

Lab Tests

6

Retaining Wall between the east portals of the Corbin Tunnels

On November 12, 1981, Dave Cochran and Ted Beeston inspected this wall and the excavation behind it. The inspection was to determine what methods could be used to protect workers behind the wall from rocks falling from the slope above the structure.

In a meeting later in the day with

②

○ District Engineers and a representative of Nevada Industrial Safety, Cochran and Preston mentioned the following possible protective measures

1. Use wire mesh bolted to the rock face - expensive

or

2. Use a timber protective roof over the workers - preferred -

○ Also discussed in the meeting was the possible

Use of a buttress on the outside of the wall for support. Cochran mentioned that if this alternative for support of the wall is used, additional drilling would be required to determine allowable footing pressures for the buttress.

On November 13, 1981,

Cochran and Beeston inspected

○ The West portal wall. The
fill behind the wall has
settled and spalling ^{at joints} ~~at joints~~
outward movement of the
wall was seen.

○

826-351

SAMPLED
4-12-82

Carlin Tunnel Backfill (F-96)

pH	8.76
Resistivity	5850
SiO ₂	84.93 %
SO ₃	0.33 %
Mat. Poss. CaSO ₄ ·2H ₂ O	0.71 %

6-28-82

93 = 141.00
165.00
119.85

119.00g dry (remaining)

SOIL MECHANICS LABORATORY

end test wet ~ 191.67g

end test dry ~ 178.73g

DIRECT SHEAR ON COHESIONLESS SOIL

tare

SOIL SAMPLE

VISUAL CLASSIFICATION Coarsely Sand
AND DESCRIPTION

LOCATION I-80, Carlin Tunnel

BORING NO. _____ SAMPLE DEPTH _____

SAMPLE NO. _____

SPECIFIC GRAVITY, G_s , 2.66 @ 20°C (-#2)

SOIL SAMPLE WEIGHT

INITIAL WT. CONTAINER + DRY SOIL IN g 269.44g

FINAL WT. CONTAINER + DRY SOIL IN g 119.00g

WT. DRY SOIL USED, W_s , IN g 150.44g

TEST NO. F-96 re-run (#4)

DATE May 6, 1982

TESTED BY Fisher, Saloewer & Reeston

SHEAR BOX

LENGTH, L, IN cm 6.35cm

INSIDE DEPTH, b, IN cm 3.81cm

BLOCK + GRATING, X, IN cm 3.70cm

SOIL SAMPLE VOLUME

BOX TO SOIL, v_s , IN cm 2.60cm

SOIL THICKNESS, t, IN cm 2.71cm

SAMPLE VOLUME IN cc 85.823581 cc

SOLIDS VOLUME, V_s , IN cc _____

VOID RATIO, e _____

POROSITY, n _____

NORMAL LOAD

APPLIED LOAD 1008 PSF
lbs 504 TSF lbs/sq ft

TARE IN lbs _____

SCALE LOAD IN lbs _____

PROVING RING NO. 4764

CALIBRATION FACTOR 311 lbs/10⁻⁴ in.

consolidation 1000 to .125

ELAPSED TIME IN min.	SHEAR IN in.	DIAL	SHEAR DISPLACEMENT IN in.	NORMAL DIAL IN in.	NORMAL DISPLACEMENT IN in.	PROVING RING DIAL IN .0001 in	STRESS FORCE IN lbs.	$\frac{\tau}{\sigma}$
0.00	0.000		0	0.000		0.0000		0
.25	.004		.004	.000	.000	.0050	15.55	.015
.50	.012		.012	.099	.099	.0096	27.99	.028
.75	.015		.015	.096	.096	.0122	37.94	.038
1.00	.035		.035	.093	.093	.0140	43.54	.043
1.25	.047		.047	.087	.087	.0146	45.41	.045
1.50	.059		.059	.0825	.0825	.0147	45.72	.045
1.75	.073		.073	.078	.078	.0142	44.16	.044
2.00	.085		.085	.074	.074	.01345	41.83	.041
2.31	.105		.105	.069	.069	.0124	38.56	.038
2.62	.125		.125	.064	.064	.0115	35.77	.035
3.08	.145		.145	.061	.061	.0107	33.28	.033
3.47	.165		.165	.058	.058	.0101	31.41	.031
3.83	.185		.185	.057	.057	.0095	29.55	.029
4.20	.205		.205	.055	.055	.0094	29.23	.029
4.50	.225		.225	.054	.054	.0091	28.30	.028
4.82	.245		.245	.052	.052	.0090	27.99	.028
5.18	.265		.265	.051	.051	.0089	27.68	.027
5.49	.285		.285	.0505	.0505	.0089	27.68	.027
5.77	.305		.305	.0495	.0495	.0091	28.30	.028
6.02	.325		.325	.049	.049	.0087	27.06	.027
6.26	.345		.345	.0485	.0485	.0087	27.06	.027
6.50	.365		.365	.048	.048	.0087	27.06	.027
6.79	.385		.385	.048	.048	.0086	26.75	.027
7.00	.405		.405	.047	.047	.0084	26.12	.026
7.25	.425		.425	.047	.047	.0084	26.12	.026
7.50	.445		.445	.048	.048	.0085	26.44	.026
7.78	.465		.465	.048	.048	.0085	26.44	.026

REMARKS

end test wet ~ 193.09g
 end test dry ~ 179.67g
 tare ~ 28.95g

90.15g dry (remaining)

SOIL MECHANICS LABORATORY

DIRECT SHEAR ON COHESIONLESS SOIL

SOIL SAMPLE

VISUAL CLASSIFICATION AND DESCRIPTION Gravelly Sand
 LOCATION I-80, Carlin Tunnel
 BORING NO. _____ SAMPLE DEPTH _____
 SAMPLE NO. _____
 SPECIFIC GRAVITY, G_s , 2.66 @ 20% (-#4)

SOIL SAMPLE WEIGHT

INITIAL WT. CONTAINER + DRY SOIL IN g 241.96g
 FINAL WT. CONTAINER + DRY SOIL IN g 90.15g
 WT. DRY SOIL USED, W_s , IN g 151.81g

TEST NO. F-96 re-run (#5)

DATE May 6, 1982
 TESTED BY Fisher, Schaeffer & Gehring

SHEAR BOX

LENGTH, L, IN cm 6.35 cm
 INSIDE DEPTH, b, IN cm 3.81 cm
 BLOCK + GRATING, X, IN cm 3.70 cm

SOIL SAMPLE VOLUME

BOX TO SOIL, V_a , IN cm 2.60 cm
 SOIL THICKNESS, t, IN cm 2.71 cm
 SAMPLE VOLUME IN cc 85,823581 cc
 SOLIDS VOLUME, V_s , IN cc _____

NORMAL LOAD

APPLIED LOAD 2018 PSF
1,009 TSF lbs/sq ft
 TARE IN lbs _____
 SCALE LOAD IN lbs _____

PROVING RING NO. 4764
 CALIBRATION FACTOR 311 lbs/10⁻⁴ in.

VOID RATIO, e _____
 POROSITY, n _____

consolidation .000 to .290

ELAPSED TIME IN min.	SHEAR IN in.	SHEAR DISPLACEMENT IN in.	NORMAL DIAL IN in.	NORMAL DISPLACEMENT IN in.	PROVING RING DIAL IN .0001 in.	STRESS FORCE IN lbs.	$\frac{\tau}{\sigma}$
0.00	0.000		0.000		0.000		
.25	.002	.002	.000	.000	.0078	24.26	.012
.50	.0045	.0045	.000	.000	.0126	39.19	.019
.75	.0075	.0075	.0995	.0995	.0158	49.14	.024
1.00	.0123	.0123	.0985	.0985	.01875	58.31	.029
1.25	.0195	.0195	.097	.097	.02105	65.47	.032
1.50	.027	.027	.095	.095	.0227	70.60	.035
1.75	.0355	.0355	.093	.093	.0237	73.71	.037
2.00	.048	.048	.090	.090	.0239	74.33	.037
2.38	.068	.068	.084	.084	.0236	73.40	.036
2.69	.088	.088	.082	.082	.0222	69.04	.034
3.04	.108	.108	.076	.076	.02115	65.78	.033
3.34	.128	.128	.073	.073	.0201	62.51	.031
3.67	.148	.148	.0695	.0695	.0190	59.09	.029
3.89	.168	.168	.068	.068	.0189	58.78	.029
4.10	.188	.188	.067	.067	.0179	55.67	.028
4.33	.208	.208	.066	.066	.01745	54.27	.027
4.60	.228	.228	.065	.065	.0172	53.99	.027
4.86	.248	.248	.064	.064	.0169	52.56	.026
5.10	.268	.268	.064	.064	.0170	52.87	.026
5.29	.288	.288	.0635	.0635	.0171	53.18	.026
5.51	.308	.308	.063	.063	.0171	53.18	.026
5.70	.328	.328	.063	.063	.0169	52.56	.026
5.92	.348	.348	.0625	.0625	.0173	53.80	.027
6.15	.368	.368	.062	.062	.0173	53.80	.027
6.35	.388	.388	.062	.062	.0170	52.87	.026
6.52	.408	.408	.062	.062	.0166	51.63	.026
6.73	.428	.428	.062	.062	.0165	51.32	.025

REMARKS

end test wet ~ 193.04g
 end test dry ~ 179.78g
 tare ~ 29.66g

07.00g wet remaining
 82.69g dry (remaining)

SOIL MECHANICS LABORATORY

DIRECT SHEAR ON COHESIONLESS SOIL

SOIL SAMPLE

VISUAL CLASSIFICATION Gravelly Sand
 AND DESCRIPTION
 LOCATION I-80, Carlin Tunnel
 BORING NO. _____ SAMPLE DEPTH _____
 SAMPLE NO. _____
 SPECIFIC GRAVITY, G_s , 2.66 @ 20°C (-4)

SOIL SAMPLE WEIGHT

INITIAL WT. CONTAINER + DRY SOIL IN g 233.54g
 FINAL WT. CONTAINER + DRY SOIL IN g 82.69g
 WT. DRY SOIL USED, W_s , IN g 150.85g

TEST NO. F-96 re-run (#6)

DATE May 6, 1982

TESTED BY Fisher, Sabaer & Cooker

SHEAR BOX

LENGTH, L, IN cm 6.35cm
 INSIDE DEPTH, b, IN cm 3.81cm
 BLOCK + GRATING, X, IN cm 3.70cm

SOIL SAMPLE VOLUME

BOX TO SOIL, V_b , IN cm 2.575cm
 SOIL THICKNESS, t, IN cm 2.685cm
 SAMPLE VOLUME IN cc 85.031851 c.c.
 SOLIDS VOLUME, V_s , IN cc _____

NORMAL LOAD

APPLIED LOAD 4032 PSF
lbs/3.01675F lbs/sq ft

TARE IN lbs _____

SCALE LOAD IN lbs _____

PROVING RING NO. 4764
 CALIBRATION FACTOR .311 lbs/10⁻⁴ in.

VOID RATIO, e _____
 POROSITY, n _____

consolidation .000 to .330

ELAPSED TIME IN min.	SHEAR IN in. DIAL	SHEAR DISPLACEMENT IN in.	NORMAL DIAL IN in.	NORMAL DISPLACEMENT IN in.	PROVING RING DIAL IN .0001 in	STRESS FORCE IN lbs.	$\frac{\tau}{\sigma}$
0.00	0.000		0.000		0.0000		
.25	.001	.001	.000	.000	.0054	16.79	.004
.50	.0025	.0025	.006	.000	.0185	57.54	.014
.75	.006	.006	.000	.000	.0194	60.33	.015
1.00	.009	.009	.000	.000	.0237	73.71	.018
1.25	.014	.014	.000	.000	.0292	90.81	.023
1.50	.021	.021	.0995	.0995	.0336	104.50	.026
1.75	.029	.029	.0985	.0985	.0378	117.56	.029
2.00	.037	.037	.097	.097	.0413	128.44	.032
2.44	.057	.057	.091	.091	.0452	140.57	.035
2.68	.077	.077	.086	.086	.0457	142.13	.035
2.95	.097	.097	.081	.081	.0444	138.08	.034
3.16	.117	.117	.077	.077	.0423	131.55	.033
3.43	.137	.137	.074	.074	.04085	127.04	.032
3.69	.157	.157	.072	.072	.0387	120.36	.030
3.96	.177	.177	.070	.070	.0373	116.00	.029
4.20	.197	.197	.069	.069	.0369	114.76	.028
4.46	.217	.217	.068	.068	.0363	112.89	.028
4.72	.237	.237	.068	.068	.0348	108.23	.027
5.00	.257	.257	.067	.067	.0344	106.98	.027
5.26	.277	.277	.066	.066	.0331	102.94	.026
5.54	.297	.297	.066	.066	.0336	104.50	.026
5.77	.317	.317	.066	.066	.0339	105.43	.026
6.00	.337	.337	.066	.066	.0338	105.12	.026
6.29	.357	.357	.065	.065	.0340	105.77	.026
6.52	.377	.377	.065	.065	.0337	104.81	.026
6.75	.397	.397	.066	.066	.0343	106.67	.026
6.98	.417	.417	.066	.066	.0345	107.30	.027

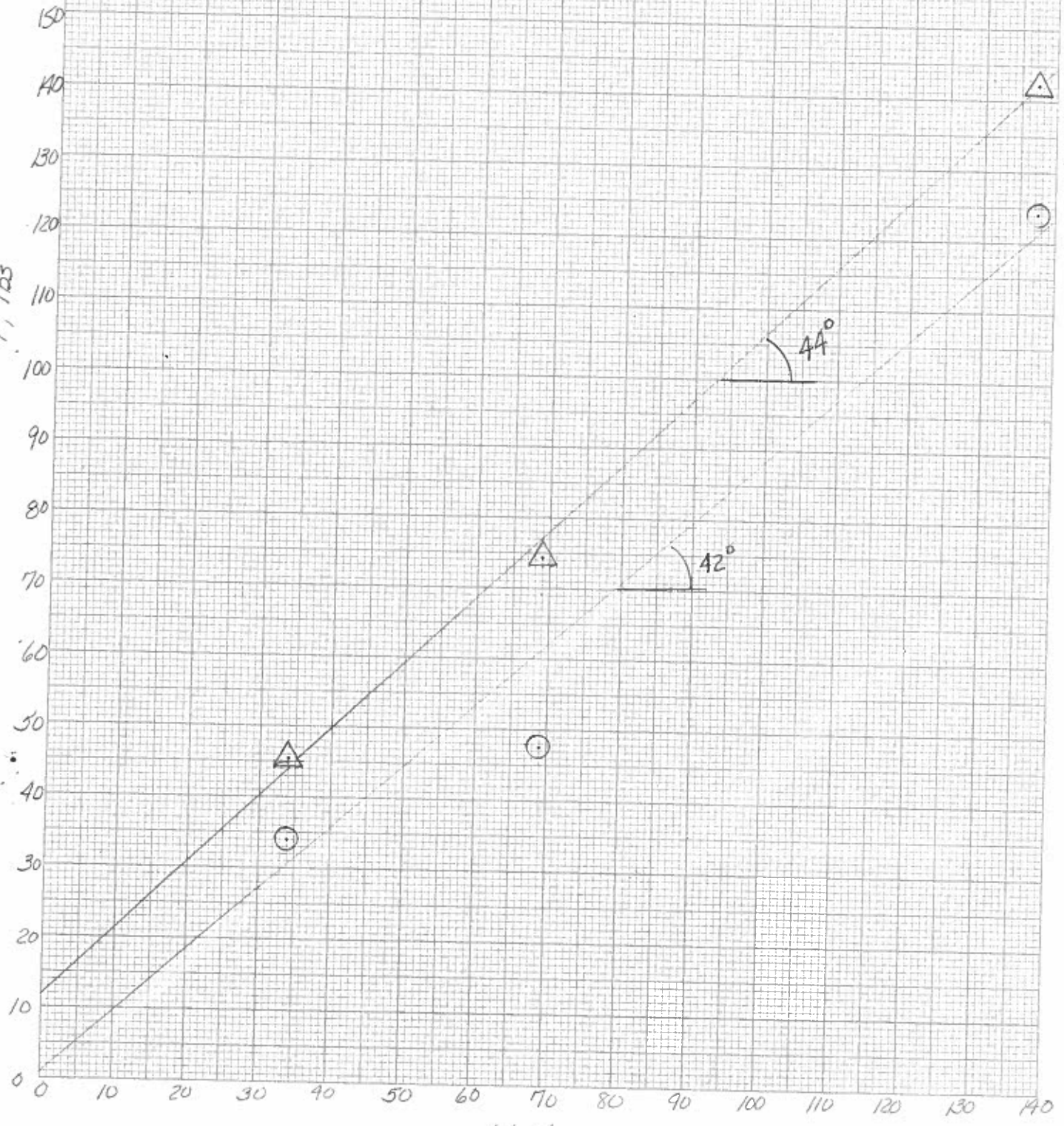
REMARKS

ND. 340R-10 1/2 DIETZGEN GRAPH PAPER
10 X 10 PER HALF INCH

DIETZGEN CORPORATION
MADE IN U.S.A.

○ ~ 6% moisture
△ ~ 9% moisture

F_1 / b_s



○ Test #4 } 9% moisture
□ Test #5 }
△ Test #6 }

$\frac{70}{10} \times 10^{-3}$

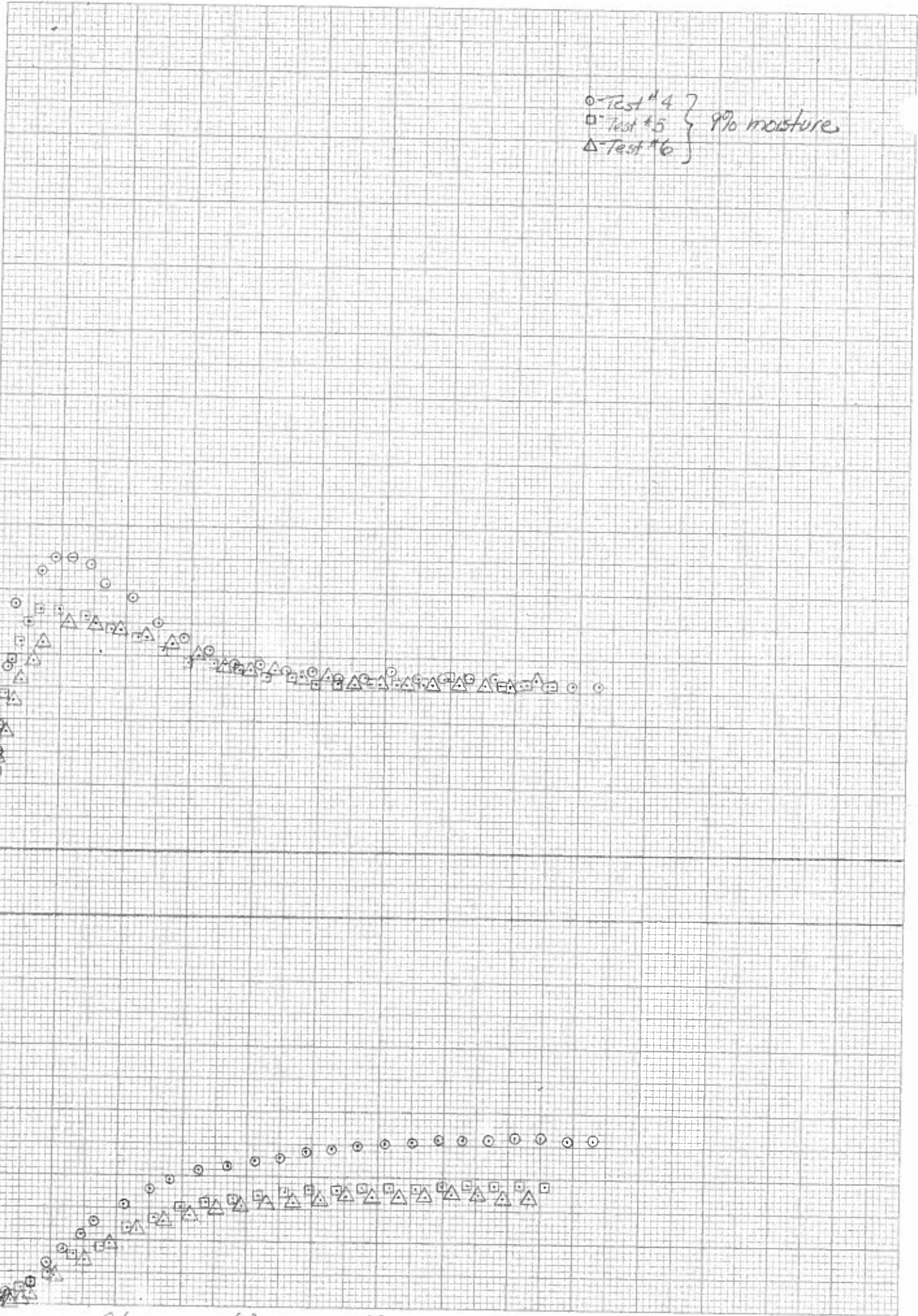
Normal Displacement in Inches $\times 10^{-3}$

50
40
30
20
10
0

0
10
20
30
40
50
60
70
80
90
100

0.1 0.2 0.3 0.4 0.5 0.6 0.7

Shear Displacement in Inches



end test wet 177.48g ✓
 end test dry 168.92g ✓
 tare 29.23g ✓

SOIL MECHANICS LABORATORY

✓ 41.04g wet (remaining) + con
 ✓ 89.54g dry (remaining) + con

DIRECT SHEAR ON COHESIONLESS SOIL

SOIL SAMPLE

VISUAL CLASSIFICATION Gravelly sand
 AND DESCRIPTION _____
 LOCATION I-80, 42.1in Tunnel
 BORING NO. _____ SAMPLE DEPTH _____
 SAMPLE NO. _____
 SPECIFIC GRAVITY, G_s , 2.66 @ 20°C (-#1)

SOIL SAMPLE WEIGHT

INITIAL WT. CONTAINER + DRY SOIL IN g 230.00g
 FINAL WT. CONTAINER + DRY SOIL IN g 89.54g
 WT. DRY SOIL USED, W_s , IN g 140.46g

TEST NO. F-96 re-run (41)

DATE May 5, 1962

TESTED BY Fisher & Schover
Cochran

SHEAR BOX

LENGTH, L, IN cm 6.35 cm
 INSIDE DEPTH, b, IN cm 3.81 cm
 BLOCK + GRATING, X, IN cm 3.70 cm

SOIL SAMPLE VOLUME

BOX TO SOIL, V_s , IN cm 2.65 cm
 SOIL THICKNESS, t, IN cm 2.76 cm
 SAMPLE VOLUME IN cc 87.407042 cc
 SOLIDS VOLUME, V_s , IN cc _____
 VOID RATIO, e _____
 POROSITY, n _____

NORMAL LOAD N

APPLIED LOAD 1008 pss
504 TSF lbs/ft²
 TARE IN lbs _____
 SCALE LOAD IN lbs _____

PROVING RING NO. 4764
 CALIBRATION FACTOR .311 lbs/10⁻⁴ in.

consolidation .000 to .008

ELAPSED TIME IN min.	SHEAR IN in. DIAL	SHEAR DISPLACEMENT IN in.	NORMAL DIAL IN in.	NORMAL DISPLACEMENT IN in.	PROVING RING, DIAL IN .0001 in	STRESS FORCE IN lbs.	$\frac{\tau}{\sigma} \frac{F}{N}$
0.00	0.000		0.000	0	0.000	0	
.25	.0038	.0038	0.000	0	.00475	14.7725	.015
.50	.0100	.0100	0.000	0	.00735	22.86	.023
.75	.0200	.0200	.099	.099	.00950	29.55	.029
1.00	.0350	.0350	.096	.096	.01030	32.03	.032
1.25	.0460	.0460	.094	.094	.01075	33.43	.033
1.50	.0680	.0680	.092	.092	.01090	33.90	.034
1.75	.0740	.0740	.089	.089	.01095	34.05	.034
2.00	.0880	.0880	.086	.086	.01080	33.59	.033
2.40	.108	.1080	.082	.082	.01040	32.34	.032
2.70	.1278	.1278	.079	.079	.01000	31.10	.031
3.04	.1480	.1480	.078	.078	.00970	30.17	.030
3.31	.1680	.1680	.076	.076	.00950	29.55	.029
3.59	.1880	.1880	.074	.074	.00930	28.92	.029
3.89	.2080	.2080	.073	.073	.00920	28.61	.028
4.17	.228	.228	.071	.071	.00910	28.30	.028
4.40	.248	.248	.070	.070	.00905	28.15	.028
4.65	.268	.268	.069	.069	.00900	27.99	.028
4.88	.288	.288	.069	.069	.00880	27.37	.027
5.25	.308	.308	.0685	.0685	.00900	27.99	.028
5.55	.328	.328	.068	.068	.00895	27.83	.028
5.86	.348	.348	.068	.068	.00915	28.46	.028
6.04	.358	.358	.067	.067	.00905	28.15	.028
6.23	.378	.378	.067	.067	.00925	28.77	.029
6.52	.408	.408	.065	.065	.00920	28.61	.028
6.75	.428	.428	.065	.065	.00905	28.15	.028
6.99	.448	.448	.064	.064	.00900	27.99	.028
7.15	.468	.468	.063	.063	.00890	27.68	.027

REMARKS

net test wet 171.53g
 net test dry 163.37g
 base 28.84g

SOIL MECHANICS LABORATORY

DIRECT SHEAR ON COHESIONLESS SOIL

101.15g wet (remainin)
 105.89g dry (remainin)

SOIL SAMPLE

VISUAL CLASSIFICATION Gravelly Sand
 AND DESCRIPTION _____
 LOCATION I-80, Carlin Tunnel
 BORING NO. _____ SAMPLE DEPTH _____
 SAMPLE NO. _____
 SPECIFIC GRAVITY, G_s , 2.66 @ 20°C (#4)

SOIL SAMPLE WEIGHT

INITIAL WT. CONTAINER + DRY SOIL IN g 241.30g
 FINAL WT. CONTAINER + DRY SOIL IN g 105.89g
 WT. DRY SOIL USED, W_s , IN g 135.41g

TEST NO. F-96 re-run (#2)

DATE May 5, 1982

TESTED BY Fisher & Schoenier
Cochran

SHEAR BOX

LENGTH, L, IN cm 6.35 cm
 INSIDE DEPTH, b, IN cm 3.81 cm
 BLOCK + GRATING, X, IN cm 3.70 cm

SOIL SAMPLE VOLUME

BOX TO SOIL, y_g , IN cm 2.525 cm
 SOIL THICKNESS, t, IN cm 2.635 cm
 SAMPLE VOLUME IN cc 83.448390 cc
 SOLIDS VOLUME, V_s , IN cc _____
 VOID RATIO, e _____
 POROSITY, n _____

NORMAL LOAD

APPLIED LOAD 1009.5 SF 1009.5 SF
 TARE IN lbs _____
 SCALE LOAD IN lbs _____

PROVING RING NO. 4764
 CALIBRATION FACTOR 311 lbs / 10⁻⁴ in

consolidation .000 to .019 to .020

ELAPSED TIME IN min.	SHEAR IN in.	SHEAR DISPLACEMENT IN in.	NORMAL DIAL IN in.	NORMAL DISPLACEMENT IN in.	PROVING RING DIAL IN .0001 in	STRESS FORCE IN lbs.	$\frac{\tau}{\sigma}$
0.00	0.000		0.000		0.000		
.25	.007	.007	.000		.0075	23.33	.012
.50	.013	.013	.000		.0088	27.37	.014
.75	.0235	.0235	.000		.0140	43.54	.022
1.00	.035	.035	.000		.0131	40.74	.020
1.25	.047	.047	.099		.0139	43.23	.021
1.50	.062	.062	.097		.0143	44.47	.022
1.75	.085	.085	.096		.0144	44.78	.022
2.00	.088	.088	.094		.0146	45.41	.023
2.39	.108	.108	.093		.0145	45.10	.022
2.73	.128	.128	.092		.01455	45.25	.022
3.07	.148	.148	.090		.0141	43.85	.022
3.46	.168	.168	.089		.0143	44.47	.022
3.83	.188	.188	.087		.01415	44.01	.022
4.20	.208	.208	.086		.0141	43.85	.022
4.59	.228	.228	.085		.01405	43.70	.022
5.00	.248	.248	.084		.01405	43.70	.022
5.38	.268	.268	.083		.0141	43.85	.022
5.73	.288	.288	.083		.0141	43.85	.022
6.04	.308	.308	.082		.0142	44.16	.022
6.32	.328	.328	.0815		.0143	44.47	.022
6.76	.348	.348	.080		.0145	45.10	.022
7.00	.368	.368	.080		.0146	45.41	.023
7.28	.388	.388	.079		.0148	46.03	.023
7.66	.408	.408	.078		.0151	46.96	.023
8.09	.428	.428	.077		.0153	47.58	.024
8.38	.448	.448	.076		.0149	46.34	.023
8.66	.468	.468	.074		.0151	46.96	.023

REMARKS

end test wet 183.52g
 end test dry 154.23g
 tare 29.29g

81.11g wet (remain)
 85.80g dry (remain)

SOIL MECHANICS LABORATORY

DIRECT SHEAR ON COHESIONLESS SOIL

SOIL SAMPLE
 VISUAL CLASSIFICATION Gravelly sand
 AND DESCRIPTION
 LOCATION I-80, Carlin Tunnel
 BORING NO. _____ SAMPLE DEPTH _____
 SAMPLE NO. _____
 SPECIFIC GRAVITY, G_s , 2.66 @ 20°C (-#4)

SOIL SAMPLE WEIGHT
 INITIAL WT. CONTAINER + DRY SOIL IN g 232.09g
 FINAL WT. CONTAINER + DRY SOIL IN g 85.89g
 WT. DRY SOIL USED, W_s , IN g 146.20g

TEST NO. F-96 re-run (#3)
 DATE May 5, 1982
 TESTED BY Fisher, Cochran, Borstein

SHEAR BOX
 LENGTH, L, IN cm 6.35 cm
 INSIDE DEPTH, b, IN cm 3.81 cm
 BLOCK + GRATING, X, IN cm 3.70 cm

SOIL SAMPLE VOLUME
 BOX TO SOIL, V_s , IN cm 2.65 cm
 SOIL THICKNESS, t , IN cm 2.76 cm
 SAMPLE VOLUME IN cc 87.467042 cc
 SOLIDS VOLUME, V_s , IN cc _____

NORMAL LOAD 137.45#
 APPLIED LOAD 4032 PSF
 TARE IN lbs _____
 SCALE LOAD IN lbs _____

PROVING RING NO. 4764
 CALIBRATION FACTOR 311 lbs/10⁻⁴ in.

VOID RATIO, e _____
 POROSITY, n _____

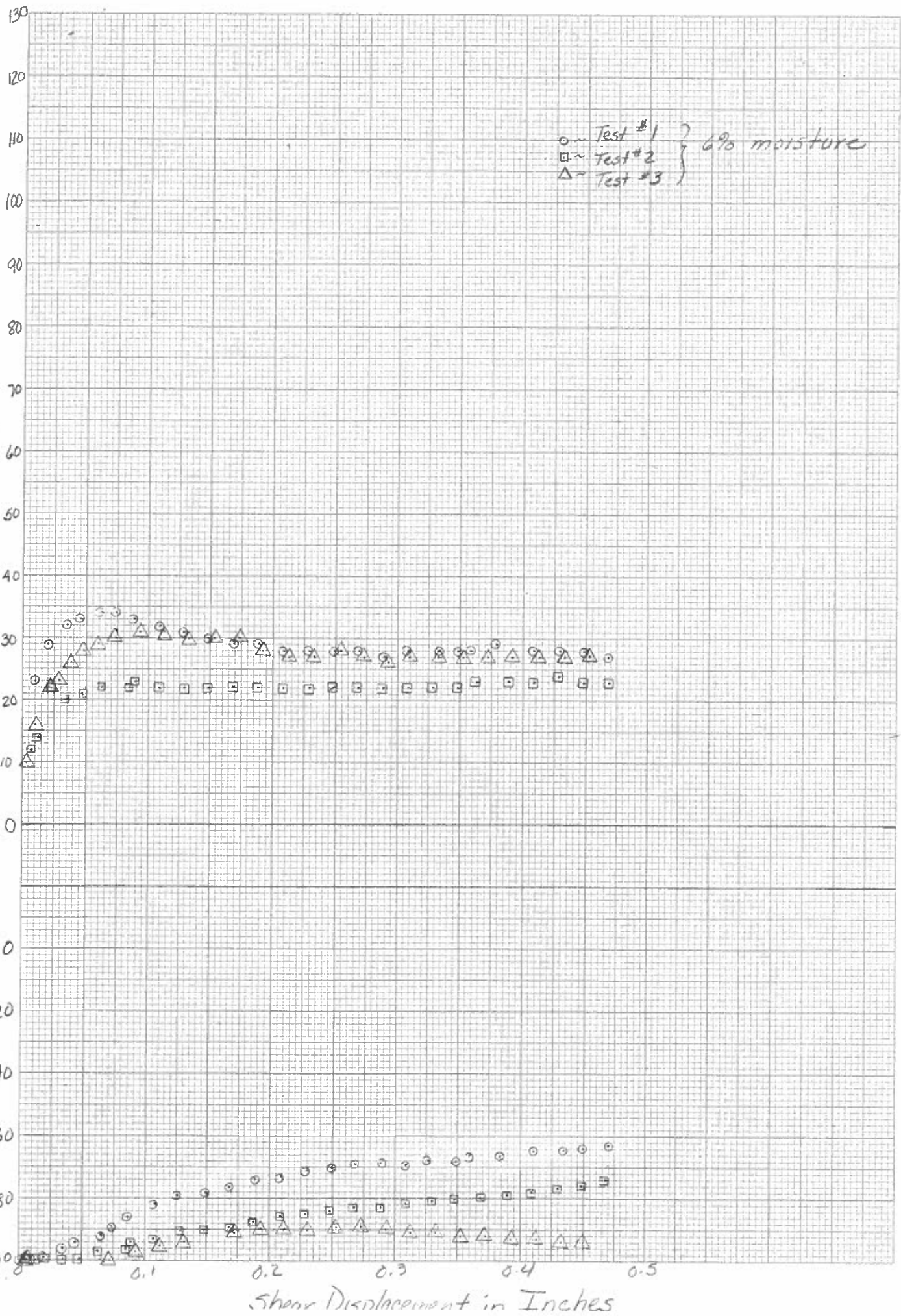
consolidation .000 to .038

ELAPSED TIME IN min.	SHEAR DIAL IN in.	SHEAR DISPLACEMENT IN in.	NORMAL DIAL IN in.	NORMAL DISPLACEMENT IN in.	PROVING RING DIAL IN .0001 in	STRESS FORCE IN lbs.	$\frac{\tau}{\sigma}$
0.00	0.000		0.000		0.000		
.25	.004	.004	.006		.0131	40.74	.010
.50	.011	.011	.099		.0210	65.31	.016
.75	.021	.021	.099		.0288	89.57	.022
1.00	.0285	.0285	.099		.0304	94.54	.023
1.25	.0385	.0385	.099		.0332	103.25	.026
1.50	.0487	.0487	.000		.0361	112.27	.028
1.75	.059	.059	.099		.0378	117.56	.029
2.00	.072	.072	.099		.0388	120.67	.030
2.33	.092	.092	.097		.0397	123.47	.031
2.64	.112	.112	.095		.0399	124.09	.031
2.93	.132	.132	.094		.0393	122.22	.030
3.23	.152	.152	.092		.0393	122.22	.030
3.47	.172	.172	.091		.0384	119.42	.030
3.74	.192	.192	.090		.0365	113.52	.028
4.09	.212	.212	.090		.0371	115.38	.027
4.39	.232	.232	.090		.0355	110.41	.027
4.66	.252	.252	.089		.0347	107.92	.028
4.99	.272	.272	.089		.0345	107.30	.027
5.24	.292	.292	.090		.0341	106.05	.026
5.55	.312	.312	.091		.0347	107.92	.027
5.85	.332	.332	.091		.0346	107.61	.027
6.11	.352	.352	.092		.0351	109.16	.027
6.40	.372	.372	.092		.0345	107.30	.027
6.70	.392	.392	.093		.0348	108.23	.027
7.01	.412	.412	.093		.0353	109.78	.027
7.30	.432	.432	.094		.0352	109.97	.027
7.57	.452	.452	.094		.0351	109.16	.027

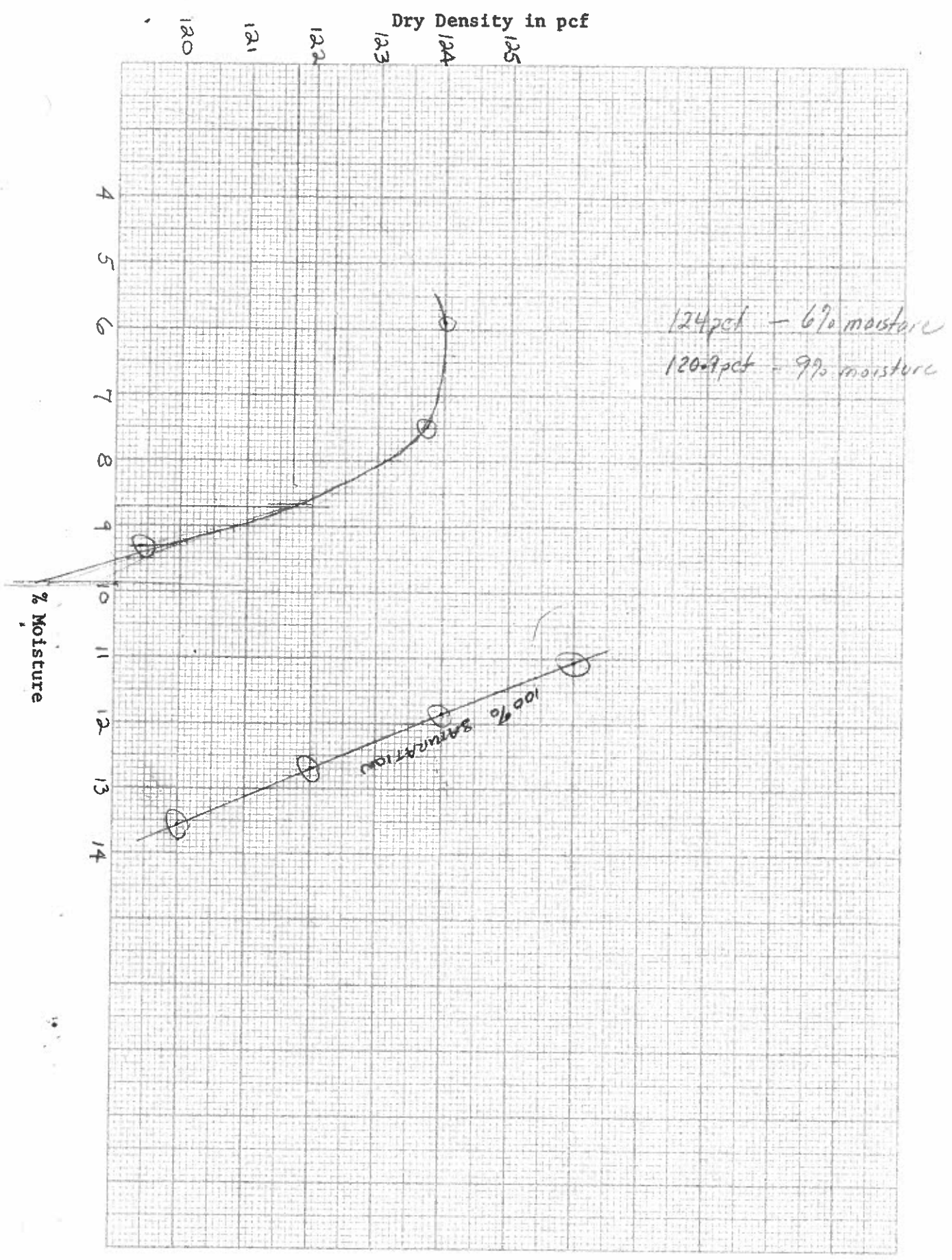
REMARKS

$\tau/c \times 10^{-3}$

Normal Displacement in Inches $\times 10^{-2}$



STATE OF NEVADA - DEPARTMENT OF HIGHWAYS
Materials and Research Laboratory



SPECIFIC GRAVITY

SAMPLE NO. F-96 re-run (on - #4)

E. A. NO. 71081

DATE 5-4-82

COUNTY EKO

JOB DESCRIPTION Carlin Tunnel

PYCROMETER NO. 1

SAMPLE WEIGHT 25.00 g

PYC + SAMPLE + H₂O WEIGHT 175.94 g

TEMP, °C 26°

W_a 160.32

K .9986

SPGR 2.66 @ 20°C

$$\text{Sp Gr} = \frac{W_o}{W_o + (W_a - W_b)}$$

$$\frac{25.00}{25 + (160.32 - 175.94)} \times .9986$$

STATE OF NEVADA—DEPARTMENT OF HIGHWAYS
COMPACTION REPORT

Date April 14 1982

E.A. or Cont. No. 71081
Control Section Carlisle Tunnel
County ELKO

Test Hole No. (Code)
Station
Reference to C.L.
Embankment Depth
Type of Material
Compaction Equipment

SAND VOLUME DATA

1. Initial Wt. Sand
2. Wt. of Residue
3. Wt. of Sand Used, 1-2
4. Sand Density
5. Vol. Hole + Cone + Plate, 3 + 4
6. Vol. of Cone + Plate
7. Vol. of Hole, 5-6

EXCAVATED SAMPLE

	Part	Total	Part	Total	Part	Total
8. Wet Weight						
9. Dry Weight						
10. Wt. of Water, 8-9						
11. % Moisture (10 ÷ 9) × 100						
12. Dry Wt. of No. 4+						
13. Dry Wt. of No. 4-						
14. FIELD DENSITY WET, pcf, 8 total + 7						
15. FIELD DENSITY DRY, pcf [14 ÷ (100 + % moist.)] 100						

DATA FOR THE CALCULATED MAXIMUM DENSITY DETERMINATION NEV T101

Harvard M.C. Test on No. 4—	Wet	Dry	%M	Wet	Dry	%M	Wet	Dry	%M
1	131.82	124.01	5.9%						
2	133.78	123.75	7.5%						
3 <i>kw</i>	131.64	119.39	9.3%						
4									
5									

16. Total Sample, approx. Opt. Moist.
[(1-P) × 2%] + [P × Test Opt. Moist.]

Apparent Specific Gravity Test, G Nev. T104

17. Wt. of Aggregate, (1½" - #4), A
18. Wt. of pycnometer, p
19. Wt. of pyc. + water, p + M
20. Wt. of pyc., water, aggregate, p + M₁ + A
21. Wt. of water recovered from pyc., M₂
22. If M₁ - M₂ ≤ 14 gm., G = A ÷ (M - M₂)
23. If M₁ - M₂ > 14 gm.,
G = A ÷ [(M - M₂) + 0.5 (M₁ - M₂ - 14)]
24. Constant, 56.16
25. Decimal Equiv. of % No. 4 +, (1-P), 12 ÷ 9
26. Decimal Equiv. of % No. 4 -, P, 13 ÷ 9
27. H.M.C.T. in pcf, d
28. CALCULATED MAX. DENSITY, pcf,
D = GK (1-P) + Pd (1.03)
29. COMPACTION, %, (15 ÷ 28) 100

REMARKS
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Test by

Res. Engr.

Date Reported.....
 Lab. No. F-96
 Date Rec'd. 4/13/02
 Checked By. CSH
 Sheet. 1 of 1

STATE OF NEVADA
 DEPARTMENT OF
 TRANSPORTATION
 MATERIALS AND TESTING DIVISION

Cont. or E.A. No. 71081
 County ELKO
 Project.....
 Job Description CARLIN TUNNEL

REPORT OF TESTS ON SOILS AND AGGREGATES

Log of Test Hole or Core

Material.....
 Samplers No.....
 Date Field Work Completed.....
 Sampled By.....
 Source of Sample (station, elev., ϕ).....
 Distance or Quantity Represented by Sample.....
 Samplers Description of Material, Location, Terrain, etc.....



Sieve Size	% Passing	Specs.		Specs.
3"			✓ Liquid Limit	<u>18</u>
2"			✓ Plasticity Index	<u>N.P.</u>
1½"			Specific Gravity	
1"	<u>100</u>		Resistance Value	
¾"	<u>97</u>		Soil Support Value	
½"	<u>94</u>		Cover	Stabilometer Expansion Pressure
¼"	<u>92</u>		Thickness:	
No. 4	<u>85</u>		✓ HMCT: % No. 4— <u>85</u>	% No. 4+ <u>.15</u>
No. 10	X		Max. Dens. <u>124.01</u>	Sp. Gr. <u>2.71</u>
No. 16			Opt. Moist. <u>5.9</u>	
No. 40			Calculated Maximum Density	<u>128.9 pcf</u>
No. 50			Sand Equivalent	
No. 100			Fractured Face, %	
No. 200			LAR; % loss @.....Rev.	
✓ Natural Moisture, % <u>12.1%</u>		WET WT. <u>204</u>	Degradation: P ₂₀ , %	
		DRY WT. <u>182</u>	H, in.	
Soluble Radical	Parts Per Million		Other Tests.....	
Salt: CO ₃ & HCO ₃				
Chloride				
Sulphate	pH			
Total Soluble Salts (Resistivity).....				

H.R.B. Classification.....

Remarks and Recommendations.....

DISTRIBUTION:

..... District Engineer
 Resident Engineer
 Construction Engineer
 Laboratory



SOIL MECHANICS LABORATORY

DIRECT SHEAR ON COHESIONLESS SOIL

SOIL SAMPLE

VISUAL CLASSIFICATION gravelly sand
AND DESCRIPTION _____

LOCATION Carlisle Tunnel

BORING NO. _____ SAMPLE DEPTH _____

SAMPLE NO. _____

SPECIFIC GRAVITY, G_s , 2.41 ~ total sample
2.69 ~ -10 sample

SOIL SAMPLE WEIGHT

INITIAL WT. CONTAINER + DRY SOIL IN g _____

FINAL WT. CONTAINER + DRY SOIL IN g 65.85g

WT. DRY SOIL USED, W_s , IN g 34.82g

1" = 2.54cm

TEST NO. 1

DATE 4-20-82

TESTED BY Fisher

1Kg = 2.204623 pound

NORMAL LOAD 1Kg = 1000g

APPLIED LOAD 2.204623 lbs _____ lbs/sq ft

TARE IN lbs _____

SCALE LOAD IN lbs _____

SHEAR BOX

LENGTH, L, IN cm _____

INSIDE DEPTH, b, IN cm _____

BLOCK + GRATING, X, IN cm _____

SOIL SAMPLE VOLUME

BOX TO SOIL, V_c , IN cc $2\frac{1}{32} = 1.67cm$

SOIL THICKNESS, t, IN cm 1.79cm

SAMPLE VOLUME IN cc 56.69cc

SOLIDS VOLUME, V_s , IN cc _____

VOID RATIO, e _____

POROSITY, n _____

PROVING RING NO. 4764

CALIBRATION FACTOR 311 lbs/10⁻⁴ inch

100 - .095 for consolidation

ELAPSED TIME IN min.	SHEAR IN in.	DIAL DISPLACEMENT IN in.	NORMAL DIAL DISPLACEMENT IN in.	PROVING RING DIAL IN .0001 in.	STRESS FORCE Shear IN lbs.	$\frac{\tau}{\sigma}$	
0	0	0	0.1	0	0	0	
.25	.003	.003	0	- 0	19.0	5.909	2.680
.50	.010	.010	.098	- .002	25.6	7.775	3.526
.75	.020	.020	.095	- .005	29.5	9.1745	4.161
1.00	.033	.033	.092	- .008	30.5	9.4855	4.303
1.25	.043	.043	.081	- .019	32.0	9.952	4.514
1.50	.056	.056	.076	- .024	30.5	9.4855	4.303
1.75	.070	.070	.070	- .030	30.0	9.33	4.232
2.00	.084	.084	.064	- .036	29.5	9.1745	4.161
2.38	.104	.104	.055	- .045	26.5	8.2415	3.738
2.70	.124	.124	.047	- .053	26.0	8.086	3.668
3.00	.144	.144	.043	- .057	25.0	7.775	3.527
3.29	.164	.164	.039	- .061	25.0	7.775	3.527
3.65	.184	.184	.035	- .065	24.0	7.464	3.386
3.98	.204	.204	.031	- .069	24.0	7.464	3.386
4.22	.224	.224	.027	- .073	24.0	7.464	3.386
4.50	.244	.244	.025	- .075	23.0	7.153	3.245
4.74	.264	.264	.023	- .077	22.0	6.842	3.103
5.02	.284	.284	.020	- .080	22.0	6.842	3.103
5.25	.304	.304	.017	- .083	22.0	6.842	3.103
5.50	.324	.324	.015	- .085	21.5	6.6865	3.033
5.70	.344	.344	.013	- .087	21.5	6.6865	3.033
5.90	.364	.364	.011	- .089	22.0	6.842	3.103
6.15	.384	.384	.009	- .09	21.0	6.531	2.962

REMARKS

SOIL MECHANICS LABORATORY

DIRECT SHEAR ON COHESIONLESS SOIL

SOIL SAMPLE VISUAL CLASSIFICATION gravelly sand
 AND DESCRIPTION
 LOCATION CARLIN TUNNEL
 BORING NO. _____ SAMPLE DEPTH _____
 SAMPLE NO. _____
 SPECIFIC GRAVITY, G_s , 2.41 - Total Sample
2.69 - 10 sample

SOIL SAMPLE WEIGHT
 INITIAL WT. CONTAINER + DRY SOIL IN g _____
 FINAL WT. CONTAINER + DRY SOIL IN g 112.12 = 83.28g
 WT. DRY SOIL USED, W_s , IN g 107.24 = 78.40g
4.88g

TEST NO. 2
 DATE 4-21-82
 TESTED BY FISHER

SHEAR BOX LENGTH, L, IN cm _____
 INSIDE DEPTH, b, IN cm _____
 BLOCK + GRATING, X, IN cm _____

SOIL SAMPLE VOLUME, V_s , IN cc _____
 BOX TO SOIL, y_0 , IN cm 5/8" = 2.34 cm
 SOIL THICKNESS, t , IN cm 2.46 cm
 SAMPLE VOLUME IN cc 77.91 cc
 SOLIDS VOLUME, V_s , IN cc _____
 VOID RATIO, e _____
 POROSITY, n _____

NORMAL LOAD 2kg
 APPLIED LOAD 1.409246 lbs _____ lbs/sq ft
 TARE IN lbs _____
 SCALE LOAD IN lbs _____

PROVING RING NO. 4764
 CALIBRATION FACTOR 3111 lbs / 10⁻⁴ in

ELAPSED TIME IN min.	SHEAR IN in.	SHEAR DISPLACEMENT IN in.	NORMAL DIAL IN in.	NORMAL DISPLACEMENT IN in.	PROVING RING DIAL IN .0001 in	STRESS FORCE IN lbs.	$\frac{\tau}{\sigma}$
0.00	0.000	0	0.100	-0	0.000	0	0
0.25	0.007	.007	0.099	-.001	0.0265	8.7415	3.738
.50	0.014	.014	0.095	-.005	0.032	9.952	4.514
.75	0.027	.027	0.090	-.010	0.034	10.574	4.796
1.00	0.044	.044	0.083	-.017	0.032	9.952	4.514
1.25	0.056	.056	0.078	-.022	0.031	9.641	4.373
1.50	0.068	.068	0.074	-.026	0.0305	9.4855	4.303
1.75	0.082	.082	0.0695	-.0305	0.0295	9.1745	4.161
2.00	0.095	.095	0.0655	-.0345	0.0285	8.8635	4.020
2.40	0.115	.115	0.0605	-.0395	0.027	8.397	3.809
2.80	0.135	.135	0.056	-.044	0.026	8.086	3.668
3.20	0.155	.155	0.0525	-.0475	0.026	8.086	3.668
3.50	0.175	.175	0.049	-.051	0.0245	7.6195	3.456
3.95	0.195	.195	0.046	-.054	0.0255	7.9305	3.597
4.30	0.215	.215	0.043	-.057	0.024	7.464	3.386
4.75	0.235	.235	0.041	-.059	0.0235	7.3085	3.315
5.12	0.255	.255	0.039	-.061	0.0235	7.3085	3.315
5.45	0.275	.275	0.037	-.063	0.0255	7.9305	3.597
5.81	0.295	.295	0.035	-.065	0.024	7.464	3.386
6.28	0.320	.320	0.033	-.067	0.024	7.464	3.386
6.47	0.335	.335	0.030	-.070	0.0245	7.6195	3.456
6.98	0.355	.355	0.029	-.071	0.024	7.464	3.386
7.03	0.375	.375	0.028	-.072	0.024	7.464	3.386
7.30	0.395	.395	0.026	-.074	0.024	7.464	3.386
7.60	0.415	.415	0.025	-.075	0.024	7.464	3.386

REMARKS

SOIL MECHANICS LABORATORY

DIRECT SHEAR ON COHESIONLESS SOIL

SOIL SAMPLE VISUAL CLASSIFICATION gravelly sand SOIL SAMPLE WEIGHT TEST NO. 3
 AND DESCRIPTION gravelly sand INITIAL WT. CONTAINER + DRY SOIL IN g _____ DATE 4-21-82
 LOCATION CARLIN TUNNEL FINAL WT. CONTAINER + DRY SOIL IN g 103.15 = 72.86 TESTED BY FISHER
 BORING NO. _____ SAMPLE DEPTH 30.29 WT. DRY SOIL USED, W_g, IN g 98.90 = 68.61
 SAMPLE NO. _____ SPECIFIC GRAVITY, G_s, 2.41, total sample 7.25g
2.69, -10 sample

SHEAR BOX SOIL SAMPLE VOLUME NORMAL LOAD 4kg
 LENGTH, L, IN cm _____ BOX TO SOIL, y_0 , IN cm $\frac{15}{100} = 2.38$ cm
 INSIDE DEPTH, b, IN cm _____ SOIL THICKNESS, t, IN cm 2.50 cm
 BLOCK + GRATING, X, IN cm _____ SAMPLE VOLUME IN cc 79.17 cc
 TARE IN lbs _____
 SCALE LOAD IN lbs _____

PROVING RING NO. 4764 VOID RATIO, e _____
 CALIBRATION FACTOR $\frac{3.11 \text{ lbs}}{10^{-4} \text{ in}}$ POROSITY, n _____

ELAPSED TIME IN min.	SHEAR DIAL IN in.	SHEAR DISPLACEMENT IN in.	NORMAL DIAL IN in.	NORMAL DISPLACEMENT IN in.	PROVING RING DIAL IN .0001 in	STRESS FORCE IN lbs.	$\frac{\tau}{\sigma}$
0.00	0.000	0	.100	0	.000	0	0
.25	0.000	0	.100	0	.003	.933	.106
.50	0.000	0	.100	0	.002	1.622	.071
.75	0.003	.003	.0995	-.0045	.029	9.019	1.023
1.00	0.013	.013	.096	-.004	.048	14.928	1.693
1.25	0.027	.027	.090	-.010	.051	15.861	1.799
1.50	0.039	.039	.0845	-.0155	.0505	15.7055	1.781
1.75	0.053	.053	.079	-.021	.049	15.239	1.728
2.00	0.066	.066	.075	-.025	.048	14.928	1.693
2.38	0.086	.086	.070	-.030	.0405	12.5955	1.428
2.78	0.106	.106	.065	-.035	.043	13.373	1.516
3.12	0.126	.126	.0625	-.0375	.0415	12.9065	1.464
3.45	0.146	.146	.060	-.040	.039	12.129	1.375
3.85	0.166	.166	.058	-.042	.039	12.129	1.375
4.28	0.186	.186	.0555	-.0445	.039	12.129	1.375
4.67	0.206	.206	.053	-.047	.0375	11.6625	1.323

REMARKS _____

DIETZGEN CORPORATION
MADE IN U.S.A.

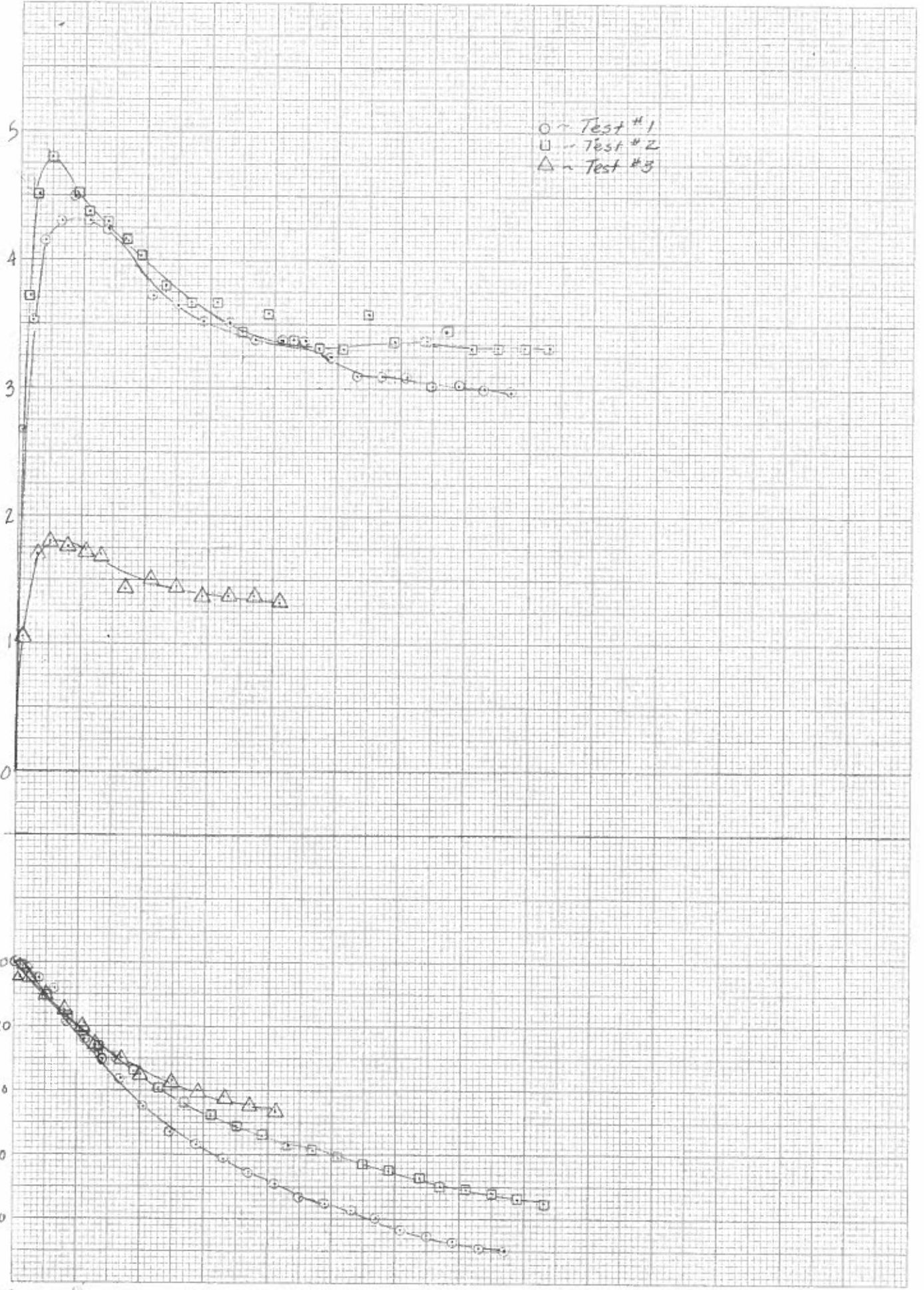
NO. 340R-10 1/4 DIETZGEN GRAPH PAPER
10 X 10 PER HALF INCH

2/1/53

○ ~ Test #1
□ ~ Test #2
△ ~ Test #3

Normal Displacement in Inches $\times 10^{-3}$

0
20
40
60
80



Shear Displacement in Inches

SOIL MECHANICS LABORATORY

DIRECT SHEAR ON COHESIONLESS SOIL

SOIL SAMPLE VISUAL CLASSIFICATION gravelly sand

LOCATION 10 ft in Tunnels

BORING NO. _____

SAMPLE NO. _____

SPECIFIC GRAVITY, G_s , 2.41 - total 15.5

SHEAR BOX LENGTH, L , IN CM _____

INSIDE DEPTH, b , IN CM _____

BLOCK + GRATING, X , IN CM _____

CALIBRATION FACTOR, $\frac{311 \text{ lbs} / 10 \text{ in}^2}{4.724}$

SOIL SAMPLE WEIGHT _____

INITIAL WT. CONTAINER + DRY SOIL IN g _____

FINAL WT. CONTAINER + DRY SOIL IN g 119.78

WT. DRY SOIL USED, W_s , IN g 112.52

APPLIED LOAD 2.2646226 lbs

NORMAL LOAD 1 kg

BOX TO SOIL, Y_0 , IN CM 2.26218

SOIL SAMPLE VOLUME " 5.74

SOIL THICKNESS, t , IN CM 2.26 cm

SAMPLE VOLUME IN cc 72.04 cc

SOLIDS VOLUME, V_s , IN cc _____

VOID RATIO, e , _____

POROSITY, n , _____

TEST NO. 4 DATE 4-21-82

TESTED BY _____

SCALE LOAD IN lbs _____

TARE IN lbs _____

ELAPSED TIME IN min.	SHEAR IN in. DIAL	SHEAR DISPLACEMENT IN in.	NORMAL DIAL IN in.	NORMAL DISPLACEMENT IN in.	PROVING RING DIAL IN .001 in	STRESS FORCE IN lbs.	REMARKS
0.00	0.000	0	0.100	0	0.000		
.25	.010	.010	.097	-.003	0.024	7.464	3.386
.50	.021	.021	.091	-.009	.0325	10.108	4.585
.75	.032	.032	.0825	-.0175	.034	10.574	4.794
1.00	.045	.045	.074	-.026	.0325	10.108	4.585
1.25	.057	.057	.067	-.033	.031	9.641	4.373
1.50	.067	.067	.061	-.039	.0295	9.175	4.161
1.75	.084	.084	.055	-.045	.027	8.397	3.809
2.00	.098	.098	.051	-.049	.0255	7.931	3.597
2.24	.110	.110	.047	-.053	.023	7.153	3.245
2.71	.130	.130	.042	-.058	.022	6.842	3.103
3.04	.150	.150	.0385	-.0615	.021	6.531	2.962
3.42	.170	.170	.035	-.065	.021	6.531	2.962
3.77	.190	.190	.0325	-.0675	.021	6.531	2.962
4.12	.210	.210	.030	-.070	.021	6.531	2.962
4.50	.230	.230	.027	-.073	.021	6.531	2.962

SOIL MECHANICS LABORATORY
DIRECT SHEAR ON COHESIONLESS SOIL

SOIL SAMPLE
 VISUAL CLASSIFICATION _____
 AND DESCRIPTION _____
 LOCATION _____
 BORING NO. _____
 SAMPLE NO. _____
 SAMPLE DEPTH _____
 SPECIFIC GRAVITY, G_s , _____
 2.41 Total Sample
 2.69, -10 sample

SHEAR BOX
 LENGTH, L, IN CM _____
 6.35 cm - 0.25
 INSIDE DEPTH, b , IN CM _____
 3.81 cm
 BLOCK + GRATING, _____
 X, IN CM _____

SOIL SAMPLE VOLUME
 BOX TO SOIL, x_0 , IN CM _____
 0.34 cm
 SOIL THICKNESS, t , IN CM _____
 0.46 cm
 SAMPLE VOLUME IN CC _____
 77.91 cc
 SOLIDS VOLUME, V_s , IN CC _____
 TARE IN LBS _____
 SCALE LOAD IN LBS _____

SOIL SAMPLE WEIGHT
 INITIAL WT. CONTAINER + DRY SOIL IN G _____
 FINAL WT. CONTAINER + DRY SOIL IN G _____
 124.08 = 94.80
 USED, W_s , IN G _____
 115.63 = 86.35
 8.45g

TEST NO. 5
DATE 4-21-82
TESTED BY _____
APPLIED LOAD _____
 2 kg
NORMAL LOAD _____
APPLIED LOAD _____
 1400 lb

CALIBRATION RING NO. 4769
CALIBRATION FACTOR 3.11 lbs/10⁻⁴ in.

ELAPSED TIME IN MIN.	SHEAR DIAL DISPLACEMENT IN IN.	SHEAR DIAL DISPLACEMENT IN IN.	NORMAL DIAL DISPLACEMENT IN IN.	NORMAL DIAL DISPLACEMENT IN IN.	PROVING RING DIAL IN .0001 IN.	STRESS FORCE IN LBS.	REMARKS
0.00	0.000	0	0.100	0	0.000	0	
.25	.011	.011	.0885	-.0015	.021	6.531	1.481
.50	.018	.018	.096	-.004	.029	9.019	2.045
.75	.033	.033	.0895	-.0105	.036	11.196	2.539
1.00	.045	.045	.083	-.017	.035	10.885	2.469
1.25	.057	.057	.078	-.022	.034	10.574	2.398
1.50	.070	.070	.072	-.028	.033	10.263	2.328
1.75	.081	.081	.0675	-.0325	.030	9.330	2.116
2.00	.094	.094	.0635	-.0365	.0285	8.864	2.010
2.10	.114	.114	.058	-.042	.0255	7.931	1.799
2.71	.134	.134	.0545	-.0465	.0225	6.998	1.587
3.07	.154	.154	.051	-.049	.023	7.153	1.602
3.50	.174	.174	.0475	-.0525	.0225	6.998	1.587
3.90	.194	.194	.0445	-.0555	.022	6.842	1.552
4.29	.214	.214	.0425	-.0575	.021	6.531	1.481
4.68	.234	.234	.039	-.061	.021	6.531	1.481
5.00	.254	.254	.037	-.063	.021	6.531	1.481
5.45	.274	.274	.035	-.065	.0215	6.087	1.516
5.76	.294	.294	.033	-.067	.021	6.531	1.481
6.10	.314	.314	.031	-.069	.021	6.531	1.481

SOIL MECHANICS LABORATORY

DIRECT SHEAR ON COHESIONLESS SOIL

SOIL SAMPLE

VISUAL CLASSIFICATION AND DESCRIPTION gravely sand

LOCATION _____

BORING NO. _____ SAMPLE DEPTH _____

SAMPLE NO. _____

SPECIFIC GRAVITY, G_s , 2.41, 4 of 2 sample
2.69, -10 sample

SOIL SAMPLE WEIGHT

INITIAL WT. CONTAINER + DRY SOIL IN g _____

FINAL WT. CONTAINER + DRY SOIL IN g 121.12 g = 91.50 g

WT. DRY SOIL USED, W_s , IN g 113.99 g = 84.37 g

TEST NO. 6

DATE 4-21-82

TESTED BY _____

SHEAR BOX

LENGTH, L, IN cm _____

INSIDE DEPTH, b, IN cm _____

BLOCK + GRATING, X, IN cm _____

SOIL SAMPLE VOLUME

BOX TO SOIL, V_d , IN cm³ 2.34 cm³

SOIL THICKNESS, t, IN cm 2.46 cm

SAMPLE VOLUME IN cc 77.91 cc

SOLIDS VOLUME, V_s , IN cc _____

VOID RATIO, e _____

POROSITY, n _____

NORMAL LOAD 4 kg

APPLIED LOAD 818.44 lbs _____ lbs/sq ft

TARE IN lbs _____

SCALE LOAD IN lbs _____

PROVING RING NO. 4764

CALIBRATION FACTOR, 311 lbs / 10⁻⁴ in.

ELAPSED TIME IN min.	SHEAR IN in.	DIAL	SHEAR DISPLACEMENT IN in.	NORMAL DIAL	DISPLACEMENT IN in.	PROVING RING DIAL IN .0001 in	STRESS FORCE IN lbs.	$\frac{\tau}{\sigma}$
0.00	0.000		0	0100	0	0.000	0	0
.25	.008		.008	.099	-.001	.0305	9.486	1.076
.50	.017		.017	.0955	-.0045	.0435	13.529	1.534
.75	.027		.027	.091	-.008	.051	15.861	1.799
1.00	.040		.040	.085	-.015	.0525	16.328	1.852
1.25	.054		.054	.0785	-.0215	.053	16.483	1.869
1.50	.068		.068	.072	-.028	.050	15.550	1.763
1.75	.082		.082	.0665	-.0335	.047	14.617	1.658
2.00	.095		.095	.062	-.038	.044	13.684	1.552
2.38	.115		.115	.056	-.044	.0415	12.907	1.464
2.75	.135		.135	.0525	-.048	.0395	12.285	1.393
3.11	.155		.155	.050	-.050	.036	11.196	1.270
3.47	.175		.175	.047	-.053	.036	11.196	1.270
3.76	.195		.195	.044	-.056	.0355	11.041	1.252
4.04	.215		.215	.042	-.058	.035	10.885	1.234
4.34	.235		.235	.041	-.059	.0335	10.419	1.181
4.57	.255		.255	.0395	-.0605	.039	10.574	1.199
4.80	.275		.275	.039	-.061	.035	10.885	1.234
5.06	.295		.295	.038	-.062	.039	10.574	1.199
5.33	.315		.315	.037	-.063	.039	10.574	1.199
5.60	.335		.335	.036	-.064	.0355	11.041	1.252
5.82	.355		.355	.035	-.065	.035	10.885	1.234
6.05	.375		.375	.034	-.066	.035	11.196	1.270
6.30	.395		.395	.033	-.067	.036	11.196	1.270
6.50	.415		.415	.0325	-.0675	.039	10.574	1.199
6.76	.435		.435	.031	-.069	.035	10.885	1.234
6.98	.455		.455	.030	-.070	.035	10.885	1.234
7.18	.475		.475	.029	-.071	.035	10.885	1.234

REMARKS

DIETZGEN CORPORATION
MADE IN U.S.A.

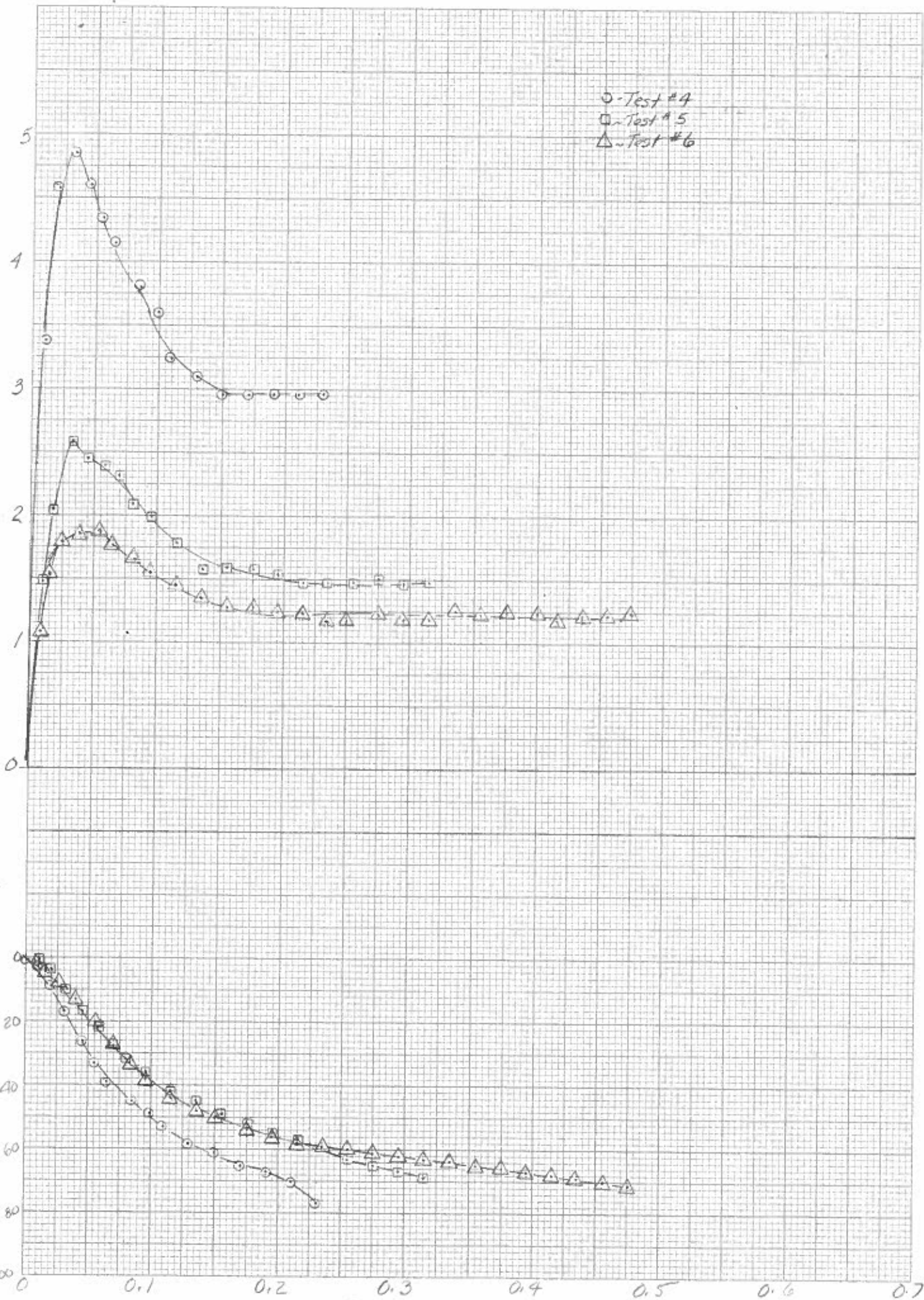
NO. 34DR-10 1/4 DIETZGEN GRAPH PAPER
10 X 10 PER HALF INCH

$\frac{1}{2}$ (0.5)

○ - Test #4
□ - Test #5
△ - Test #6

Normal Displacement in Inches $\times 10^{-3}$

Shear Displacement in Inches



Test No	Weight Soil (wet)	Weight Soil (dry)	Weight H ₂ O
1	157.96g	148.48g	9.48g
2	159.57g	150.00g	9.57g
3	159.57g	150.00g	9.57g
4	164.84g	150.00g	14.84g
5	164.84g	150.00g	14.84g
6	164.84g	150.00g	14.84g

FINAL MOISTURE CONTENT

1	37.00g	34.82g	2.18g
2	83.28g	78.40g	4.88g
3	72.86g	68.61g	4.25g
4	90.48g	83.22g	7.26g
5	94.80g	86.35g	8.45g
6	91.50g	84.37g	7.13g