

**APPENDIX F.3**

**SOIL MOISTURE-DENSITY AND  
CALIFORNIA BEARING RATIO TESTS**

**NORTH ANNA COL**

**DATA REPORT REV. 0  
JANUARY 23, 2007**

**MACTEC PROJECT NO. 6468-06-1472**

# COMPACTION TEST REPORT/ ASTM D-1557-02

Curve No.: TP-1-1

Project No.: 6468061472

Date: 12/1/06

Project: NORTH ANNA COL PROJECT

Location: TEST PIT No 1 23 ft / 22/07

Elev./Depth: 0-1.5'

Sample No. TP-1-1

Remarks: ND= NOT DETERMINED

## MATERIAL DESCRIPTION

Description: Brown red silty sandy clay(VISUAL)

Classifications -

USCS: ND

AASHTO: ND

Nat. Moist. = 23.4 %

Sp.G. = ND

Liquid Limit = ND

Plasticity Index = ND

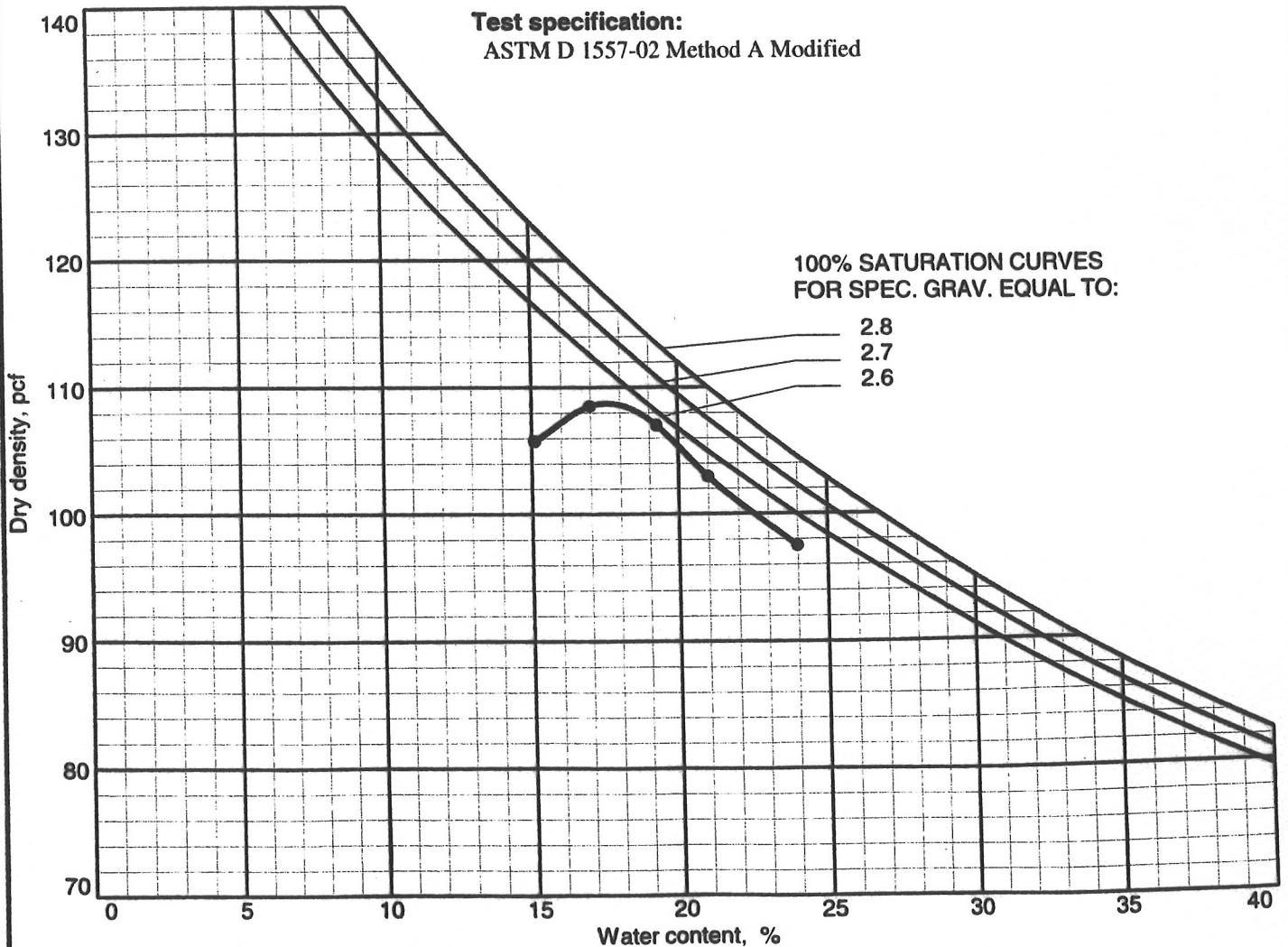
% > No.4 = 0.9 %

% < No.200 = ND %

## TEST RESULTS

Maximum dry density = 108.7 pcf

Optimum moisture = 17.6 %





**MOISTURE DENSITY TEST DATA**

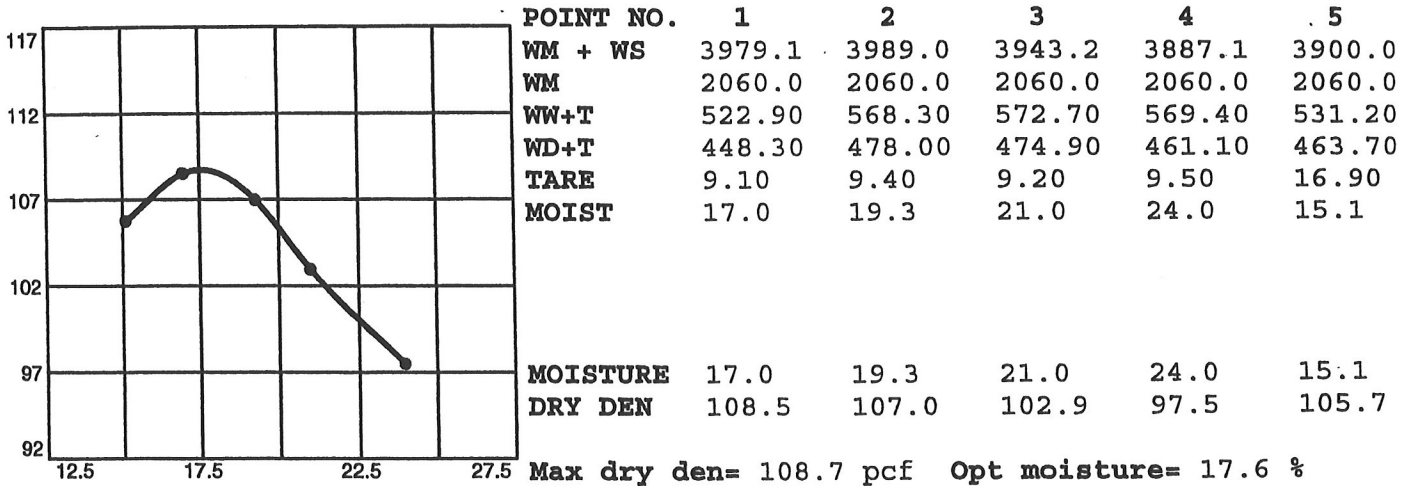
**Client:** Dominion Nuclear North Anna  
**Project:** NORTH ANNA COL PROJECT  
**Project Number:** 6468061472

**Specimen Data**

**Source:** TEST PIT 1  
**Sample No.:** TP-1-1  
**Elev. or Depth:** 0-1.5' **Sample Length(in./cm.):** 18  
**Location:**  
**Description:** Brown red silty sandy clay(VISUAL)  
**Liquid Limit:** ND **Plasticity Index:** ND **Natural Moisture:** 23.4  
**Date:** 12/1/06 **USCS Classification:** ND **AASHTO Classification:** ND  
**Testing Remarks:** ND= NOT DETERMINED  
**Percent retained on No.4 sieve:** 0.9  
**Percent passing No. 200 sieve:** ND **Specific gravity:** ND

**Test Data And Results For Curve TP-1-1**

**Type of test:** ASTM D 1557-02 Method A Modified  
**Mold Dia.:** 4.00 in. **Hammer Wt.:** 10 lb. **Drop:** 18 in.  
**Layers:** five **Blows per Layer:** 25



# COMPACTION TEST REPORT/ ASTM D-1557-02

Curve No.: TP-1-2

Project No.: 6468061472

Date: 12/1/06

Project: NORTH ANNA COL PROJECT

Location: TEST PIT No 1 28y 1/23/07

Elev./Depth: 1.5-4'

Sample No. TP-1-2

Remarks: ND = NOT DETERMINED

## MATERIAL DESCRIPTION

Description: Yellow brown slightly silty sandy clay (VISUAL)

Classifications -

USCS: ND

AASHTO: ND

Nat. Moist. = 22.6 %

Sp.G. = ND

Liquid Limit = ND

Plasticity Index = ND

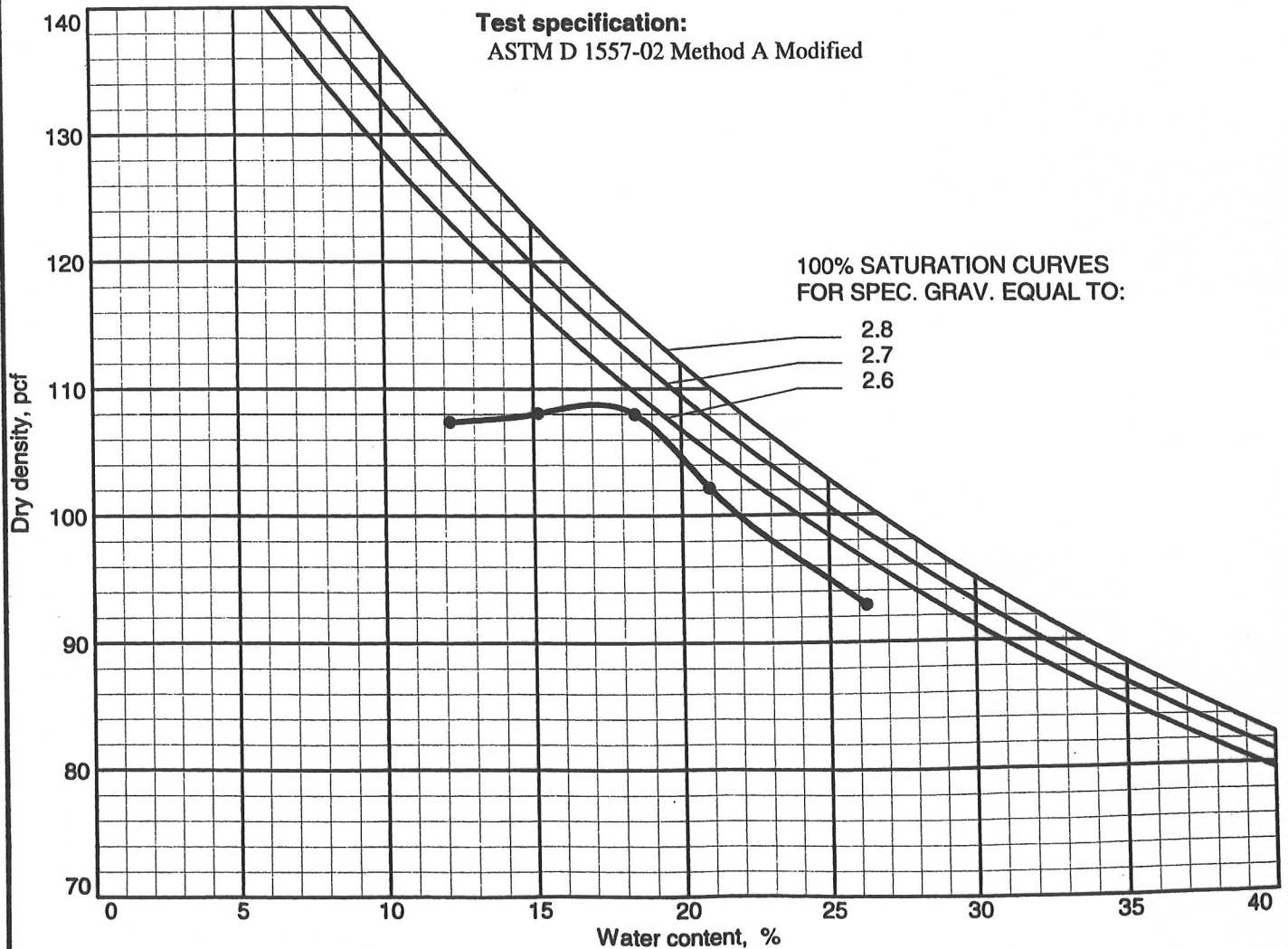
% > No.4 = 100.0 %

% < No.200 = ND %

## TEST RESULTS

Maximum dry density = 108.8 pcf

Optimum moisture = 17.1 %



MOISTURE DENSITY TEST DATA

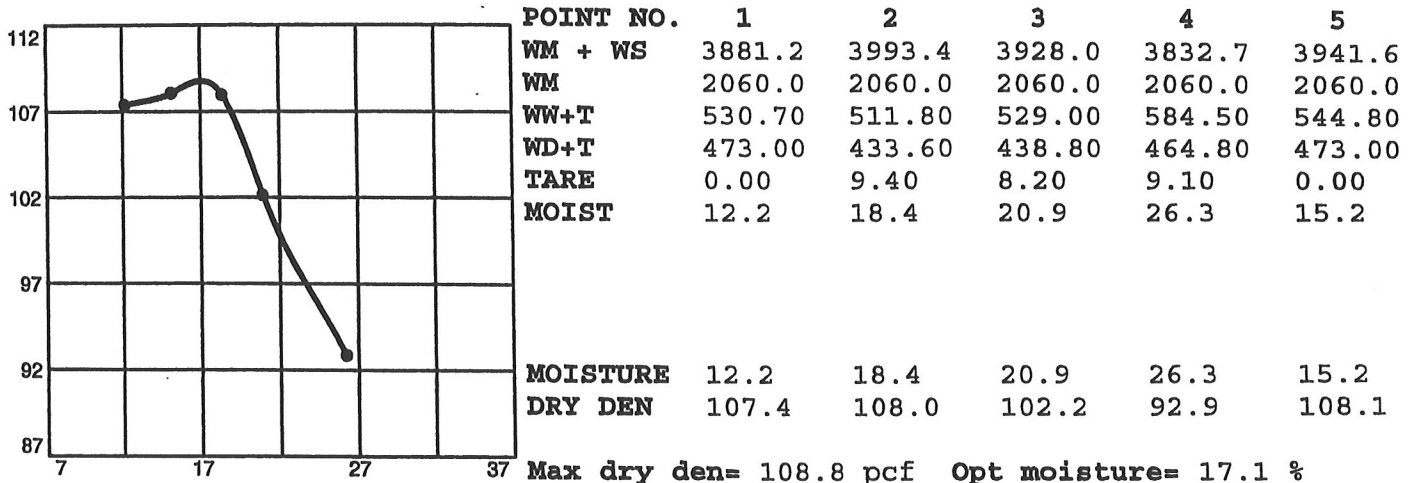
Client: Dominion Nuclear North Anna
Project: NORTH ANNA COL PROJECT
Project Number: 6468061472

Specimen Data

Source: TEST PIT 1
Sample No.: TP-1-2
Elev. or Depth: 1.5-4'
Sample Length(in./cm.): 2.5
Location:
Description: Yellow brown slightly silty sandy clay (VISUAL)
Liquid Limit: ND Plasticity Index: ND Natural Moisture: 22.6
Date: 12/1/06 USCS Classification: ND AASHTO Classification: ND
Testing Remarks: ND = NOT DETERMINED
Percent retained on No.4 sieve: 100.0
Percent passing No. 200 sieve: ND Specific gravity: ND

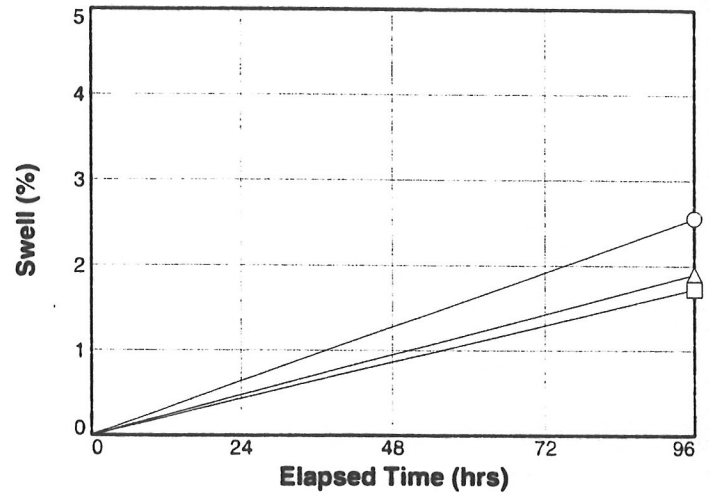
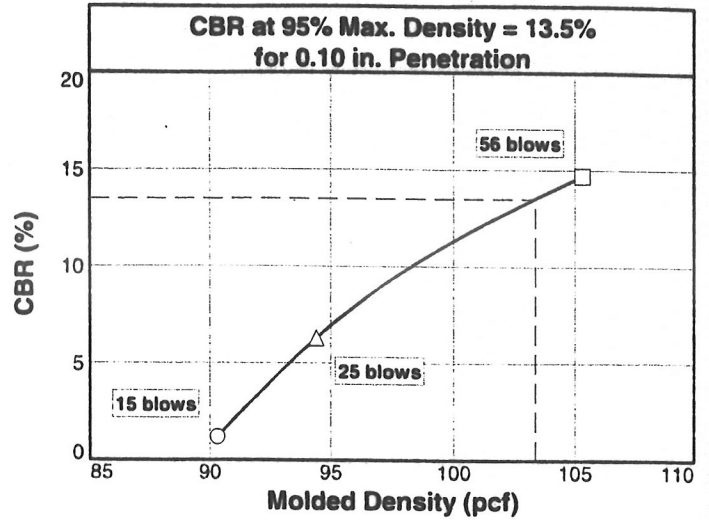
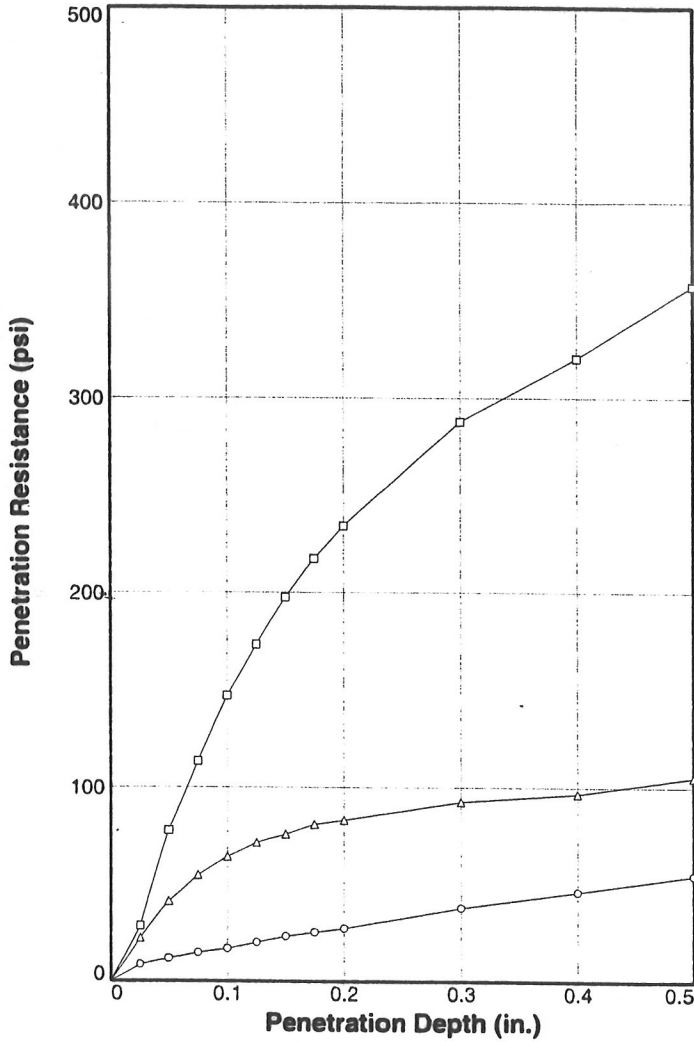
Test Data And Results For Curve TP-1-2

Type of test: ASTM D 1557-02 Method A Modified
Mold Dia.: 4.00 in. Hammer Wt.: 10 lb. Drop: 18 in.
Layers: five Blows per Layer: 25



# BEARING RATIO TEST REPORT

ASTM D 1883-99 *05 LAB 1/23/07*



	Molded			Soaked			CBR (%)		Linearity Correction (in.)	Surcharge (lbs.)	Max. Swell (%)
	Density (pcf)	Percent of Max. Dens.	Moisture (%)	Density (pcf)	Percent of Max. Dens.	Moisture (%)	0.10 in.	0.20 in.			
1 ○	90.3	83	17.0	88.1	81	25.2	1.2	1.6	-0.048	10.01	2.6
2 △	94.4	86.8	17.0	92.6	85.2	22.8	6.3	5.5	-0.003	10.03	1.9
3 □	105.3	96.8	17.2	103.5	95.2	19.4	14.7	15.6	0.000	10.01	1.7

Material Description	USCS	Max. Dens. (pcf)	Optimum Moisture (%)	LL	PI
	Yellow brown slightly silty sandy clay (VISUAL)	ND	108.8	17.1	ND

**Project No:** 6468061472  
**Project:** NORTH ANNA COL PROJECT  
**Source of Sample:** TEST PIT 1      **Depth:** 1.5-4'  
**Sample Number:** TP-1-2  
**Date:**

**BEARING RATIO TEST REPORT**  
**MACTEC, Inc.**

**Test Description/Remarks:**  
 Tested in accordance with ASTM D-1883, section 7.1.2

Figure \_\_\_\_\_

## BEARING RATIO TESTING RESULTS

(ASTM D 1883-99)(05) 1/23/07 UBJ

**Date:**  
**Project No.:** 6468061472  
**Project:** NORTH ANNA COL PROJECT  
**Location:** TEST PIT 1  
**Depth:** 1.5-4' **Sample Number:** TP-1-2  
**Material Description:** Yellow brown slightly silty sandy clay (VISUAL)  
**USCS Classification:** ND  
**Liquid Limit:** ND **Plasticity Index:** ND

**Test Description:** Tested in accordance with ASTM D-1883, section 7.1.2  
**Maximum Dry Density:** 108.8 **Optimum Moisture Content:** 17.1  
**Testing Remarks:**

### Sample 1 (15 Blows; Surcharge: 10.01 lbs.)

**Water Content**

Wt. Wet Soil+Tare, gms. 518.2    Wt. Soil+Tare, gms. 442.8    Wt. Tare, gms. 0    **Moisture, % 17.0**

**Unit Weight**

Wt. Mold+Soil, gms. 7782    Wt. Mold, gms. 4188    Ht. Soil, in. 4.581    **Density, pcf 90.3**

**Swell Data**

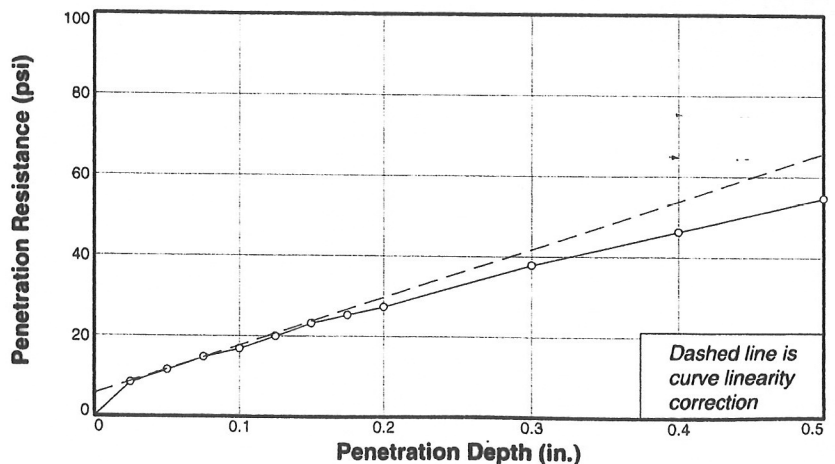
Elapsed Time, hrs.	Dial Reading in. x 1,000	Swell %
0	154	0.0
96	271	2.6

**Final Water Content**

	Wt. Wet Soil+Tare, gms.	Dry Soil+Tare	Tare	Moisture, %
Top	513.8	406.7	9.0	26.9
Middle	568.5	460.6	17.0	24.3
Bottom	568.5	460.6	17.0	24.3

**Penetration Test Data**

Pen. in.	Dial Reading in. x 1,000	Stress psi	CBR %
0.0	0	0.0	
0.025	8	8.4	
0.05	11	11.6	
0.075	14	14.7	
0.1	16	16.8	1.2
0.125	19	20.0	
0.15	22	23.1	
0.175	24	25.2	
0.2	26	27.3	1.6
0.3	36	37.8	1.7
0.4	44	46.2	1.8
0.5	52	54.6	1.9



**Sample 2 (25 Blows; Surcharge: 10.03 lbs.)**

**Water Content**

Wt. Wet Soil+Tare, gms. 371.1    Wt. Soil+Tare, gms. 317.2    Wt. Tare, gms. 0    **Moisture, % 17.0**

**Unit Weight**

Wt. Mold+Soil, gms. 7974    Wt. Mold, gms. 4218    Ht. Soil, in. 4.582    **Density, pcf 94.4**

**Swell Data**

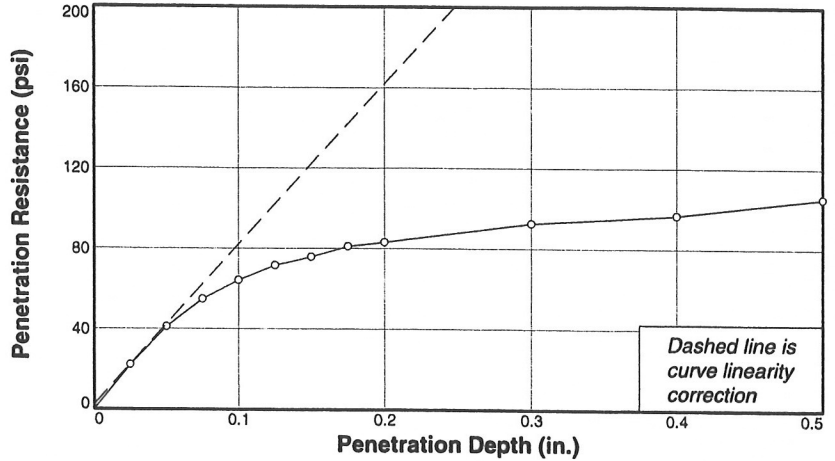
Elapsed Time, hrs.	Dial Reading in. x 1,000	Swell %
0	90	0.0
96	177	1.9

**Final Water Content**

	Wt. Wet Soil+Tare, gms.	Dry Soil+Tare	Tare	Moisture, %
Top	551.4	447.4	17.1	24.2
Middle	559.9	461.2	17.1	22.2
Bottom	559.2	461.2	17.1	22.1

**Penetration Test Data**

Pen. in.	Dial Reading in. x 1,000	Stress psi	CBR %
0.0	0	0.0	
0.025	21	22.1	
0.05	39	41.0	
0.075	52	54.6	
0.1	61	64.1	6.3
0.125	68	71.4	
0.15	72	75.6	
0.175	77	80.9	
0.2	79	83.0	5.5
0.3	88	92.4	4.9
0.4	92	96.6	4.2
0.5	100	105.0	4.0



**Sample 3 (56 Blows; Surcharge: 10.01 lbs.)**

**Water Content**

Wt. Wet Soil+Tare, gms. 414.3    Wt. Soil+Tare, gms. 353.5    Wt. Tare, gms. 0    **Moisture, % 17.2**

**Unit Weight**

Wt. Mold+Soil, gms. 8382    Wt. Mold, gms. 4188    Ht. Soil, in. 4.578    **Density, pcf 105.3**

**Swell Data**

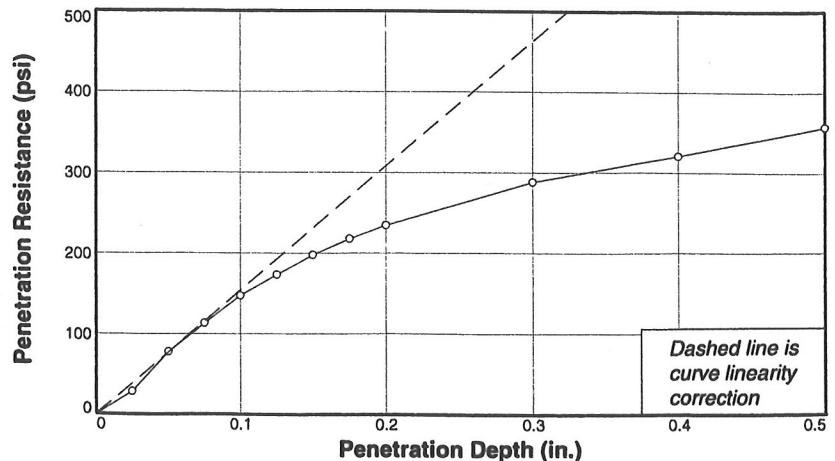
Elapsed Time, hrs.	Dial Reading in. x 1,000	Swell %
0	473	0.0
96	552	1.7

**Final Water Content**

	Wt. Wet Soil+Tare, gms.	Dry Soil+Tare	Tare	Moisture, %
Top	533.9	443.6	17	21.2
Middle	542.6	459.8	13.9	18.6
Bottom	542.6	459.8	13.9	18.6

**Penetration Test Data**

Pen. in.	Dial Reading in. x 1,000	Stress psi	CBR %
0.0	0	0.0	
0.025	27	28.4	
0.05	74	77.7	
0.075	108	113.5	
0.1	140	147.1	14.7
0.125	165	173.3	
0.15	188	197.5	
0.175	207	217.4	
0.2	223	234.3	15.6
0.3	274	287.8	15.1
0.4	305	320.4	13.9
0.5	340	357.2	13.7



# COMPACTION TEST REPORT/ ASTM D-1557-02

Curve No.: TP-2

Project No.: 6468061472

Date: 12/2/06

Project: NORTH ANNA COL PROJECT

Location: *TEST PIT No 2 LABS 1/22/07*

Elev./Depth: 0-3.8

Sample No. TP-2

Remarks: ND= NOT DETERMINED

## MATERIAL DESCRIPTION

Description: Brown slightly silty sandy clay

Classifications -

USCS: ND

AASHTO: ND

Nat. Moist. = 22.6 %

Sp.G. = ND

Liquid Limit = ND

Plasticity Index = ND

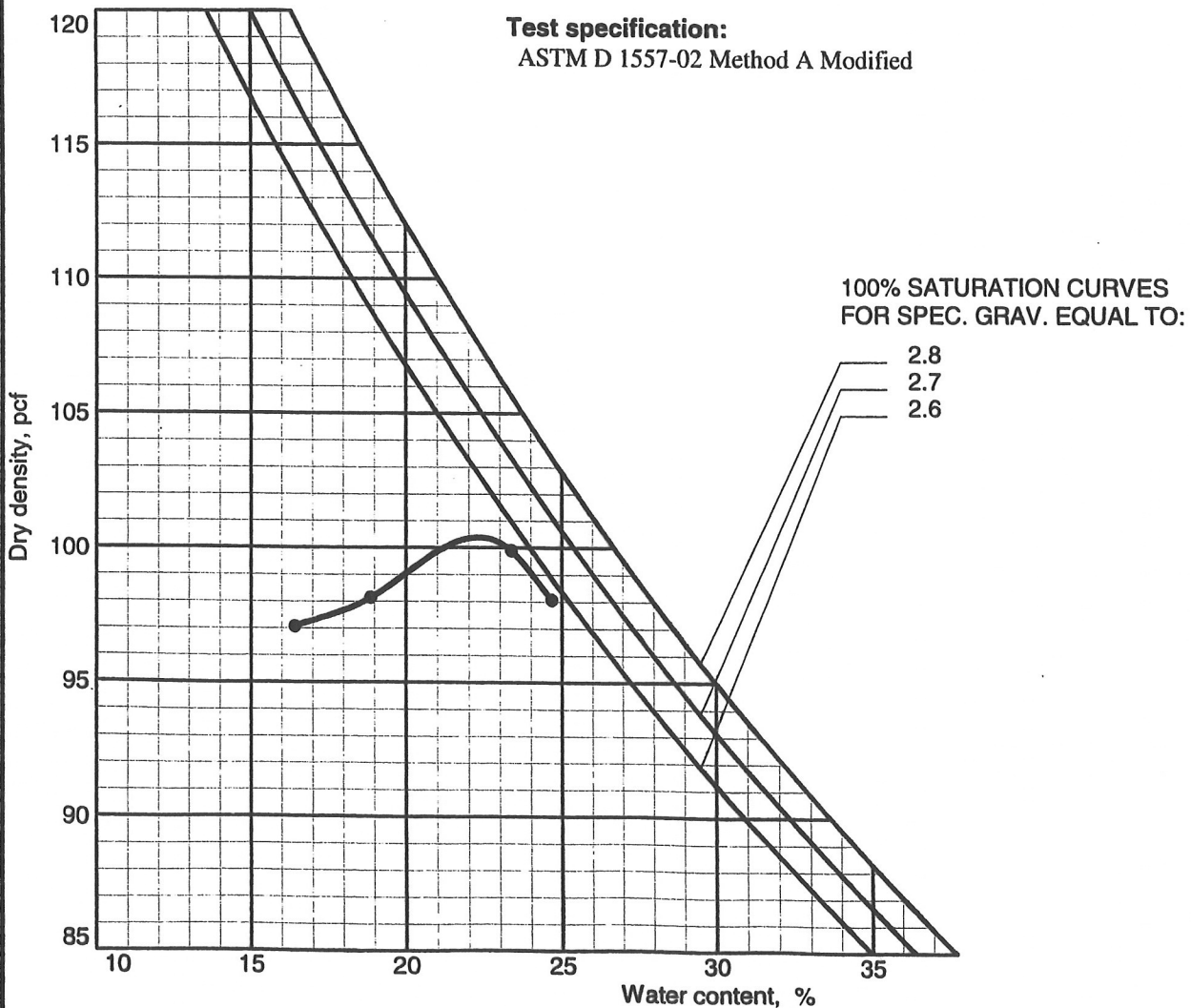
% > No.4 = 0.0 %

% < No.200 = ND %

## TEST RESULTS

Maximum dry density = 100.4 pcf

Optimum moisture = 22.3 %



Figure

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**MOISTURE DENSITY TEST DATA**

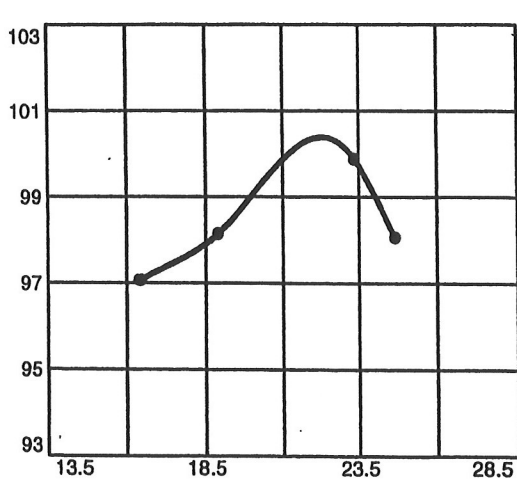
**Client:** Dominion Nuclear North Anna  
**Project:** NORTH ANNA COL PROJECT  
**Project Number:** 6468061472

**Specimen Data**

**Source:** TEST PIT 2  
**Sample No.:** TP-2  
**Elev. or Depth:** 0-3.8 **Sample Length(in./cm.):** 3.8  
**Location:**  
**Description:** Brown slightly silty sandy clay  
**Liquid Limit:** ND **Plasticity Index:** ND **Natural Moisture:** 22.6  
**Date:** 12/2/06 **USCS Classification:** ND **AASHTO Classification:** ND  
**Testing Remarks:** ND= NOT DETERMINED  
**Percent retained on No.4 sieve:** 0.0  
**Percent passing No. 200 sieve:** ND **Specific gravity:** ND

**Test Data And Results For Curve TP-2**

**Type of test:** ASTM D 1557-02 Method A Modified  
**Mold Dia.:** 4.00 in. **Hammer Wt.:** 10 lb. **Drop:** 18 in.  
**Layers:** five **Blows per Layer:** 25



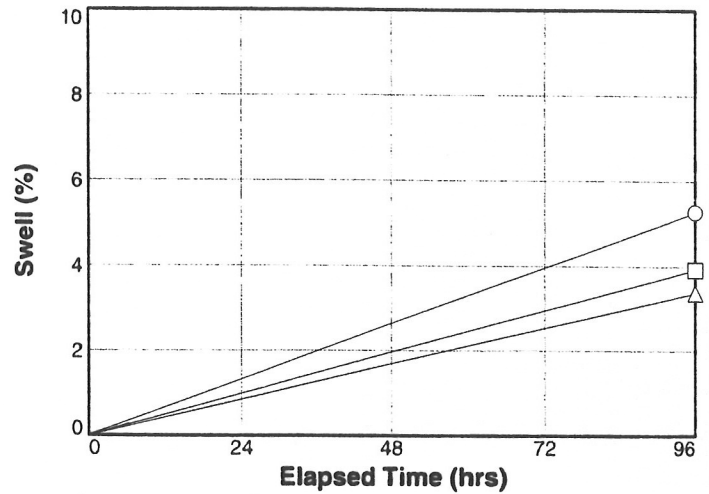
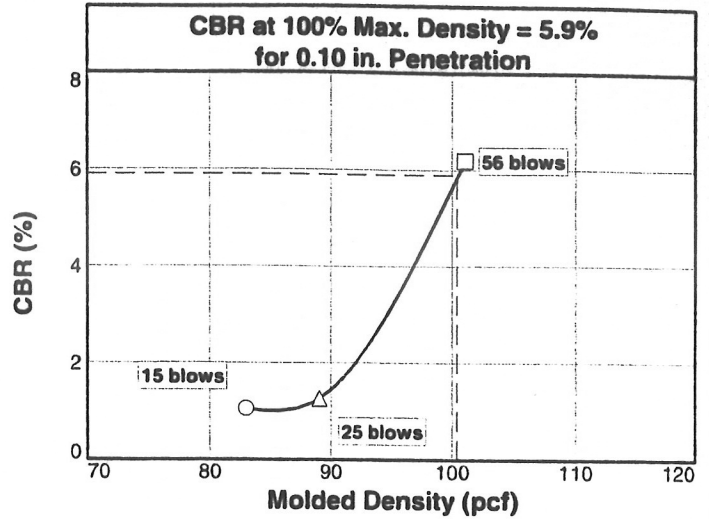
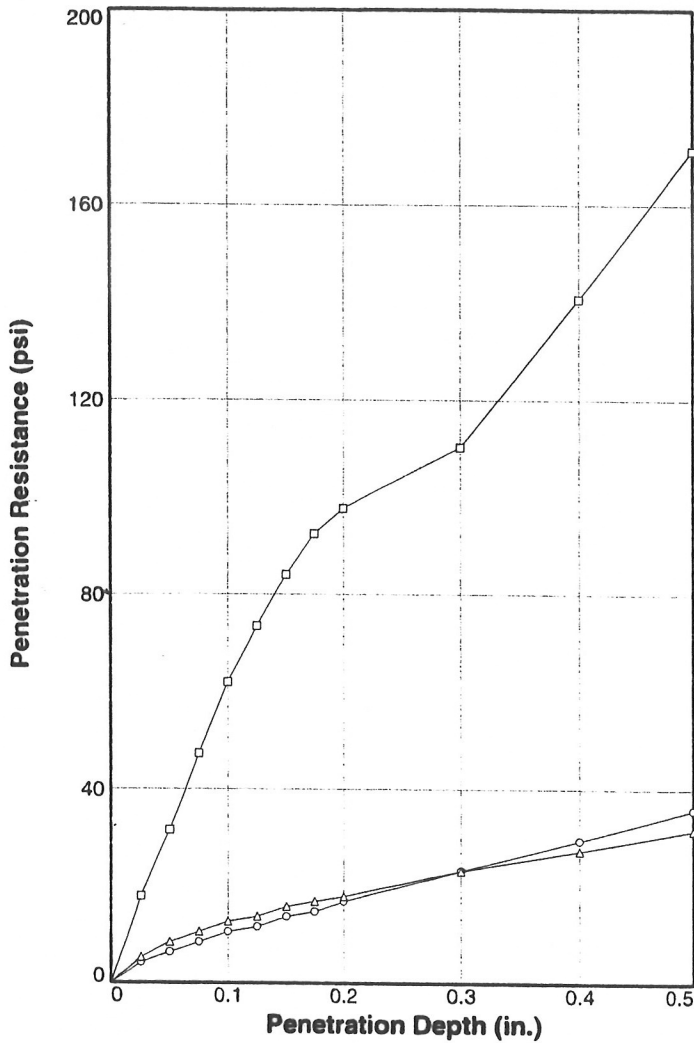
POINT NO.	1	2	3	4
WM + WS	3768.3	3824.0	3922.8	3908.3
WM	2060.0	2060.0	2060.0	2060.0
WW+T	558.50	529.70	565.20	544.80
WD+T	481.70	447.00	459.90	438.80
TARE	13.90	9.20	9.10	9.20
MOIST	16.4	18.9	23.4	24.7
MOISTURE	16.4	18.9	23.4	24.7
DRY DEN	97.1	98.1	99.9	98.1

**Max dry den=** 100.4 pcf **Opt moisture=** 22.3 %



# BEARING RATIO TEST REPORT

ASTM D 1883-99 *05 L23 1/23/07*



	Molded			Soaked			CBR (%)		Linearity Correction (in.)	Surcharge (lbs.)	Max. Swell (%)
	Density (pcf)	Percent of Max. Dens.	Moisture (%)	Density (pcf)	Percent of Max. Dens.	Moisture (%)	0.10 in.	0.20 in.			
1 ○	83.0	82.7	22.8	78.8	78.5	36.8	1.1	1.1	0.000	10.0	5.3
2 △	89.1	88.7	22.0	86.2	85.8	37.1	1.3	1.2	0.000	10.0	3.4
3 □	101.0	100.6	22.0	97.2	96.8	30.0	6.2	6.5	0.000	10.0	3.9

Material Description	USCS	Max. Dens. (pcf)	Optimum Moisture (%)	LL	PI
	Brown slightly silty sandy clay	ND	100.4	22.3	ND

**Project No:** 6468061472  
**Project:** NORTH ANNA COL PROJECT  
**Source of Sample:** TEST PIT 2      **Depth:** 0-3.8  
**Sample Number:** TP-2  
**Date:** 11/15/06

**Test Description/Remarks:**  
  
 Tested in accordance with ASTM D-1883-05, Section 7.1.2  
 ND = NOT DETERMINED.

BEARING RATIO TEST REPORT  
**MACTEC, Inc.**

Figure \_\_\_\_\_

## BEARING RATIO TESTING RESULTS

(ASTM D 1883-99) 05 May 1/23/07

**Date:** 11/15/06  
**Project No.:** 6468061472  
**Project:** NORTH ANNA COL PROJECT  
**Location:** TEST PIT 2  
**Depth:** 0-3.8                      **Sample Number:** TP-2  
**Material Description:** Brown slightly silty sandy clay  
**USCS Classification:** ND  
**Liquid Limit:** ND                      **Plasticity Index:** ND  
  
**Test Description:**  
**Maximum Dry Density:** 100.4                      **Optimum Moisture Content:** 22.3  
**Testing Remarks:** Tested in accordance with ASTM D-1883-05, Section 7.1.2  
 ND = NOT DETERMINED.

**Sample 1                      (15 Blows; Surcharge: 10.0 lbs.)**

**Water Content**  
 Wt. Wet Soil+Tare, gms. 794.4    Wt. Soil+Tare, gms. 653.05    Wt. Tare, gms. 33.9                      **Moisture, % 22.8**

**Unit Weight**  
 Wt. Mold+Soil, gms. 7664    Wt. Mold, gms. 4196    Ht. Soil, in. 4.585                      **Density, pcf 83.0**

**Swell Data**

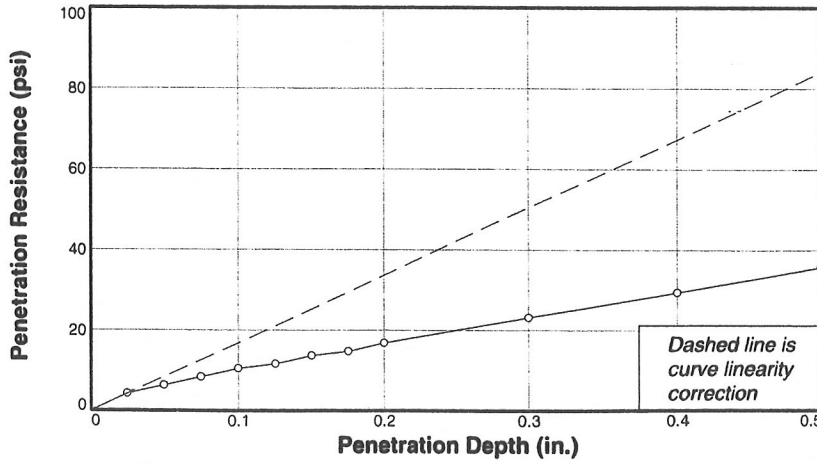
Elapsed Time, hrs.	Dial Reading in. x 1,000	Swell %
0	130	0.0
96	372	5.3

**Final Water Content**

	Wt. Wet Soil+Tare, gms.	Dry Soil+Tare	Tare	Moisture, %
Top	536.2	389.2	17.2	39.5
Middle	580.6	433.1	16.4	35.4
Bottom	580.6	433.1	16.4	35.4

**Penetration Test Data**

Pen. in.	Dial Reading in. x 1,000	Stress psi	CBR %
0.0	0	0.0	
0.025	4	4.2	
0.05	6	6.3	
0.075	8	8.4	
0.1	10	10.5	1.1
0.125	11	11.6	
0.15	13	13.7	
0.175	14	14.7	
0.2	16	16.8	1.1
0.3	22	23.1	1.2
0.4	28	29.4	1.3
0.5	34	35.7	1.4



**Sample 2 (25 Blows; Surcharge: 10.0 lbs.)**

**Water Content**

Wt. Wet Soil+Tare, gms. 476.1    Wt. Soil+Tare, gms. 393.2    Wt. Tare, gms. 17.2    **Moisture, % 22.0**

**Unit Weight**

Wt. Mold+Soil, gms. 7862    Wt. Mold, gms. 4156    Ht. Soil, in. 4.594    **Density, pcf 89.1**

**Swell Data**

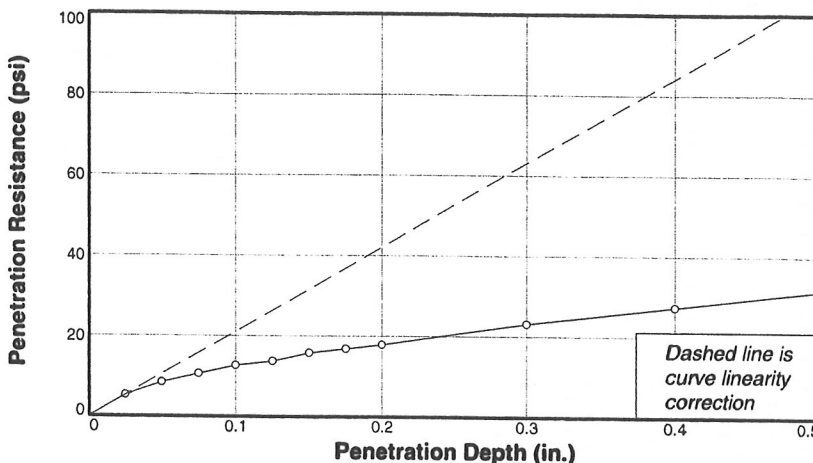
Elapsed Time, hrs.	Dial Reading in. x 1,000	Swell %
0	95	0.0
96	250	3.4

**Final Water Content**

	Wt. Wet Soil+Tare, gms.	Dry Soil+Tare	Tare	Moisture, %
Top	522.6	372.1	6.7	41.2
Middle	574.2	429.4	17.1	35.1
Bottom	574.2	429.4	17.1	35.1

**Penetration Test Data**

Pen. in.	Dial Reading in. x 1,000	Stress psi	CBR %
0.0	0	0.0	
0.025	5	5.3	
0.05	8	8.4	
0.075	10	10.5	
0.1	12	12.6	1.3
0.125	13	13.7	
0.15	15	15.8	
0.175	16	16.8	
0.2	17	17.9	1.2
0.3	22	23.1	1.2
0.4	26	27.3	1.2
0.5	30	31.5	1.2



**Sample 3 (56 Blows; Surcharge: 10.0 lbs.)**

**Water Content**

Wt. Wet Soil+Tare, gms. 462    Wt. Soil+Tare, gms. 384.7    Wt. Tare, gms. 33.7    **Moisture, % 22.0**

**Unit Weight**

Wt. Mold+Soil, gms. 8360    Wt. Mold, gms. 4166    Ht. Soil, in. 4.583    **Density, pcf 101.0**

**Swell Data**

Elapsed Time, hrs.	Dial Reading in. x 1,000	Swell %
0	83	0.0
96	263	3.9

**Final Water Content**

	Wt. Wet Soil+Tare, gms.	Dry Soil+Tare	Tare	Moisture, %
Top	542.4	411.8	9.3	32.4
Middle	545.9	427.9	16.9	28.7
Bottom	545.9	427.9	16.9	28.7

**Penetration Test Data**

Pen. in.	Dial Reading in. x 1,000	Stress psi	CBR %
0.0	0	0.0	
0.025	17	17.9	
0.05	30	31.5	
0.075	45	47.3	
0.1	59	62.0	6.2
0.125	70	73.5	
0.15	80	84.0	
0.175	88	92.4	
0.2	93	97.7	6.5
0.3	105	110.3	5.8
0.4	134	140.8	6.1
0.5	163	171.2	6.6

