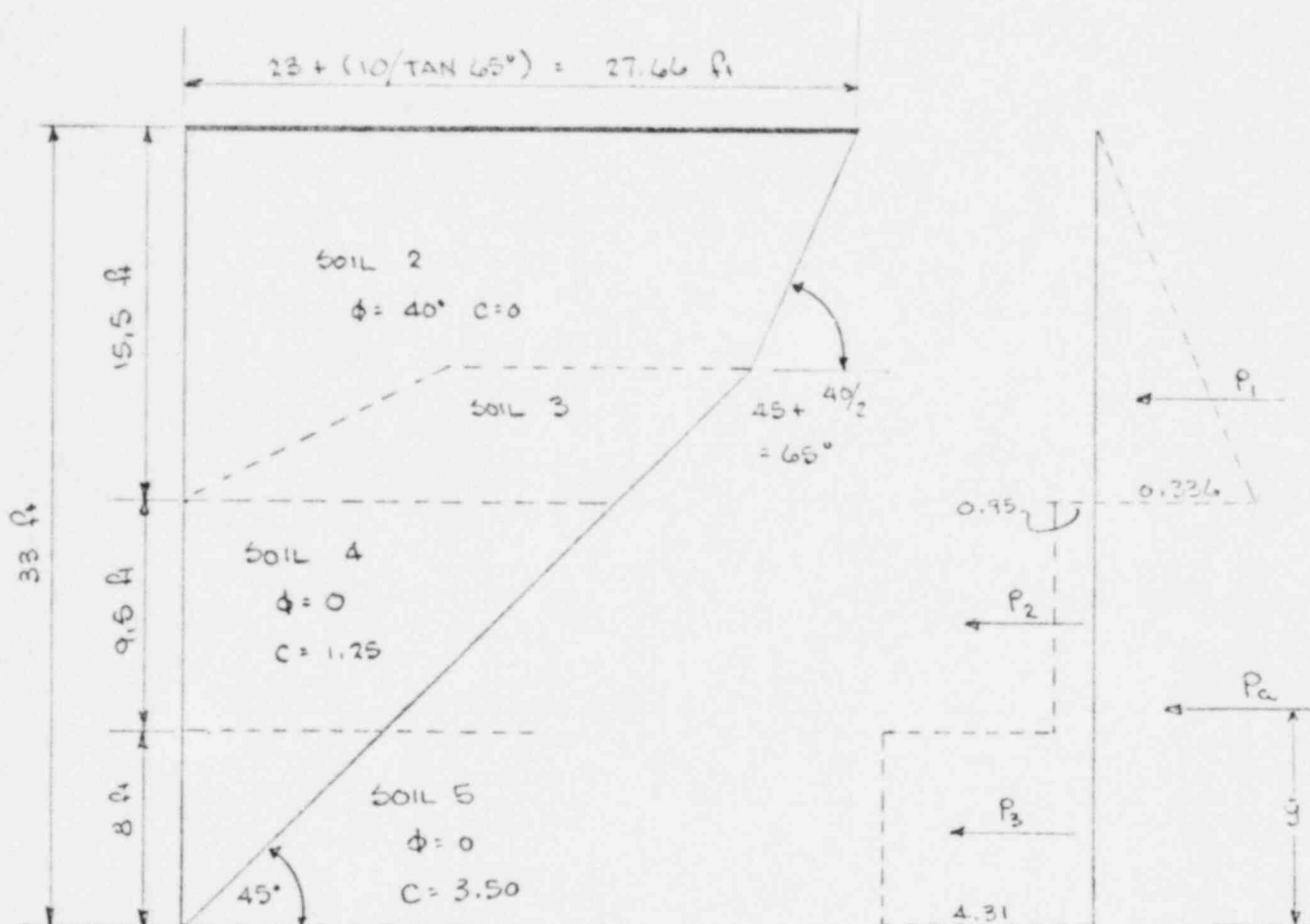
8 JUL 81

G-4

(142)

William H. Neal

ACTIVE WEDGE



@ $h = 0$ $p = 0$

@ $h = 15.5$ $p = 0.100(15.5)(0.217) = 0.336$
 $p' = 0.100(15.5) - 2(1.25) = -0.95$

@ $h = 25$ ft $p = 1.55 + 0.12(9.5) - 2(3.5) = -4.31$

$P_1 = 0.5(0.336)(15.5) = 2.6$ kip

$P_2 = (-0.95)(9.5) = -9.0$ kip

$P_3 = -4.31(8) = -34.5$ kip

$P_a = -40.9$ kip

Use: $P_a = 0$

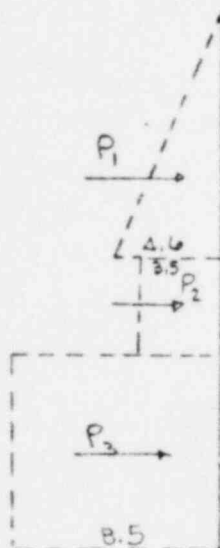
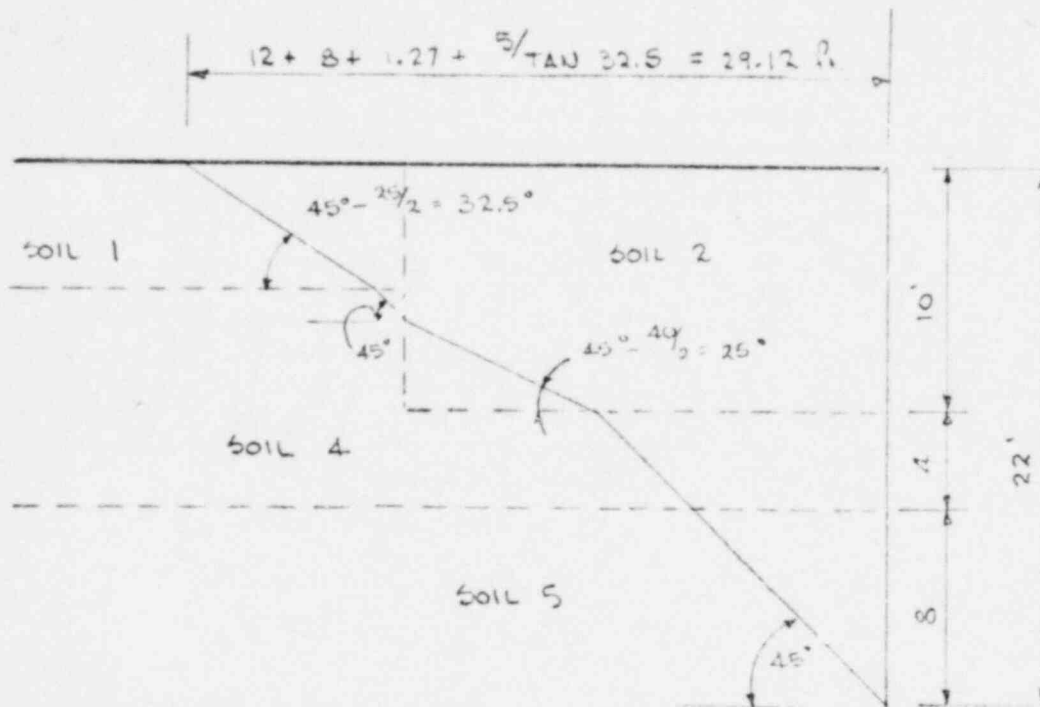
ENRICO FERMI II ATOMIC POWER PLANT
 TRANSLATORY SLIDE CHECK OF SHORE BARRIER
 J.R. DECATOR PE.

8 JUL 81

G-5
 (143)

William R. Neal

PASSIVE WEDGE



@ $h=0$ $p=0$

@ $h=10$ $p = 0.100(10)(4.599) = 4.6$
 $p' = 0.10(10) + 2(1.25) = 3.5$

@ $h=14$ $p = 1 + 0.12(4) + 2(3.5) = 8.5$

$P_1 = 0.5(4.6)(10) = 23$

$P_2 = 3.5(4) = 14$

$P_3 = 8.5(8) = 68$

$P_p = 105 \text{ kip}$

ENRICO FERMI II ATOMIC POWER PLANT
TRANSLATORY SLIDE CHECK OF SHORE BARRIER
J.R. DECATOR P.E.

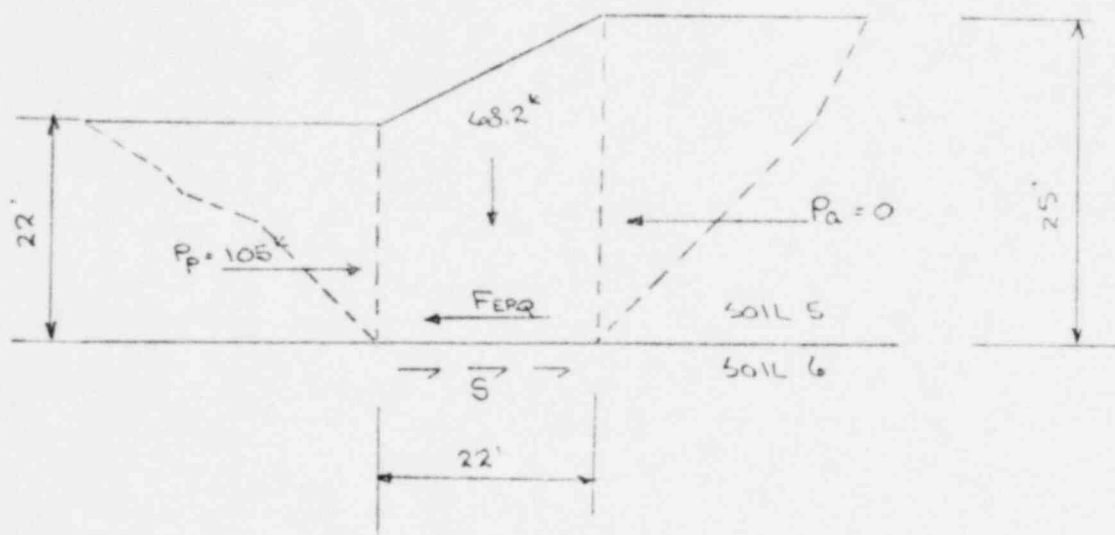
8 JUL 81

G-6

(144)

William R. Kline

TRANSLATORY SLIDE: CLAY SOIL 5 @ ROCK (SOIL 6)



FORCES TENDING TO CAUSE MOVEMENT

$$= FERQ + P_a$$

$$FERQ = 0.15(68.2) = 10.23 \text{ KIP}$$

FORCES TENDING TO OPPOSE MOVEMENT

$$= P_p + S$$

$$= 105 + 3.5(22) = 182 \text{ KIP}$$

FACTOR OF SAFETY AGAINST TRANSLATORY SLIDE OF
CLAY ABOVE THE ROCK CASE

$$= 182 / 10.23 = \underline{\underline{18}}$$

ENRICO FERMI II ATOMIC POWER PLANT
TRANSLATORY SLIDE CHECK OF SHORE BARRIER
J.R. DECATOR PE

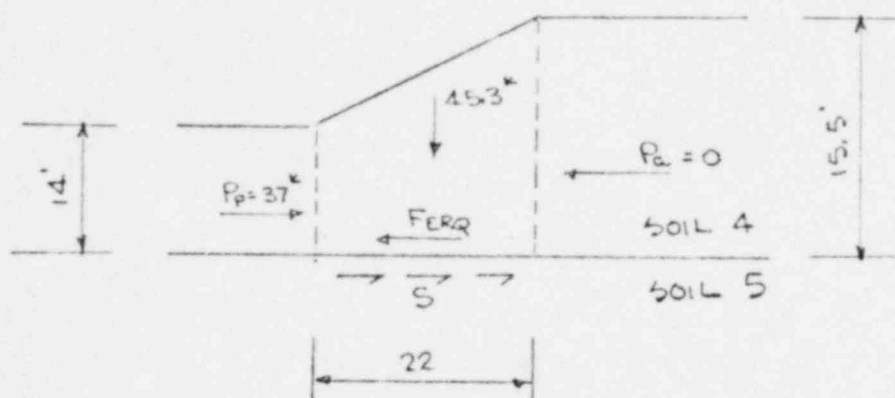
8 JUL 81

G-7

(145)

William L. Neal

TRANSLATORY SLIDE: CLAY SOIL 4 @ CLAY SOIL 5



FORCES TENDING TO CAUSE MOVEMENT:

$$F_{ERQ} = 45.3 \times 0.15 = 6.8 \text{ kip}$$

$$P_a = 0$$

FORCES TENDING TO OPPOSE MOVEMENT:

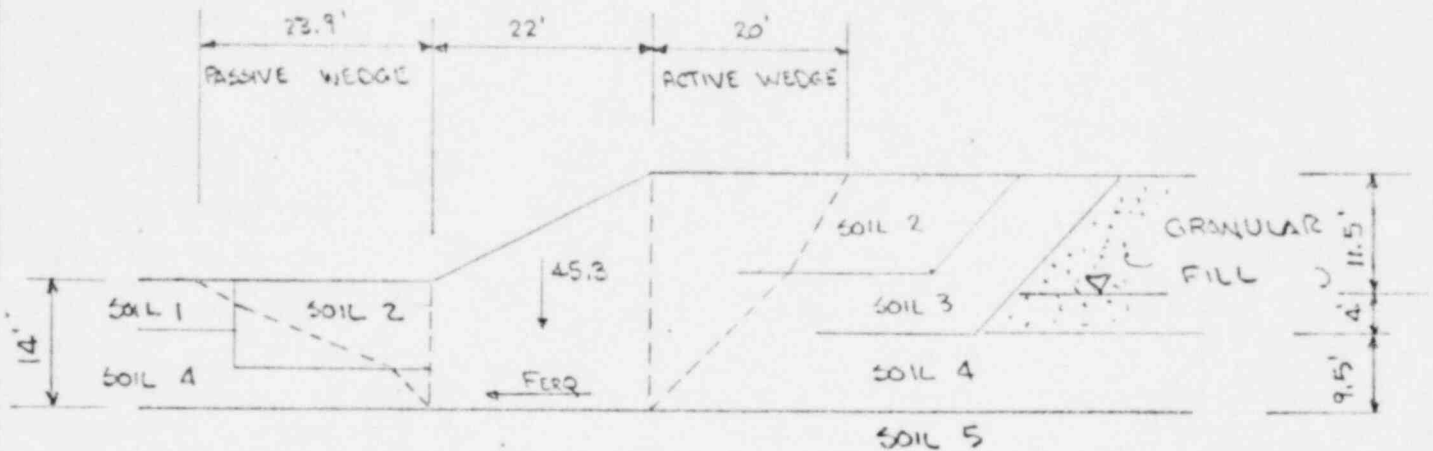
$$P_p = 37^k$$

$$S = 22(1.25) = 27.5$$

FACTOR OF SAFETY AGAINST TRANSLATORY SLIDE OF CLAY
SOIL 4 @ CLAY SOIL 5

$$= (37 + 27.5) / 6.8 = 9.5$$

EFFECT OF TRAPPED WATER BEHIND SHORE BARRIER



WIDTH OF ACTIVE WEDGE

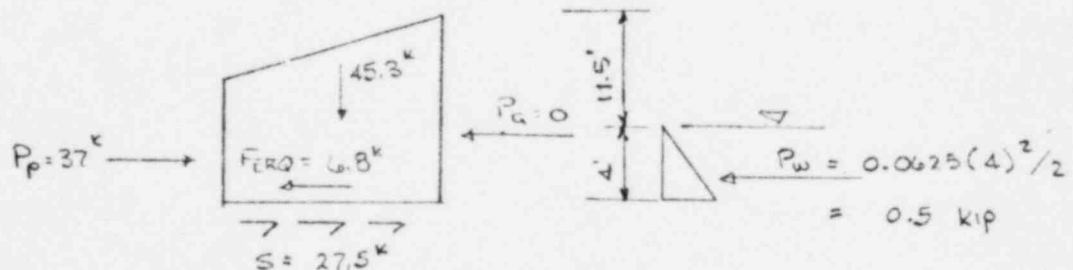
$$= 9.5 + 5.5 + 10 / \tan 65^\circ = 20 \text{ ft}$$

WIDTH OF PASSIVE WEDGE

$$= 4 + 16 + 2.5 / \tan 32.5 = 23.9 \text{ ft}$$

SINCE THE GRANULAR FILL IS OUTSIDE THE ACTIVE ZONE FOR THE SHORE BARRIER, ANY WATER TRAPPED IN THE FILL WILL HAVE NO EFFECT ON THE STABILITY OF THE SHORE BARRIER ITSELF.

NEVERTHELESS:



$$F.S. = \frac{37 + 27.5}{6.8 + 0.5} = 8.8 //$$

REFERENCES

1. "ICES SLOPE User Manual", McDonnell Douglas Automation Company.
2. "Enrico Fermi Atomic Power Plant Unit 2 Shore Protection Barrier Earthquake Stability Analysis", Ralph M. Parsons, Company, Job. No. 4577-3, April, 1972.
3. "Comparison of Slope Stability Methods of Analysis", Fredlund and Krahn, Canadian Geotechnical Journal, Vol. 14, No. 3, 1977.
4. "Foundation Analysis and Design", Bowles, McGraw Hill, 1968.
5. "Foundations, Retaining and Earth Structures," T. Schebotarioff, McGraw-Hill, 1973.
6. "Foundation Engineering", Peck, Hanson & Thornburn; J. Wiley, 1974.
7. "Stability and Performance of Slopes and Embankments", American Society of Civil Engineers Proceedings; Berkeley, California, 1969.