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SOFT AIRFIELD TESTS WITH F-4 AIRCRAFT

VINCE CASSINO

NEW MEXICO ENGINEERING RESEARCH INSTITUTE
UNIVERSITY OF NEW MEXICO
P.O. BOX 25, UNIVERSITY STATION
ALBUQUERQUE, NEW MEXICO 87131

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20. ABSTRACT (Continue on reverse side if necessary and identify by block number) Tests were conducted to investigate the interaction of soil surfaces with the landing gear of F-4E aircraft to validate computer prediction routines. Site selection and soil tests are described. In-place soil tests were conducted, and aircraft ground performance was measured during towed and powered taxi operations. Soil strength was adequate to support the aircraft for the two loadings used. Laboratory tests were performed to further identify the soil strength parameters. Aircraft location while operating on the test area was determined by a ground survey system and a laser tracking system.		

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PREFACE

This report was prepared by the New Mexico Engineering Research Institute, University of New Mexico, Box 25, University Station, Albuquerque, New Mexico 87131, under contract F29601-81-C-0013, for the Air Force Engineering and Services Center, Air Force Engineering and Services Laboratory, Tyndall AFB, Florida.

This report summarizes work done between May and September 1981. Captain Cary R. Wallington was AFESC Project Officer.

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This report has been reviewed by the Public Affairs Office (PA) and is releasable to the National Technical Information Service (NTIS). At NTIS it will be available to the general public, including foreign nations.

This technical report has been reviewed and is approved for publication.

Cary R. Wallington
 CARY R. WALLINGTON, Capt, USAF
 Project Officer, ALRS

James R. Van Orman
 JAMES R. VAN ORMAN
 Chief, Rapid Runway Repair Branch

John E. Goins
 JOHN E. GOIN, Lt Col, USAF
 Chief Engrg. Research Div.

Robert E. Brandon
 ROBERT E. BRANDON
 Deputy Director
 Engineering and Services Laboratory



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INTRODUCTION

Background

If airfield runways are destroyed, it may be necessary to use unpaved soil surfaces for the launch and recovery of aircraft. Computer routines designed to predict the ability of aircraft to land, taxi, and take off from unpaved soil surfaces have been developed.

Objective

The objective of this effort was to provide support services for the validation of existing computer routines which predict the interaction of aircraft landing gear and soil surfaces. Validation of these routines is necessary for the design and evaluation of soil structures which can be used to supplement existing Air Force runways and taxiways.

Program Description

The field testing program consisted of site selection and preparation, soil surface roughness surveys, load cart tests, soil strength evaluation, rut depth measurements, and site restoration. The aircraft used was an F-4E aircraft with 38,000- and 54,000-pound loads. Passes were made with towed and powered loads.

The test methods and equipment used for the field tests and the laboratory soil test results are described in this report.

SEQUENCE OF EVENTS

The preliminary site investigation began in November 1980, when surface roughness survey lines and soil strength test data were obtained at McClellan Air Force Base, California, by the soils consultant. The first two survey lines were obtained by the McClellan base surveyor, and the data were reduced by the Air Force Engineering Service Center (AFESC). A private testing laboratory obtained the soil strength test data consisting of California Bearing Ratio (CBR), soil moisture content, and density. The decision to use Area 2 at McClellan was made after studying the data obtained.

Site preparation commenced in April 1981 with clearing and leveling of the test site area by the Prime Beef unit stationed at McClellan. Three surface roughness survey lines were taken after the site preparation by the base surveyor and personnel from the New Mexico Engineering Research Institute (NMERI). Minor leveling work was performed to bring the field to conditions required for aircraft operation. Preceding the aircraft operations in June, a load cart with a 17,000-pound single-wheel load (simulating a 38,000-pound F-4 aircraft) was operated to proof-roll the area for spots which could cause damage to the aircraft. Measurements with the cone penetrometer were taken along these paths to obtain soil strength data for the comparison of measured with predicted rut depths. The length of Area 2 was then reduced from 2400 to 1900 feet because the end area was found to contain slopes higher than called for in the roughness criteria. There were also soft spots in the north and south ends that did not meet the soil strength requirements.

The area was also tested methodically with soil strength test pits from which CBR, nuclear moisture-density, soil samples, and CBR-penetrometer correlation values were obtained. These tests gave a range of values that were useful in determining the areas in which the loaded aircraft could be operated safely. From these data, areas were mapped for the two loads at which the aircraft was to be operated. A sequence-of-events plan was developed for the ground operations of the aircraft.

First, calibration tests were performed with the 38,000-pound F-4 aircraft on rigid pavements. Then the aircraft was towed onto the soil strip with the aircraft tug. In the towed 38,000-pound tests, ruts were developed that would not allow the tow machine to pull the aircraft; however, the aircraft was able to move out of the soft spots, after the tow machine was removed, under its own power. Areas were then located where the 38,000- and 54,000-pound tests could be conducted safely. The test events were performed, and rut measurements and penetrometer readings were taken along the aircraft paths for rut depth-penetrometer data correlation. Soil moisture-density data were also taken at these points. In areas where the surface was impenetrable, a ditching machine was used to remove the crust down to a softer layer where the penetrometer could be used. All rut measurements and penetrometer readings were taken on the same day as the aircraft operation.

TEST SITE

Figure 1 shows the location of Area 2, the test site, on the base. The site was cleared of vegetation and large rocks and graded until relatively level. Figure 2 shows the test site and the survey lines. Lines A and B were surveyed by Air Force personnel before the site was graded. After the grading and clearing of the site, NIMERI conducted a roughness survey along three lines. Roughness survey data are given in Appendix A.

Table 1 gives the details of the site layout. Aircraft path lines were marked with chalk between the coordinates given in Table 1. The site entry point is shown in Figure 3. Figure 4 shows the paths used for the load cart tests.

FIELD TESTS

CBR Field Test

The CBR is a measure of the shear strength of the soil. The in-place field test is, under certain conditions, a satisfactory test for determining the load capacity of a material in the field.

The load on the soil is applied by a capped cylinder. The equipment consists of: (1) a mechanical screw jack to apply the load; (2) calibrated proving rings; (3) a penetration piston (3-square-inch area) with internally threaded pipe extensions with connectors; (4) dial gages and support; (5) a circular steel plate of 10-inch diameter, weighing 10 pounds, and having a 2-1/32-inch diameter hole in the center; and (6) surcharge weights, truck jacks, and a loaded truck to provide the resistance for the CBR screw jack. Figure 5 is a photograph of a CBR apparatus.

After the surface was leveled and prepared by removing the loose material, the penetration test was performed. Load readings were obtained at 0.025-, 0.050-, 0.075-, 0.100-, 0.125-, 0.150-, 0.175-, 0.200-, 0.250-, and 0.300-inch penetrations at the surface and at a depth of 10 inches. Three CBR tests were performed at each elevation. If the results of these three tests did not show reasonable agreement, three additional tests were made. The bearing value in

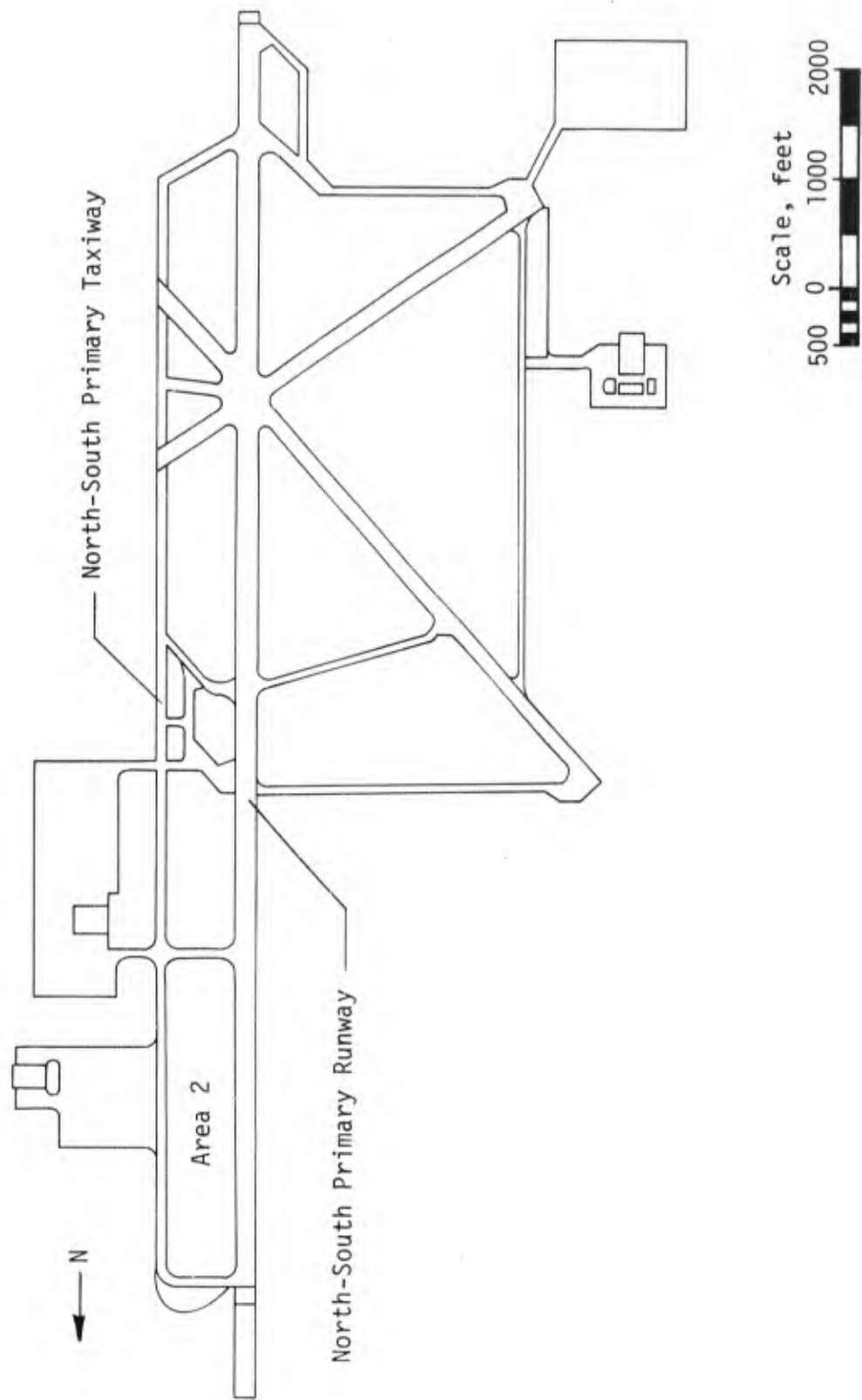


Figure 1. McClellan Air Force Base Layout, Showing Area 2.

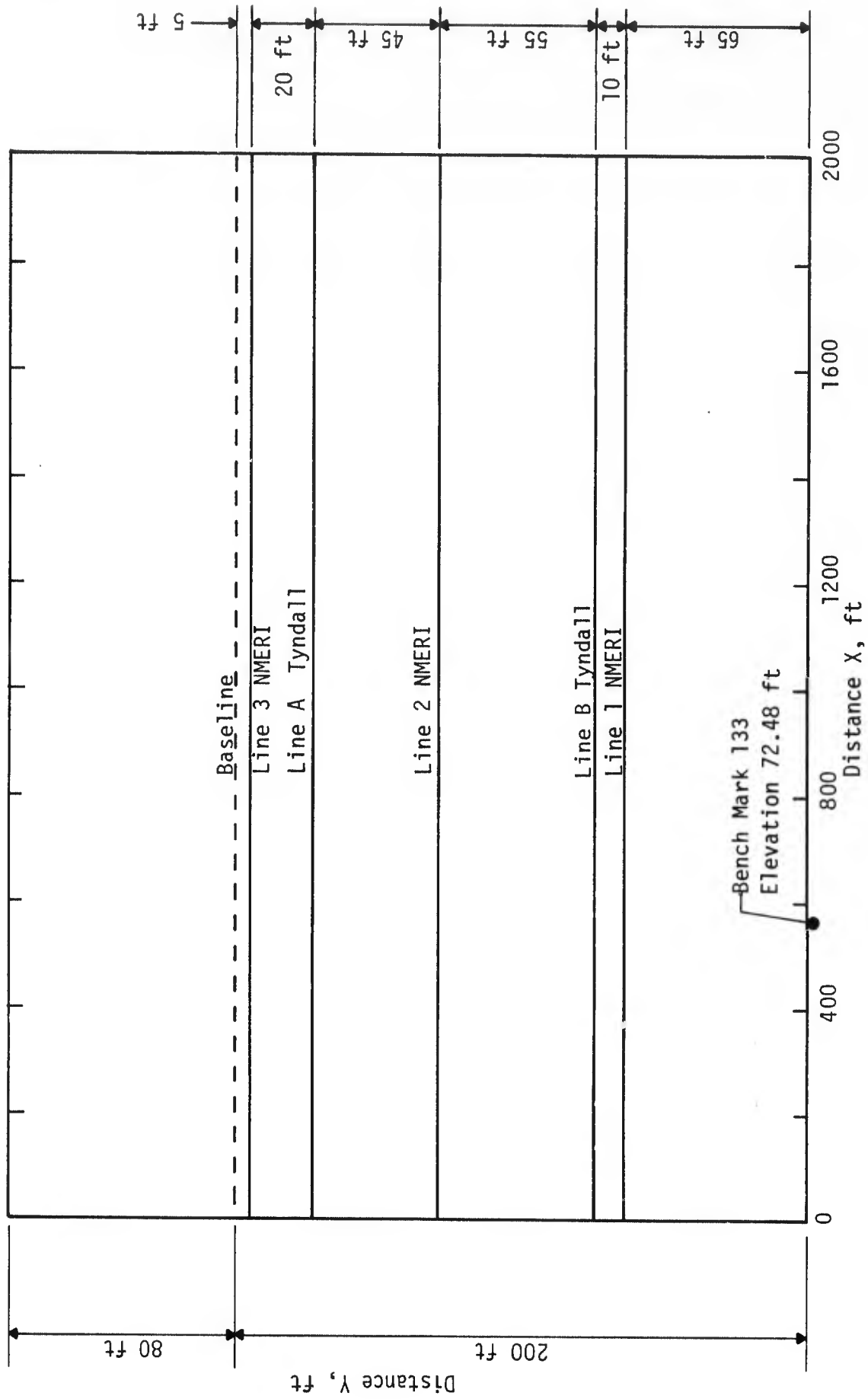


Figure 2. Area 2, Surface Roughness Survey Lines.

TABLE 1. TEST SITE LAYOUT.

Site Feature	South End		North End	
	X	Y	X	Y
Total Site Layout	0.000	-75.000	1900.000	-75.000
	0.000	200.000	1900.000	200.000
Towed 38,000-lb aircraft	300.000	-25.000	800.000	-25.000
	300.000	125.000	800.000	125.000
Powered 38,000-lb aircraft	800.000	35.000	1900.000	35.000
	800.000	185.000	1900.000	185.000
Powered 54,000-lb aircraft	800.000	-55.000	190.000	-55.000
	800.000	60.000	190.000	60.000
Site Entry Point	662.500	200.000	1845.000	200.000



Figure 3. Site Entry.

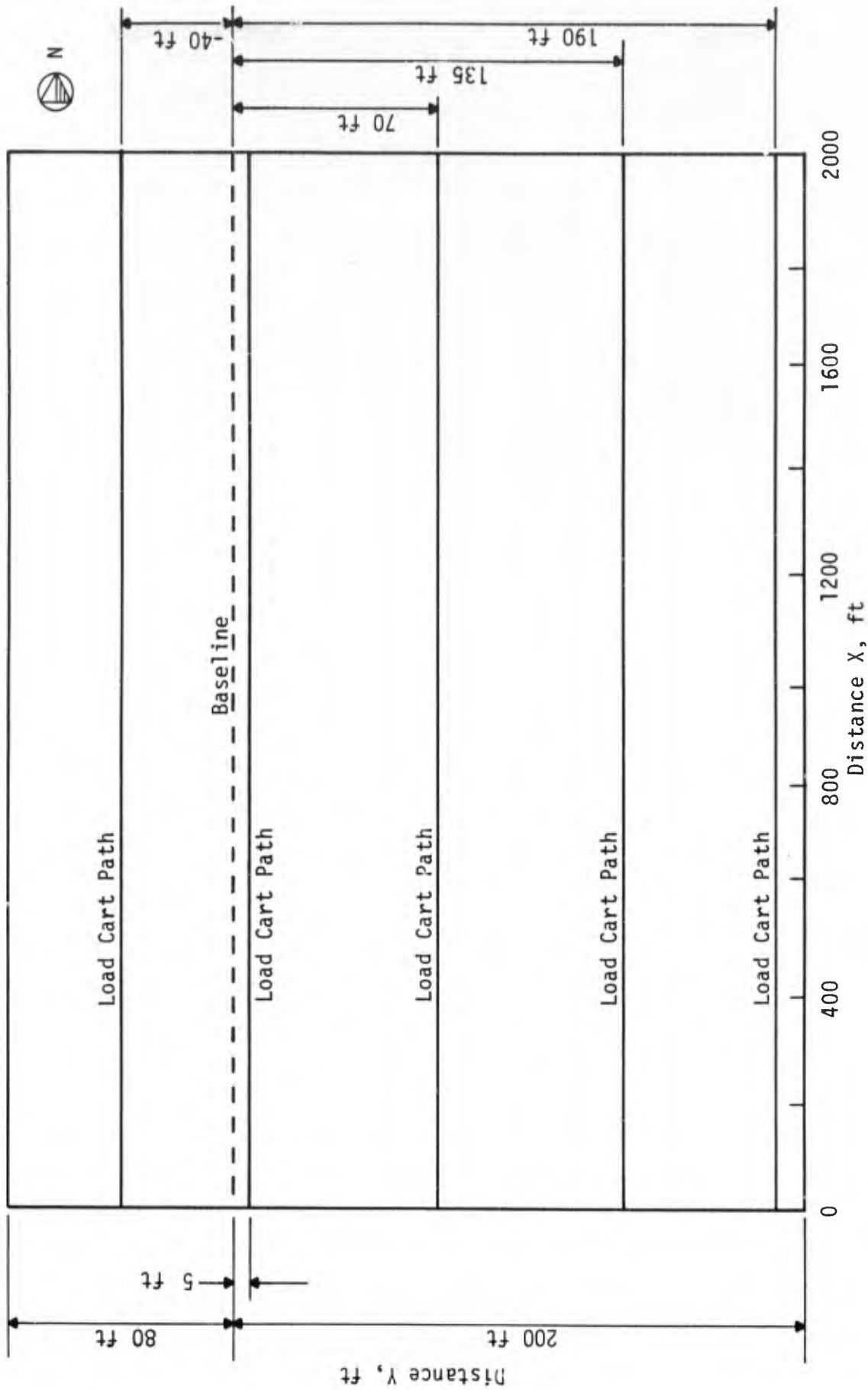


Figure 4. Load Cart Paths, Area 2.

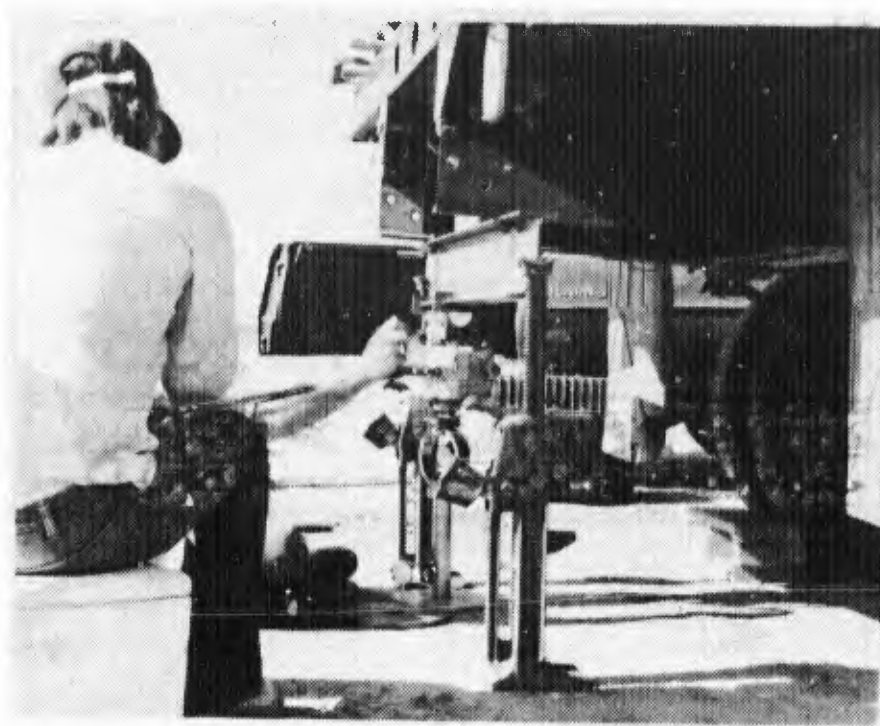


Figure 5. CBR Test.

pounds per square inch and the CBR in percent were computed. The stress-penetration curves were drawn and corrected, if necessary, to determine the CBR value. CBR values are given in Appendix B. At completion of the test, a sample was obtained at the point of penetration for a water content determination.

Cone Penetrometer Measurements

The cone penetrometer used at McClellan Air Force Base was hand operated (Figure 6). The penetrometer consists of a shaft with a 0.2-inch-area cone at the end for shearing the soil. Load readings are taken from a precalibrated proving ring and dial gage indicator. The load in pounds was converted to pounds per square inch, and that value was taken as the cone index.

Because of the hard crust on the soil at McClellan, the surface could not be penetrated. A person cannot apply sufficient force to penetrate the soil when the equivalent CBR is greater than approximately 20. Therefore, a



Figure 6. Penetrometer.

trencher was used to excavate to a depth at which the soil could be penetrated (Figure 7). Results of the penetrometer tests are given in Appendix C.

Nuclear Moisture-Density Tests

The Troxler Electronic Laboratories Model 3411-B nuclear moisture-density gage was used for in-place field measurements for soil moisture and density (Figure 8). There are two nuclear sources in the gage. The Cesium source for density measurements is located on the end of the source rod which can measure to a depth of 12 inches. The Americium source is used for moisture measurements and is located in the approximate center of the gage base. The reading of wet density is converted to dry density by the internal microprocessor using the moisture content obtained.

Because the source for moisture measurements is located in the base of the Troxler, the moisture readings are most accurate near the gage. The source does not penetrate the soil, as does the density source, and is heavily influenced by the water closest to it. In the CBR tests, the gage was placed

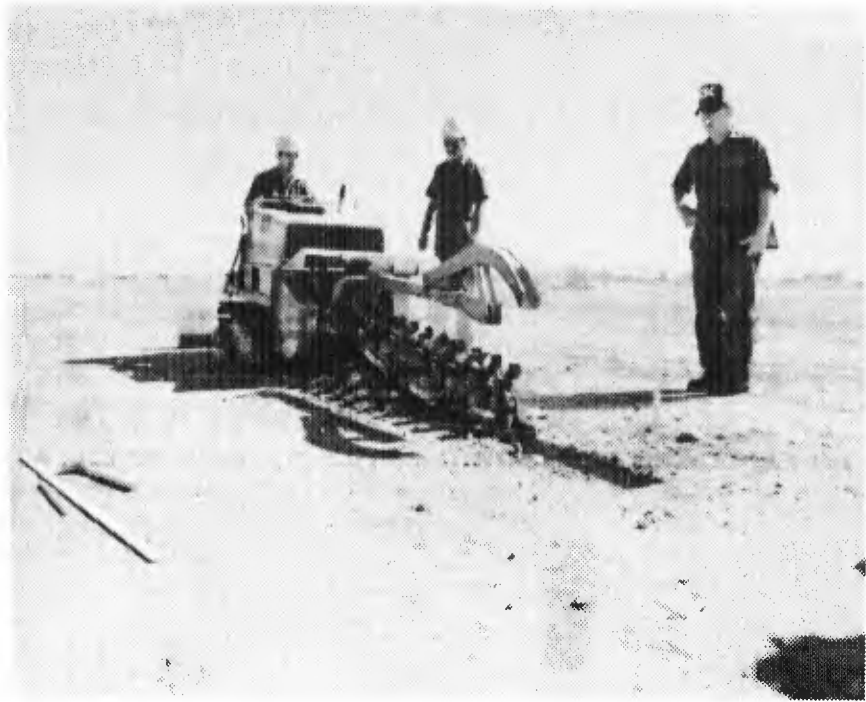


Figure 7. Ditching Machine.

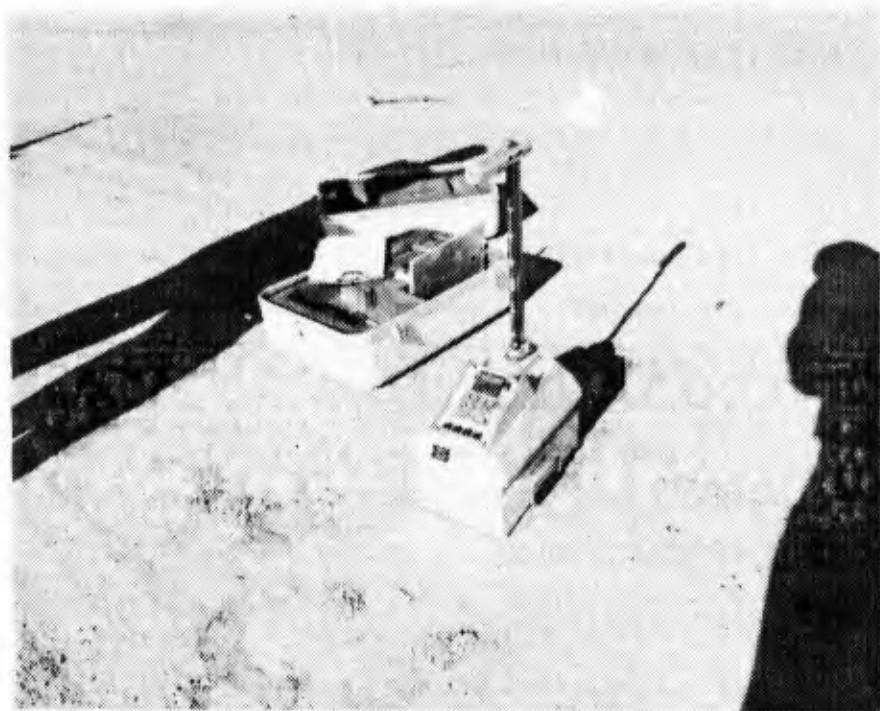


Figure 8. Nuclear Moisture-Density.

at the two elevations at which the CBR readings were taken. On the penetrometer tests, however, the Troxler remained at the surface; therefore, little confidence is placed in the deeper readings. For this reason, samples for laboratory testing were taken at the depth of the density readings. These laboratory moisture contents were used to convert wet density for more accurate results. Moisture content and density values are given in Appendix D.

LABORATORY SOIL TESTS

Soil samples were classified onsite in a field laboratory. Samples were analyzed for particle size, liquid limit, plastic limit, plasticity index, engineering classification, and moisture content. Additional laboratory testing was done at NMERI, including specific gravity, -200 particle size, and the remolded, unconsolidated, undrained (UU) triaxial tests.* Laboratory soil test results are given in Appendix E.

GROUND LOAD VEHICLE (LOAD CART)

The vehicle used for wheel load simulation was furnished by AFESC. The load cart was a front-wheel-drive military truck, modified by replacing the rear of the vehicle with a frame on which an aircraft wheel was attached. Weights are loaded on the frame to simulate a single-wheel loading. The 17,000-pound single-wheel loading was approximately equal to that of a 38,000-pound aircraft. An outrigger wheel is attached for stability. Figure 9 is a photograph of the vehicle.

RUT MEASUREMENTS

A Hewlett-Packard 3810-A surveying instrument was used in measuring the ruts of the aircraft right main gear, left main gear, and nose wheels. Ground readings were taken next to the tire ruts and in the center of the tire print of all four wheels.

The 3810-A reads horizontal distance and angle and vertical distance and angle, giving the location on an X-Y coordinate grid and the depth of the rut.

*These tests were conducted according to American Society for Testing and Materials (ASTM) specifications as given in ASTM documents D-422, D-423, D-424, D-2487, D-2216, D-854, and D-2850.

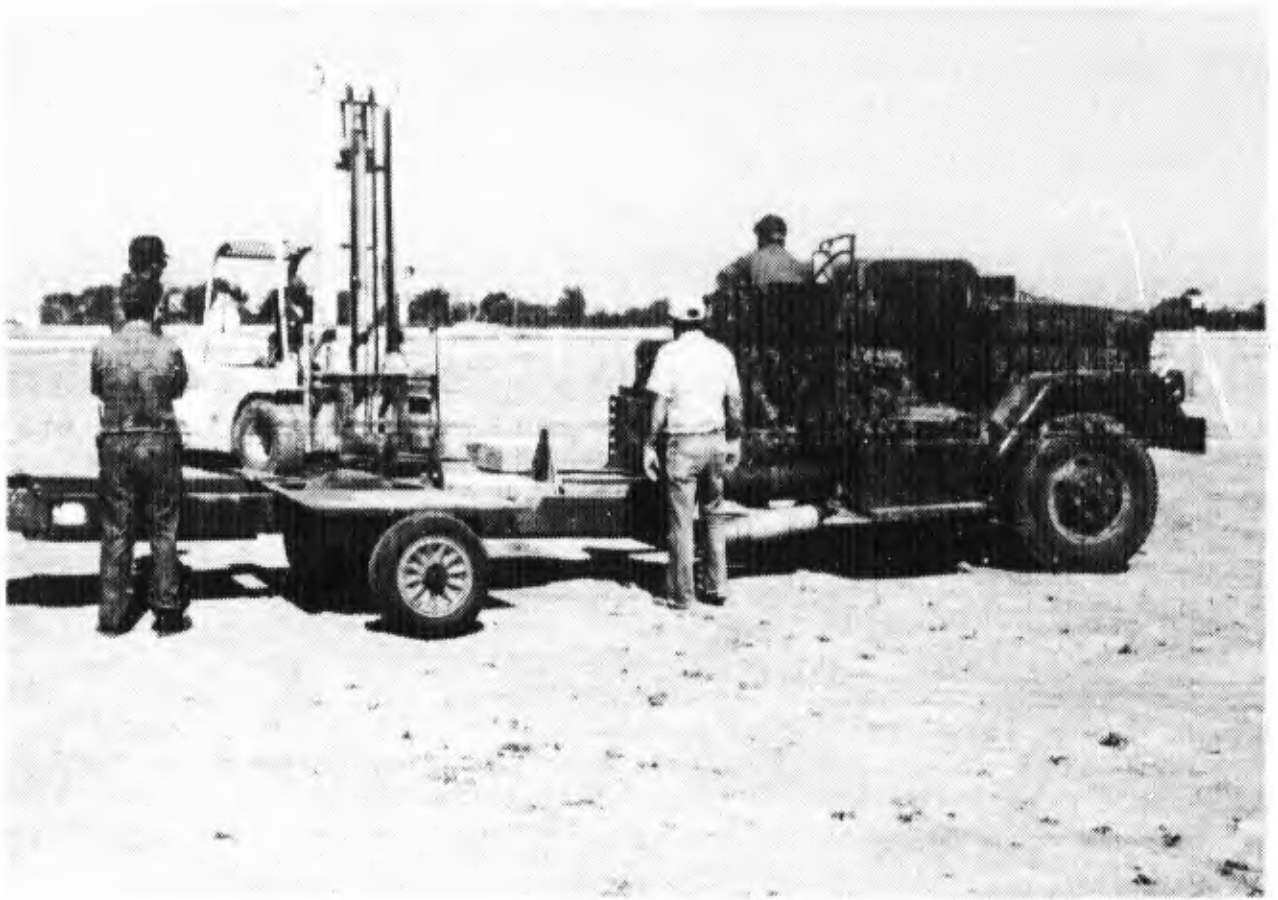


Figure 9. Photograph of Load Cart.

Because many rut depth measurements were very small, and because of surface slopes and roughness, some rut depth measurements were actually higher (positive) than the surrounding surface elevations. This system for measuring rut depth is not satisfactory. However, the location of the rut by this system gives good results and is accurate. Rut depth measurements are given in Appendix F.

SUMMARY

The soil at Area 2, McClellan AFB consisted of inorganic clays with low to medium plasticity (CL) and inorganic silts with very fine sands (ML).* CBR soil strengths for the entire area averaged 41 for the surface readings and 20 for the 10-inch depth. The south and center part of the test area (station 0+00 to 14+00) had surface readings averaging 44 with 10-inch depths averaging 7. At the north end (station 14+00 to 19+00) the CBRs averaged 37 at the surface and 52 at the 10-inch depth. Beyond station 19+00 the soil strength was comparable to the south end with low 10-inch depth values.

Analysis of the load-bearing capacity of the soils was complicated by the two-layered soil strength at the south and center portion of the test area. When the hard upper layer is sheared the soil strength would not support the load at 38,000-pounds. The north end soil strength was too high to give any significant rut depths at the heavier 54,000-pound load.

Softer, uniform with depth soils would give data which could be analyzed for comparison with predicted routines.

CONCLUSIONS

The in situ field test data collected on Area 2 at McClellan Air Force Base exhibited a range of values which are indicative of the soil conditions at the time of the F-4 aircraft operations. Laboratory data on disturbed soil samples were used to identify the soil strength and engineering properties parameters.

*Unified Soil Classification System.

Penetrometer data obtained in the field and correlated with CBR and soil property data can be used to rapidly evaluate soft soil for aircraft operations.

The ground roughness surveys and rut depth measurements from the aircraft operations performed in this project, along with the soil data, provide information for the validation of computer routines which predict the ability of aircraft to operate on soft soil surfaces.

APPENDIX A
GROUND ROUGHNESS SURVEYS

TABLE A-1. F-4E SAFE/McCLELLAN AFB TEST PROGRAM GROUND ROUGHNESS SURVEY.
GROUND ELEVATION LINE "A" (25 FT EAST OF \mathcal{C}).

\mathcal{C} Station (North-South)	Surface Elevation (ft)	\mathcal{C} Station (North-South)	Surface Elevation (ft)
-1 + 50.0	70.1	2 + 74.1	71.3
-1 + 38.6	70.2	2 + 83.9	71.4
-1 + 27.3	70.4	2 + 94.4	71.4
-1 + 16.8	70.6	3 + 04.6	71.6
-1 + 06.4	70.7	3 + 14.6	71.9
-0 + 98.0	70.8	3 + 24.8	72.0
-0 + 88.7	70.8	3 + 35.5	71.8
-0 + 79.9	71.0	3 + 46.4	72.0
-0 + 71.3	70.9	3 + 5.64	71.9
-0 + 63.3	71.0	3 + 65.8	72.1
-0 + 54.2	71.0	3 + 75.4	72.2
-0 + 44.1	71.2	3 + 85.6	72.1
-0 + 34.9	71.3	3 + 95.5	72.0
-0 + 24.7	71.7	4 + 04.9	72.0
-0 + 14.6	71.8	4 + 14.5	71.7
-0 + 03.5	71.7	4 + 24.8	71.8
0 + 07.2	72.0	4 + 34.6	71.9
0 + 17.7	72.0	4 + 44.6	71.8
0 + 27.5	72.1	4 + 54.7	71.9
0 + 38.3	72.1	4 + 64.1	71.9
0 + 48.7	72.1	4 + 73.8	72.0
0 + 59.3	72.0	4 + 83.0	72.1
0 + 76.6	72.1	4 + 92.7	72.0
0 + 81.5	72.0	5 + 01.7	72.0
0 + 92.9	71.9	5 + 09.4	71.7
1 + 03.5	71.9	5 + 19.4	72.0
1 + 14.1	71.8	5 + 29.1	72.5
1 + 24.5	71.9	5 + 38.9	72.5
1 + 35.1	72.1	5 + 49.0	72.3
1 + 45.1	72.1	5 + 59.6	72.0
1 + 53.6	72.0	5 + 69.0	72.3
1 + 63.3	72.1	5 + 7.8	72.0
1 + 73.3	72.0	5 + 56.5	72.4
1 + 82.2	71.8	5 + 96.3	72.4
1 + 92.7	72.1	6 + 12.0	72.2
2 + 02.8	71.6	6 + 24.5	72.3
2 + 13.3	71.3	6 + 35.3	72.5
2 + 23.6	71.5	6 + 48.4	72.4
2 + 33.9	71.4	6 + 61.8	72.5
2 + 43.5	71.4	6 + 73.8	72.2
2 + 53.6	71.4	6 + 86.7	72.3
2 + 64.1	71.3	7 + 01.1	72.7

\mathcal{C} - centerline

TABLE A-1. F-4E SAFE/McCLELLAN AFB TEST PROGRAM GROUND ROUGHNESS SURVEY.
GROUND ELEVATION LINE "A" (25 FT EAST OF Q) (CONTINUED).

Q Station (North-South)	Surface Elevation (ft)	Q Station (North-South)	Surface Elevation (ft)
7 + 14.7	72.7	13 + 53.7	74.2
7 + 28.6	72.6	13 + 66.1	74.2
7 + 42.7	72.7	13 + 79.2	74.3
7 + 56.9	72.6	13 + 92.4	74.2
7 + 70.6	72.4	14 + 05.2	74.2
7 + 85.1	72.2	14 + 18.1	74.4
7 + 98.7	72.2	14 + 31.3	74.3
8 + 12.5	72.6	14 + 43.8	74.3
8 + 25.9	73.1	14 + 56.0	74.5
8 + 40.2	73.2	14 + 68.2	74.4
8 + 53.7	73.0	14 + 80.1	74.8
8 + 65.7	72.9	14 + 92.6	74.6
8 + 78.4	72.8	15 + 04.7	74.8
8 + 90.8	72.9	15 + 16.9	74.8
9 + 03.5	73.3	15 + 20.3	74.9
9 + 16.5	73.3	15 + 41.1	74.7
9 + 29.5	73.3	15 + 53.1	74.6
9 + 42.5	73.6	15 + 65.5	74.9
9 + 55.7	73.7	15 + 77.4	74.9
9 + 68.5	73.6	15 + 89.2	75.1
9 + 81.5	73.7	16 + 01.7	75.3
9 + 94.3	74.0	16 + 14.4	75.4
10 + 06.9	73.6	16 + 25.1	75.4
10 + 19.5	73.6	16 + 36.9	75.4
10 + 31.8	73.6	16 + 48.5	75.7
10 + 44.1	73.8	16 + 61.3	75.6
10 + 57.1	73.5	16 + 74.0	75.6
10 + 84.2	73.1	16 + 90.0	75.7
10 + 97.5	72.8	16 + 98.0	75.7
11 + 10.2	73.1	17 + 10.4	75.6
11 + 23.1	73.4	17 + 22.0	75.8
11 + 36.6	73.4	17 + 34.4	75.6
11 + 49.4	73.6	17 + 45.8	75.5
11 + 62.4	73.6	17 + 57.3	75.5
11 + 75.4	73.7	17 + 69.3	75.8
11 + 88.4	73.7	17 + 81.6	75.7
12 + 01.3	73.7	17 + 93.7	75.6
12 + 14.0	73.6	17 + 96.0	75.5
12 + 26.4	73.7	18 + 08.3	75.5
12 + 39.3	73.6	18 + 21.0	75.5
12 + 51.5	73.7	18 + 33.1	75.4
12 + 64.3	73.9	18 + 45.9	75.4
12 + 77.2	73.7	18 + 58.4	75.4
12 + 90.0	73.6	18 + 70.7	75.5
13 + 03.0	74.0	18 + 83.8	75.7
13 + 15.8	74.5	18 + 96.6	75.8
13 + 28.5	74.1	19 + 10.3	75.8
13 + 41.3	74.1	19 + 23.0	75.7

TABLE A-1. F-4E SAFE/McCLELLAN AFB TEST PROGRAM GROUND ROUGHNESS SURVEY.
GROUND ELEVATION LINE "A" (25 FT EAST OF ζ) (CONCLUDED).

ζ Station (North-South)	Surface Elevation (ft)	ζ Station (North-South)	Surface Elevation (ft)
19 + 36.5	75.7	26 + 06.8	72.3
19 + 49.5	75.6	26 + 20.4	72.3
19 + 62.8	75.7	26 + 33.4	72.5
19 + 76.1	75.8	26 + 47.2	72.7
19 + 89.2	75.8	26 + 63.1	73.0
20 + 03.2	75.6	26 + 86.1	73.5
20 + 16.2	75.4		
20 + 28.6	75.1		
20 + 40.8	74.3		
20 + 52.6	74.7		
20 + 65.4	74.8		
20 + 78.1	74.8		
20 + 90.6	74.7		
21 + 03.5	74.6		
21 + 29.3	74.5		
21 + 42.6	74.4		
21 + 56.1	74.1		
21 + 69.6	74.2		
21 + 82.3	74.1		
21 + 96.2	73.8		
22 + 09.9	73.8		
22 + 23.5	73.7		
22 + 36.7	73.7		
22 + 51.2	73.7		
22 + 64.1	73.5		
22 + 78.0	73.5		
22 + 92.1	73.4		
23 + 06.1	73.3		
23 + 19.6	73.2		
23 + 33.9	73.1		
23 + 46.7	73.0		
23 + 59.3	73.0		
23 + 72.8	72.9		
23 + 87.1	72.8		
24 + 01.4	72.7		
24 + 15.1	72.6		
24 + 29.4	72.3		
24 + 43.0	72.3		
24 + 56.7	72.2		
24 + 70.0	72.2		
24 + 83.5	72.1		
25 + 12.9	71.9		
25 + 26.8	71.9		
25 + 41.0	71.9		
25 + 53.1	71.8		
25 + 65.8	71.8		
25 + 79.2	71.8		
25 + 92.6	72.1		

TABLE A-2. F-4E SAFE/McCLELLAN AFB TEST PROGRAM GROUND ROUGHNESS SURVEY.
GROUND ELEVATION LINE "B" (25 FT EAST OF ζ).

ζ Station (North-South)	Surface Elevation (ft)	ζ Station (North-South)	Surface Elevation (ft)
-1 + 50.0	69.7	3 + 47.6	71.5
-1 + 39.4	69.7	3 + 56.4	71.6
-1 + 27.7	69.9	3 + 65.4	71.6
-1 + 14.8	70.3	3 + 74.7	71.6
-1 + 01.0	70.6	3 + 83.8	71.7
-0 + 88.2	71.0	3 + 93.2	71.7
-0 + 74.6	71.2	4 + 02.3	71.7
-0 + 59.7	71.5	4 + 12.8	71.7
-0 + 46.6	71.7	4 + 22.0	71.7
-0 + 34.1	71.8	4 + 31.4	71.7
-0 + 20.2	71.9	4 + 40.4	71.8
-0 + 06.7	72.0	4 + 49.1	71.9
0 + 06.8	72.0	4 + 58.6	71.9
0 + 20.9	72.1	4 + 67.1	72.0
0 + 30.8	72.1	4 + 75.6	71.9
0 + 44.6	72.2	4 + 84.3	71.9
0 + 58.1	72.2	4 + 94.8	71.8
0 + 72.2	72.3	5 + 05.8	71.7
0 + 85.2	72.3	5 + 15.9	71.8
1 + 00.2	72.2	5 + 25.8	71.7
1 + 16.5	72.1	5 + 35.6	71.6
1 + 30.4	72.3	5 + 45.9	71.6
1 + 43.0	72.1	5 + 55.0	71.6
1 + 53.9	72.0	5 + 64.8	71.6
1 + 64.5	72.0	5 + 74.0	71.7
1 + 75.2	71.8	5 + 84.4	71.7
1 + 85.6	71.8	5 + 94.0	71.6
1 + 95.4	71.8	6 + 05.1	71.4
2 + 06.3	71.6	6 + 15.8	71.4
2 + 16.3	71.6	6 + 25.4	71.2
2 + 26.2	71.7	6 + 35.7	71.1
2 + 36.7	71.7	6 + 47.1	71.2
2 + 47.8	71.6	6 + 57.9	71.2
2 + 58.6	71.6	6 + 70.4	71.4
2 + 68.5	71.6	6 + 81.9	71.5
2 + 78.3	71.6	6 + 93.2	71.7
2 + 89.0	71.6	7 + 03.7	71.8
2 + 98.7	71.6	7 + 15.0	71.9
3 + 08.9	71.6	7 + 26.0	72.0
3 + 19.1	71.6	7 + 36.8	71.8
3 + 27.6	71.5	7 + 47.0	71.8
3 + 37.2	71.5	7 + 58.7	71.8

TABLE A-2. F-4E SAFE/McCLELLAN AFB TEST PROGRAM GROUND ROUGHNESS SURVEY.
GROUND ELEVATION LINE "B" (25 FT EAST OF ζ) (CONTINUED).

ζ Station (North-South)	Surface Elevation (ft)	ζ Station (North-South)	Surface Elevation (ft)
7 + 69.7	72.1	13 + 62.5	72.9
7 + 80.8	71.9	13 + 74.9	72.8
7 + 92.4	72.1	13 + 87.0	73.0
8 + 05.5	71.9	14 + 00.1	73.1
8 + 17.8	71.9	14 + 12.6	73.0
8 + 29.5	72.1	14 + 25.2	73.0
8 + 41.5	72.0	14 + 36.8	73.2
8 + 54.0	72.2	14 + 50.0	73.3
8 + 66.8	72.2	14 + 62.1	73.2
8 + 78.7	72.4	14 + 73.5	73.2
8 + 90.5	72.4	14 + 84.4	73.2
9 + 02.5	72.5	14 + 95.5	73.2
9 + 14.5	72.5	15 + 06.8	73.7
9 + 26.1	72.5	15 + 17.7	73.5
9 + 37.7	72.6	15 + 29.4	73.6
9 + 49.8	72.4	15 + 41.3	73.6
9 + 61.8	72.6	15 + 53.1	73.7
9 + 73.5	72.8	15 + 64.9	73.7
9 + 85.8	72.8	15 + 77.4	73.8
9 + 98.8	72.8	15 + 89.5	73.6
10 + 11.5	72.8	16 + 02.1	74.1
10 + 23.4	73.0	16 + 14.3	74.1
10 + 34.1	73.0	16 + 26.4	74.1
10 + 45.4	73.0	16 + 37.8	74.3
10 + 57.8	73.2	16 + 49.5	74.3
10 + 70.1	73.1	16 + 61.2	74.5
10 + 82.8	72.9	16 + 72.2	74.7
10 + 94.9	72.9	16 + 85.5	74.5
11 + 18.7	72.8	16 + 97.6	74.6
11 + 30.9	72.9	17 + 09.2	74.5
11 + 42.1	72.9	17 + 21.8	74.7
11 + 53.7	72.9	17 + 34.1	74.9
11 + 65.8	73.1	17 + 45.8	75.0
11 + 78.2	73.2	17 + 58.4	75.1
11 + 90.9	73.2	17 + 71.9	75.1
12 + 03.7	73.2	17 + 84.2	75.1
12 + 16.8	73.3	17 + 96.7	75.2
12 + 29.6	73.3	18 + 01.2	75.3
12 + 42.0	73.3	18 + 13.2	75.3
12 + 54.5	73.1	18 + 25.9	75.4
12 + 66.3	73.2	18 + 39.0	75.5
12 + 78.0	73.2	18 + 51.7	75.5
12 + 89.7	73.4	18 + 64.6	75.7
13 + 00.7	73.3	18 + 77.5	75.9
13 + 13.1	73.0	18 + 90.3	75.9
13 + 26.5	73.2	19 + 03.4	76.0
13 + 39.9	73.2	19 + 16.4	76.1
13 + 52.2	73.2	19 + 29.3	76.0

TABLE A-2. F-4E SAFE/McCLELLAN AFB TEST PROGRAM GROUND ROUGHNESS SURVEY.
GROUND ELEVATION LINE "D" (25 FT EAST OF Q) (CONCLUDED).

Q Station (North-South)	Surface Elevation (ft)	Q Station (North-South)	Surface Elevation (ft)
19 + 43.1	76.2	25 + 90.7	71.7
19 + 56.4	76.3	26 + 03.5	71.8
19 + 68.9	76.4	26 + 16.9	72.0
19 + 82.8	76.2	26 + 30.6	72.2
19 + 95.1	76.4	26 + 42.5	72.6
20 + 08.4	76.4	26 + 54.5	72.8
20 + 20.8	76.4	26 + 66.1	72.0
20 + 33.7	76.3	26 + 83.3	72.0
20 + 46.7	76.1		
20 + 60.2	76.0		
20 + 73.8	75.6		
20 + 87.7	75.4		
21 + 00.5	75.3		
21 + 13.3	75.1		
21 + 38.5	74.9		
21 + 51.6	74.8		
21 + 65.0	74.8		
21 + 78.1	74.8		
21 + 90.5	74.8		
22 + 02.9	74.8		
22 + 15.0	74.6		
22 + 27.6	74.4		
22 + 41.0	74.3		
22 + 54.0	74.1		
22 + 66.5	73.9		
22 + 79.5	73.8		
22 + 92.0	73.7		
23 + 04.1	73.6		
23 + 17.3	73.6		
23 + 30.7	73.4		
23 + 43.9	73.2		
23 + 55.7	73.0		
23 + 67.9	72.9		
23 + 80.6	72.9		
23 + 94.2	72.8		
24 + 07.2	72.7		
24 + 20.9	72.6		
24 + 34.6	72.4		
24 + 47.6	72.2		
24 + 60.6	72.1		
24 + 73.2	72.0		
24 + 97.8	72.0		
25 + 11.4	71.9		
25 + 24.4	71.9		
25 + 38.1	71.9		
25 + 51.3	71.9		
25 + 64.8	71.9		
25 + 78.8	71.7		

TABLE A-3. F-4E SAFE/McCLELLAN AFB TEST PROGRAM GROUND ROUGHNESS SURVEY.
GROUND ELEVATION LINE "1" (135 FT EAST OF Q).

Q Station (North-South)	Surface Elevation (ft)	Q Station (North-South)	Surface Elevation (ft)
0 + 23.1	71.26		
0 + 45.4	71.46	9 + 53.3	73.2
0 + 70.8	71.56	9 + 74.5	73.2
0 + 93.2	71.56	9 + 96.4	73.3
1 + 15.3	71.56	10 + 18.1	73.5
1 + 37.9	71.46	10 + 39.7	73.6
1 + 60.9	71.56	10 + 60.7	73.8
1 + 83.8	71.66	10 + 81.8	73.6
2 + 06.7	71.46	11 + 02.8	73.4
2 + 29.2	71.26	11 + 24.4	73.5
2 + 51.9	71.06	11 + 46.3	73.7
2 + 74.2	71.16	11 + 67.8	73.9
2 + 95.6	71.16	11 + 88.5	74.0
3 + 17.9	71.2	12 + 09.7	71.06
3 + 40.8	71.6	12 + 32.9	74.0
3 + 63.4	71.7	12 + 56.2	74.1
3 + 85.6	71.9	12 + 78.8	74.1
4 + 07.7	72.0	13 + 01.0	74.1
4 + 29.4	71.8	13 + 23.7	74.1
4 + 51.5	71.7	13 + 46.1	74.3
4 + 73.4	71.7	13 + 67.9	74.3
4 + 95.2	71.8	13 + 91.3	74.3
5 + 17.4	71.8	14 + 15.1	74.4
5 + 39.7	71.7	14 + 38.6	74.4
5 + 61.7	71.8	14 + 62.1	74.5
5 + 84.1	71.9	14 + 85.4	74.5
6 + 05.8	72.1	15 + 08.3	74.6
6 + 27.8	72.2	15 + 32.7	74.6
6 + 49.6	72.3	15 + 55.1	74.7
6 + 71.7	72.2	15 + 77.3	74.7
6 + 93.3	72.3	16 + 00.0	74.8
7 + 14.8	72.4	16 + 23.8	75.0
7 + 36.8	72.5	16 + 47.8	75.2
7 + 58.9	72.5	16 + 71.4	75.3
7 + 81.0	72.4	16 + 93.8	75.3
8 + 02.5	72.3	17 + 16.5	75.3
8 + 24.0	72.5	17 + 39.3	75.2
8 + 45.2	72.7	17 + 61.6	75.2
8 + 67.2	72.7	17 + 84.0	75.3
8 + 88.9	72.9	18 + 06.6	75.3
9 + 09.9	72.9	18 + 28.7	75.3
9 + 31.9	73.0	18 + 51.1	75.4
		18 + 74.4	75.3

TABLE A-3. F-4E SAFE/McCLELLAN AFB TEST PROGRAM GROUND ROUGHNESS SURVEY.
GROUND ELEVATION LINE "1" (135 FT EAST OF Q) (CONCLUDED).

Q Station (North-South)	Surface Elevation (ft)	Q Station (North-South)	Surface Elevation (ft)
18 + 97.0	75.3		
19 + 19.7	75.3		
19 + 44.6	75.4		
19 + 68.2	75.3		
19 + 91.6	75.3		
20 + 14.0	75.2		
20 + 35.6	75.0		
20 + 57.9	74.8		
20 + 81.2	74.5		
21 + 04.7	74.4		
21 + 28.3	74.3		
21 + 52.6	74.0		
21 + 75.6	73.8		
21 + 98.4	73.7		
22 + 21.3	73.5		
22 + 43.4	73.5		
22 + 66.3	73.4		
22 + 89.4	73.3		
23 + 14.2	73.0		
23 + 36.9	72.8		
23 + 60.1	72.6		
23 + 82.6	72.5		
24 + 00.8	72.4		

TABLE A-4. F-4E SAFE/McCLELLAN AFB TEST PROGRAM GROUND ROUGHNESS SURVEY.
GROUND ELEVATION LINE "2" (70 FT EAST OF Q).

Q Station (North-South)	Surface Elevation (ft)	Q Station (North-South)	Surface Elevation (ft)
0 + 18.5	71.6	9 + 98.0	72.7
0 + 42.0	71.7	10 + 20.2	72.9
0 + 64.2	71.7	10 + 42.7	73.1
0 + 85.8	71.7	10 + 65.0	73.1
1 + 04.9	71.7	10 + 87.2	73.0
1 + 26.8	71.6	11 + 10.3	72.9
1 + 48.5	71.6	11 + 33.3	73.1
1 + 69.8	71.7	11 + 54.9	73.2
1 + 91.7	71.6	11 + 77.1	73.5
2 + 13.8	71.5	11 + 00.4	73.5
2 + 36.8	71.3	11 + 22.4	73.7
2 + 59.3	71.0	12 + 45.9	73.7
2 + 81.7	70.9	12 + 69.8	73.7
3 + 03.6	71.0	12 + 92.8	73.8
3 + 26.3	71.2	13 + 18.1	73.7
3 + 48.8	71.3	13 + 41.8	73.8
3 + 71.6	71.2	14 + 34.3	73.8
3 + 94.1	71.3	14 + 57.7	73.9
4 + 16.4	71.3	14 + 80.6	73.9
4 + 38.6	71.2	15 + 03.6	74.0
4 + 60.6	71.5	15 + 27.1	73.9
4 + 82.9	71.5	15 + 50.2	74.1
5 + 05.4	71.5	15 + 73.3	74.3
5 + 28.3	71.6	15 + 97.0	74.4
5 + 50.9	71.6	16 + 20.2	74.5
5 + 73.7	71.7	16 + 43.4	74.6
5 + 95.9	71.9	16 + 67.1	74.6
6 + 18.4	71.9	16 + 89.6	74.7
6 + 40.9	71.9	17 + 13.7	74.9
6 + 63.7	72.0	17 + 37.4	75.1
6 + 86.9	72.0	17 + 60.3	75.3
7 + 09.2	72.1	17 + 83.0	75.4
7 + 75.2	72.1	18 + 06.2	75.5
7 + 97.3	72.2	18 + 29.1	75.5
8 + 18.8	72.3	18 + 52.9	75.7
8 + 40.6	72.4	18 + 76.3	75.7
8 + 62.4	72.4	19 + 00.2	75.8
8 + 84.4	72.3	19 + 22.9	75.8
9 + 07.7	72.5	19 + 46.2	75.7
9 + 30.2	72.6	20 + 16.6	75.7
9 + 52.4	72.6	20 + 40.0	75.5
9 + 75.1	72.8	20 + 63.8	75.2

TABLE A-4. F-4E SAFE/McCLELLAN AFB TEST PROGRAM GROUND ROUGHNESS SURVEY.
GROUND ELEVATION LINE "2" (70 FT EAST OF \mathcal{C}) (CONCLUDED).

\mathcal{C} Station (North-South)	Surface Elevation (ft)	\mathcal{C} Station (North-South)	Surface Elevation (ft)
20 + 87.5	74.9		
21 + 11.3	74.7		
21 + 35.0	74.4		
21 + 58.4	74.3		
21 + 82.0	74.1		
22 + 05.6	73.9		
22 + 30.0	73.7		
22 + 53.1	73.5		
22 + 76.8	73.5		
23 + 00.3	73.3		
23 + 24.4	73.0		
23 + 47.9	72.7		
23 + 72.4	72.7		
24 + 00.2	72.3		

TABLE A-5. F-4E SAFE/McCLELLAN AFB TEST PROGRAM GROUND ROUGHNESS SURVEY.
GROUND ELEVATION LINE "3" (5 FT EAST OF Q).

Q Station (North-South)	Surface Elevation (ft)	Q Station (North-South)	Surface Elevation (ft)
0 + 22.1	71.7	9 + 49.7	72.2
0 + 44.6	71.8	9 + 71.5	72.2
0 + 67.4	71.9	9 + 93.2	72.4
0 + 82.0	72.0	10 + 15.6	72.5
1 + 11.4	72.0	10 + 37.8	72.8
1 + 32.7	72.1	10 + 59.5	72.9
1 + 54.8	72.0	10 + 69.4	72.5
1 + 76.9	71.9	10 + 85.1	72.8
1 + 99.0	71.8	11 + 07.8	72.6
2 + 21.8	71.8	11 + 30.5	72.7
2 + 44.0	71.6	11 + 52.4	72.9
2 + 65.6	71.5	11 + 74.1	73.0
2 + 87.0	71.5	11 + 96.1	73.2
3 + 07.8	71.4	12 + 18.1	73.3
3 + 30.1	71.4	12 + 38.6	73.3
3 + 52.3	71.4	12 + 61.7	73.4
3 + 74.9	71.4	12 + 84.6	73.3
3 + 97.1	71.5	13 + 08.9	73.2
4 + 19.6	71.6	13 + 32.4	73.1
4 + 41.2	71.6	13 + 55.8	73.0
4 + 62.6	71.6	13 + 80.2	73.0
4 + 84.8	71.7	14 + 03.8	73.0
5 + 10.5	71.7	14 + 26.8	73.1
5 + 32.1	71.6	14 + 50.3	73.1
5 + 54.8	71.4	14 + 74.1	73.1
5 + 77.9	71.5	14 + 97.5	73.2
6 + 00.6	71.6	15 + 21.0	73.1
6 + 22.1	71.5	15 + 43.8	73.3
6 + 44.6	71.2	15 + 67.0	73.3
6 + 55.9	71.2	15 + 89.6	73.5
6 + 88.3	71.4	16 + 12.5	73.6
7 + 09.8	71.6	16 + 35.9	73.6
7 + 31.7	71.7	16 + 59.1	73.7
7 + 53.4	71.8	16 + 82.5	73.7
7 + 75.6	71.8	17 + 05.7	73.8
7 + 97.7	71.8	17 + 29.3	73.9
8 + 18.7	71.9	17 + 52.3	74.0
8 + 40.6	72.0	17 + 75.2	74.2
8 + 61.2	72.1	17 + 98.1	74.4
8 + 83.4	72.1	18 + 21.5	74.4
9 + 05.4	72.2	18 + 44.5	74.4
9 + 28.1	72.3	18 + 68.1	74.7

TABLE A-5. F-4E SAFE/McCLELLAN AFB TEST PROGRAM GROUND ROUGHNESS SURVEY.
GROUND ELEVATION LINE "3" (5 FT EAST OF ζ) (CONCLUDED).

ζ Station (North-South)	Surface Elevation (ft)	ζ Station (North-South)	Surface Elevation (ft)
18 + 91.5	74.6		
19 + 15.3	75.0		
19 + 38.8	75.2		
19 + 61.0	75.5		
19 + 85.4	75.7		
20 + 09.5	75.8		
20 + 33.8	75.8		
20 + 57.2	75.6		
20 + 80.1	75.4		
21 + 03.1	75.0		
21 + 26.5	74.8		
21 + 49.5	74.7		
21 + 72.6	74.4		
21 + 95.8	74.3		
22 + 18.7	73.9		
22 + 42.2	73.6		
22 + 65.4	73.4		
22 + 88.7	73.3		
23 + 11.7	73.2		
23 + 35.4	72.7		
23 + 58.7	72.6		
23 + 81.7	72.6		
23 + 99.7	72.6		

APPENDIX B
CALIFORNIA BEARING RATIO

TABLE B-1. CALIFORNIA BEARING RATIO (CBR) TESTS.

Test Designation	Date	Location, ft		Depth, in	CBR Value	
		X	Y		0.1 in	0.2 in
CBR 1	5-30-81	1935.606	151.320	1	28	---
				10	4.2	5.6
CBR 2	5-30-81	1947.061	2.463	0	49	42
				10	19	19
CBR 3	5-30-81	1240.406	-5.338	0	36	40
				10	3.9	4.0
CBR 4	6-1-81	367.573	140.612	0	33	32
				10	8.0	8.4
CBR 5	6-2-81	376.435	-11.803	0	45	31
				10	5.5	6.0
CBR 6	6-2-81	551.642	38.736	0	36	38
				10	10	12.3
CBR 7	6-3-81	724.801	-12.00	0	62	42
				10	7.6	8.7
CBR 8	6-3-81	722.889	141.461	0	41	32
				10	7.3	7.2
CBR 9	6-4-81	901.363	126.111	0	42	36
				10	8.0	8.3
CBR 10	6-4-81	989.667	174.639	0	25	23
				10	6.0	5.3
CBR 11	6-5-81	1196.384	123.674	0	50	42
				10	5.0	5.0
CBR 12	6-5-81	1402.846	24.211	0	54	42
				10	7.0	7.0
CBR 13	6-5-81	1501.248	175.268	0	18	18
				10	59	---
CBR 14	6-6-81	1600.848	124.764	0	42	38
				10	65	---
CBR 15	6-6-81	1803.111	24.708	0	48	39
				9	37	31
CBR 16	6-6-81	1801.346	175.304	0	19	18
				10	80+	---
CBR 17	6-8-81	901.363	-36.110	0	43	44
				10	6.0	6.0

--- indicates no value obtained.

TABLE B-1. CALIFORNIA BEARING RATIO (CBR) TESTS (CONCLUDED).

Test Designation	Date	Location, ft		Depth, in	CBR Value	
		X	Y		0.1 in	0.2 in
CBR 18	6-8-81	1403.060	-34.389	0	41	41
				10	24	35
CBR 19	6-8-81	1804.611	-34.040	0	54	---
				10	37	35
CBR 4A	6-12-81	367.573	140.612	0	35	---
				10	6.0	6.3
CBR 6A	6-12-81	551.642	38.736	0	53	43
				10	19	14
CBR 8A	6-12-81	722.889	141.461	0	36	34
				10	9	9

--- indicates no value obtained.

APPENDIX C
PENETROMETER TESTS

TABLE C-1. TESTS BEFORE AIRCRAFT OPERATIONS.

Test Designation	Date	Location, ft		Depth, in	Penetration Resistance, lb			
		X	Y		Test 1	Test 2	Test 3	Average
PEN 1	6-15-81	---	---	8	160	---	---	---
				10	30	---	---	---
				12	35	---	---	---
				14	40	---	---	---
PEN 2	6-15-81	---	---	4	---	>180	---	---
				6	---	>180	---	---
				8	---	>180	---	---
				10	160	>180	---	---
				12	160	>180	---	---
				14	160	>180	---	---
CBR 3	6-11-81	1240.406	-5.338	8.5	140	160	155	152
				11.5	175	165	150	163
				14.5	125	150	125	133
CBR 4	6-11-81	367.573	140.612	7	140	135	145	140
				10	100	115	110	108
				13	120	115	75	103
CBR 4A	6-13-81	376.573	140.612	13	40	25	25	30
				16	40	20	30	30
				19	25	25	30	27
CBR 5	6-11-81	376.435	-11.803	7.5	150	120	140	137
				10.5	135	100	95	110
				13.5	125	105	115	115
CBR 6	6-11-81	551.642	38.736	10	125	130	175	143
				13	160	135	175	157
				16	145	105	130	133
CBR 6A	6-13-81	551.642	38.736	13	---	---	160	---
				16	---	---	---	---
				19	---	---	---	---
CBR 7	6-11-81	724.801	-12.000	8	185	175	170	177
				11	145	170	170	162
				14	75	65	105	82
CBR 8	6-11-81	722.889	141.461	9.5	190	220	220	220
				12.5	160	---	---	---
				15.5	140	---	---	---
CBR 8A	6-13-81	722.889	141.461	13	125	120	135	127
				16	90	75	110	92
				19	65	40	45	50

--- indicates no data obtained.

TABLE C-1. TESTS BEFORE AIRCRAFT OPERATIONS (CONTINUED).

Test Designation	Date	Location, ft		Depth, in	Penetration Resistance, lb			
		X	Y		Test 1	Test 2	Test 3	Average
CBR 9	6-11-81	901.363	26.111	5.5	200	195	175	190
				8.5	215	155	185	185
				11.5	180	160	160	167
CBR 10	6-11-81	989.667	174.639	6	200	165	145	170
				9	190	130	145	155
				12	165	170	135	157
CBR 11	6-11-81	1196.384	123.674	8.5	140	130	160	143
				11.5	90	135	145	123
				14.5	70	95	75	80
CBR 12	6-11-81	1402.846	24.211	6.5	140	165	180	162
				9.5	105	145	155	135
				12.5	125	125	145	132
CBR 17	6-11-81	901.363	-36.110	10	215	195	150	187
				13	205	185	155	182
				16	190	185	155	177
1-A	6-16-81	300.000	140.000	12	125	---	45	83
				14	125	50	40	72
				16	120	50	35	68
				18	85	40	35	53
				20	45	45	70	53
				22	55	55	70	60
				24	80	65	75	73
2-A	6-16-81	376.573	140.612	10	---	---	65	---
				12	---	---	60	---
				14	150	100	55	82
				16	175	>160	90	>150
				18	170	---	>150	>150
3-A	6-16-81	500.000	140.000	Rock fill encountered				
4-A	6-16-81	600.000	140.000	14	55	40	50	48
				16	60	45	70	58
				18	60	45	70	58
				20	55	40	65	53
				22	50	50	60	53
				24	65	65	60	63
5-A	6-16-81	722.889	141.461	14	85	105	95	95
				16	75	70	95	80
				18	40	55	65	53
				20	40	45	55	47
				22	40	30	50	40
				24	35	40	50	42

--- indicates no data obtained.

TABLE C-1. TESTS BEFORE AIRCRAFT OPERATIONS (CONTINUED).

Test Designation	Date	Location, ft		Depth, in	Penetration Resistance, lb			
		X	Y		Test 1	Test 2	Test 3	Average
6-A	6-16-81	800.000	140.000	14	80	45	30	52
				16	85	35	35	52
				18	55	25	40	40
				20	45	35	40	40
				22	55	45	60	53
				24	85	>120	>120	>115
1-B	6-16-81	300.000	40.000	10	55	---	---	---
				12	70	---	40	55
				14	50	>150	>150	>125
				16	25	---	---	---
				18	25	---	---	---
				20	>150	---	---	---
2-B	6-16-81	400.000	40.000	12	75	---	---	---
				14	55	50	---	53
				16	75	50	45	57
				18	80	35	55	57
				20	90	45	>165	>100
				22	>120	100	---	>110
3-B	6-16-81	500.000	40.000	10	80	---	---	---
				12	30	---	---	---
				14	>160	---	---	---
				16	---	---	---	---
				18	---	125	---	125
				20	---	>165	>140	>150
4-B	6-16-81	551.642	38.736	10	---	50	105	73
				12	---	55	65	60
				14	50	65	60	58
				16	60	65	70	65
				18	50	120	90	87
				20	>160	>160	>160	>160
5-B	6-16-81	600.000	40.000	10	---	70	---	---
				12	120	80	60	90
				14	110	110	90	103
				16	110	135	70	112
				18	105	90	80	93
				20	75	75	65	72
				22	>160	120	90	>130
				24	---	>160	>150	>150

--- indicates no data obtained.

TABLE C-1. TESTS BEFORE AIRCRAFT OPERATIONS (CONTINUED).

Test Designation	Date	Location, ft		Depth, in	Penetration Resistance, lb			
		X	Y		Test 1	Test 2	Test 3	Average
6-B	6-16-81	700.000	40.000	10	---	70	100	85
				12	120	80	60	90
				14	110	110	90	103
				16	110	135	70	105
				18	105	90	80	93
				20	75	75	65	72
				22	>160	120	90	>120
				24	---	>160	>150	>155
7-B	6-16-81	800.000	40.000	8	---	---	105	---
				10	---	90	120	105
				12	20	100	55	58
				14	30	50	35	38
				16	30	35	35	33
				18	30	30	40	33
				20	>150	>150	>150	>150
1-C	6-16-81	300.000	-10.000	10	---	---	130	---
				12	25	55	130	70
				14	30	115	85	77
				16	40	90	70	67
				18	45	55	55	52
				20	65	45	40	50
				22	75	50	40	55
				24	60	55	55	57
2-C	6-16-81	376.435	-11.803	12	---	>110	---	---
				14	60	---	80	70
				16	60	---	75	68
				18	55	---	>160	>100
				20	>160	---	---	---
3-C	6-16-81	500.000	-10.000	10	---	---	100	---
				12	100	110	150	120
				14	>160	110	75	>100
				16	---	120	65	92
				18	---	50	50	50
				20	---	45	45	45
				22	---	50	45	47
				24	---	65	75	70
4-C	6-16-81	600.000	-10.000	14	45	90	70	68
				16	55	55	140	87
				18	40	>160	90	>75
				20	45	---	90	67
				22	55	---	80	67
				24	>150	---	85	>105

--- indicates no data obtained.

TABLE C-1. TESTS BEFORE AIRCRAFT OPERATIONS (CONTINUED).

Test Designation	Date	Location, ft		Depth, in	Penetration Resistance, lb			
		X	Y		Test 1	Test 2	Test 3	Average
5-C	6-16-81	724.801	-12.000	10	90	---	70	80
				12	105	---	130	118
				14	105	55	>165	>100
				16	75	75	---	75
				18	95	90	---	93
				20	100	105	---	103
				22	100	120	---	110
				24	100	130	---	115
6-C	6-16-81	800.000	-10.000	10	---	145	---	---
				12	---	>160	80	>100
				14	65	---	75	70
				16	90	---	>165	>100
				18	>160	---	---	---
1-D	6-17-81	800.000	175.000	10	70	70	65	68
				12	70	95	125	97
				14	70	105	100	93
				16	60	135	40	78
				18	65	125	40	77
				20	100	100	60	87
				22	80	50	>150	>80
				24	110	50	---	80
2-D	6-17-81	989.667	174.639	12	80	55	80	73
				14	90	75	90	85
				16	75	90	125	93
				18	105	130	70	102
				20	75	50	50	58
				22	50	50	50	50
				24	35	35	45	38
3-D	6-17-81	1100.000	175.000	12	>170	>170	>170	>170
4-D	6-17-81	1300.000	175.000	12	>170	>170	>170	>170
5-D	6-17-81	1400.000	173.000	10	---	---	100	---
				12	60	70	75	70
				14	65	70	105	80
				16	>150	>150	100	>120
				18	>150	>150	>150	>150
6-D	6-17-81	1520.248	175.000	10	>150	>150	>150	>150
7-D	6-17-81	1700.000	175.000	12	>150	>150	>150	>150
8-D	6-17-81	1801.346	175.304	12	>150	>150	>150	>150

--- indicates no data obtained.

TABLE C-1. TESTS BEFORE AIRCRAFT OPERATIONS (CONTINUED).

Test Designation	Date	Location, ft		Depth, in	Penetration Resistance, lb			
		X	Y		Test 1	Test 2	Test 3	Average
9-D	6-17-81	1900.000	175.000	10	75	35	120	77
				12	70	35	100	68
				14	60	25	90	58
				16	50	30	85	55
				18	40	65	55	53
				20	>150	>150	80	>100
1-E	6-17-81	800.000	125.000	10	50	35	30	38
				12	75	55	35	55
				14	75	60	40	58
				16	60	70	80	70
				18	>150	50	>150	>100
				20	---	>150	---	---
2-E	6-17-81	900.000	125.000	10	85	70	50	68
				12	80	40	70	63
				14	80	30	35	48
				16	70	20	30	40
				18	50	20	30	33
				20	35	35	25	33
				22	30	>150	25	>50
				24	35	---	>150	>100
3-E	6-17-81	1196.384	123.674	10	---	80	---	---
				12	70	50	50	57
				14	50	40	50	47
				16	25	45	45	38
				18	35	35	20	30
				20	40	25	20	28
				22	40	50	20	37
				24	50	120	40	70
4-E	6-17-81	1300.000	125.000	10	85	75	50	70
				12	90	110	70	90
				14	85	80	70	78
				16	70	65	60	65
				18	>150	100	>150	>120
				20	---	>150	---	---
5-E	6-17-81	1500.000	125.000	10	---	---	>150	---
				12	>150	130	---	>140
				14	---	>150	---	---
				16	---	---	---	---
6-E	6-17-81	1600.848	124.764	10	>150	>150	>150	>150

--- indicates no data obtained.

TABLE C-1. TESTS BEFORE AIRCRAFT OPERATIONS (CONTINUED).

Test Designation	Date	Location, ft		Depth, in	Penetration Resistance, lb			
		X	Y		Test 1	Test 2	Test 3	Average
7-E	6-17-81	1700.000	125.000	10	---	60	110	85
				12	60	75	90	75
				14	100	80	80	87
				16	75	50	60	63
				18	45	40	100	60
				20	40	55	105	67
				22	30	90	100	73
				24	20	135	>150	>80
8-E	6-17-81	1900.000	125.000	10	---	70	40	55
				12	---	65	90	155
				14	60	75	80	73
				16	75	60	80	73
				18	60	70	75	68
				20	40	>150	>150	>100
				22	>150	---	---	---
				24	>150	---	---	---
1-F	6-17-81	800.000	25.000	10	---	70	40	55
				12	---	65	90	78
				14	60	75	80	72
				16	75	60	80	72
				18	60	70	75	68
				20	40	>150	>150	>100
				22	>150	---	---	---
				24	>150	---	---	---
2-F	6-17-81	901.363	26.110	10	---	70	---	---
				12	60	100	100	88
				14	50	105	70	75
				16	35	100	55	63
				18	30	75	40	48
				20	25	60	40	42
				22	25	50	35	37
				24	20	50	30	33
3-F	6-17-81	1100.000	25.000	10	115	65	---	90
				12	100	50	40	63
				14	55	40	40	45
				16	50	40	40	43
				18	40	35	35	37
				20	40	30	30	37
				22	50	30	35	38
				24	45	35	40	40

--- indicates no data obtained.

TABLE C-1. TESTS BEFORE AIRCRAFT OPERATIONS (CONCLUDED).

Test Designation	Date	Location, ft		Depth, in	Penetration Resistance, lb			
		X	Y		Test 1	Test 2	Test 3	Average
4-F	6-17-81	1402.846	24.211	10	50	---	105	78
				12	70	25	100	65
				14	70	30	75	58
				16	75	40	75	63
				18	100	50	75	75
				20	110	>150	85	>100
				22	>150	---	>150	>150
5-F	6-17-81	1500.000	25.000	10	>150	>150	>150	>150
6-F	6-17-81	1700.000	25.000	10	>150	>150	>150	>150
7-F	6-17-81	1803.111	24.708	8	>150	>150	>150	>150
8-F	6-17-81	1900.000	25.000	12	>150	>150	>150	>150

--- indicates no data obtained.

TABLE C-2. TESTS AFTER AIRCRAFT OPERATIONS.

a. IN-RUT MEASUREMENTS

Test Designation ^a	Date	Location, ft X Y		Depth, in	Penetration Resistance, lb			
					Test 1	Test 2	Test 3	Average
1T-38	6-19-81	706.440	-13.844	8	---	85	---	85
				10	---	120	---	120
				12	120	80	85	95
				14	95	55	130	93
				16	80	60	135	92
				18	90	65	150	102
				20	90	75	45	70
				22	90	60	120	90
				24	90	80	105	92
2T-38	6-19-81	486.692	83.483	10	---	85	---	85
				12	25	40	35	33
				14	25	25	30	27
				16	30	35	40	38
				18	40	50	45	38
				20	150+	150+	150+	150+
3T-38	6-19-81	444.873	29.353	12	75	110	90	92
				14	100	95	80	92
				16	70	70	70	70
				18	45	45	80	57
				20	45	35	60	47
				22	40	35	75	50
				24	50	150+	60	87
4T-38	6-19-81	479.874	-12.240	12	100	60	115	92
				14	80	60	90	77
				16	30	35	50	38
				18	25	40	25	30
				20	30	30	30	30
				22	50	45	50	38
				24	85	90	80	85
5T-38	6-19-81	396.557	58.716	10	---	35	---	35
				12	40	70	---	55
				14	90	70	65	75
				16	75	55	50	60
				18	70	40	45	52
				20	50	35	50	45
				22	35	25	40	37
				24	50	25	35	37

a. Designations indicate test number, towed or powered aircraft, and weight. For example, 1T-38 indicates first test, towed, 38,000 lb.

TABLE C-2. TESTS AFTER AIRCRAFT OPERATIONS (CONTINUED).

b. OUT-OF-RUT MEASUREMENTS

Test Designation ^a	Date	Location, ft		Depth, in	Penetration Resistance, lb			
		X	Y		Test 1	Test 2	Test 3	Average
6T-38	6-19-81	389.248	86.225	8	---	---	70	70
				10	---	40	80	60
				12	30	50	60	47
				14	30	45	40	38
				16	30	30	30	30
				18	20	25	30	25
				20	25	25	30	27
				22	35	30	35	33
				24	40	65	40	48
1P-38	6-22-81	919.785	57.799	10	90	---	70	80
				12	80	90	110	93
				14	45	55	70	57
				16	50	45	55	50
				18	50	50	40	47
				20	45	45	45	45
				22	40	35	45	40
				24	40	30	50	40
3P-38	6-22-81	967.772	99.982	12	90	105	110	102
				14	125	95	140	120
				16	140	95	120	118
				18	75	70	60	68
				20	50	40	50	47
				22	55	30	30	38
				24	50	20	45	38
5P-38	6-22-81	1198.658	91.081	10	---	60	---	60
				12	45	60	50	53
				14	40	45	40	42
				16	30	25	30	28
				18	45	40	35	40
				20	85	75	55	72
				22	<150	<150	<150	<150
7P-38	6-22-81	1180.959	13.821	12	105	105	110	107
				14	70	50	80	67
				16	30	35	40	35
				18	20	30	30	28
				20	20	80	40	37
				22	<150	<150	<150	<150

a. Designations indicate test number, towed or powered aircraft, and weight. For example, 1T-38 indicates first test, towed, 38,000 lb.

TABLE C-2. TESTS AFTER AIRCRAFT OPERATIONS (CONTINUED).

b. OUT-OF-RUT MEASUREMENTS (CONTINUED)

Test Designation ^a	Date	Location, ft		Depth, in	Penetration Resistance, lb			
		X	Y		Test 1	Test 2	Test 3	Average
11P-38	6-22-81	1037.165	1.564	12	90	70	<150	<100
				14	70	90	---	80
				16	45	70	---	58
				18	85	80	---	83
				20	50	60	---	55
				22	55	40	---	47
				24	50	50	---	50
20P-38	6-22-81	1464.574	116.452	12	100	50	7	75
				14	90	150	---	80
				16	110	160	---	135
				18	105	<150	---	<105
				20	<150	<150	---	<150
23P-38	6-22-81	1364.261	22.006	12	---	50	50	50
				14	130	50	45	78
				16	80	50	55	63
				18	60	40	45	48
				20	50	40	80	57
				22	60	<150	150+	<100
				24	55	---	---	---
26P-38	6-22-81	1295.980	71.030	12	70	---	75	73
				14	45	60	45	50
				16	45	70	50	55
				18	50	75	75	67
				20	60	75	75	70
				22	70	90	80	80
				24	90	110	125	108
32P-38	6-22-81	1662.843	105.095	12	<150	<150	<150	<150
37P-38	6-22-81	1764.936	116.058	12	<150	<150	<150	<150
46P-38	6-22-81	1290.038	-58.434	12	70	70	65	68
				14	63	40	40	38
				16	30	35	40	35
				18	25	40	50	38
				20	30	45	60	45
				22	35	55	60	50
				24	50	65	65	60

a. Designations indicate test number, towed or powered aircraft, and weight. For example, 1T-38 indicates first test, towed, 38,000 lb.

TABLE C-2. TESTS AFTER AIRCRAFT OPERATIONS (CONTINUED).
 b. OUT-OF-RUT MEASUREMENTS (CONTINUED)

Test Designation ^a	Date	Location, ft X Y		Depth, in	Penetration Resistance, lb			
					Test 1	Test 2	Test 3	Average
48P-38	6-22-81			12	---	75	30	57
				14	30	45	50	43
				16	35	70	95	67
				18	35	105	85	75
				20	50	35	65	50
				22	40	45	50	45
				24	35	45	45	43
14P-38	6-22-81	997.799	95.714	12	85	100	100	95
				14	125	140	155	140
				16	<150	150	125	<125
				18	---	120	<150	<120
				20	---	75	---	---
				22	---	45	---	---
				24	---	50	---	---
15P-38	6-22-81	1092.266	108.886	12	115	100	80	98
				14	95	75	95	88
				16	50	60	50	53
				18	30	40	45	38
				20	35	40	40	38
				22	40	55	35	43
				24	45	60	50	52
18P-38	6-22-81	1323.032	120.351	10	---	50	---	---
				12	50	55	55	53
				14	45	50	55	50
				16	35	<150	<150	<150
				18	35	---	---	---
				20	35	---	---	---
				22	<150	---	---	---
1P-54	6-23-81	1068.726	1.407	8	---	---	130	---
				10	---	---	100	---
				12	50	55	130	78
				14	80	110	110	100
				16	120	105	90	105
				18	130	80	70	93
				20	85	75	65	78
				22	85	55	50	63
				24	95	65	70	77

a. Designations indicate test number, towed or powered aircraft, and weight. For example, 1T-38 indicates first test, towed, 38,000 lb.

TABLE C-2. TESTS AFTER AIRCRAFT OPERATIONS (CONCLUDED).
 b. OUT-OF-RUT MEASUREMENTS (CONCLUDED)

Test Designation ^a	Date	Location, ft X Y		Depth, in	Penetration Resistance, lb			
					Test 1	Test 2	Test 3	Average
2P-54	6-23-81	1273.500	13.042	8	---	100	---	---
				10	---	70	90	80
				12	85	80	100	87
				14	100	100	105	102
				16	100	110	135	115
				18	<150	135	<150	<135
				20	---	150	---	---
3P-54	6-23-81	1152.484	503.452	8	---	---	80	---
				10	---	65	60	63
				12	55	65	50	58
				14	75	140	150	122
				16	110	155	<150	<130
				18	<150	<150	---	<150
4P-54	6-23-81	1648.253	14.066	12	<150	<150	<150	<150
5P-54	6-23-81	1578.594	26.055	12	---	---	110	---
				14	140	110	90	113
				16	70	115	60	83
				18	40	80	<150	<80
				20	<150	70	---	<100
				22	---	<150	---	---
6P-54	6-23-81	1482.985	2.616	10	<150	<150	<150	<150
7P-54	6-23-81	1142.889	11.458	14	20	45	40	35
				16	30	30	50	38
				18	35	25	55	38
				20	30	20	50	33
				22	40	<150	60	<50
				24	<150	---	<150	<150
8P-54	6-23-81	1039.949	9.568	10	<150	<150	<150	<150
11P-54	6-23-81	1109.116	-7.631	10	<150	<150	<150	<150

a. Designations indicate test number, towed or powered aircraft, and weight. For example, 1T-38 indicates first test, towed, 38,000 lb.

APPENDIX D
MOISTURE-DENSITY TESTS

TABLE D-1. MOISTURE-DENSITY TESTS FOR CALIFORNIA BEARING RATIO.

Test Designation	Location, ft		Depth, in	Wet	Dry ^a	Laboratory Moisture Content, percent
	X	Y		Unit Weight, lb/ft ³	Unit Weight, lb/ft ³	
CBR 1	1935.606	151.320	2	98.9	97.1	1.89
			10	109.2	102.1	6.91
CBR 2	1947.061	2.463	2	99.3	97.2	2.20
			10	95.0	90.3	5.19
CBR 3	1240.406	-5.338	2	110.7	107.6	2.92
			10	115.7	101.3	14.25
CBR 4	367.573	140.612	2	102.4	99.7	2.65
			10	111.8	106.4	10.62
CBR 5	376.435	-11.803	2	100.7	99.1	1.61
			10	102.8	95.2	7.96
CBR 6	551.642	38.736	2	100.1	98.8	1.13
			10	108.1	101.5	6.47
CBR 7	724.801	-12.000	2	104.4	103.2	1.17
			10	111.3	101.7	9.43
CBR 8	722.889	141.461	2	107.1	102.1	2.33
			10	102.1	94.2	8.39
CBR 9	901.363	26.111	2	102.8	93.8	2.67
			10	105.6	97.6	8.22
CBR 10	989.667	174.639	2	97.8	91.1	1.92
			10	106.0	91.3	10.56
CBR 11	1196.384	123.674	2	103.9	102.0	1.84
			10	110.2	101.8	8.22
CBR 12	1402.846	24.211	2	102.0	100.5	1.49
			10	110.9	94.5	17.40
CBR 13	1501.248	175.268	2	97.5	92.7	5.19
			10	112.4	98.1	14.57
CBR 14	1600.848	124.764	2	104.5	97.7	1.85
			10	109.9	97.3	12.90
CBR 15	1803.111	24.708	2	107.9	106.3	1.48
			9	118.5	109.0	8.69

a. Laboratory moisture contents were used to correct nuclear wet densities.

TABLE D-1. MOISTURE-DENSITY TESTS FOR CALIFORNIA BEARING RATIO (CONCLUDED).

Test Designation	Location, ft		Depth, in	Wet Unit Weight, lb/ft ³	Dry ^a Unit Weight, lb/ft ³	Laboratory Moisture Content, percent
	X	Y				
CBR 16	1801.346	175.304	2	108.7	106.0	2.55
			10	118.5	109.0	8.69
CBR 17	900.708	20.680	2	105.4	103.9	1.43
			10	112.2	104.0	7.86
CBR 18	1403.060	21.389	2	108.5	106.4	1.93
			10	111.9	98.9	13.10
CBR 19	1804.611	19.040	2	103.8	100.7	3.08
			10	120.8	111.5	8.37
CBR 4A	367.573	140.612	2	105.6	97.1	2.20
			10	114.0	97.6	11.50
CBR 6A	551.642	38.736	2	b---	b---	1.72
			10	b---	b---	8.77
CBR 8A	722.889	141.461	2	101.2	99.4	1.77
			10	110.0	101.6	8.30

- a. Laboratory moisture contents were used to correct nuclear wet densities.
 b. Reading error.

TABLE D-2. MOISTURE-DENSITY RESULTS FOR PENETROMETER TESTS.

Test Designation	Date	Location, ft X Y		Depth, in	Wet Unit Weight, lb/ft ³	Dry Unit Weight, lb/ft ³	Nuclear Moisture Content, percent
1-A	6-16-81	300.000	140.000	2	105.2	101.2	3.8
				6	110.1	106.2	3.8
				10	112.0	108.2	---
2-A	6-16-81	367.573	140.612	2	102.1	97.2	4.8
				6	106.1	101.3	4.8
				10	107.2	102.4	---
3-A	6-16-81	500.000	140.000	2	101.1	95.9	5.2
				6	106.7	101.2	5.2
				10	108.4	103.3	---
4-A	6-16-81	600.000	140.00	2	104.3	99.8	4.7
				6	107.1	102.7	4.7
				10	111.7	106.8	---
5-A	6-16-81	722.889	141.461	2	102.8	97.6	5.0
				6	109.1	104.0	5.0
				10	113.0	108.2	---
6-A	6-16-81	800.000	140.000	2	106.8	102.8	4.0
				6	107.8	103.8	4.0
				10	109.4	105.0	---
1-B	6-16-81	300.000	40.000	2	108.4	102.8	5.3
				6	111.7	106.2	5.3
				10	114.0	108.4	---
2-B	6-16-81	400.000	40.000	2	103.3	98.8	4.5
				6	106.4	101.8	4.5
				10	109.7	105.1	---
3-B	6-16-81	500.000	40.000	2	103.3	99.1	4.1
				6	107.5	103.2	4.1
				10	111.1	106.7	---
4-B	6-16-81	551.642	38.736	2	105.5	101.1	4.1
				6	112.8	108.5	4.1
				10	112.4	108.1	---
5-B	6-16-81	600.000	40.000	2	104.4	100.6	3.7
				6	111.0	107.2	3.7
				10	114.5	110.6	---
6-B	6-16-81	700.000	40.000	2	103.9	99.6	4.1
				6	104.7	100.7	4.1
				10	108.0	103.7	---

Note: Readings inaccurate on 10-inch measurements.

TABLE D-2. MOISTURE-DENSITY RESULTS FOR PENETROMETER TESTS (CONTINUED).

Test Designation	Date	Location, ft		Depth, in	Wet Unit Weight, lb/ft ³	Dry Unit Weight, lb/ft ³	Nuclear Moisture Content, percent
		X	Y				
7-B	6-16-81	800.000	40.000	2	109.0	104.1	4.5
				6	113.2	108.5	4.5
				10	116.3	111.3	---
1-C	6-16-81	300.000	-10.000	2	106.1	102.1	3.6
				6	110.6	106.6	3.6
				10	112.3	108.7	---
2-C	6-16-81	376.435	-11.803	2	102.6	98.8	4.0
				6	105.2	101.1	4.0
				10	103.9	99.9	---
3-C	6-16-81	500.000	-10.000	2	103.0	99.2	3.8
				6	106.7	102.8	3.8
				10	110.8	106.8	---
4-C	6-16-81	600.000	-40.000	2	98.7	94.6	3.9
				6	104.2	100.5	3.9
				10	107.5	103.4	---
5-C	6-16-81	-724.801	-12.000	2	104.1	100.2	4.0
				6	104.3	100.5	4.0
				10	105.9	101.7	---
6-C	6-18-61	-800.000	-10.000	2	98.2	93.7	5.3
				6	109.5	104.0	5.3
				10	111.4	105.8	---
1-D	6-17-81	800.000	175.000	2	109.3	103.9	5.4
				6	112.7	107.3	5.4
				10	116.1	110.7	---
2-D	6-17-81	989.667	174.639	2	100.2	95.9	4.2
				6	104.5	100.2	4.2
				10	106.4	102.4	---
3-D	6-17-81	1100.000	175.000	2	103.2	99.2	4.1
				6	111.4	107.2	4.1
				10	119.8	115.6	---
4-D	6-17-81	1300.000	175.000	2	105.5	102.2	3.6
				6	113.5	109.8	3.6
				10	114.6	110.9	---

Note: Readings inaccurate on 10-inch measurements.

TABLE D-2. MOISTURE-DENSITY RESULTS FOR PENETROMETER TESTS (CONTINUED).

Test Designation	Date	Location, ft X Y		Depth, in	Wet Unit Weight, lb/ft ³	Dry Unit Weight, lb/ft ³	Nuclear Moisture Content, percent
5-D	6-17-81	1400.000	175.000	2	104.9	101.2	4.0
				6	106.6	102.6	4.0
				10	112.8	108.5	---
6-D	6-17-81	15201.248	175.268	2	105.1	95.8	9.1
				6	108.2	98.9	9.1
				10	108.2	99.4	---
7-D	6-17-81	1700.000	175.000	2	108.0	100.9	7.3
				6	114.8	107.7	7.3
				10	118.1	110.4	---
8-D	6-17-81	1801.346	175.304	2	110.4	105.6	4.6
				6	116.4	111.7	4.6
				10	121.2	116.7	---
9-D	6-17-81	1900.00	175.000	2	102.1	99.3	2.7
				6	103.6	101.0	2.7
				10	104.1	101.5	---
1-E	6-17-81	800.000	125.000	2	105.2	100.5	4.6
				6	107.6	103.0	4.6
				10	109.7	104.9	---
2-E	6-17-81	900.000	125.000	2	105.2	100.8	4.0
				6	108.1	104.1	4.0
				10	110.2	106.2	---
3-E	6-17-81	1196.384	123.674	2	109.0	104.7	4.1
				6	113.9	109.5	4.1
				10	114.2	109.7	---
4-E	6-17-81	1300.000	125.000	2	104.2	100.6	3.8
				6	106.3	102.6	3.8
				10	107.2	102.9	---
5-E	6-17-81	1500.000	125.000	2	107.0	100.7	6.4
				6	109.9	103.2	6.4
				10	111.0	104.4	---
6-E	6-17-81	1600.848	124.764	2	109.7	103.4	6.3
				6	106.5	99.9	6.3
				10	108.6	102.2	---

Note: Readings inaccurate on 10-inch measurements.

TABLE D-2. MOISTURE-DENSITY RESULTS FOR PENETROMETER TESTS (CONTINUED).

Test Designation	Date	Location, ft X Y		Depth, in	Wet Unit Weight, lb/ft ³	Dry Unit Weight, lb/ft ³	Nuclear Moisture Content, percent
7-E	6-17-81	1700.000	125.000	2	98.9	94.2	4.8
				6	102.2	97.3	4.8
				10	107.6	103.0	---
8-E	6-17-81	1900.000	125.000	2	108.3	105.2	2.8
				6	107.1	104.2	2.8
				10	110.7	107.6	---
1-F	6-17-81	800.000	55.000	2	96.8	90.0	7.0
				6	103.0	96.4	7.0
				10	105.7	99.3	---
2-F	6-17-81	901.363	36.110	2	104.0	97.8	5.9
				6	107.0	101.3	5.9
				10	108.5	102.7	---
3-F	6-17-81	1100.000	-35.000	2	111.0	106.2	4.5
				6	114.0	109.0	4.5
				10	114.7	109.6	---
4-F	6-17-81	1402.846	-34.211	2	104.3	97.7	6.3
				6	106.4	100.1	6.3
				10	107.0	100.9	---
5-F	6-17-81	1500.000	-35.000	2	107.0	102.3	4.5
				6	110.0	105.2	4.5
				10	110.3	105.5	---
6-F	6-17-81	1700.000	-35.000	2	105.5	100.7	5.0
				6	106.7	101.2	5.0
				10	110.0	105.1	---
7-F	6-17-81	1803.111	35.708	2	100.8	95.7	5.3
				6	103.2	98.0	5.3
				10	107.1	101.8	---
8-F	6-17-81	1900.000	-35.000	2	105.7	102.8	2.6
				6	111.6	108.8	2.6
				10	113.6	110.8	---
1-G	6-18-81	800.000	35.000	2	104.7	99.7	5.0
				6	107.5	102.3	5.0
				10	111.0	105.8	---
2-G	6-18-81	900.708	-35.680	2	101.2	97.9	3.5
				6	105.6	101.7	3.5
				10	109.2	105.6	---

Note: Readings inaccurate on 10-inch measurements.

TABLE D-2. MOISTURE-DENSITY RESULTS FOR PENETROMETER TESTS (CONTINUED).

Test Designation	Date	Location, ft		Depth, in	Wet Unit Weight, lb/ft ³	Dry Unit Weight, lb/ft ³	Nuclear Moisture Content, percent
		X	Y				
3-G	6-18-81	1100.000	-35.000	2	104.2	100.2	4.0
				6	107.8	103.6	4.0
				10	109.9	105.1	---
4-G	6-18-81	1300.000	-35.000	2	103.8	97.8	5.8
				6	110.1	104.1	5.8
				10	111.7	106.0	---
5-G	6-18-81	1403.060	-35.389	2	105.7	99.8	6.0
				6	108.9	102.5	6.0
				10	109.4	103.4	---
6-G	6-18-81	1500.000	-35.000	2	105.3	98.1	7.0
				6	109.0	102.2	7.0
				10	108.1	101.0	---
7-G	6-18-81	1700.000	-35.000	2	107.9	101.1	6.4
				6	107.8	101.2	6.4
				10	113.8	107.4	---
8-G	6-18-81	1804.611	-35.040	2	109.7	101.8	6.8
				6	117.6	110.6	6.8
				10	120.7	113.3	---
9-G	6-18-81	1900.000	-35.000	2	101.0	94.5	6.3
				6	107.4	101.5	6.3
				10	110.9	104.5	---
1T-38	6-19-81	706.440	-13.844	2	100.0	96.3	3.9
				6	98.1	94.3	3.9
				10	104.7	100.8	---
2T-38	6-19-81	486.692	83.483	2	100.8	95.7	5.2
				6	106.2	100.8	5.2
				10	111.3	106.2	---
3T-38	6-19-81	444.873	29.353	2	99.0	95.1	4.2
				6	98.5	94.4	4.2
				10	102.8	98.2	---
4T-38	6-19-81	479.874	-12.240	2	108.4	96.7	3.4
				6	106.9	103.6	3.4
				10	109.9	106.6	---

Note: Readings inaccurate on 10-inch measurements.

TABLE D-2. MOISTURE-DENSITY RESULTS FOR PENETROMETER TESTS (CONTINUED).

Test Designation	Date	Location, ft		Depth, in	Wet Unit Weight, lb/ft ³	Dry Unit Weight, lb/ft ³	Nuclear Moisture Content, percent
		X	Y				
5T-38	6-19-81	396.557	58.716	2	101.3	97.5	3.8
				6	102.0	98.3	3.8
				10	103.8	99.9	---
6T-38	6-19-81	389.248	86.225	2	103.8	98.3	5.4
				6	102.3	97.2	5.4
				10	103.8	98.5	---
1P-38	6-22-81	919.785	57.799	2	103.8	100.0	3.7
				6	108.6	104.5	3.7
				10	110.0	106.2	---
3P-38	6-22-81	967.772	99.982	2	101.3	97.9	3.5
				6	103.2	99.9	3.5
				10	106.1	102.3	---
5P-38	6-22-81	1198.658	91.081	2	107.3	103.0	4.2
				6	112.7	107.9	4.2
				10	113.7	109.2	---
7P-38	6-22-81	1180.959	13.821	2	105.3	102.7	3.3
				6	108.2	104.6	3.3
				10	110.4	106.9	---
11P-38	6-22-81	1037.165	1.564	2	106.6	98.4	8.0
				6	106.5	98.6	8.0
				10	107.0	98.9	---
14P-38	6-22-81	997.799	95.714	2	107.3	103.6	3.5
				6	112.2	108.3	3.5
				10	113.8	110.2	---
15P-38	6-22-81	1092.266	108.886	2	104.4	101.2	3.4
				6	106.2	102.5	3.4
				10	106.9	103.5	---
18P-38	6-22-81	1323.032	120.351	2	107.3	102.3	4.7
				6	111.6	106.7	4.7
				10	114.8	109.7	---
20P-38	6-22-81	1464.574	116.452	2	105.6	100.8	4.5
				6	109.4	104.6	4.5
				10	115.5	110.9	---
23P-38	6-22-81	1364.261	22.006	2	106.4	101.2	4.8
				6	109.3	104.5	4.8
				10	109.0	104.3	---

Note: Readings inaccurate on 10-inch measurements.

TABLE D-2. MOISTURE-DENSITY RESULTS FOR PENETROMETER TESTS (CONTINUED).

Test Designation	Date	Location, ft X Y		Depth, in	Wet Unit Weight, lb/ft ³	Dry Unit Weight, lb/ft ³	Nuclear Moisture Content, percent
26P-38	6-22-81	1295.980	71.030	2	107.4	101.3	5.6
				6	110.7	105.0	5.6
				10	113.2	107.4	---
32P-38	6-22-81	1662.843	105.095	2	103.0	99.2	3.6
				6	105.4	101.6	3.6
				10	109.5	105.9	---
37P-38	6-22-81	1764.936	116.058	2	106.5	99.2	7.0
				6	111.5	104.4	7.0
				10	117.9	110.5	---
45P-38	6-22-81	1415.191	-67.012	2	104.2	98.2	5.6
				6	107.4	101.8	5.6
				10	109.1	103.6	---
47P-38	6-22-81	1156.263	-44.410	2	106.6	103.1	3.7
				6	108.2	104.2	3.7
				10	108.8	105.1	---
1P-54	6-24-81	1068.726	1.407	2	105.7	101.9	3.5
				6	107.1	103.3	3.5
				10	107.4	104.0	---
2P-54	6-24-81	1273.500	13.042	2	105.2	101.7	3.5
				6	107.4	103.7	3.5
				10	109.8	106.2	---
3P-54	6-24-81	1152.484	503.452	2	108.3	99.9	8.0
				6	112.9	104.7	8.0
				10	112.8	104.5	---
4P-54	6-24-81	1648.253	14.066	2	102.2	94.6	8.0
				6	111.3	103.5	8.0
				10	114.7	107.1	---
5P-54	6-24-81	1578.594	26.055	2	109.8	103.2	6.3
				6	111.2	104.6	6.3
				10	114.1	107.1	---
6P-54	6-24-81	1482.985	2.616	2	106.8	101.3	5.5
				6	107.7	102.1	5.5
				10	106.2	100.5	---
7P-54	6-24-81	1142.889	11.458	2	104.6	100.8	3.9
				6	108.5	104.4	3.9
				10	111.8	107.5	---

Note: Readings inaccurate on 10-inch measurements.

TABLE D-2. MOISTURE-DENSITY RESULTS FOR PENETROMETER TESTS (CONCLUDED).

Test Designation	Date	Location, ft X Y		Depth, in	Wet Unit Weight, lb/ft ³	Dry Unit Weight, lb/ft ³	Nuclear Moisture Content, percent
8P-54	6-24-81	1039.949	9.568	2	100.2	96.4	3.8
				6	102.7	99.0	3.8
				10	106.3	102.4	---
9P-54	6-25-81	1237.118	1.318	2	113.3	105.0	7.5
				6	116.8	108.9	7.5
				10	120.7	112.7	---
10P-54	6-25-81	1037.634	31.705	2	105.7	99.0	6.5
				6	107.8	101.3	6.5
				10	109.8	103.3	---
11P-54	6-25-81	1109.116	-7.631	2	106.1	98.5	7.7
				6	107.1	99.4	7.7
				10	104.7	97.0	---
12P-54	6-25-81	1088.231	-56.204	2	109.2	103.3	5.8
				6	112.0	105.9	5.8
				10	112.5	106.7	---
13P-54	6-25-81	1063.819	-107.870	2	95.2	91.5	3.8
				6	102.1	98.5	3.8
				10	107.2	104.3	---

Note: Readings inaccurate on 10-inch measurements.

APPENDIX E

LABORATORY SOIL TEST RESULTS

TABLE E-1. SUMMARY OF FIELD AND LABORATORY SOIL PROPERTIES.

Test Designation	Field Location, ft		Depth, in	CBR Ratio	Field In-Place		Soil Type	Laboratory			
	X	Y			Water Content, percent	Dry Density, lb/ft ³		Atterberg Limits	L.L.	P.L.	P.I.
CBR 1	1935.60	151.32	1-2	28	1.89	97.1	---	---	---	---	---
		4	10	4	6.91	102.1	---	---	---	---	---
CBR 2	1947.06	2.46	0-2	49	2.20	97.2	---	---	---	---	---
		19	10	19	5.19	90.3	---	---	---	---	---
CBR 3	1240.40	-5.33	0-2	36	2.92	107.6	CL	26.8	15.0	11.7	---
		4	10	4	14.25	101.3	CL	26.8	15.0	11.7	---
CBR 4	367.57	140.61	0-2	33	2.65	99.7	CL-ML	22.5	13.7	8.8	2.72
		8	10	8	10.62	106.4	CL-ML	22.5	13.7	8.8	2.72
CBR 5	376.43	-11.80	0-2	45	1.61	99.1	CL-ML	22.0	14.3	7.7	2.69
		6	10	6	7.96	95.2	CL-ML	22.0	14.3	7.7	2.69
CBR 6	551.64	38.73	0-2	38	1.13	98.8	CL-ML	18.3	12.4	5.9	2.66
		12	10	12	6.47	101.5	CL-ML	18.3	12.4	5.9	2.66
CBR 7	724.80	-12.00	0-2	62	1.17	103.2	---	---	---	---	---
		8	10	8	9.43	101.7	---	---	---	---	---
CBR 8	722.89	126.11	0-2	41	2.33	102.1	CL-ML	19.7	12.0	7.7	2.72
		7	10	7	8.39	94.2	CL-ML	19.7	12.0	7.7	2.72
CBR 9	901.36	126.11	0-2	42	2.67	93.8	CL-ML	20.5	14.3	6.2	2.71
		8	10	8	8.22	97.6	CL-ML	20.5	14.3	6.2	2.71
CBR 10	989.66	174.63	0-2	25	1.92	91.1	CL-ML	18.5	13.9	4.6	2.71
		6	10	6	10.56	91.3	CL-ML	18.5	13.9	4.6	2.71
CBR 11	1196.38	123.17	0-2	50	1.84	102.0	CL-ML	17.0	12.1	4.9	2.71
		5	10	5	8.22	101.8	CL-ML	17.0	12.1	4.9	2.71
CBR 12	1402.84	24.21	0-2	54	1.49	100.5	---	---	---	---	---
		7	10	7	17.40	94.5	---	---	---	---	---

TABLE E-1. SUMMARY OF FIELD AND LABORATORY SOIL PROPERTIES (CONCLUDED).

Test Designation	Field Location, ft		Depth, in	Field In-Place		Soil Type	Laboratory			Specific Gravity	
	X	Y		CBR Ratio	Water Content, percent		Dry Density, lb/ft ³	Atterberg Limits	L.L.		P.L.
CBR 13	1501.24	175.26	0-2 10	18	5.19 14.57	92.7 98.1	CL CL	37.0 37.0	20.3 20.3	16.7 16.7	2.73 2.73
CBR 14	1600.84	124.76	0-2 10	42 65	1.85 12.90	97.7 97.3	---	---	---	---	---
CBR 15	1800.11	27.70	0-2 10	48 37	1.48 8.69	106.3 109.0	CL-ML CL-ML	22.5 22.5	19.6 19.6	2.9 2.9	2.70 2.70
CBR 16	1801.34	175.30	0-2 10	19 80+	2.55 8.69	106.0 109.0	---	---	---	---	---
CBR 17	901.36	-36.11	0-2 10	44 6	1.43 7.86	103.9 104.0	CL-ML CL-ML	18.4 18.4	10.5 10.5	7.9 7.9	2.74 2.74
CBR 18	1403.06	-34.38	0-2 10	41 35	1.93 13.10	106.4 98.9	CL-ML CL-ML	23.5 23.5	17.3 17.3	6.2 6.2	2.73 2.73
CBR 19	1403.06	-34.38	0-2 10	54 34	2.30 8.37	103.8 104.5	---	---	---	---	---
CBR 4A	367.57	140.61	0-2 10	35 6	2.20 11.50	103.3 102.2	---	---	---	---	---
CBR 6A	551.64	38.73	0-2 10	53 19	1.72 8.77	---	---	---	---	---	---
CBR 8A	722.89	141.64	0-2 10	36 9	1.77 8.30	99.4 101.6	---	---	---	---	---

TABLE E-2. SUMMARY OF REMOLDED, UNCONSOLIDATED, UNDRAINED TRIAXIAL TESTS.

Test Specimen	Moisture Content, percent		Dry Density, lb/ft ³	Confining Pressure, lb/in ²	Deviator Stress, lb/in ²	Strain, inches	Friction Angle, (φ), deg	Apparent Cohesion, lb/in ²	Blows Per Layer	Height of Hammer Drop, inches
	Target	Actual								
CBR 15	8.0	8.78	103.79	0	35.37	0.045	31.5	9	6	12
	8.0	8.57	103.89	10	58.96	0.100				
	8.0	8.57	103.89	25	83.75	0.450				
	11.0	10.98	98.54	0	17.40	0.050	30	4	6	12
	11.0	10.67	100.22	10	37.03	0.150				
	11.0	10.67	100.22	25	67.87	1.150				
	14.0	14.05	99.08	0	14.08	0.070	26	5	6	12
	14.0	13.55	102.29	10	32.70	0.280				
	14.0	13.55	102.29	25	56.06	1.000				
CBR 17	8.0	7.60	104.72	0	19.28	0.055	24.5	6	6	12
	8.0	7.28	106.34	10	29.31	0.210				
	8.0	7.28	106.34	25	54.42	1.050				
	11.0	11.50	103.03	0	13.83	0.070	23.5	5	6	6
	11.0	9.94	105.50	10	29.54	0.500				
	11.0	9.94	105.50	25	46.88	1.200				
	14.0	13.86	110.94	0	13.02	0.200	20.3	4	4	6
	14.0	13.87	112.79	10	20.23	1.000				
	14.0	14.06	108.48	25	39.08	1.400				

Note: Remolded with three layers, 5.5-lb drop hammer.

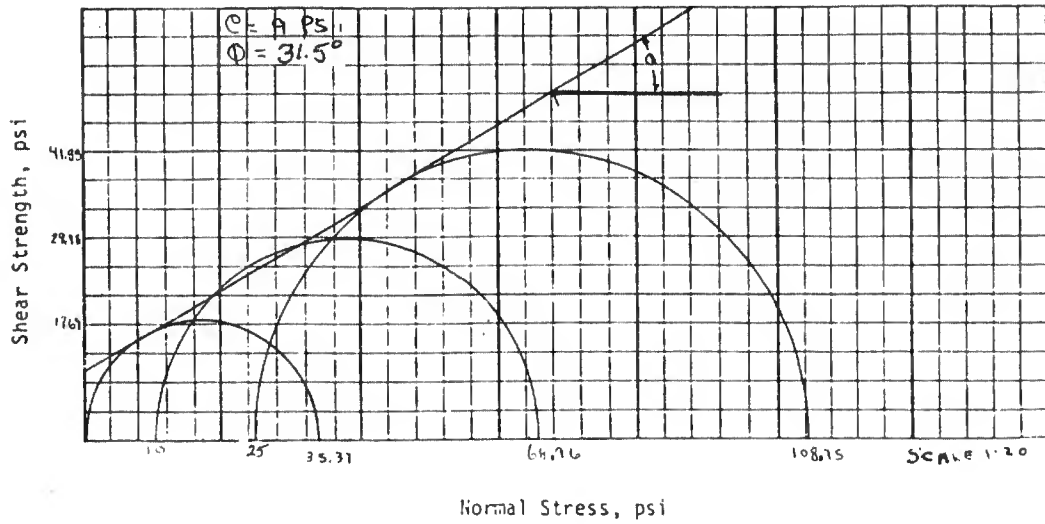
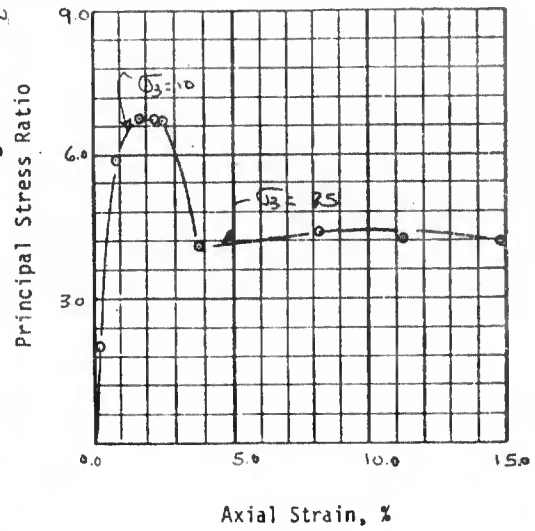
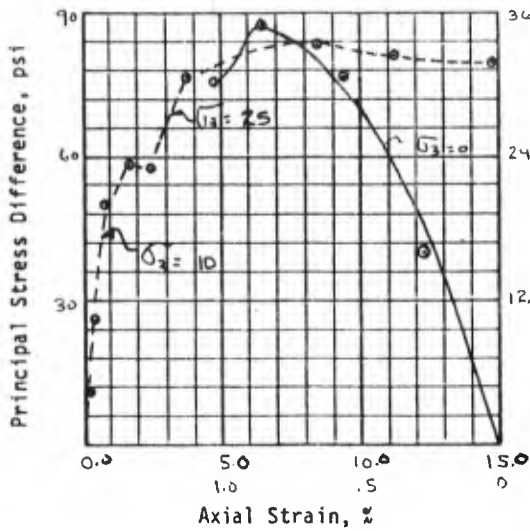
TRIAXIAL SHEAR TEST

Test Type UU

Sample No. (BR-15-S)

Specimen No.	1	2A*	2B*	3	4
Consolidation Pressure, psi	0	10	25		
Initial Water Content, %	8.78	8.57	8.57		
Final Water Content, %					
Dry Density, pcf	103.77	103.99	103.89		

*2A and 2B are results from staged tests on same specimens.



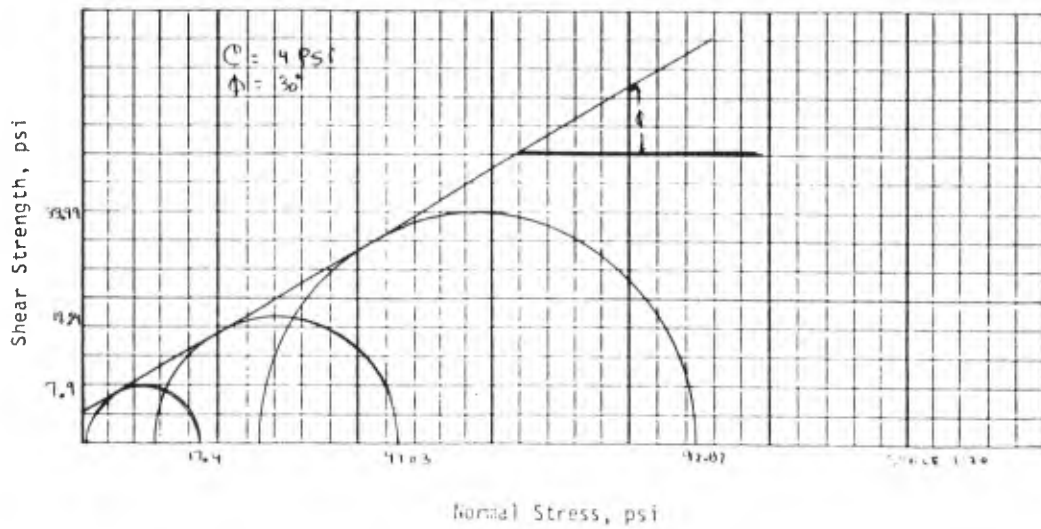
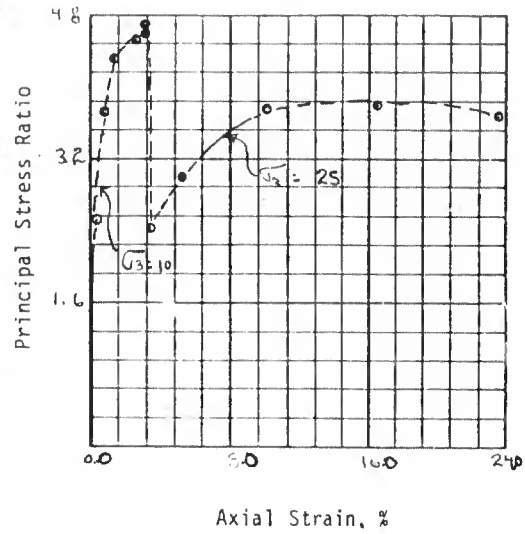
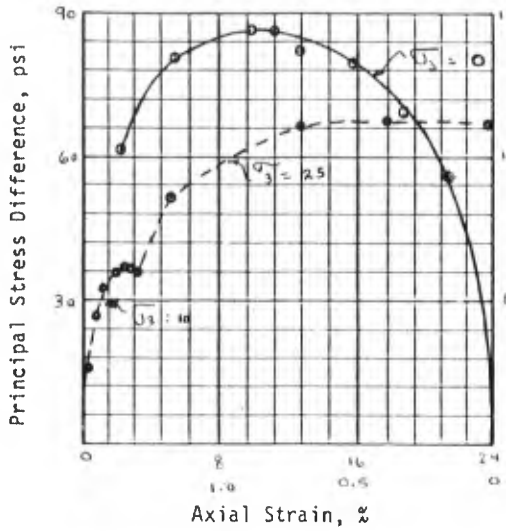
TRIAXIAL SHEAR TEST

Test Type UU

Sample No. CBR #15 11%

Specimen No.	1	2A*	2B*	3	4
Consolidation Pressure, psi	0	10	25		
Initial Water Content, %	10.98	10.67	10.67		
Final Water Content, %					
Dry Density, pcf	113.54	100.22	100.22		

*2A and 2B are results from staged tests on same specimens.



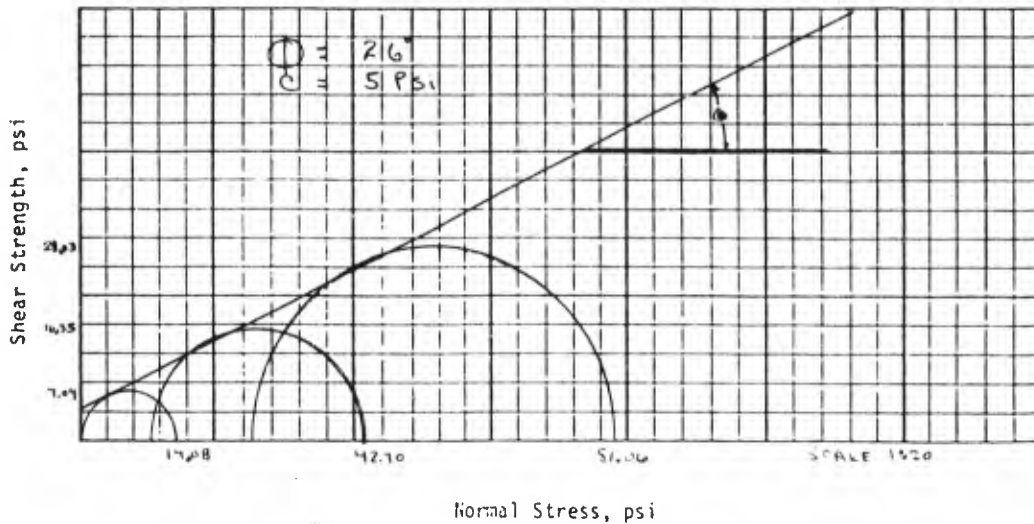
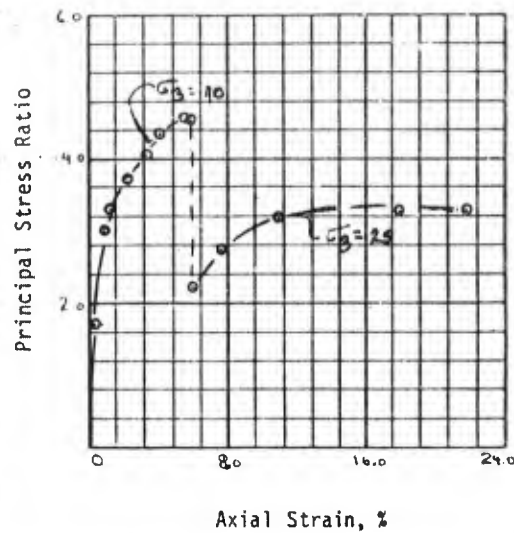
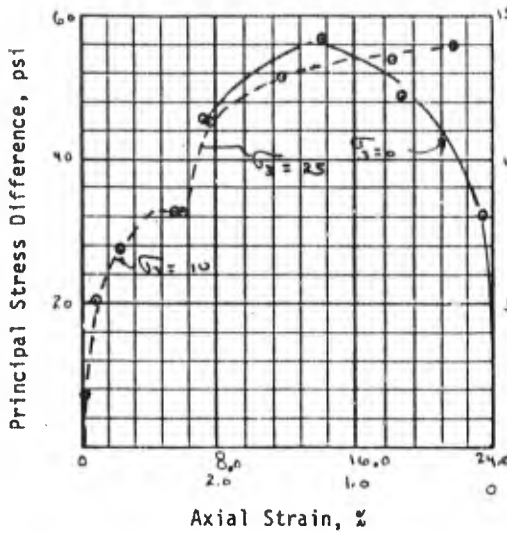
TRIAXIAL SHEAR TEST

Test Type UU

Sample No. CBR-15-14%

Specimen No.	1	2A*	2B*	3	4
Consolidation Pressure, psi	0	10	25		
Initial Water Content, %	14.05	13.55	13.55		
Final Water Content, %					
Dry Density, pcf	99.08	102.29	102.29		

*2A and 2B are results from staged tests on same specimens.



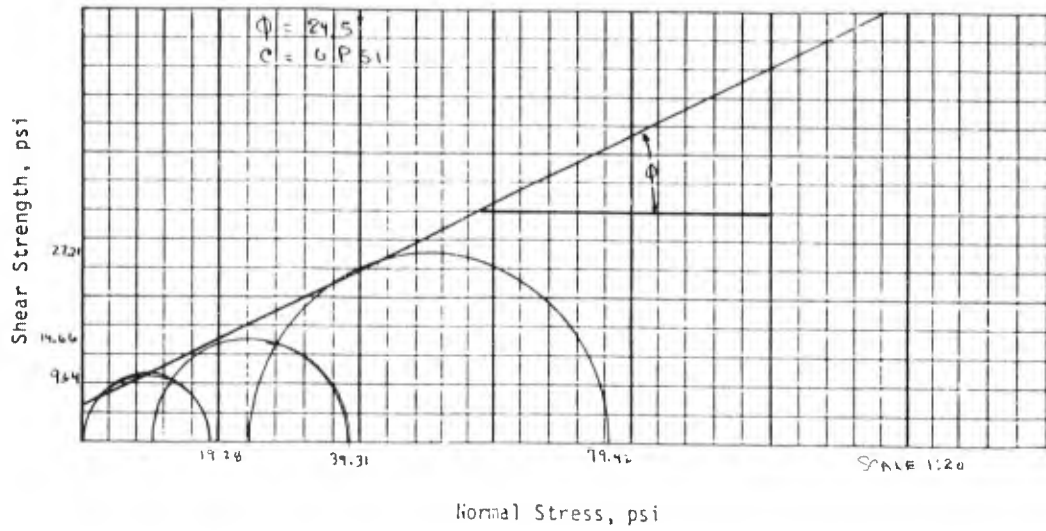
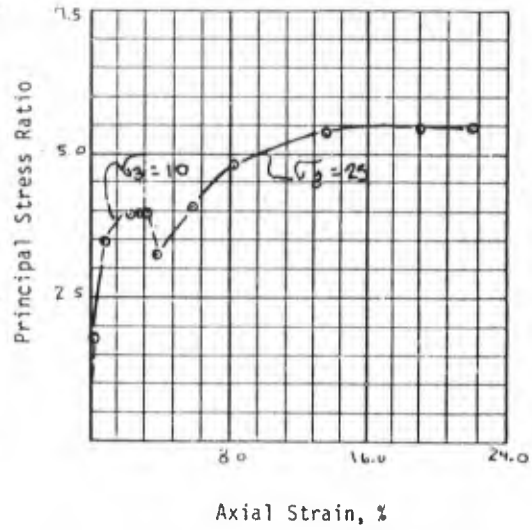
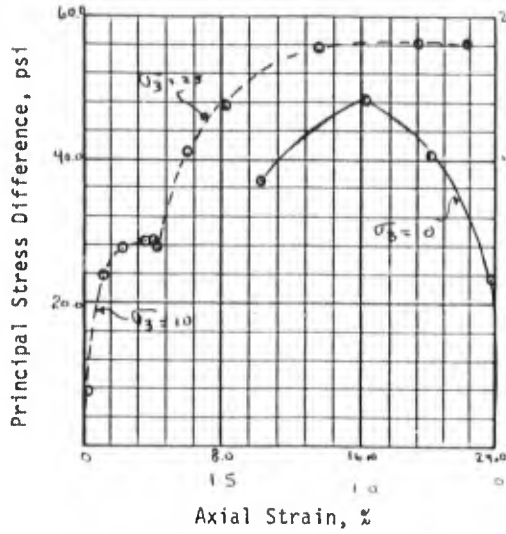
TRIAXIAL SHEAR TEST

Test Type _____

Sample No. CBR-17-87

Specimen No.	1	2A*	2B*	3	4
Consolidation Pressure, psi	0	10	25		
Initial Water Content, %	7.60	7.28	7.28		
Final Water Content, %					
Dry Density, pcf	104.72	106.34	106.34		

*2A and 2B are results from staged tests on same specimens.



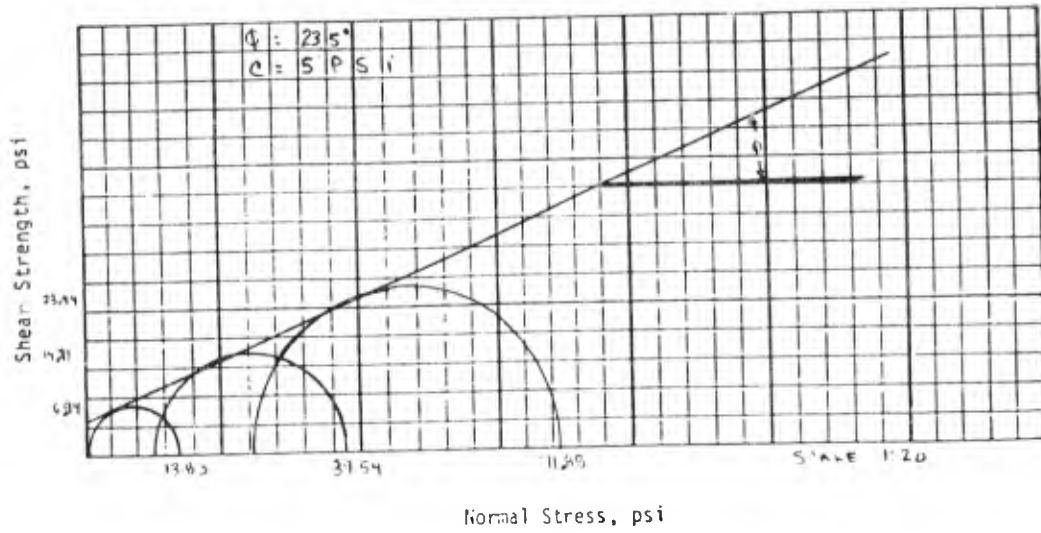
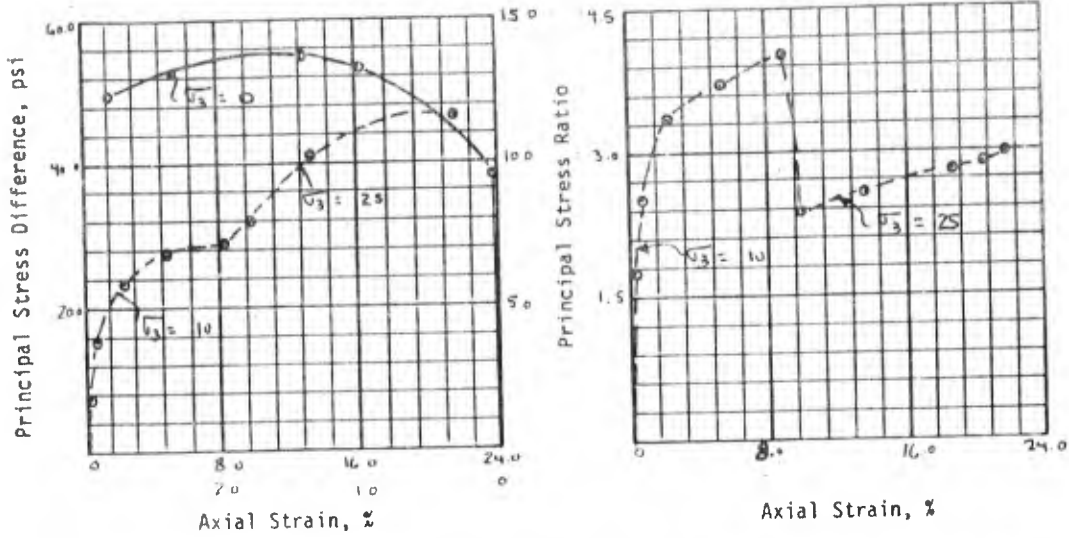
TRIAXIAL SHEAR TEST

Test Type UU

Sample No. BR-17-11%

Specimen No.	1	2A*	2B*	3	4
Consolidation Pressure, psi	0	10	25		
Initial Water Content, %	11.5	11.4	9.94		
Final Water Content, %					
Dry Density, pcf	103.03	105.50	105.50		

*2A and 2B are results from staged tests on same specimens.

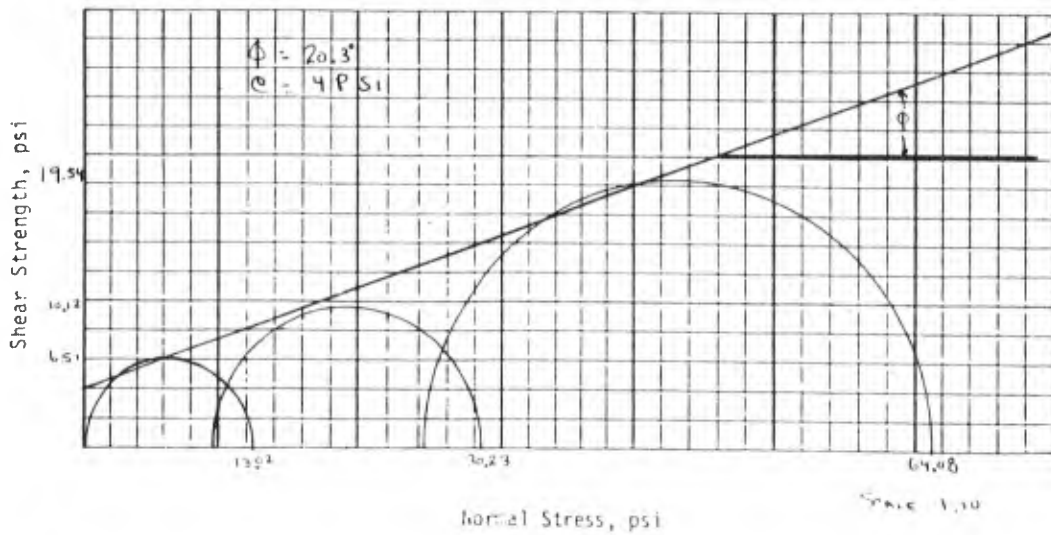
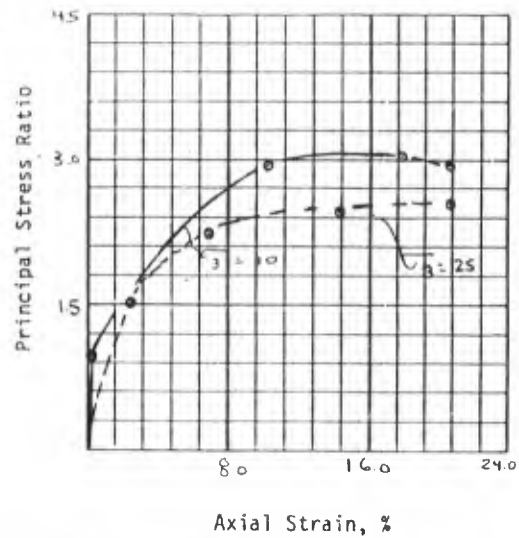
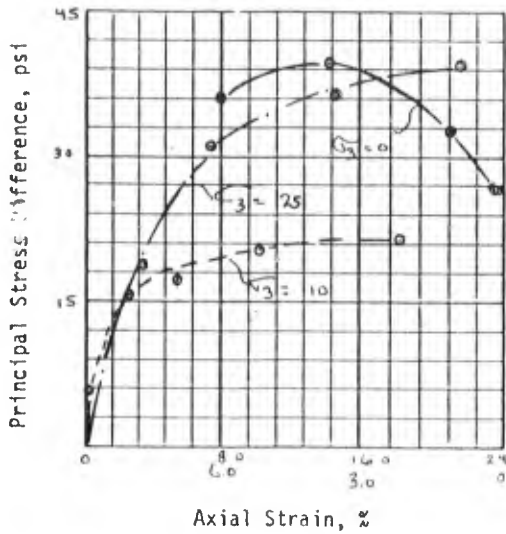


TRIAXIAL SHEAR TEST

Test Type _____

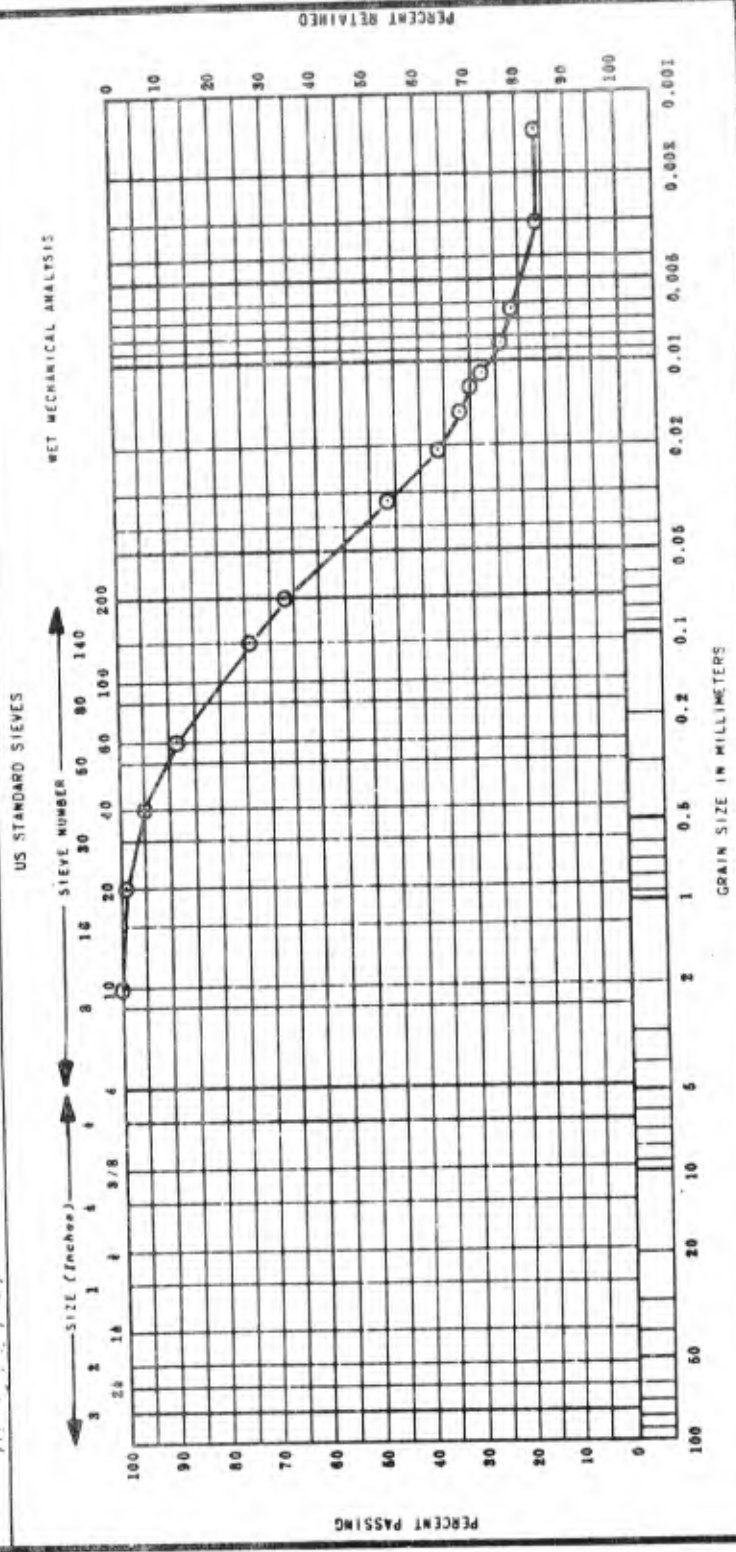
Sample No. CBR-17-1970

Specimen No.	1	2		3	4
Consolidation Pressure, psi	0	10		25	
Initial Water Content, %	13.86	13.87		14.06	
Final Water Content, %					
Dry Density, pcf	110.94	112.79		108.48	



PROJECT *MS-015, 11a1* DATE *7/27*

GRAIN SIZE DISTRIBUTION GRAPH - AGGREGATE GRADING CHART

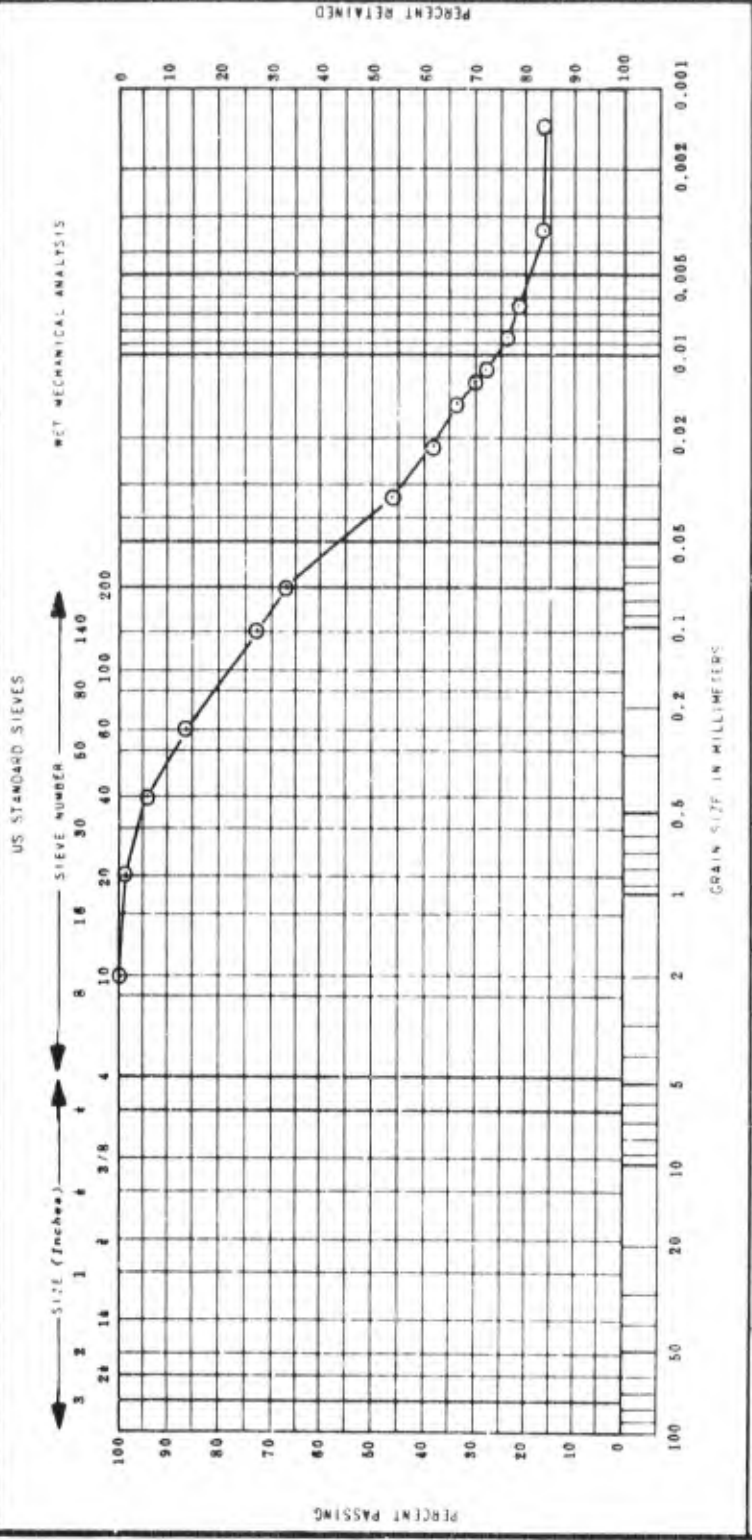


EXCAVATION NUMBER	SAMPLE NUMBER	NATURAL % MOISTURE	"L	"P	"P	CLASSIFICATION	REMARKS
<i>CPK 41</i>		<i>2.33</i>	<i>22.50</i>	<i>13.72</i>	<i>8.76</i>	<i>CL-ML</i>	<i>SP 2715</i>
TECHNICIAN (Signature)							CHECKED BY (Signature)
PLOTTED BY (Signature)							<i>Vc</i>

DATE 7/27

GRAIN SIZE DISTRIBUTION GRAPH - AGGREGATE GRADING CHART

PROJECT *Deerfield*

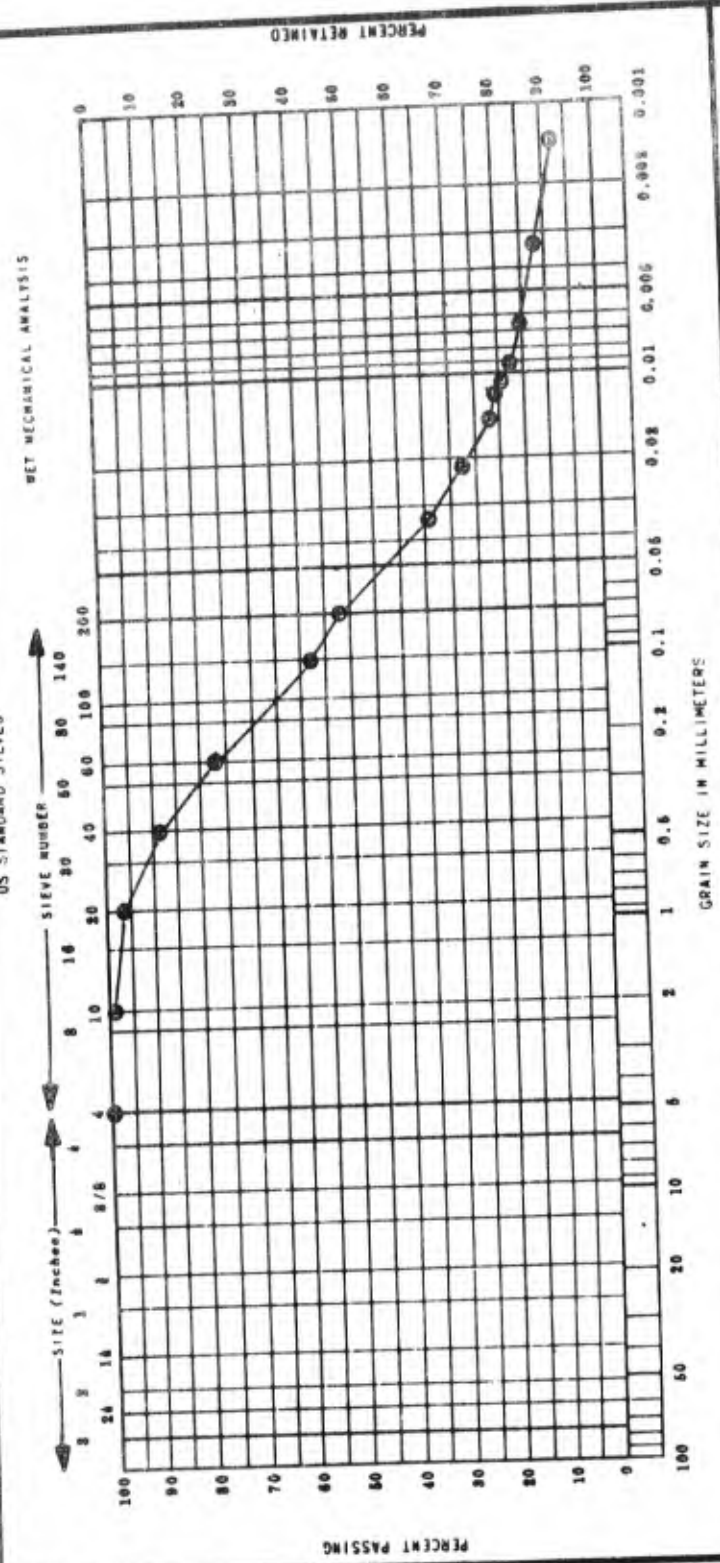


EXCAVATION NUMBER	SAMPLE NUMBER	NATURAL % MOISTURE	"L"	"P"	"6"	CLASSIFICATION	REMARKS
CEP # 5		194	220	M32	7.65	CL-M	SP. 269
TECHNICIAN (Signature)							VC
PLOTTED BY (Signature)							CHECKED BY (Signature)

DATE 2-24-52

GRAIN SIZE DISTRIBUTION GRAPH - AGGREGATE GRADING CHART

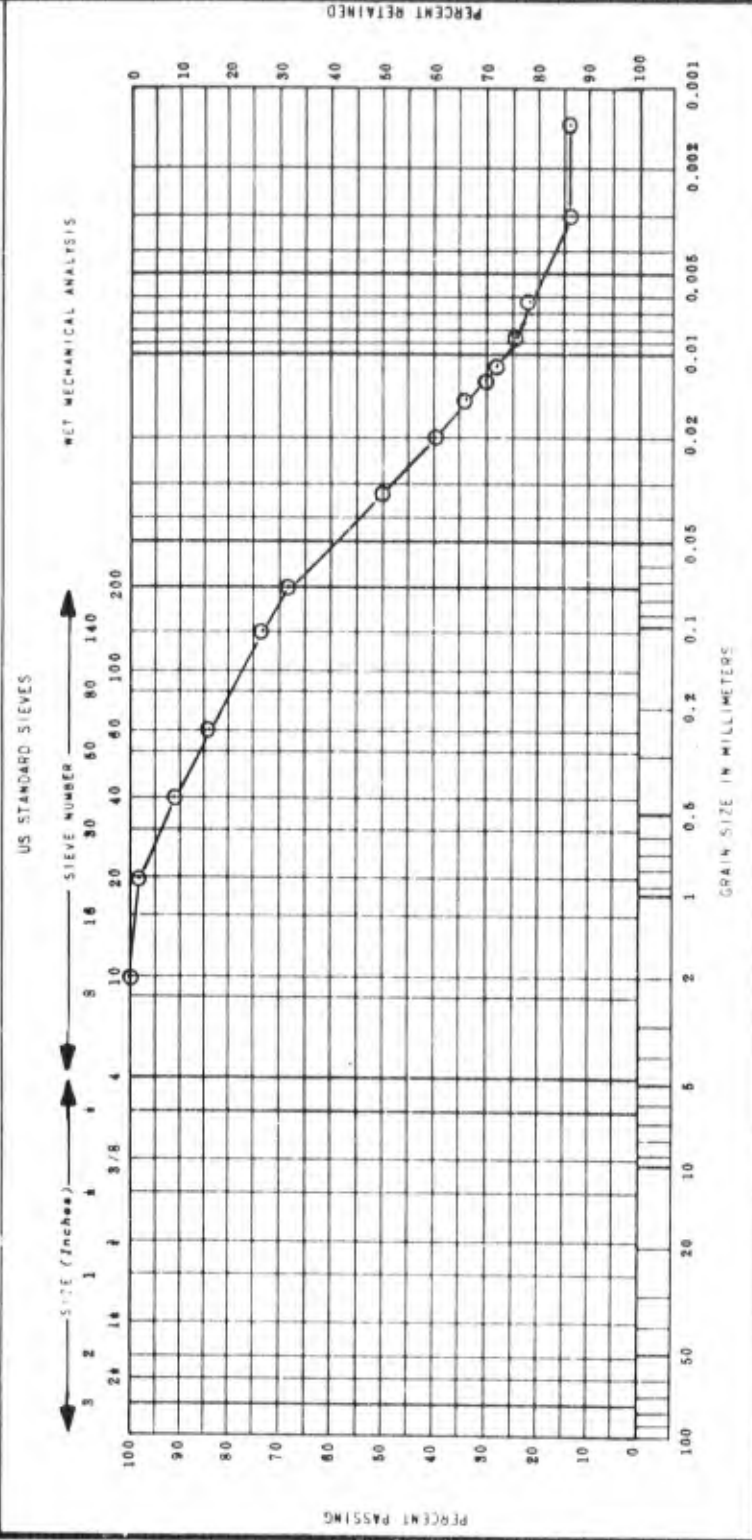
PROJECT
McClellan CBR # 6



EXCAVATION NUMBER	SAMPLE NUMBER	NATURAL % MOISTURE	w _p	I _p	CLASSIFICATION	REMARKS
CBR # 6		18.23	12.42	5.81	CL - ML	Sp Gr 2.666
TECHNICIAN (Signature)						CHECKED BY (Signature)

PROJECT: *M2 Cleona* DATE: *7/27*

GRAIN SIZE DISTRIBUTION GRAPH - AGGREGATE GRADING CHART

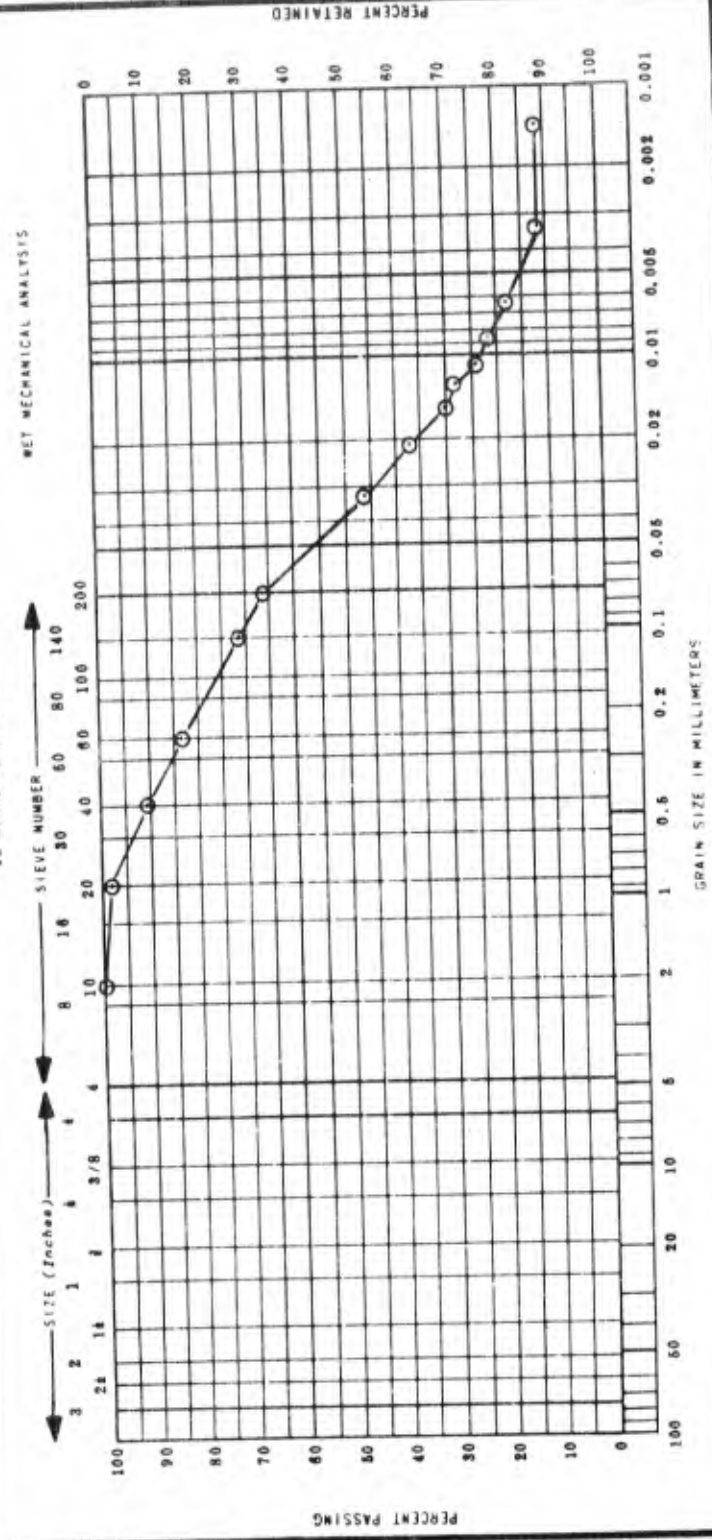


EXCAVATION NUMBER	SAMPLE NUMBER	NATURAL % MOISTURE	*L	*P	IP	CLASSIFICATION	REMARKS
<i>CR #8</i>		<i>3.47</i>	<i>19.7</i>	<i>12.0</i>	<i>7.7</i>	<i>CW-ML</i>	<i>SP 2.15</i>
TECHNICIAN (Signature) <i>[Signature]</i>							CHECKED BY (Signature) <i>VC</i>
PLOTTED BY (Signature) <i>[Signature]</i>							

DATE 7/27

GRAIN SIZE DISTRIBUTION GRAPH - AGGREGATE GRADING CHART

PROJECT 170000000

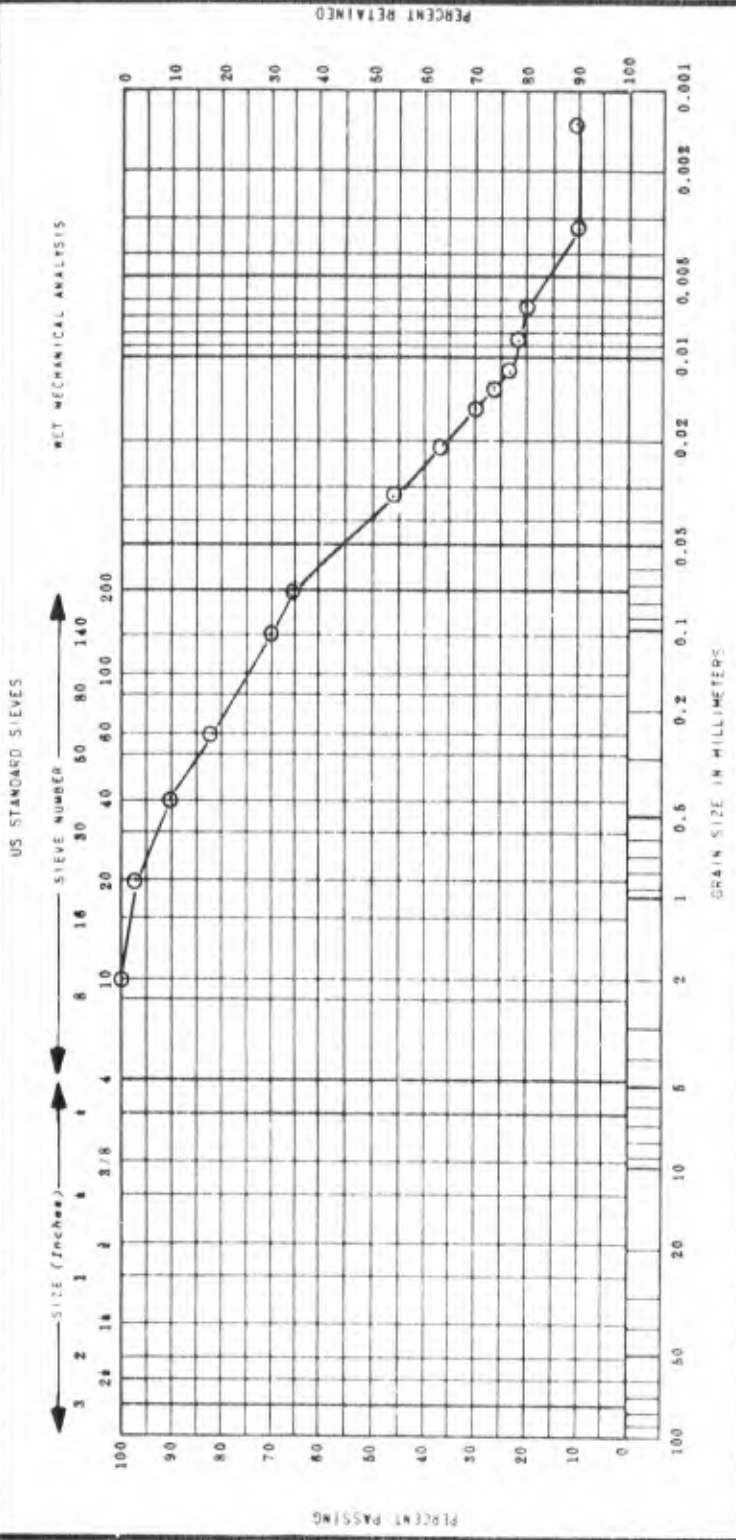


EXCAVATION NUMBER	SAMPLE NUMBER	NATURAL % MOISTURE	W _p	L _p	CLASSIFICATION	REMARKS
00K 49		3.07	14.3	6.2	C.L.M.M.	S.P. 2.71
TECHNICIAN (Signature) J.S.			PLOTTED BY (Signature)		CHECKED BY (Signature) VC	

GRAIN SIZE DISTRIBUTION GRAPH - AGGREGATE GRADING CHART

DATE 7/27

PROJECT



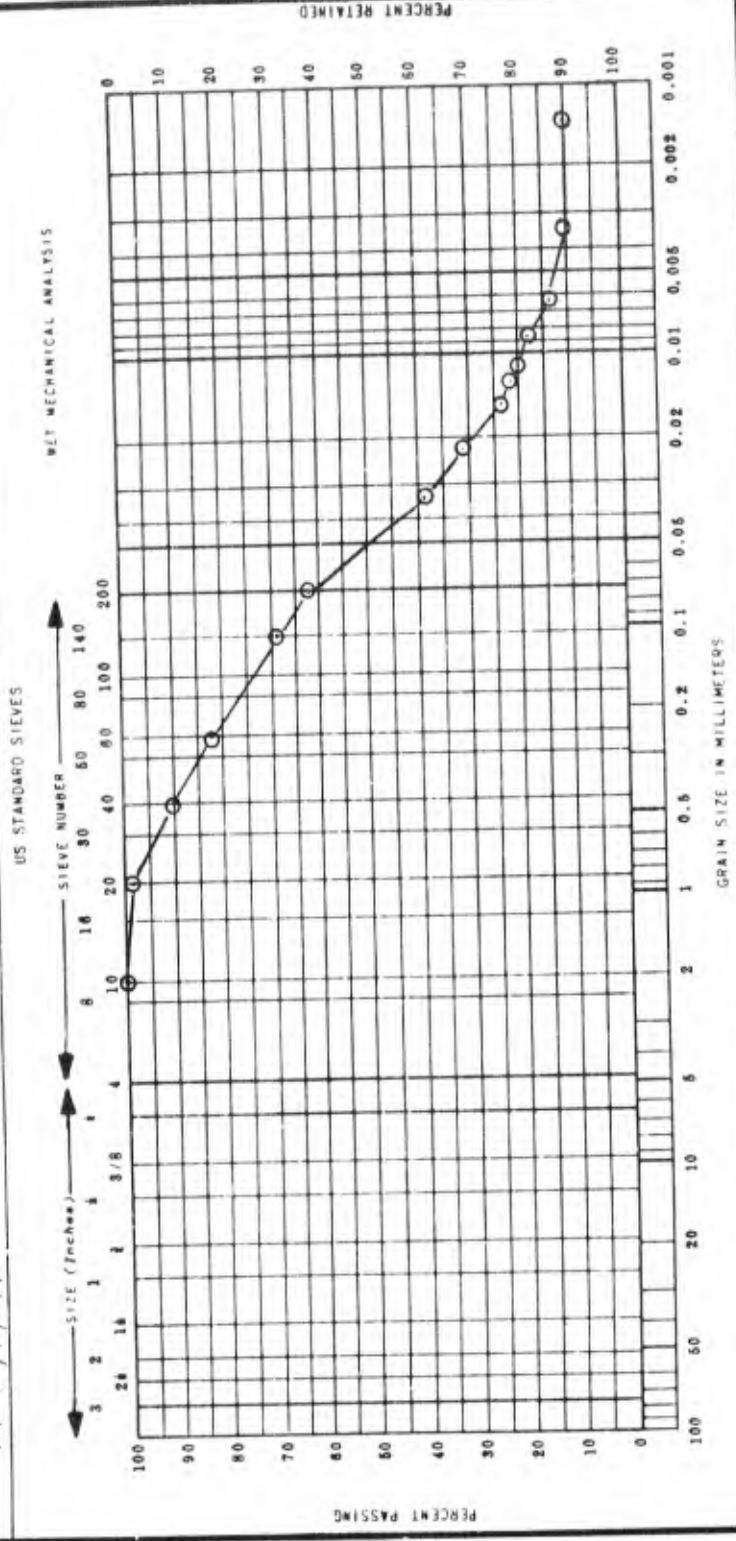
EXCAVATION NUMBER	SAMPLE NUMBER	NATURAL % MOISTURE	*L	*P	IP	CLASSIFICATION	REMARKS
03.810		1.44	18.5	13.54	4.61	CL _{ML}	7/27
TECHNICIAN (Signature)							CHECKED BY (Signature)
PLOTTED BY (Signature)							

DATE 7/27

GRAIN SIZE DISTRIBUTION GRAPH - AGGREGATE GRADING CHART

PROJECT

HCC Jettah



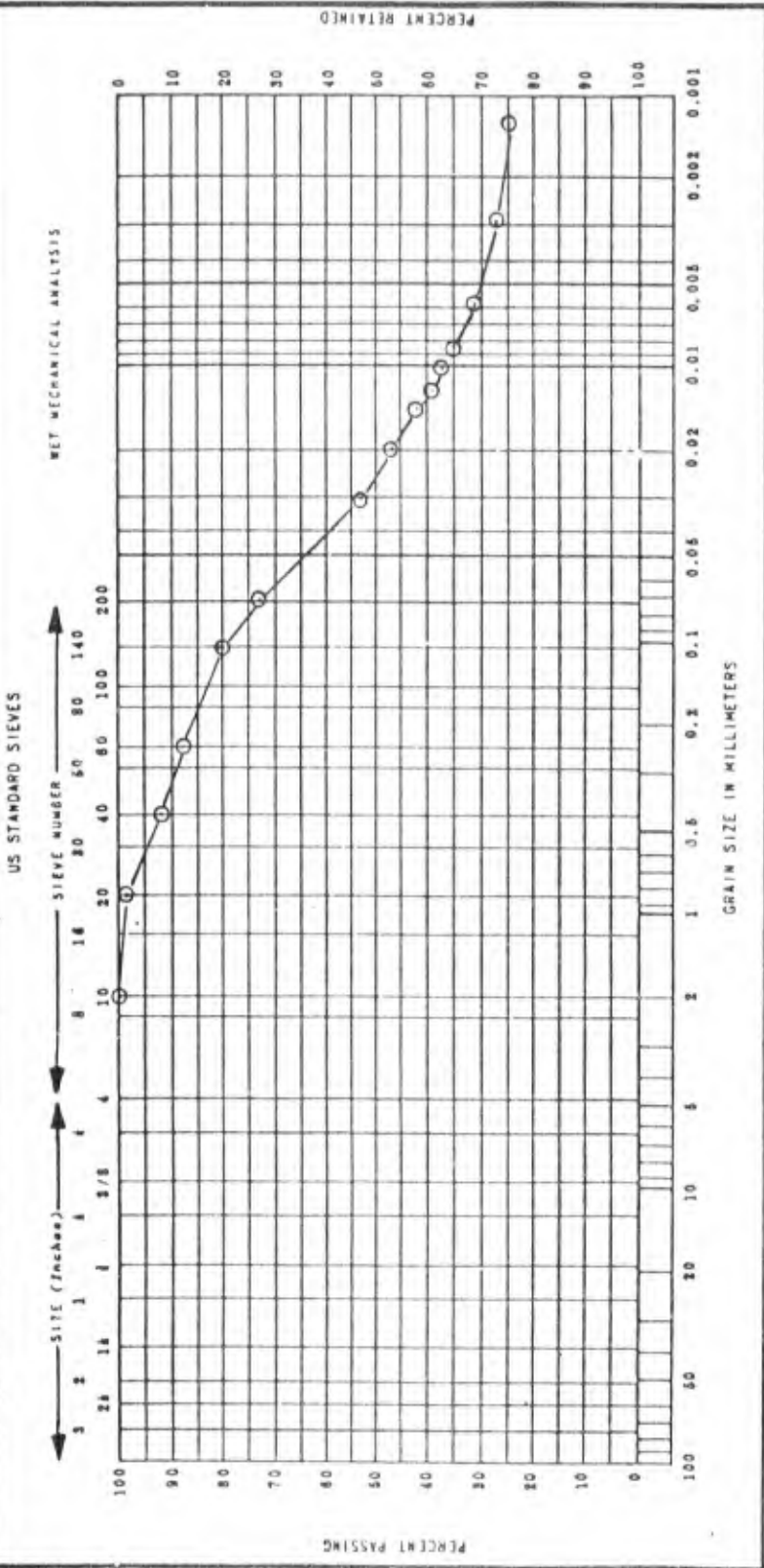
ELEVATION NUMBER	SAMPLE NUMBER	NATURAL % MOISTURE	M _L	W _P	I _P	CLASSIFICATION	REMARKS
CPA 11		3.6	17.0	12.0	4.9	M-L-C-W	S.P 211
TECHNICIAN (Signature) <i>[Signature]</i>							CHECKED BY (Signature) <i>VC</i>
PLOTTED BY (Signature) <i>K</i>							

GRAIN SIZE DISTRIBUTION GRAPH - AGGREGATE GRADING CHART

DATE 7/27

PROJECT

McClellan



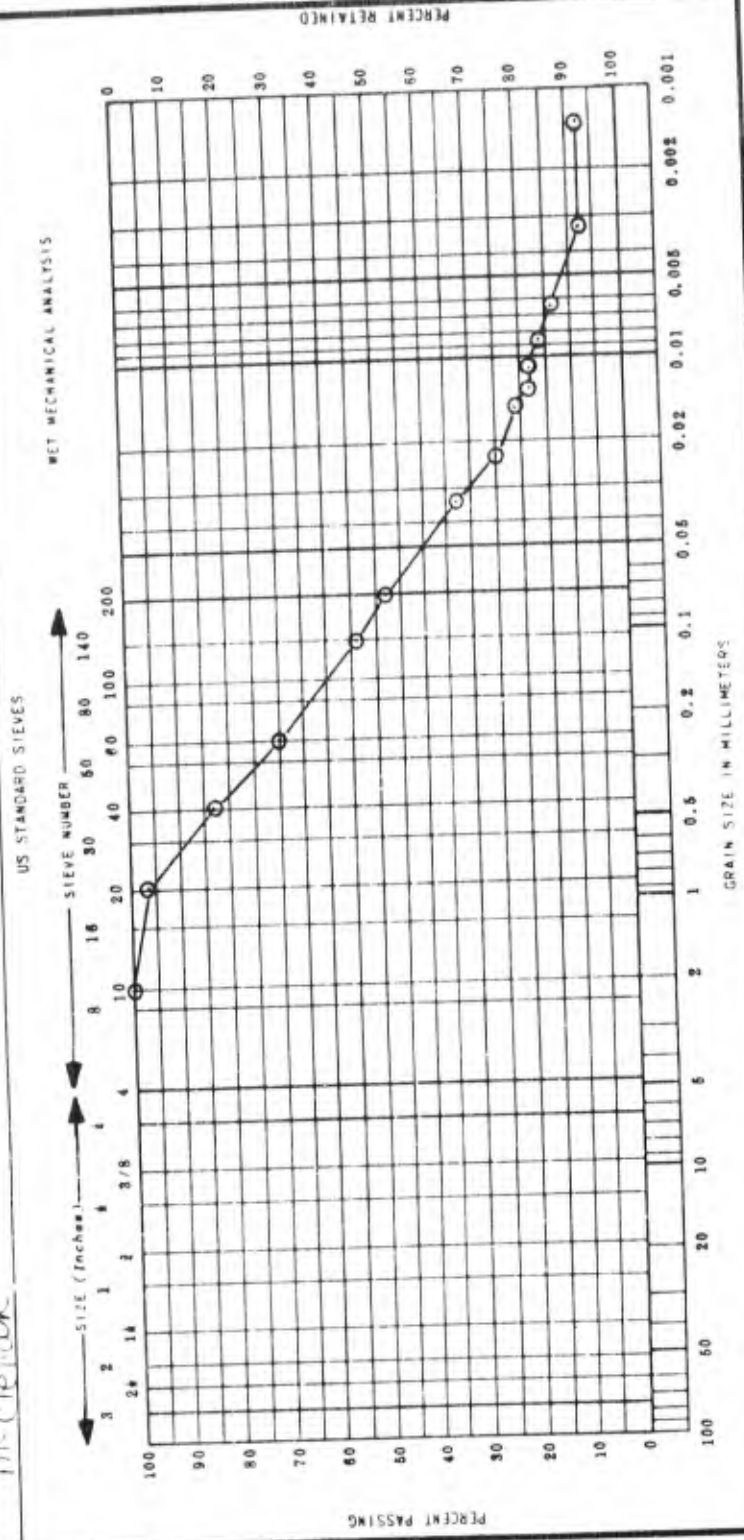
EXCAVATION NUMBER	SAMPLE NUMBER	NATURAL % MOISTURE	W _L	W _P	I _p	CLASSIFICATION	REMARKS
113		5.84	37.0	20.29	16.7	EL	SP 2.73

TECHNICIAN (Signature) *GK* PLOTTED BY (Signature) *GK*
 CHECKED BY (Signature) *VC*

DATE 7/27

GRAIN SIZE DISTRIBUTION GRAPH - AGGREGATE GRADING CHART

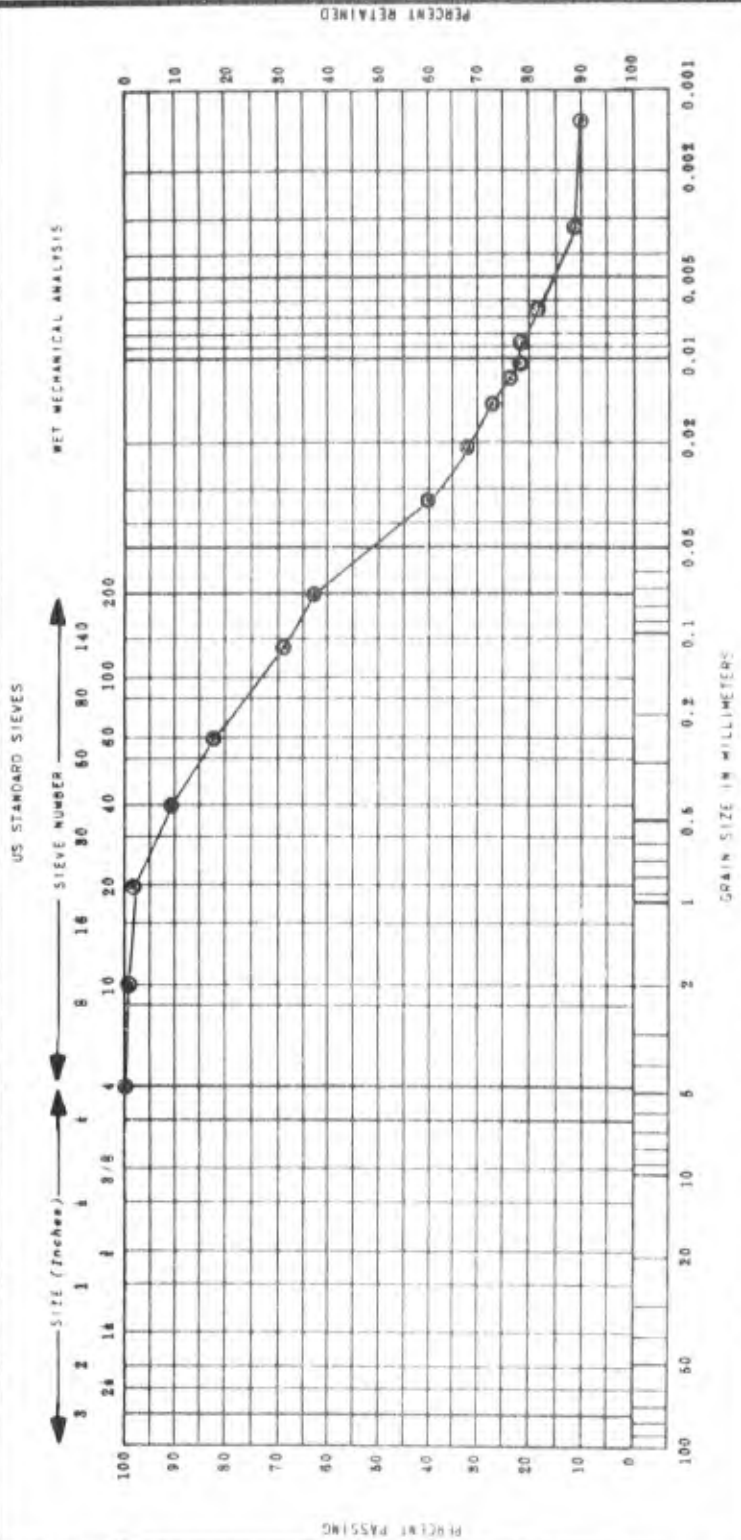
PROJECT *Inco Jellison*



EXCAVATION NUMBER	SAMPLE NUMBER	NATURAL % MOISTURE	w _L	w _p	I _p	CLASSIFICATION	REMARKS
CBK #15		3.55	22.5	19.6	2.9	CL-ML	C.P. 2.645
TECHNICIAN (Signature) <i>SJ CK</i>						CHECKED BY (Signature) <i>VC</i>	
PLOTTED BY (Signature) <i>CK</i>							

PROJECT Mc Clellan CBR 517 DATE 2-18-82

GRAIN SIZE DISTRIBUTION GRAPH - AGGREGATE GRADING CHART



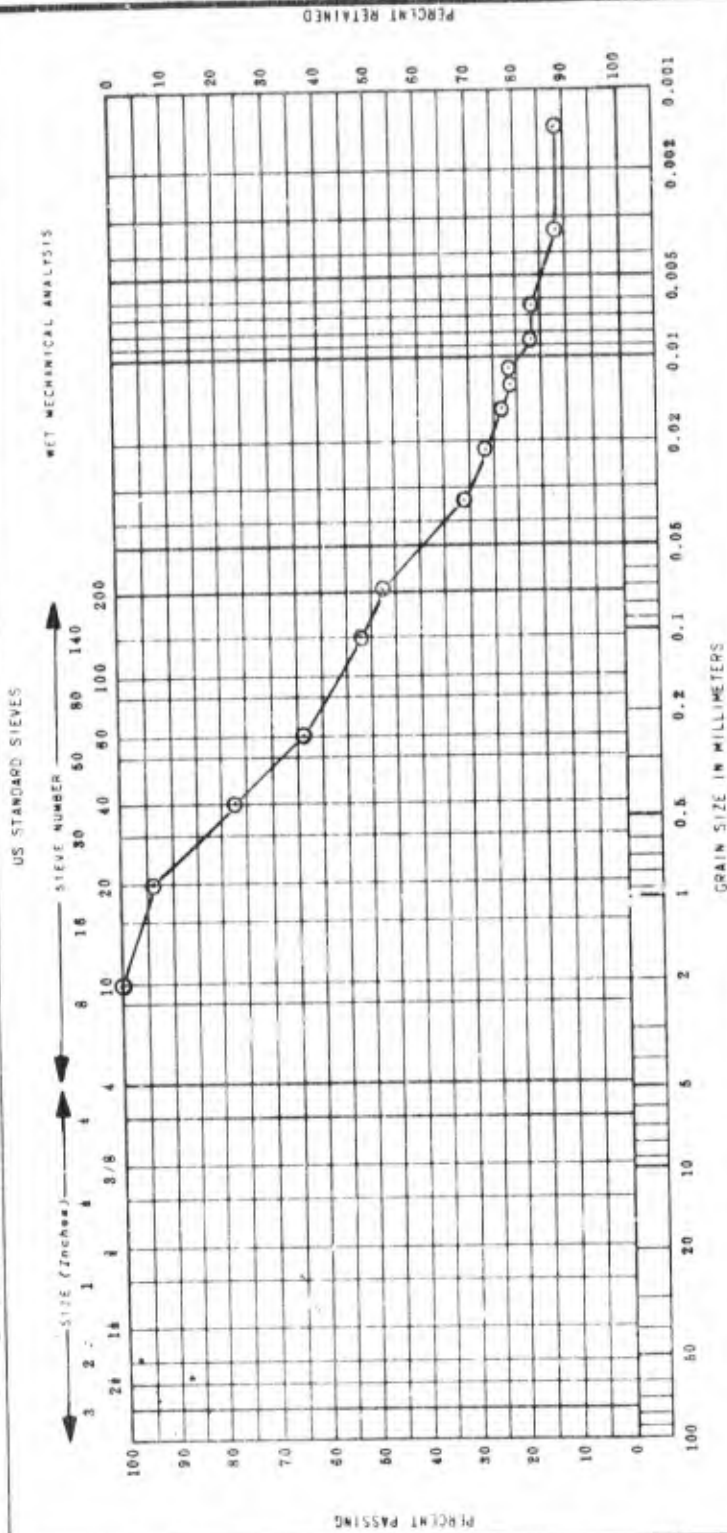
EXCAVATION NUMBER	SAMPLE NUMBER	NATURAL % MOISTURE	% L	% P	I _p	CLASSIFICATION	REMARKS	
CBR 17			18.41	10.53	7.98	CL-ML	G _s 2.74	
TECHNICIAN (Signature)							PLOTTED BY (Signature)	CHECKED BY (Signature)
							RL	AS

GRAIN SIZE DISTRIBUTION GRAPH - AGGREGATE GRADING CHART

DATE 7/27

PROJECT

McClellan



EXCAVATION NUMBER	SAMPLE NUMBER	NATURAL % MOISTURE	W _p	F _p	CLASSIFICATION	REMARKS
OK 218		5.50	23.5	17.3	CL-M	SP 2.73
TECHNICIAN (Signature) <i>OK</i>					CHECKED BY (Signature) <i>Vc</i>	
PLOTTED BY (Signature) <i>OK</i>						

APPENDIX F
RUT DEPTH MEASUREMENTS

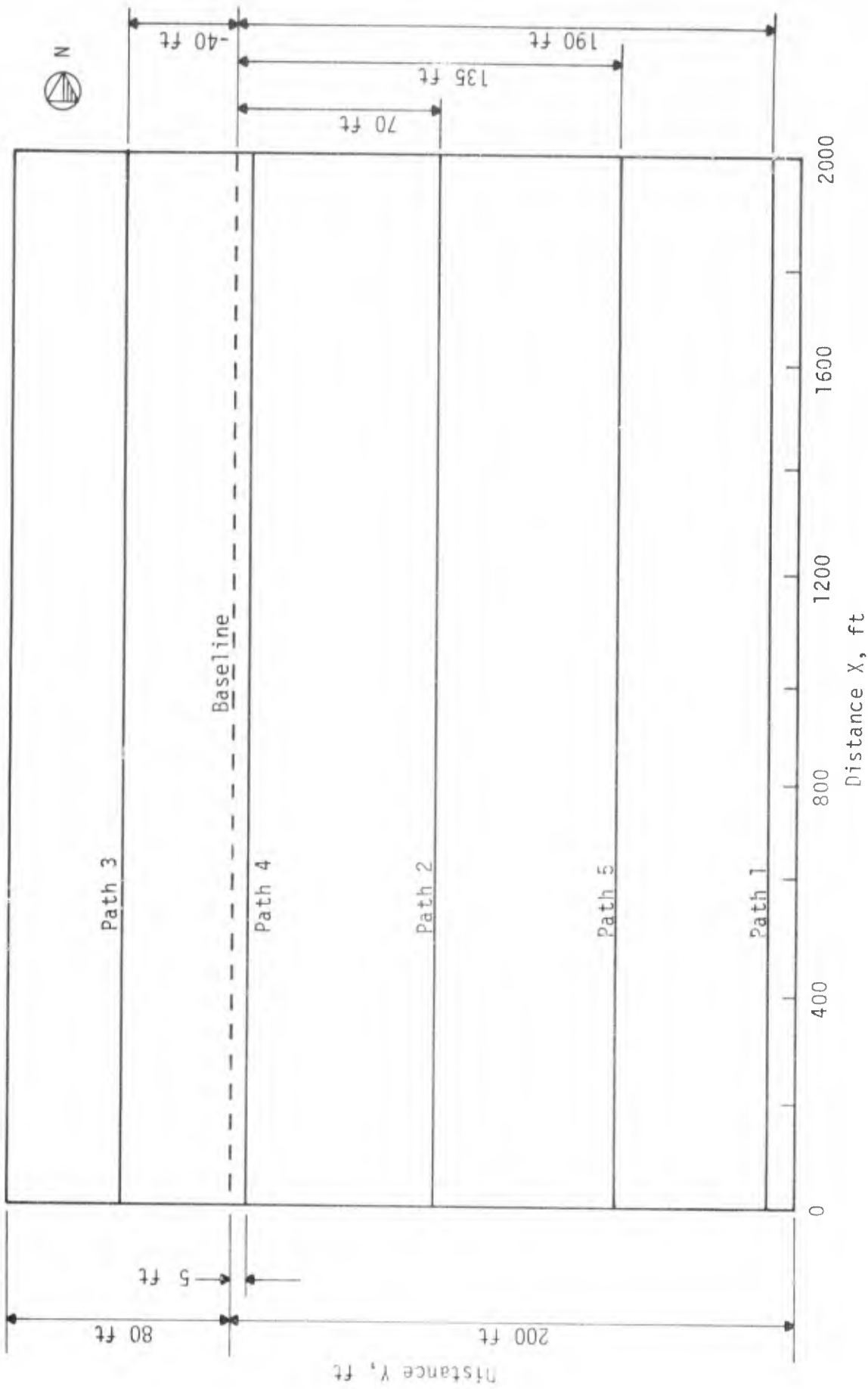


Figure F-1. Load Cart Paths, Area 2.

TABLE F-1. RUT DEPTH MEASUREMENTS FOR CART, 17,000-POUND LOAD^a.

Cart Path	Location, ft		Rut Depth, in
	X	Y	
Path 1 S→N	220.000	190.000	2.5
	225.000		4
	250.000		3
	357.000		1.5
	370.000		2.25
	505.000		2
	510.000		Drain pipe
	515.000		2.75
	550.000		2.5
	625.000		1.5
	715.000		1.75
	745.000		2
	765.000		2.25
	795.000		2
	830.000		1.75
	880.000		1.5
	935.000		2
	995.000		2
	1040.000		3.5
	2010.000		2
2070.000		1.75	
2085.000		1.75	
2180.000		2	
2205.000		6.5	
Path 2 N→S	2285.000	70.000	4
	2275.000		2
	2205.000		1.5
	2165.000		1.5
	2150.000		1.5

a. All tests had 17,000-lb load except three tests on Path 5. These tests had 21,000-lb loads.

TABLE F-1. RUT DEPTH MEASUREMENTS FOR CART, 17,000-POUND LOAD^a (CONTINUED).

Cart Path	Location, ft		Rut Depth, in
	X	Y	
Path 2 N→S	2135.000	70.000	1.75
	2130.000	↓	2
	2115.000		2
	1990.000		2
	1930.000		2.5
	1880.000		2
	1210.000		1.5
	1200.000		2
	1155.000		1.5
	1000.000		2
	980.000		2
	930.000		2.5
	820.000		1.5
	770.000		2
	700.000		2
	470.000		1.5
	320.000		2.5
315.000	2.5		
225.000	2.25		
140.000	2.5		
Path 3 S→N	108.000	-40.000	1.75
	178.000	↓	2
	244.000		b---
	273.000		b---
	354.000		0.875
	392.000		b---
	470.000		0.875
	770.000		b---

a. All tests had 17,000-lb load except three tests on Path 5. These tests had 21,000-lb loads.

b. Rut not measurable.

TABLE F-1. RUT DEPTH MEASUREMENTS FOR CART, 17,000-POUND LOAD^a (CONTINUED).

Cart Path	Location, ft		Rut Depth, in
	X	Y	
Path 3 S→N	893.000	-40.000	2.5
	1118.000	↓	2.25
	1193.000		2
	1403.000		2
Path 4 N→S	2300.000		5.000
	2000.000	↓	b---
	1421.000		b---
	1406.000		2.25
	1400.000		b---
	1286.000		b---
	1250.000		2
	1202.000		1.75
	1157.000		5
	1052.000		2.5
	280.000		b---
	262.000		1.5
	257.000		1.5
	191.000		3.5
	95.000		4
	38.000	4	
Path 5 S→N	51.000	135.000	a ₂
	126.000	↓	a ₄
	270.000		a ₆
	330.000		5
	426.000		3
	855.000		1.5
	900.000		3

a. All tests had 17,000-lb load except three tests on Path 5. These tests had 21,000-lb loads.

b. Rut not measurable.

TABLE F-1. RUT DEPTH MEASUREMENTS FOR CART, 17,000-POUND LOAD^a (CONCLUDED).

Cart Path	Location, ft		Rut Depth, in
	X	Y	
Path 5 S→N	1137.000	135.000	1 to 2
	1227.000	↓	1.75
	1308.000		1.75
	1392.000		b---
	2085.000		1.5
	2118.000		5.5
	2184.000		2.5
	2289.000		b---
	2370.000		2.25
	2400.000		8
	2622.000		b---

- a. All tests had 17,000-lb load except three tests on Path 5. These tests had 21,000-lb loads.
- b. Rut not measurable.

TABLE F-2. RUT DEPTH MEASUREMENTS FOR 38,000-POUND TOWED AIRCRAFT.

Location, ft		Depth of Rut, in			
X	Y	Left Main Gear	Right Main Gear	Right Nose Wheel	Left Nose Wheel
706.925	-12.751		1.176		
706.222	5.102	0			
683.937	-4.278			0.552	
683.772	-4.973				0.432
480.180	-11.619		0.072		
484.796	5.712	0.516			
460.522	2.791				0.588
460.125	2.097			0.072	
445.980	29.275	1.032			
464.898	28.800		0.480		
454.609	51.618			0.540	
454.047	52.044				0.468
486.829	82.438		0.174		
491.627	65.112	0.078			
511.272	80.368				0.020
511.421	80.900			0	
529.385	78.409		0.120		
520.398	62.770	0.744			
544.899	58.874				0
545.543	59.051			0.108	
407.214	3.613		0.276		
415.174	19.458	0.948			
390.977	22.087			1.200	
390.424	21.581				0.120
397.828	57.623		0.120		
409.380	43.830	1.14			
421.354	65.395				0.120
421.392	66.198			0.156	

TABLE F-2. RUT DEPTH MEASUREMENTS FOR 38,000-POUND TOWED AIRCRAFT
(CONCLUDED).

Location, ft		Depth of Rut, in			
X	Y	Left Main Gear	Right Main Gear	Right Nose Wheel	Left Nose Wheel
390.361	85.807		0.744		
407.449	80.472	1.14			
405.250	105.392				0.504
404.661	105.867			0.660	
458.564	150.276		0.828		
461.982	132.762	0.588			
483.045	146.044				0.372
482.856	146.703			0.252	
576.500	158.494		0.240		
575.680	140.513	1.104			
599.254	147.961				0.156
599.304	148.714			0.276	

TABLE F-3. RUT DEPTH MEASUREMENTS FOR 38,000-POUND POWERED AIRCRAFT.

Location, ft		Depth of Rut, in			
		Left Main Gear	Right Main Gear	Right Nose Wheel	Left Nose Wheel
X	Y				
916.478	65.803		0.588		
929.666	53.658	1.368			
939.322	76.224				0.240
938.772	76.747			0	
927.601	77.803		0.192		
940.613	65.619	0.756			
950.165	88.434				0
949.760	89.000			0	
962.814	107.606		0.204		
970.563	91.466	1.620			
987.358	109.143				0
987.237	109.766			0.048	
1115.998	119.248		0.036		
1115.632	101.271	0.744			
1139.139	109.863				0.552
1139.215	110.472			0.312	
1197.878	90.720		0.468		
1182.024	82.403	0.516			
1200.142	65.884				0
1200.843	66.000			0.120	
1205.545	58.621		0.636		
1187.736	59.601	0.288			
1195.352	36.135				0.120
1196.114	35.817			0.156	
1180.657	13.821		0.072		
1171.832	30.244	0.396			
1155.914	11.807				0.072
1156.028	11.085			0.084	

TABLE F-3. RUT DEPTH MEASUREMENTS FOR 38,000-POUND POWERED AIRCRAFT (CONTINUED).

Location, ft		Depth of Rut, in			
		Left Main Gear	Right Main Gear	Right Nose Wheel	Left Nose Wheel
X	Y				
1120.097	4.594		0.312		
1119.880	22.493	0.516			
1096.894	13.251				0.036
1097.044	12.565			0.048	
1196.964	5.351		1.116		
1100.557	21.984	0.552			
1077.927	12.769				0.636
1077.891	12.012			0.684	
1090.306	3.716		0.756		
1089.434	21.622	0			
1066.847	12.506				0.312
1066.860	11.781			0.036	
1037.317	2.531		0.204		
1037.393	20.537	0.708			
1014.346	12.317				0.036
1014.327	11.587			0.072	
991.591	13.976		0.312		
1002.667	26.482	0.072			
979.033	32.841				0.072
978.256	32.698			0.036	
971.274	53.583		0.156		
989.038	52.751	0.276			
981.189	76.020				0.120
980.549	76.226			0	
998.313	95.016		0.276		
1007.166	79.454	1.176			
1022.911	98.664				0.192
1022.918	99.288			0.120	

TABLE F-3. RUT DEPTH MEASUREMENTS FOR 38,000-POUND POWERED AIRCRAFT
(CONTINUED).

Location, ft		Depth of Rut, in			
		Left Main Gear	Right Main Gear	Right Nose Wheel	Left Nose Wheel
X	Y				
1092.382	107.882		0.312		
1092.511	89.988	0.276			
1115.725	98.858				0.624
1115.843	99.551			0	
1236.275	116.492		0.396		
1237.020	98.576	0.312			
1259.952	108.822				0
1259.930	109.477			0.072	
1300.237	119.276		0.120		
1300.022	101.251	0.552			
1323.472	110.074				0
1323.514	110.799			0.120	
1323.021	119.414		0.360		
1322.928	101.515	0.480			
1346.272	110.065				0.120
1346.281	110.729			0.240	
1381.312	119.708		0.396		
1380.988	101.747	0.480			
1404.088	110.326				0
1404.027	111.102			0.108	
1464.093	115.372		0.048		
1455.384	99.605	0.396			
1479.703	95.862				0.072
1480.330	96.220			0.348	
1479.931	84.891		0.072		
1462.064	87.032	0.192			
1467.335	63.082				0.552
1467.754	62.468			0.552	
1439.169	45.131		0.276		

TABLE F-3. RUT DEPTH MEASUREMENTS FOR 38,000-POUND POWERED AIRCRAFT (CONTINUED).

Location, ft		Depth of Rut, in			
		Left Main Gear	Right Main Gear	Right Nose Wheel	Left Nose Wheel
X	Y				
1432.358	61.694	0.408			
1414.256	44.839				0.276
1414.414	44.042			0.240	
1364.138	23.316		0.468		
1360.594	40.840	0.948			
1339.422	28.427				0.192
1339.487	27.749			0.312	
1320.440	18.528		6.684		
1319.568	36.382	0.864			
1296.931	27.106				0.084
1296.918	26.429			0.744	
1282.397	40.814		1.068		
1300.103	43.949	1.104			
1287.397	64.456				0.156
1286.798	65.241			0.384	
1296.573	69.985		0.588		
1305.157	54.233	0.672			
1321.129	72.879				0.120
1321.289	73.675			0.312	
1322.486	77.620		0.672		
1325.430	59.427	1.464			
1346.615	71.640				0.672
1346.366	72.308			0.120	
1355.692	82.415		0.120		
1358.535	64.872	0.348			
1379.957	77.182				0.120
1379.775	77.788			0.636	
1419.250	92.363		0.396		
1421.774	74.570	0.276			

TABLE F-3. RUT DEPTH MEASUREMENTS FOR 38,000-POUND POWERED AIRCRAFT
(CONTINUED).

Location, ft		Depth of Rut, in			
		Left Main Gear	Right Main Gear	Right Nose Wheel	Left Nose Wheel
X	Y				
1443.428	86.677				0.156
1443.228	87.412			1.164	
1544.986	111.339		0.276		
1547.121	93.427	0.948			
1568.511	104.476				1.140
1568.607	105.324			0	
1620.772	118.275		0.048		
1621.654	100.442	0.516			
1644.327	109.826				0.012
1644.381	110.415			0.372	
1661.871	104.637		0.864		
1649.218	91.755	0.708			
1671.521	81.999				0.348
1672.288	82.072			0.108	
1677.375	71.705		0.084		
1659.544	70.248	1.848			
1669.616	48.365				0.660
1670.469	48.159			0.240	
1615.190	17.155		0.156		
1619.087	34.887	2.316			
1595.037	32.241				1.848
1594.066	31.739			2.004	
1583.564	89.507		0.480		
1598.336	79.255	0.036			
1604.149	103.172				0.648
1603.662	103.823			2.268	
1702.816	120.105		1.092		
1703.311	101.988	0.204			

TABLE F-3. RUT DEPTH MEASUREMENTS FOR 38,000-POUND POWERED AIRCRAFT (CONTINUED).

Location, ft		Depth of Rut, in			
X	Y	Left Main Gear	Right Main Gear	Right Nose Wheel	Left Nose Wheel
1726.000	111.512				0
1725.974	112.146			0.204	
1764.566	115.112		0.828		
1755.892	99.438	0.192			
1779.903	96.368				0
1780.502	96.811			0.048	
1777.162	73.473		0.036		
1762.674	83.753	0.036			
1756.806	59.266				0.192
1756.695	58.467			1.176	
1735.511	72.805		0.552		
1750.908	82.033	0.672			
1730.741	96.593				0.228
1729.982	96.834			0.432	
1742.868	106.824		0		
1752.422	91.428	0.432			
1766.784	111.481				0.960
1766.972	112.120			0.036	
1798.797	71.741		0.156		
1780.895	68.734	0.984			
1793.366	47.474				0.396
1793.923	47.355			0.228	
1753.580	-18.541		0.228		
1742.952	-3.932	0.552			
1730.122	-24.717				0.192
1730.435	-25.357			0.192	
1645.681	-45.430		0.588		
1643.216	-27.686	0.516			

TABLE F-3. RUT DEPTH MEASUREMENTS FOR 38,000-POUND POWERED AIRCRAFT (CONCLUDED).

Location, ft		Depth of Rut, in			
X	Y	Left Main Gear	Right Main Gear	Right Nose Wheel	Left Nose Wheel
1621.574	-39.024				0.348
1621.737	-39.790			0.192	
1572.761	-49.897		0		
1573.030	-34.728	0.624			
1548.040	-44.624				0
1547.979	-45.312			0.156	
1415.142	-66.162		0.156		
1414.529	-50.374	0.120			
1391.241	-60.519				0.228
1391.436	-61.554			0.228	
1290.109	-57.237		0.480		
1292.645	-39.421	1.140			
1268.149	-46.2691				0.072
1267.988	-47.078			0.036	
1156.705	-43.271		0.156		
1160.478	-26.894	0.504			
1135.531	-31.323				0.816
1135.415	-32.018			0.540	

TABLE F-4. RUT DEPTH MEASUREMENTS FOR 54,000-POUND POWERED AIRCRAFT.

Location, ft		Depth of Rut, in			
		Left Main Gear	Right Main Gear	Right Nose Wheel	Left Nose Wheel
X	Y				
1065.890	37.421		0.672		
1068.665	-15.648	1.536			
1092.042	-8.299				0.312
1091.977	-7.759			0.396	
1243.597	11.272		5.640		
1243.559	-6.753	0.276			
1267.071	2.944				0.684
1266.913	3.939			0.204	
1125.676	521.360		0.516		
1414.985	-7.424	0.504			
1419.070	154.383				0
1406.774	197.218			0.492	
1648.093	13.487		0.156		
1645.389	-4.304	0.348			
1670.321	4.051				0.192
1670.047	4.809			0.228	
1578.541	26.734		0.120		
1575.812	44.205	0.468			
1553.988	32.078				0.312
1554.378	31.142			0.276	
1483.032	3.278		0		
1484.168	20.339	0.876			
1460.035	12.833				0.120
1460.249	12.133			0	
1143.027	12.378		0.180		
1138.419	30.269	0.516			
1117.977	15.614				0.204
1118.022	14.889			0.084	
1039.988	10.315		0.396		
1038.803	28.182	0.984			

TABLE F-4. RUT DEPTH MEASUREMENTS FOR 54,000-POUND POWERED AIRCRAFT
(CONCLUDED).

Location, ft		Depth of Rut, in			
		Left Main Gear	Right Main Gear	Right Nose Wheel	Left Nose Wheel
X	Y				
1015.904	17.097				0.120
1015.970	16.239			0.276	
1236.105	2.108		0.036		
1219.471	9.112	0.036			
1217.783	-14.664				0.120
1218.399	-15.326			0.192	
1038.211	30.999		0.240		
1049.118	16.597	0.624			
1062.596	36.206				0.084
1062.665	36.654			0.084	
1109.495	-7.267		0.372		
1118.647	8.108	0.036			
1094.914	13.213				0.036
1094.165	13.175			0.120	
1088.911	-55.643		0.312		
1095.916	-39.114	0.276			
1071.561	-37.661				0
1070.801	-37.969			0.156	
1064.080	-107.124		0.084		
1064.068	-107.152	2.040			
1039.831	-98.683				0.984
1039.871	-99.633			0.552	