


# Control Page

FO-7.5.3-04.1

## STANDARD PENETRATION TEST REPORT

### ***SOIL INVESTIGATION J. RAY McDERMOTT SECOND STAGE, ALTAMIRA PORT, MEXICO***

		<b><i>J. RAY Mc DERMOTT INTERNACIONAL, INC.</i></b>	
		TITLE: <b><i>STANDARD PENETRATION TEST REPORT</i></b>	
REFERENCE: <b><i>1650 GMS</i></b>		PROJECT: <b><i>SOIL INVESTIGATION J. RAY McDERMOTT SECOND STAGE, ALTAMIRA PORT, MEXICO</i></b>	
MADE BY: <b><i>Eliás Uribe Jiménez, P.E., Ms.E. Cedula: 5130070</i></b>		LOCATION: <b><i>ALTAMIRA PORT, TAMAULIPAS, MEXICO</i></b>	
CHECKED BY: <b><i>Pedro Ramírez Molina, P.E. Cedula: 3018470</i></b>		RECEIVED: <b><i>RAFAEL CANSECO YEBRA, P.E.</i></b>	DATE: <b><i>8-MAY-09</i></b>
APPROVED BY: <b><i>Gerardo Gallo Aguilar, P.E. Cedula: 1072743</i></b>		N° OF CONTROL: <b><i>DIC-07/09</i></b>	REVISION N°: <b><i>0</i></b>
			PAGES: <b><i>117</i></b>

REVISION 02



The interpretation of the obtained results of the standard penetration test for both cohesive and granular soils is made from empiric correlations (Reference 3 y 4) shown below that provide an approximate value of the shear strength or relative compactness, depending on the number of blows.

**Table 2. Correlation: Shear Strength in Clay**

Consistency			Very Soft	Soft	Medium	Stiff	Very Stiff	Hard
	Symbol	Unit						
SPT	$N_{SPT}$	--	0-2	2-4	4-8	8-16	16-32	>32
UCS*	$q_u$	pcf	0-500	500-1000	1000-2000	2000-4000	4000-8000	>8000
Shear Strength	$C_u$	psf	0-250	250-500	500-1000	1000-2000	2000-4000	>4000
Unit Weight Saturated	$\gamma$	pcf	<100	100-120	100-130	120-130	120-140	>130

\* UCS – Unconfined Compressive Strength

**Table 3. Correlation: Relative Density of Sand**

Compactness			Very Loose	Loose	Medium	Dense	Very Dense
	Symbol	Unit					
SPT*	$N_{SPT}$	--	0-4	4-10	10-30	30-50	>50
Relative Density	$D_r$	%	0-15	15-35	35-65	65-85	85-100
Friction	$\phi$	Deg	<28	28-30	30-36	36-41	>42
Unit Weight Moist	$\gamma$	pcf	<100	95-125	110-130	110-140	>130
Submerged	$\gamma$	pcf	<60	55-65	60-70	65-85	>75

\* SPT – Standard Penetration Test

**Table 4. Correlation: Estimating soil modulus from N**

Soil type	E (ksf)
Silts, sandy silts, slightly cohesive mixtures	$8N_1$
Clean fine to medium sands and slightly silty sands	$14N_1$
Coarse sands and sands with little gravel	$20N_1$
Sandy gravel and gravels	$24N_1$

$N_1$ : Standard penetration resistance corrected for effects of overburden pressure (blows/ft)



*Project: SOIL INVESTIGATION J. RAY McDERMOTT SECOND STAGE*

***ANNEX I  
FIGURE REPORT***

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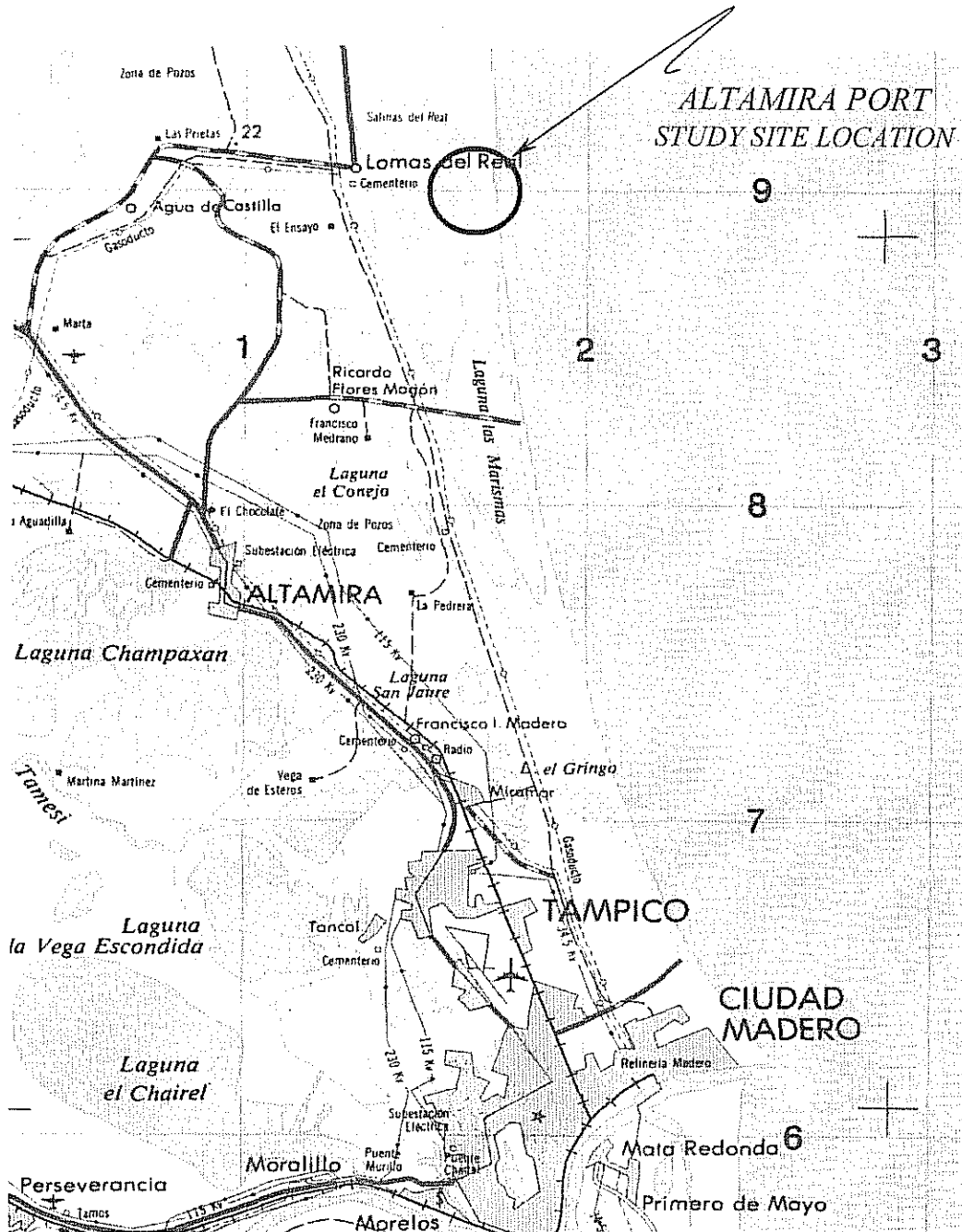


Figure 1. Study site location



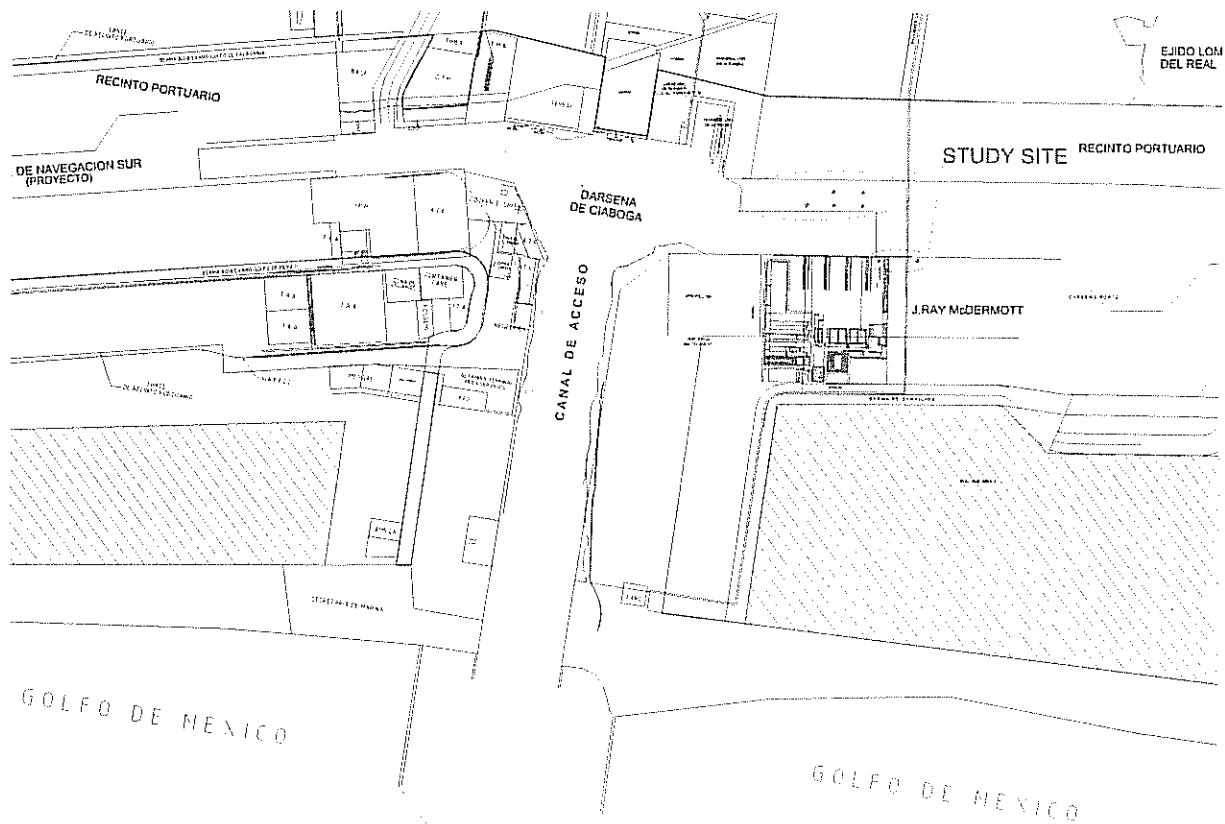


Figure 2. Location of the study site inside of the Industrial Altamira Port





Figure 3. Location of field works (SPT boreholes-U.D. sampling)





STANDARD PENETRATION TEST REPORT

Project: SOIL INVESTIGATION J. RAY McDERMOTT SECOND STAGE

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## Project: SOIL INVESTIGATION J. RAY McDERMOTT SECOND STAGE

## BORING LOG PROFILE

**PROJECT: PATIO DE FABRICACIÓN DE PLATAFORMAS MARINAS**

BOREHOLE SPT-1

LOCATION: SEE LAYOUT

Co. J. RAY McDERMOTT, INC.

PROYECT DEPTH: 62.35 m

B.H. LEVEL: G.L.

ATN: RAFAEL CANSECO

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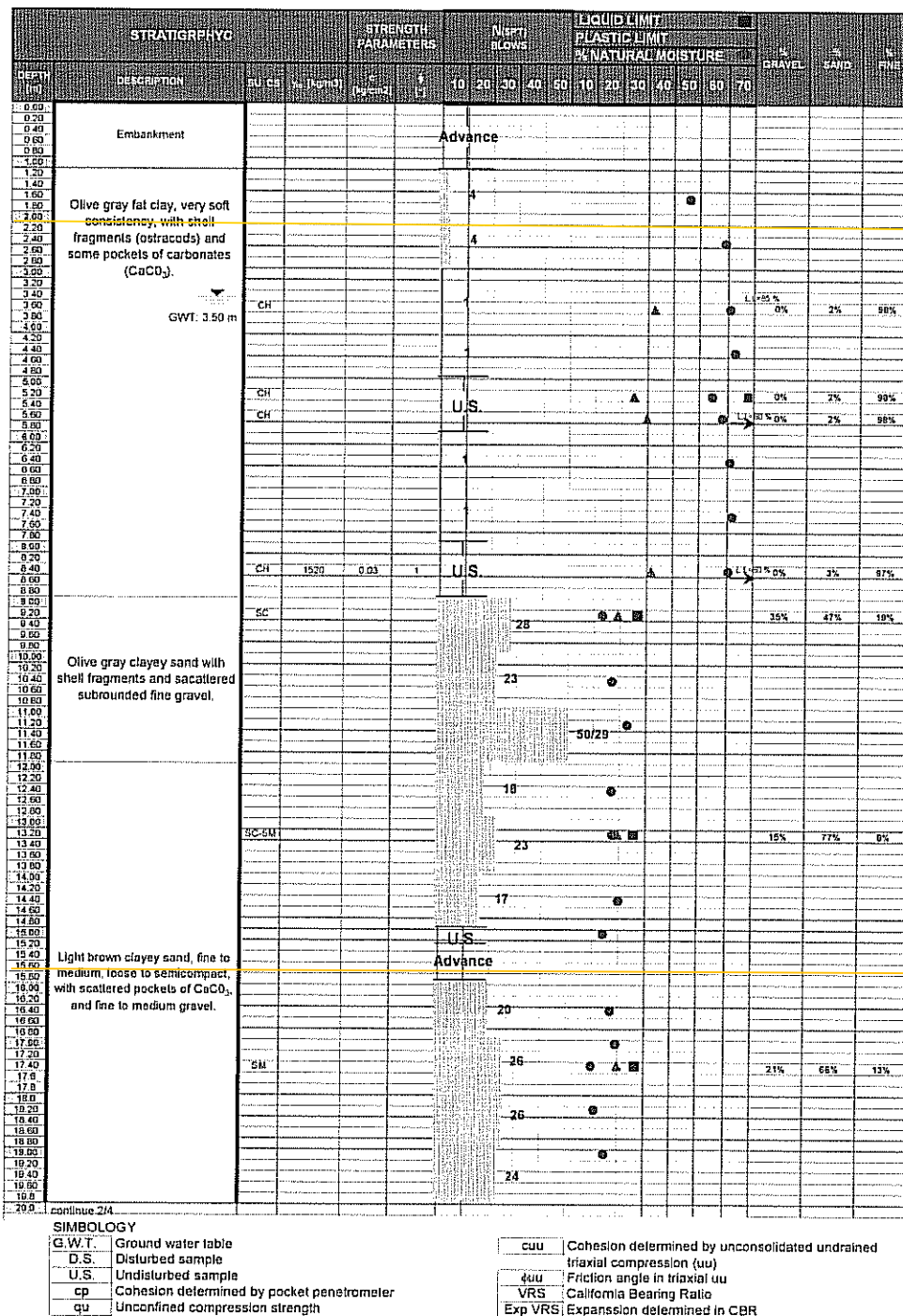


Figure 4. Boring log profile SPT-1 (continue)

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Project: SOIL INVESTIGATION J. RAY McDERMOTT SECOND STAGE

**BORING LOG PROFILE**

PROJECT: PATIO DE FABRICACIÓN DE PLATAFORMAS MARINAS

BOREHOLE SPT-1

LOCATION: SEE LAYOUT

Co. J. RAY McDERMOTT, INC

B.H. LEVEL: G.L.

ATN: RAFAEL CANSECO

PROJECT DEPTH: 62.35 m

PAGE: 2/4

DEPTH (m)	STRATIGRAPHIC DESCRIPTION	STRENGTH PARAMETERS		N <sub>60</sub> SLOWS		LIQUID LIMIT PLASTIC LIMIT % NATURAL MOISTURE		% GRAVEL	% SAND	% FINE
		CU (kPa)	φ (°)	10	20	30	40			
20.00	Light brown sand, fine to medium, semicompact, with shell fragments and scattered subrounded fine gravel.					25				
20.20										
20.40										
20.60										
20.80										
21.00										
21.20										
21.40										
21.60										
21.80										
22.00										
22.20	Greenish light brown clay, very rigid, with pockets of CaCO <sub>3</sub> .									
22.40										
22.60										
22.80										
23.00										
23.20		CH								
23.40										
23.60										
23.80										
24.00		CH								
24.20	Olive gray clay, very rigid to hard, with scattered fine gravels and pockets of CaCO <sub>3</sub> .									
24.40										
24.60										
24.80										
25.00										
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**SIMBOLOGY**

G.W.T.	Ground water table
D.S.	Disturbed sample
U.S.	Undisturbed sample
cp	Cohesion determined by pocket penetrometer
qu	Unconfined compression strength

CUU	Cohesion determined by unconsolidated undrained triaxial compression (uu)
φ <sub>UU</sub>	Friction angle in triaxial uu
VRS	California Bearing Ratio
Exp VRS	Expansion determined in CBR

Figure 4. Boring log profile SPT-1 (continue)

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Project: SOIL INVESTIGATION J. RAY McDERMOTT SECOND STAGE

**BORING LOG PROFILE**

PROJECT: PATIO DE FABRICACIÓN DE PLATAFORMAS MARINAS  
Co. J. RAY McDERMOTT, INC  
ATN: RAFAEL CANSECO

BOREHOLE SPT-1

LOCATION: SEE LAYOUT

B.H. LEVEL: G.L.

PAGE: 3/4

PROYECT DEPTH: 62.35 m

DEPTH (m)	STRATIGRPHYC	STRENGTH PARAMETERS	N <sub>SPT</sub> BLows	LIQUID LIMIT		PLASTIC LIMIT		% NATURAL MOISTURE		% GRAVEL	% SAND	% FINE
				10	20	30	40	50	60			
40.00												
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Continue 3/4

**SIMBOLOGY**

G.W.T.	Ground water table
D.S.	Disturbed sample
U.S.	Undisturbed sample
CP	Cohesion determined by pocket penetrometer
QU	Unconfined compression strength

CUU	Cohesion determined by unconsolidated undrained
CUU	Triaxial compression (uu)
CUU	Friction angle in triaxial uu
VRS	California Bearing Ratio
Exp VRS	Expansion determined in CBR

Figure 4. Boring log profile SPT-1 (continue)

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Project: SOIL INVESTIGATION J. RAY McDERMOTT SECOND STAGE

**BORING LOG PROFILE**

PROJECT: PATIO DE FABRICACIÓN DE PLATAFORMAS MARINAS  
Co. J. RAY McDERMOTT, INC  
ATN: RAFAEL CANSECO

BOREHOLE SPT-1

LOCATION: SEE LAYOUT  
B.H. LEVEL: G.L.  
PAGE: 4/4

PROJECT DEPTH: 62.35 m

STRATIGRPHYC		STRENGTH PARAMETERS					N(SPT) BLOWS					LIQUID LIMIT PLASTIC LIMIT % NATURAL MOISTURE										% GRAVEL	% SAND	% FINE
DEPTH (m)	DESCRIPTION	SU [kN/m <sup>2</sup> ]	CS [kN/m <sup>2</sup> ]	$\phi$ [°]	$c$ [kN/m <sup>2</sup> ]	$\phi$ [°]	10	20	30	40	50	10	20	30	40	50	60	70						
60.00	Olive gray clay, very rigid to hard, with scattered fine gravels.	CH											50/28			A		B		0%	3%	97%		
60.20																								
60.40																								
60.60																								
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65.00																								

**SIMBOLOGY**

G.W.T.	Ground water table
D.S.	Disturbed sample
U.S.	Undisturbed sample
cp	Cohesion determined by pocket penetrometer
qu	Unconfined compression strength

cuu	Cohesion determined by unconsolidated undrained triaxial compression (uu)
$\phi_{uu}$	Friction angle in triaxial uu
VRS	California Bearing Ratio
Exp VRS	Expansion determined in CBR

Figure 4. Boring log profile SPT-1 (continuation)



Project: SOIL INVESTIGATION J. RAY McDERMOTT SECOND STAGE

**BORING LOG PROFILE**

PROJECT: PATIO DE FABRICACIÓN DE PLATAFORMAS MARINAS

BOREHOLE SPT-2

LOCATION: SEE LAYOUT

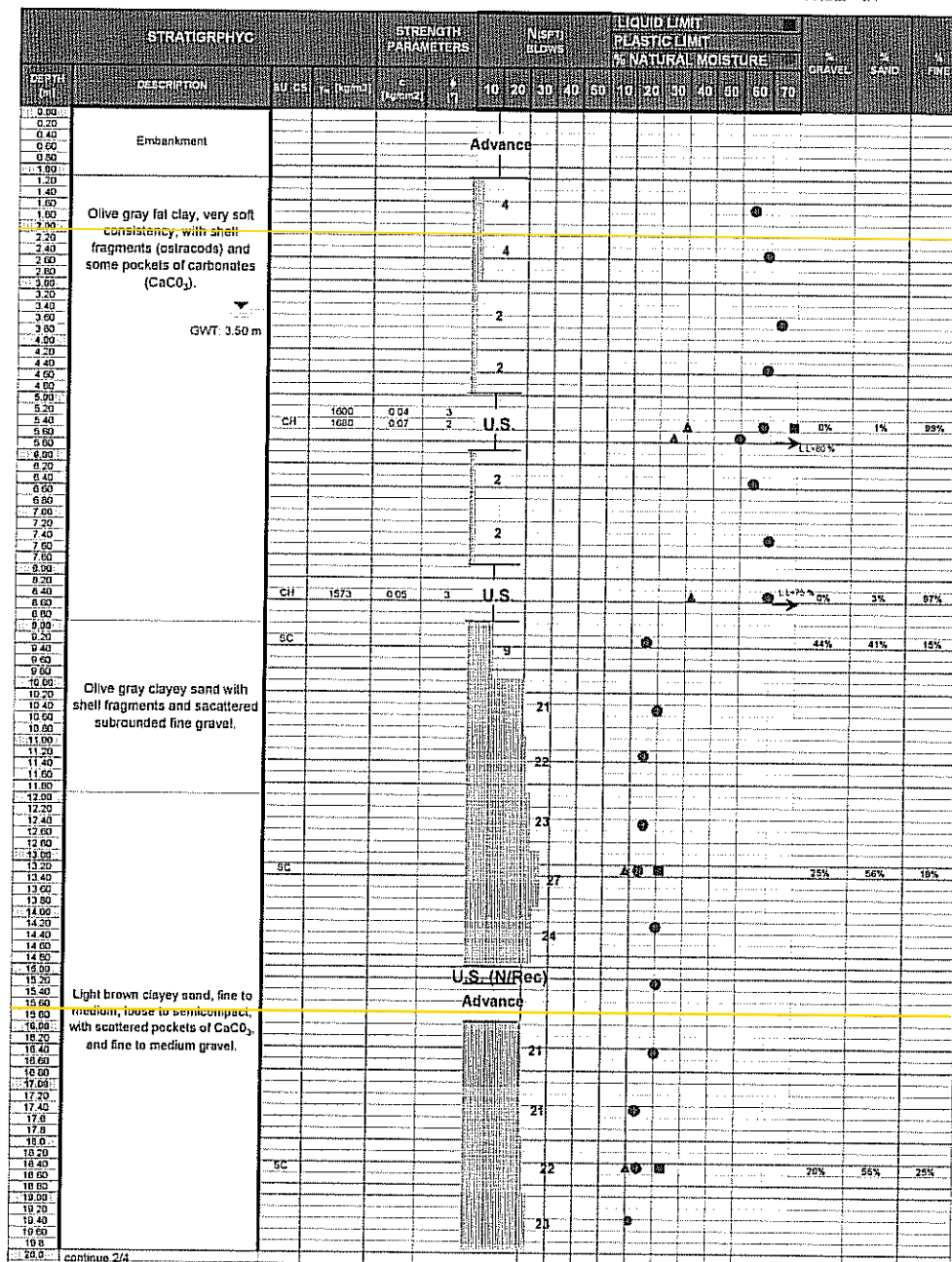
Co. J. RAY McDERMOTT, INC

B.H. LEVEL: G.L.

ATN: RAFAEL CANSECO

PROJECT DEPTH: 62.40 m

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SIMBOLY

G.W.T. Ground water table  
D.S. Disturbed sample  
U.S. Undisturbed sample  
cp Cohesion determined by pocket penetrometer  
qu Unconfined compression strength

c<sub>uu</sub> Cohesion determined by unconsolidated undrained triaxial compression (uu)  
φ<sub>uu</sub> Friction angle in triaxial uu  
VRS California Bearing Ratio  
Exp VRS Expansion determined in CBR

Figure 5. Boring log profile SPT-2 (continue)



Project: SOIL INVESTIGATION J. RAY McDERMOTT SECOND STAGE

**BORING LOG PROFILE**

PROJECT: PATIO DE FABRICACIÓN DE PLATAFORMAS MARINAS

BOREHOLE SPT-2

LOCATION: SEE LAYOUT

Co. J. RAY McDERMOTT, INC

B.H. LEVEL: G.L.

ATN: RAFAEL CANSECO

PROYECT DEPTH: 62.40 m

PAGE: 2/4

DEPTH (m)	STRATIGRPHYC DESCRIPTION	STRENGTH PARAMETERS				N-SPT BLOWS				LIQUID LIMIT PLASTIC LIMIT % NATURAL MOISTURE				% GRAVEL	% SAND	% FINE
		q (kg/cm²)	f (kg/cm²)	q (tsf)	f (tsf)	10	20	30	40	50	10	20	30			
20.00	Light brown sand, fine to medium, semicompact, with shell fragments and scattered subrounded fine gravel.	SC									65	50		37%	54%	9%
20.20											40					
20.40																
20.60																
20.80																
21.00																
21.20																
21.40																
21.60											40	0				
21.80																
22.00	Greenish light brown clay, very rigid, with pockets of CaCO <sub>3</sub> .	CH												0%	1%	99%
22.20																
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23.40																
23.60																
23.80																
24.00	Olive gray clay, very rigid to hard, with scattered fine gravels and pockets of CaCO <sub>3</sub> .															
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39.80																
40.00																

**SIMBOLOGY**

G.W.T.	Ground water table
D.S.	Disturbed sample
U.S.	Undisturbed sample
cp	Cohesion determined by pocket penetrometer
qu	Unconfined compression strength

c <sub>uu</sub>	Cohesion determined by unconsolidated undrained triaxial compression (uu)
φ <sub>uu</sub>	Friction angle in triaxial uu
VRS	California Bearing Ratio
Exp VRS	Expansion determined in CBR

Figure 5. Boring log profile SPT-2 (continue)

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## Project: SOIL INVESTIGATION J. RAY McDERMOTT SECOND STAGE

## BORING LOG PROFILE

PROJECT: PATIO DE FABRICACIÓN DE PLATAFORMAS MARINAS

BOREHOLE SPT-2

LOCATION: SEE LAYOUT

Co. J. RAY McDERMOTT, INC.

**PROYECT DEPTH: 62.40 m**

B.H. LEVEL: G.L.

AT'N: RAFAEL CANSECO

PAGE: 3/4

[illegible]

## SIMBOLOGY

G.W.T.	Ground water table
D.S.	Disturbed sample
U.S.	Undisturbed sample
cp	Cohesion determined by pocket penetrometer
qu	Unconfined compression strength

cuu	Cohesion determined by unconsolidated undrained triaxial compression (uu)
$\phi_{uu}$	Friction angle in triaxial uu
VRS	California Bearing Ratio
Exp VRS	Expansion determined in CBR

*Figure 5. Boring log profile SPT-2 (continue)*

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Project: SOIL INVESTIGATION J. RAY McDERMOTT SECOND STAGE

**BORING LOG PROFILE**

PROJECT: PATIO DE FABRICACIÓN DE PLATAFORMAS MARINAS  
Co. J. RAY McDERMOTT, INC  
ATN: RAFAEL CANSECO

BOREHOLE SPT-2

LOCATION: SEE LAYOUT

B.H. LEVEL: G.L.

PROYECT DEPTH: 62.40 m

PAGE: 4/4

DEPTH (m)	STRATIGRAPHIC DESCRIPTION	STRENGTH PARAMETERS					NIGHT BLOWS					LIQUID LIMIT PLASTIC LIMIT % NATURAL MOISTURE							% GRAVEL	% SAND	% FINE
		SU (kN/m <sup>2</sup> )	C <sub>u</sub> (kg/cm <sup>2</sup> )	C <sub>u</sub> (kg/cm <sup>2</sup> )	φ <sub>uu</sub> (°)		10	20	30	40	50	10	20	30	40	50	60	70			
60.00	Olive gray clay, very rigid to hard, with scattered fine gravels.																				
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60.40																					
60.60																					
60.80																					
61.00																					
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61.40																					
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61.80																					
62.00	END OF BOREHOLE																				
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64.60																					
64.80																					
65.00																					

**SIMBOLOGY**

G.W.T.	Ground water table
D.S.	Disturbed sample
U.S.	Undisturbed sample
cp	Cohesion determined by pocket penetrometer
qu	Unconfined compression strength

cuu	Cohesion determined by unconsolidated undrained triaxial compression (uu)
φuu	Friction angle in triaxial uu
VRS	California Bearing Ratio
Exp VRS	Expansion determined in CBR

Figure 5. Boring log profile SPT-2 (continuation)



### BORING LOG PROFILE

PROJECT: PATIO DE FABRICACIÓN DE PLATAFORMAS MARINAS

BOREHOLE SPT-3

LOCATION: SEE LAYOUT

Co. J. RAY McDERMOTT, INC

B.H. LEVEL: G.L.

ATN: RAFAEL CANSECO

PROYECT DEPTH: 62.60 m

PAGE: 1/4

STRATIGRAPHY		STRENGTH PARAMETERS			SPT BLOWS					LIQUID LIMIT PLASTIC LIMIT % NATURAL MOISTURE					% GRAVEL	% SAND	% FINE	
DEPTH (m)	DESCRIPTION	CU (kPa)	TC (kPa)	φ (°)	10	20	30	40	50	10	20	30	40	50	60	70		
0.00	Embankment																	
0.20																		
0.40																		
0.60																		
0.80																		
1.00																		
1.20																		
1.40																		
1.60																		
1.80																		
2.00	Olive gray fat clay, very soft consistency, with shell fragments (ostracods) and some pockets of carbonates (CaCO <sub>3</sub> ).																	
2.20																		
2.40																		
2.60																		
2.80																		
3.00																		
3.20																		
3.40																		
3.60																		
3.80																		
4.00	GWL 3.50 m																	
4.20																		
4.40																		
4.60																		
4.80																		
5.00																		
5.20																		
5.40		CH	1691	0.05	3	U.S.						Δ		●	■	0%	1%	99%
5.60																		
5.80																		
6.00	Olive gray clayey sand with shell fragments and scattered subrounded fine gravel.																	
6.20																		
6.40																		
6.60																		
6.80																		
7.00																		
7.20																		
7.40																		
7.60																		
7.80																		
8.00																		
8.20		CH	1500	0.09	2	U.S.						Δ		●		0%	3%	97%
8.40																		
8.60																		
8.80																		
9.00																		
9.20																		
9.40																		
9.60																		
9.80																		
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10.20																		
10.40																		
10.60																		
10.80																		
11.00																		
11.20																		
11.40																		
11.60																		
11.80																		
12.00																		
12.20																		
12.40																		
12.60																		
12.80																		
13.00																		
13.20																		
13.40																		
13.60																		
13.80																		
14.00																		
14.20																		
14.40																		
14.60																		
14.80																		
15.00																		
15.20																		
15.40																		
15.60																		
15.80																		
16.00	Light brown clayey sand, fine to medium, loose to semicompact, with scattered pockets of CaCO <sub>3</sub> and fine to medium gravel.																	
16.20																		
16.40																		
16.60																		
16.80																		
17.00																		
17.20																		
17.40																		
17.60																		
17.80																		
18.00																		
18.20																		
18.40																		
18.60																		
18.80																		
19.00																		
19.20																		
19.40																		
19.60																		
19.80																		
20.00																		
20.20																		
20.40																		
20.60																		
20.80																		
21.00																		
21.20																		
21.40																		
21.60																		
21.80																		
22.00																		
22.20																		
22.40																		
22.60																		
22.80																		
23.00																		
23.20																		
23.40																		
23.60																		
23.80																		
24.00																		
24.20																		
24.40																		
24.60																		
24.80																		



Project: SOIL INVESTIGATION J. RAY McDERMOTT SECOND STAGE

**BORING LOG PROFILE**

PROJECT: PATIO DE FABRICACIÓN DE PLATAFORMAS MARINAS

BOREHOLE SPT-3

LOCATION: SEE LAYOUT

Co. J. RAY McDERMOTT, INC

B.H. LEVEL: G.L.

ATTN: RAFAEL CANSECO

PROYECT DEPTH: 62.60 m

PAGE: 2/4

DEPTH (m)	STRATIGRAPHIC DESCRIPTION	SPT BLOWS	LIQUID LIMIT PLASTIC LIMIT % NATURAL MOISTURE	% GRAVEL	% SAND	% FINE
20.00	Light brown sand, fine to medium, semicompact, with shell fragments and scattered subrounded fine gravel.	50/16		6%	84%	10%
20.20						
20.40						
20.60						
20.80						
21.00						
21.20		40				
21.40						
21.60						
21.80						
22.00	Light brown clay, very rigid, with pockets of CaCO <sub>3</sub> .	24				
22.20						
22.40						
22.60						
22.80						
23.00		23				
23.20						
23.40						
23.60						
23.80						
24.00	Olive gray clay, very rigid to hard, with scattered fine gravels and pockets of CaCO <sub>3</sub> .	U.S. (N/Rec) Advance:				
24.20						
24.40						
24.60						
24.80						
25.00		25		0%	2%	98%
25.20						
25.40						
25.60						
25.80						
26.00	Olive gray clay, very rigid to hard, with scattered fine gravels and pockets of CaCO <sub>3</sub> .	35				
26.20						
26.40						
26.60		24				
26.80						
27.00						
27.20						
27.40						
27.60						
27.80						
28.00	Olive gray clay, very rigid to hard, with scattered fine gravels and pockets of CaCO <sub>3</sub> .	34				
28.20						
28.40						
28.60						
28.80						
29.00		35				
29.20						
29.40						
29.60						
29.80						
30.00	Olive gray clay, very rigid to hard, with scattered fine gravels and pockets of CaCO <sub>3</sub> .	39		0%	2%	98%
30.20						
30.40						
30.60						
30.80						
31.00		44				
31.20						
31.40						
31.60						
31.80						
32.00	Olive gray clay, very rigid to hard, with scattered fine gravels and pockets of CaCO <sub>3</sub> .	44				
32.20						
32.40						
32.60						
32.80						
33.00		47				
33.20						
33.40						
33.60						
33.80						
34.00	Olive gray clay, very rigid to hard, with scattered fine gravels and pockets of CaCO <sub>3</sub> .	50/30				
34.20						
34.40						
34.60						
34.80						
35.00		50/25				
35.20						
35.40						
35.60						
35.80						
36.00	Olive gray clay, very rigid to hard, with scattered fine gravels and pockets of CaCO <sub>3</sub> .	35				
36.20						
36.40						
36.60						
36.80						
37.00		35		0%	1%	99%
37.20						
37.40						
37.60						
37.80						
38.00	Olive gray clay, very rigid to hard, with scattered fine gravels and pockets of CaCO <sub>3</sub> .	41				
38.20						
38.40						
38.60						
38.80						
39.00						
39.20						
39.40						
39.60						
39.80		50/28				
40.00	continue 3/4					

**SIMBOLOGY**

G.W.T.	Ground water table
D.S.	Disturbed sample
U.S.	Undisturbed sample
cp	Cohesion determined by pocket penetrometer
qu	Unconfined compression strength

c <sub>uu</sub>	Cohesion determined by unconsolidated undrained triaxial compression (uu)
φ <sub>uu</sub>	Friction angle in triaxial uu
VRS	California Bearing Ratio
Exp VRS	Expansion determined in CBR

Figure 6. Boring log profile SPT-3 (continue)

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### BORING LOG PROFILE

PROJECT: PATIO DE FABRICACIÓN DE PLATAFORMAS MARINAS

BOREHOLE SPT-3

LOCATION: SEE LAYOUT

Co. J. RAY McDERMOTT, INC

B.H. LEVEL: G.L.

ATTN: RAFAEL CANSECO

PROJECT DEPTH: 62.60 m

PAGE: 3/4

DEPTH (m)	STRATIGRAPHIC DESCRIPTION	STRENGTH PARAMETERS				N <sub>60</sub> SPT BLOWS					LIQUID LIMIT PLASTIC LIMIT % NATURAL MOISTURE							% GRAVEL	% SAND	% FINE
		SU (kN/m <sup>2</sup> )	Cu (kN/m <sup>2</sup> )	q <sub>p</sub> (kN/m <sup>2</sup> )	f <sub>u</sub> (kN/m <sup>2</sup> )	10	20	30	40	50	10	20	30	40	50	60	70			
40.00											50/26									
40.20																				
40.40																				
40.60																				
40.80											50/25									
41.00																				
41.20																				
41.40																				
41.60																				
41.80																				
42.00																				
42.20											50/27							0%	1%	99%
42.40																				
42.60																				
42.80																				
43.00																				
43.20											50/20									
43.40																				
43.60																				
43.80																				
44.00											50/20									
44.20																				
44.40																				
44.60																				
44.80																				
45.00											50/22									
45.20																				
45.40																				
45.60																				
45.80											50/28									
46.00																				
46.20																				
46.40											50/27									
46.60																				
46.80																				
47.00																				
47.20																				
47.40																				
47.60																				
47.80																				
48.00																				
48.20											50/30							0%	1%	99%
48.40																				
48.60																				
48.80																				
49.00																				
49.20																				
49.40																				
49.60																				
49.80																				
50.00											50/24									
50.20																				
50.40											50/25									
50.60																				
50.80																				
51.00																				
51.20											46									
51.40																				
51.60																				
51.80																				
52.00																				
52.20											43									
52.40																				
52.60																				
52.80																				
53.00											42									
53.20																				
53.40																				
53.60																				
53.80																				
54.00																				
54.20											45							0%	2%	98%
54.40																				
54.60																				
54.80																				
55.00																				
55.20																				
55.40																				
55.60																				
55.80											45									
56.00																				
56.20																				
56.40																				
56.60																				
56.80																				
57.00																				
57.20																				
57.40											42									
57.60																				
57.80																				
58.00																				
58.20																				
58.40											46									
58.60																				
58.80																				
59.00																				
59.20																				
59.40																				
59.60																				
59.80																				
60.00																				

Continue 4/4

#### SIMBOLOGY

G.W.T.	Ground water table
D.S.	Disturbed sample
U.S.	Undisturbed sample
cp	Cohesion determined by pocket penetrometer
qu	Unconfined compression strength

c <sub>uu</sub>	Cohesion determined by unconsolidated undrained triaxial compression (uu)
φ <sub>uu</sub>	Friction angle in triaxial uu
VRS	California Bearing Ratio
Exp VRS	Expansion determined in CBR

Figure 6. Boring log profile SPT-3 (continue)

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Project: SOIL INVESTIGATION J. RAY McDERMOTT SECOND STAGE

**BORING LOG PROFILE**

PROJECT: PATIO DE FABRICACIÓN DE PLATAFORMAS MARINAS  
Co. J. RAY McDERMOTT, INC  
ATN: RAFAEL CANSECO

BOREHOLE SPT-3

PROYECT DEPTH: 62.60 m

LOCATION: SEE LAYOUT

B.H. LEVEL: G.L.

PAGE: 4/4

STRATIGRPHYC		STRENGTH PARAMETERS				N(SPT) BLOWS					LIQUID LIMIT PLASTIC LIMIT % NATURAL MOISTURE										% GRAVEL	% SAND	% FINE
DEPTH (m)	DESCRIPTION	SU / CG	$\gamma_s$ (kg/m <sup>3</sup> )	c (kg/cm <sup>2</sup> )	$\phi$ (°)	10	20	30	40	50	10	20	30	40	50	60	70						
60.00	Olive gray clay, very rigid to hard, with scattered fine gravels.	CH									48	65	▲								0%	0%	100%
60.20																							
60.40																							
60.60																							
61.00																							
61.20																							
61.40												47	65	●									
61.60																							
61.80																							
62.00												46	65	●									
62.20	END OF BOREHOLE																						
62.40																							
62.60																							
62.80																							
63.00																							
63.20																							
63.40																							
63.60																							
63.80																							
64.00																							
64.20																							
64.40																							
64.60																							
64.80																							
65.00																							

**SIMBOLOGY**

G.W.T.	Ground water table
D.S.	Disturbed sample
U.S.	Undisturbed sample
cp	Cohesion determined by pocket penetrometer
qu	Unconfined compression strength

CUU	Cohesion determined by unconsolidated undrained triaxial compression (uu)
φuu	Friction angle in triaxial uu
VRS	California Bearing Ratio
Exp VRS	Expansion determined in CBR

Figure 6. Boring log profile SPT-3 (continuation)



## Project: SOIL INVESTIGATION J. RAY McDERMOTT SECOND STAGE

## BORING LOG PROFILE

PROJECT: PATIO DE FABRICACIÓN DE PLATAFORMAS MARINAS

BOREHOLE SPT-4

LOCATION: SEE LAYOUT

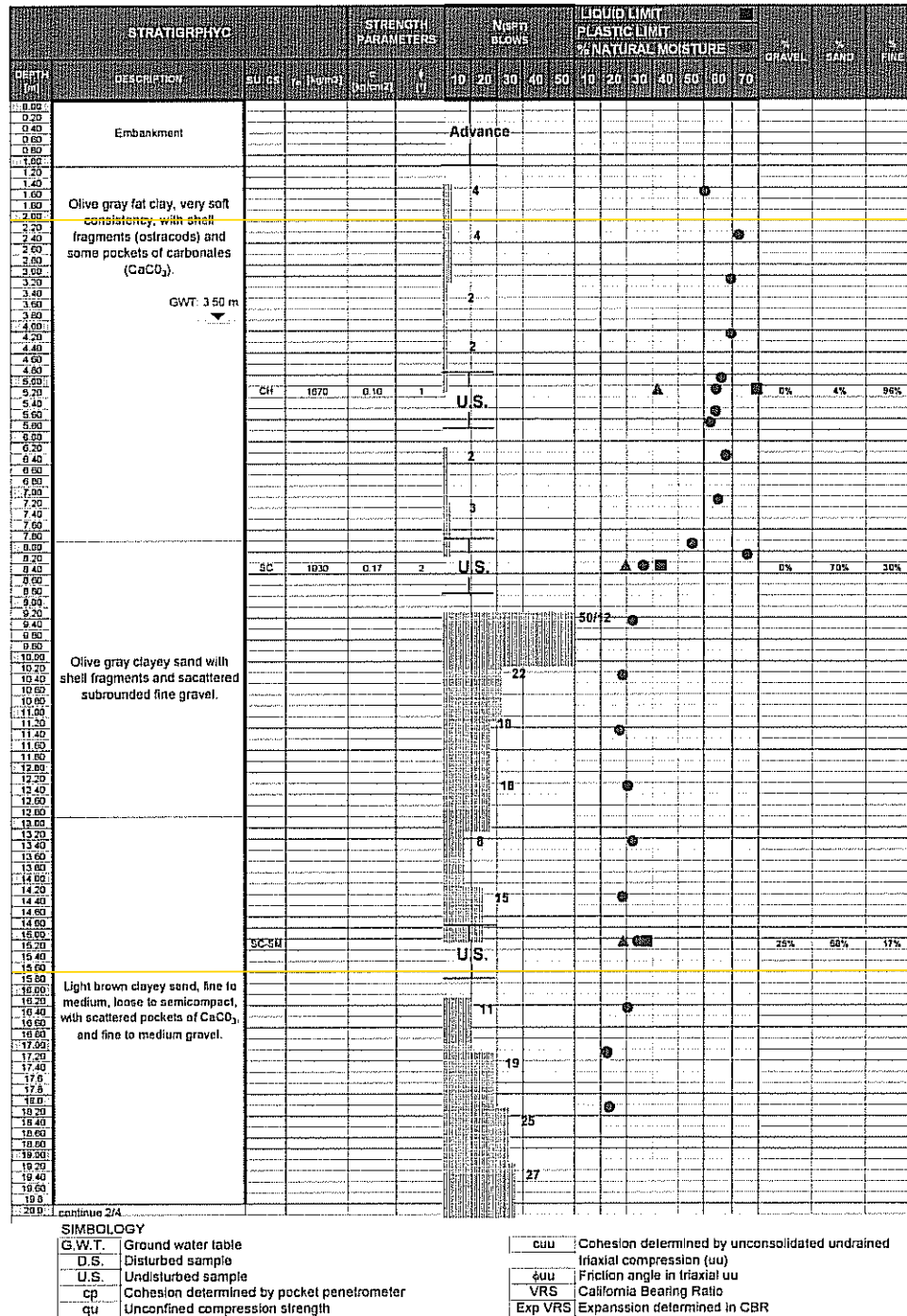
Co. J. RAY Mc DERMOTT, INC

**PROYECT DEPTH: 62.45 m**

B.H. LEVEL: G.L.

AT'N: RAFAEL CANSECO

PAGE: 1/4



*Figure 7. Boring log profile SPT-4 (continue)*

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**BORING LOG PROFILE**

PROJECT: PATIO DE FABRICACIÓN DE PLATAFORMAS MARINAS

BOREHOLE SPT-4

LOCATION: SEE LAYOUT

Co. J. RAY McDERMOTT, INC

B.H. LEVEL: G.L.

ATN: RAFAEL CANSECO

PROJECT DEPTH: 62.45 m

PAGE: 2/4

DEPTH (m)	STRATIGRAPHIC DESCRIPTION	SO	CS	f <sub>u</sub> (kg/cm <sup>2</sup> )	f <sub>c</sub> (kg/cm <sup>2</sup> )	f <sub>u</sub> (lb/in <sup>2</sup> )	LIQUID LIMIT PLASTIC LIMIT % NATURAL MOISTURE										% GRAVEL	% SAND	% FINE
							10	20	30	40	50	60	70	80	90	100			
20.00	Light brown sand, fine to medium, semicompact, with shell fragments and scattered subrounded fine gravel.	SC															29%	62%	9%
20.20																			
20.40																			
20.60																			
20.80																			
21.00																			
21.20																			
21.40																			
21.60																			
21.80																			
22.00	Light brown clay, very rigid, with pockets of CaCO <sub>3</sub> .																		
22.20																			
22.40																			
22.60																			
22.80																			
23.00																			
23.20																			
23.40																			
23.60		CH																	
23.80																			
24.00	Olive gray clay, very rigid to hard, with scattered fine gravels and pockets of CaCO <sub>3</sub> .																		
24.20																			
24.40																			
24.60																			
24.80																			
25.00																			
25.20																			
25.40																			
25.60																			
25.80																			
26.00	Olive gray clay, very rigid to hard, with scattered fine gravels and pockets of CaCO <sub>3</sub> .																		
26.20																			
26.40																			
26.60																			
26.80																			
27.00																			
27.20																			
27.40																			
27.60																			
27.80																			
28.00	Olive gray clay, very rigid to hard, with scattered fine gravels and pockets of CaCO <sub>3</sub> .																		
28.20																			
28.40																			
28.60																			
28.80																			
29.00																			
29.20																			
29.40																			
29.60																			
29.80																			
30.00	Olive gray clay, very rigid to hard, with scattered fine gravels and pockets of CaCO <sub>3</sub> .	CH															0%	1%	99%
30.20																			
30.40																			
30.60																			
30.80																			
31.00																			
31.20																			
31.40																			
31.60																			
31.80																			
32.00	Olive gray clay, very rigid to hard, with scattered fine gravels and pockets of CaCO <sub>3</sub> .																		
32.20																			
32.40																			
32.60																			
32.80																			
33.00																			
33.20																			
33.40																			
33.60																			
33.80																			
34.00	Olive gray clay, very rigid to hard, with scattered fine gravels and pockets of CaCO <sub>3</sub> .																		
34.20																			
34.40																			
34.60																			
34.80																			
35.00																			
35.20																			
35.40																			
35.60																			
35.80																			
36.00	Olive gray clay, very rigid to hard, with scattered fine gravels and pockets of CaCO <sub>3</sub> .	CH															0%	2%	98%
36.20																			
36.40																			
36.60																			
36.80																			
37.00																			
37.20																			
37.40																			
37.60																			
37.80																			
38.00	Olive gray clay, very rigid to hard, with scattered fine gravels and pockets of CaCO <sub>3</sub> .																		
38.20																			
38.40																			
38.60																			
38.80																			
39.00																			
39.20																			
39.40																			
39.60																			
39.80																			
40.00	continue 3/4																		

**SIMBOLOGY**

G.W.T.	Ground water table
D.S.	Disturbed sample
U.S.	Undisturbed sample
cp	Cohesion determined by pocket penetrometer
qu	Unconfined compression strength

c <sub>uu</sub>	Cohesion determined by unconsolidated undrained triaxial compression (uu)
φ <sub>uu</sub>	Friction angle in triaxial uu
VRS	California Bearing Ratio
Exp VRS	Expansion determined in CBR

Figure 7. Boring log profile SPT-4 (continue)

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Project: SOIL INVESTIGATION J. RAY McDERMOTT SECOND STAGE

**BORING LOG PROFILE**

PROJECT: PATIO DE FABRICACIÓN DE PLATAFORMAS MARINAS

BOREHOLE SPT-4

LOCATION: SEE LAYOUT

Co. J. RAY McDERMOTT, INC

B.H. LEVEL: G.L.

ATTN: RAFAEL CANSECO

PROJECT DEPTH: 62.45 m

PAGE: 3/4

STRATIGRAPHY		STRENGTH PARAMETERS					N(SPT) BLOWS					LIQUID LIMIT PLASTIC LIMIT % NATURAL MOISTURE					% GRAVEL	% SAND	% FINE			
DEPTH (m)	DESCRIPTION	CU (kN/m <sup>2</sup> )	CU (psi)	q <sub>u</sub> (kN/m <sup>2</sup> )	q <sub>u</sub> (psi)	f (kN/m <sup>2</sup> )	10	20	30	40	60	10	20	30	40	50	60	70				
40.00	Olive gray clay, very rigid to hard, with scattered fine gravels.											45	•									
40.20																						
40.40																						
40.60																						
41.00																						
41.20																						
41.40												43	•									
41.60																						
42.00																						
42.20		CH										39	•					0%	0%	100%		
42.40																						
42.60																						
43.00																						
43.20																						
43.40												44	•									
43.60																						
43.80																						
44.00																						
44.20																						
44.40												50/30	•									
44.60																						
44.80																						
45.00																						
45.20																						
45.40											50/15	•										
45.60																						
45.80																						
46.00											50/20	•										
46.20																						
46.40											50/20	•										
46.60																						
46.80																						
47.00	CH																0%	1%	99%			
47.20											50/27	•										
47.40																						
47.60																						
47.80																						
48.00																						
48.20											50/0	•										
48.40																						
48.60																						
48.80																						
49.00																						
49.20																						
49.40											50/25	•										
49.60																						
49.80																						
50.00											50/10	•										
50.20																						
50.40																						
50.60																						
50.80																						
51.00																						
51.20																						
51.40											46	•										
51.60																						
51.80																						
52.00																						
52.20	CH										45	•					0%	1%	99%			
52.40																						
52.60																						
52.80																						
53.00																						
53.20																						
53.40											45	•										
53.60																						
53.80																						
54.00																						
54.20											41	•										
54.40																						
54.60																						
54.80																						
55.00																						
55.20																						
55.40											42	•										
55.60																						
55.80																						
56.00																						
56.20											45	•										
56.40																						
56.60																						
56.80																						
57.00	CH										47	•					0%	2%	98%			
57.20																						
57.40																						
57.60																						
57.80																						
58.00																						
58.20											43	•										
58.40																						
58.60																						
59.00																						
59.20																						
59.40											43	•										
59.60																						
59.80																						
60.00	continue 4/4																					

continue 4/4

**SIMBOLOGY**

G.W.T.	Ground water table
D.S.	Disturbed sample
U.S.	Undisturbed sample
cp	Cohesion determined by pocket penetrometer
qu	Unconfined compression strength

cuu	Cohesion determined by unconsolidated undrained triaxial compression (uu)
quu	Friction angle in triaxial uu
VRS	California Bearing Ratio
Exp VRS	Expansion determined in CBR

Figure 7. Boring log profile SPT-4 (continue)

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Project: SOIL INVESTIGATION J. RAY McDERMOTT SECOND STAGE

**BORING LOG PROFILE**

PROJECT: PATIO DE FABRICACIÓN DE PLATAFORMAS MARINAS  
Co. J. RAY McDERMOTT, INC  
ATN: RAFAEL CANSECO

BOREHOLE SPT-4

LOCATION: SEE LAYOUT

B.H. LEVEL: G.L.

PROYECT DEPTH: 62.45 m

PAGE: 4/4

STRATIGRAPHY		STRENGTH PARAMETERS				N <sub>SPT</sub> BLOWS					LIQUID LIMIT PLASTIC LIMIT % NATURAL MOISTURE							% GRAVEL	% SAND	% FINE
DEPTH (m)	DESCRIPTION	SU (CS)	τ <sub>u</sub> (kg/cm <sup>2</sup> )	c (kg/cm <sup>2</sup> )	φ (°)	10	20	30	40	50	10	20	30	40	50	60	70			
60.00	Olive gray clay, very rigid to hard, with scattered fine gravels.	CH									45		▲	●		■		0%	3%	97%
60.20																				
60.40																				
60.60																				
60.80																				
61.00																				
61.20												47			●					
61.40																				
61.60																				
61.80																				
62.00	END OF BOREHOLE										47			●						
62.20																				
62.40																				
62.60																				
62.80																				
63.00																				
63.20																				
63.40																				
63.60																				
63.80																				
64.00																				
64.20																				
64.40																				
64.60																				
64.80																				
65.00																				

**SIMBOLOGY**

G.W.T.	Ground water table
D.S.	Disturbed sample
U.S.	Undisturbed sample
cp	Cohesion determined by pocket penetrometer
qu	Unconfined compression strength

CUU	Cohesion determined by unconsolidated undrained triaxial compression (uu)
φ <sub>uu</sub>	Friction angle in triaxial uu
VRS	California Bearing Ratio
Exp VRS	Expansion determined in CBR

Figure 7. Boring log profile SPT-4 (continuation)



## Project: SOIL INVESTIGATION J. RAY McDERMOTT SECOND STAGE

## BORING LOG PROFILE

**PROJECT: PATIO DE FABRICACIÓN DE PLATAFORMAS MARINAS**

BOREHOLE SPT-5

LOCATION: SEE LAYOUT

Co. J. RAY McDERMOTT, INC.

B.H. LEVEL: G.L.

ATN: RAFAEL CANSECO

**PROYECT DEPTH: 62.60 m**

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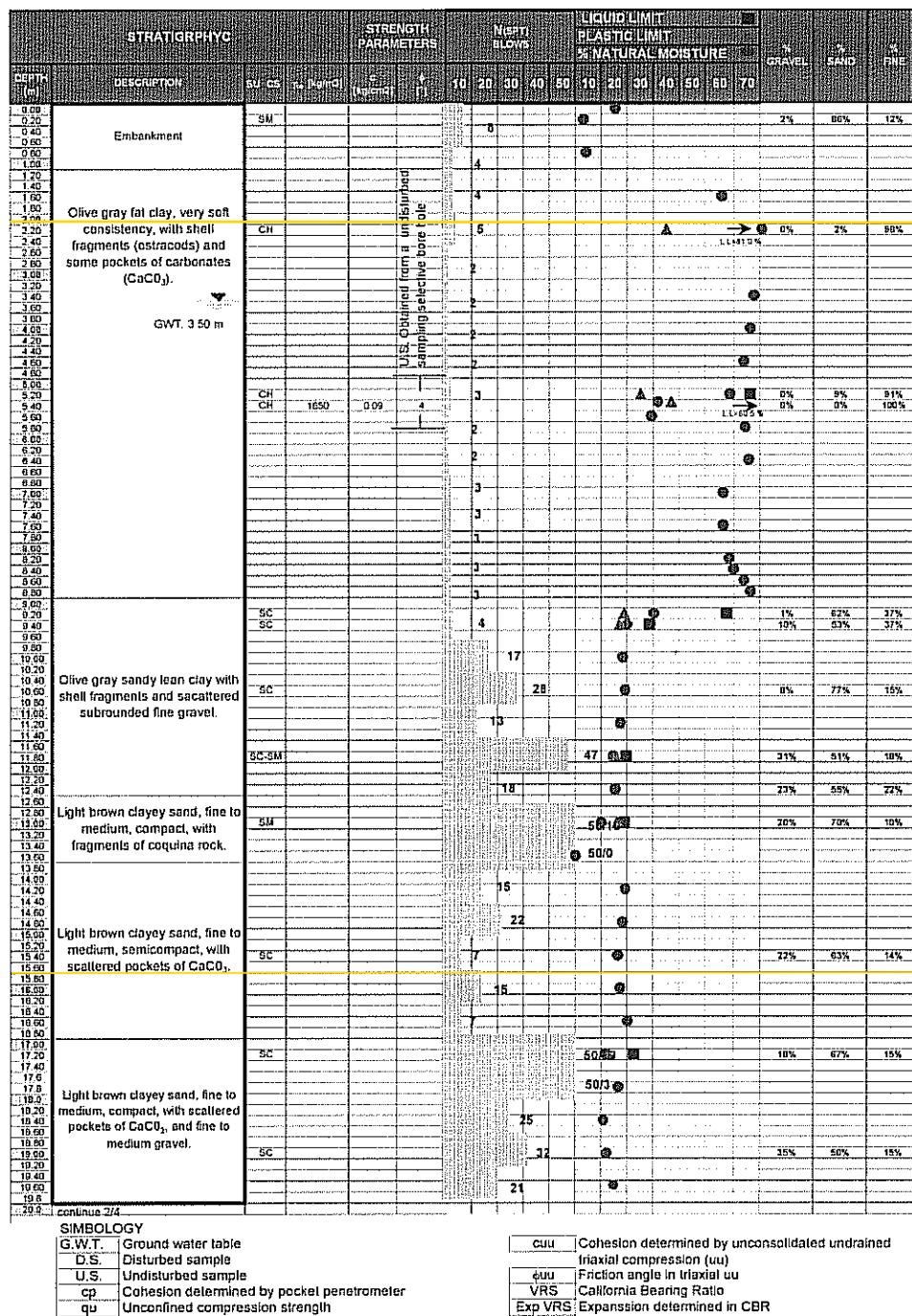


Figure 8. Boring log profile SPT-5 (continue)

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Project: SOIL INVESTIGATION J. RAY McDERMOTT SECOND STAGE

**BORING LOG PROFILE**

PROJECT: PATIO DE FABRICACIÓN DE PLATAFORMAS MARINAS

BOREHOLE SPT-5

LOCATION: SEE LAYOUT

Co. J. RAY McDERMOTT, INC

B.H. LEVEL: G.L.

ATTN: RAFAEL CANSECO

PROJECT DEPTH: 62.60 m

PAGE: 2/4

DEPTH (m)	STRATIGRAPHIC DESCRIPTION	STRENGTH PARAMETERS	N <sub>60</sub> SPT BLOWS	LIQUID LIMIT PLASTIC LIMIT % NATURAL MOISTURE										% GRAVEL	% SAND	% FINE
				10	20	30	40	50	10	20	30	40	50			
20.00	Light brown sand, fine to medium, semicompact to compact, with shell fragments and scattered subrounded fine gravel.	SC-SM	32													
20.20																
20.40																
20.60																
20.80																
21.00																
21.20																
21.40																
21.60																
21.80																
22.00			14													
22.20	Orange brown/olive gray clay, very rigid.	CH	22													
22.40																
22.60																
22.80																
23.00																
23.20			21													
23.40																
23.60			23													
23.80																
24.00																
24.20	Olive gray clay, very rigid, with pockets of CaCO <sub>3</sub> .	CH	17													
24.40																
24.60																
24.80																
25.00			23													
25.20																
25.40																
25.60			23													
25.80																
26.00																
26.20	Olive gray clay, very rigid, with pockets of CaCO <sub>3</sub> .	CH	30													
26.40																
26.60																
26.80																
27.00			30													
27.20																
27.40																
27.60			37													
27.80																
28.00			30													
28.20	Olive gray clay, very rigid to hard, with scattered fine gravels and pockets of CaCO <sub>3</sub> .	CH														
28.40																
28.60																
28.80																
29.00			34													
29.20																
29.40																
29.60			37													
29.80																
30.00			44													
30.20	Olive gray clay, very rigid to hard, with scattered fine gravels and pockets of CaCO <sub>3</sub> .	CL														
30.40																
30.60																
30.80																
31.00			37													
31.20																
31.40																
31.60			43													
31.80																
32.00																
32.20	Olive gray clay, very rigid to hard, with scattered fine gravels and pockets of CaCO <sub>3</sub> .	CH	4													
32.40																
32.60																
32.80																
33.00																
33.20																
33.40																
33.60																
33.80			50/25													
34.00																
34.20	Light brown sand, coarse, compact, with scattered subrounded fine gravel.	CH														
34.40																
34.60																
34.80																
35.00																
35.20																
35.40																
35.60																
35.80																
36.00			50/70													
36.20	Olive gray clay, very rigid to hard, with scattered fine gravels.	CH														
36.40																
36.60																
36.80																
37.00																
37.20																
37.40																
37.60																
37.80																
38.00			38													
38.20	Olive gray clay, very rigid to hard, with scattered fine gravels.	CH														
38.40																
38.60																
38.80																
39.00																
39.20																
39.40																
39.60																
39.80																
40.00			41													
40.20	Olive gray clay, very rigid to hard, with scattered fine gravels.	CH														
40.40																
40.60																
40.80																
41.00																
41.20																
41.40																
41.60																
41.80																
42.00			50/27													

**SIMBOLOGY**

G.W.T.	Ground water table
D.S.	Disturbed sample
U.S.	Undisturbed sample
cp	Cohesion determined by pocket penetrometer
qu	Unconfined compression strength

cuu	Cohesion determined by unconsolidated undrained triaxial compression (uu)
φuu	Friction angle in triaxial uu
VRS	California Bearing Ratio
Exp VRS	Expansion determined in CBR

Figure 8. Boring log profile SPT-5 (continue)



## Project: SOIL INVESTIGATION J. RAY McDERMOTT SECOND STAGE

## BORING LOG PROFILE

**PROJECT: PATIO DE FABRICACIÓN DE PLATAFORMAS MARINAS**

BOREHOLE SPT-5

LOCATION: SEE LAYOUT

Co. J. RAY Mc DERMOTT, INC

B.H. LEVEL: G.L.

AT'N: RAFAEL CANSECO

**PROYECT DEPTH: 62.60 m**

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[illegible]

## SIMBOLOGY

G.W.T.	Ground water table
D.S.	Disturbed sample
U.S.	Undisturbed sample
cp	Cohesion determined by pocket penetrometer
qu	Unconfined compression strength

cuu	Cohesion determined by unconsolidated undrained triaxial compression (uu)
$\phi_{uu}$	Friction angle in triaxial uu
VRS	California Bearing Ratio
Exp VRS	Expansion determined in CBR

*Figure 8. Boring log profile SPT-5 (continue)*

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Project: SOIL INVESTIGATION J. RAY McDERMOTT SECOND STAGE

**BORING LOG PROFILE**

PROJECT: PATIO DE FABRICACIÓN DE PLATAFORMAS MARINAS  
Co. J. RAY McDERMOTT, INC  
ATN: RAFAEL CANSECO

BOREHOLE SPT-5

LOCATION: SEE LAYOUT  
B.H. LEVEL: G.L.  
PAGE: 4/4

PROJECT DEPTH: 62.60 m

DEPTH (m)	STRATIGRAPHY DESCRIPTION	STRENGTH PARAMETERS				N(SPT) BLOWS					LIQUID LIMIT PLASTIC LIMIT % NATURAL MOISTURE										% GRAVEL	% SAND	% FINE
		SU, CS	f <sub>u</sub> (kg/cm <sup>2</sup> )	c (kg/cm <sup>2</sup> )	φ (°)	10	20	30	40	50	10	20	30	40	50	60	70						
60.00	Olive gray clay, very rigid to hard, with scattered fine gravels.	CH																			0%	1%	99%
60.20																							
60.40																							
60.60																							
61.00																							
61.20																							
61.40																							
61.60																							
61.80																							
62.00																							
62.20	END OF BOREHOLE																						
62.40																							
62.60																							
63.00																							
63.20																							
63.40																							
63.60																							
63.80																							
64.00																							
64.20																							
64.40																							
64.60																							
64.80																							
65.00																							

**SIMBOLOGY**

G.W.T.	Ground water table
D.S.	Disturbed sample
U.S.	Undisturbed sample
cp	Cohesion determined by pocket penetrometer
qu	Unconfined compression strength

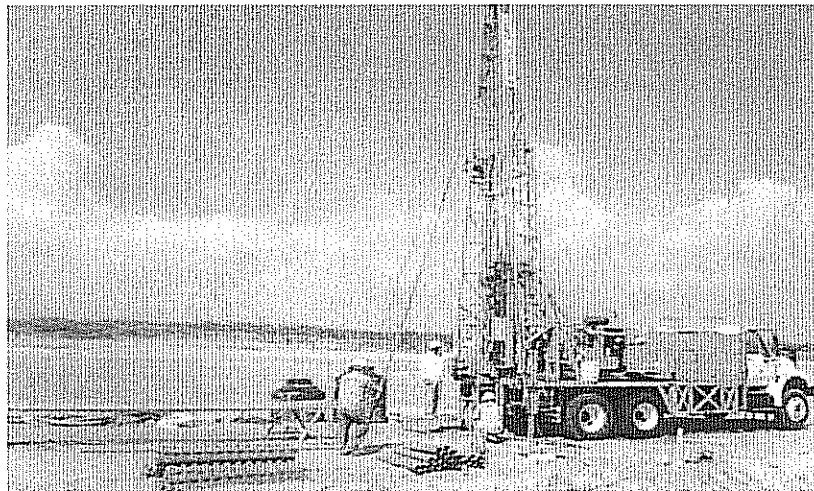
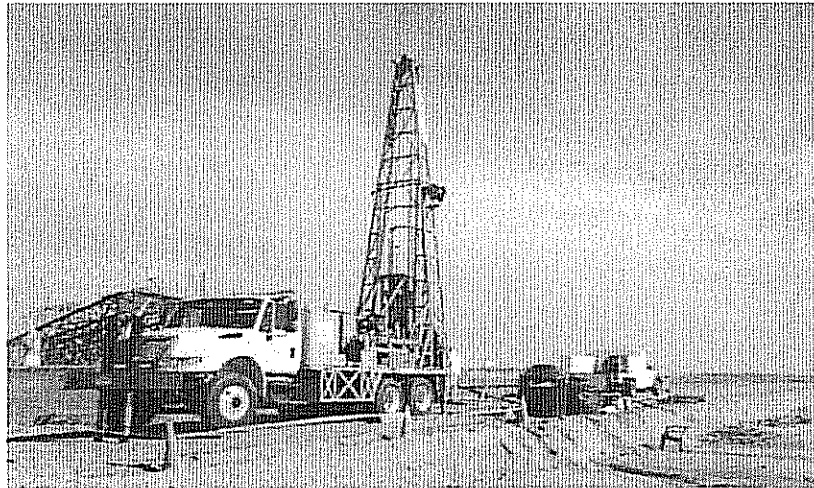
c <sub>uu</sub>	Cohesion determined by unconsolidated undrained triaxial compression (uu)
φ <sub>uu</sub>	Friction angle in triaxial uu
VRS	California Bearing Ratio
Exp VRS	Expansion determined in CBR

Figure 8. Boring log profile SPT-5 (continuation)



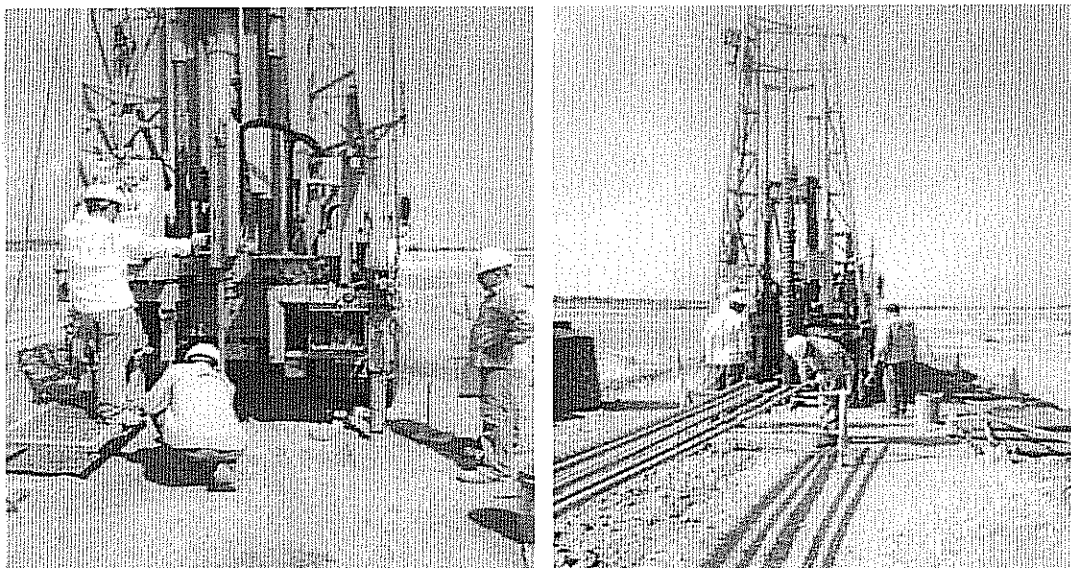
***ANNEX II  
PHOTOGRAPHIC REPORT***



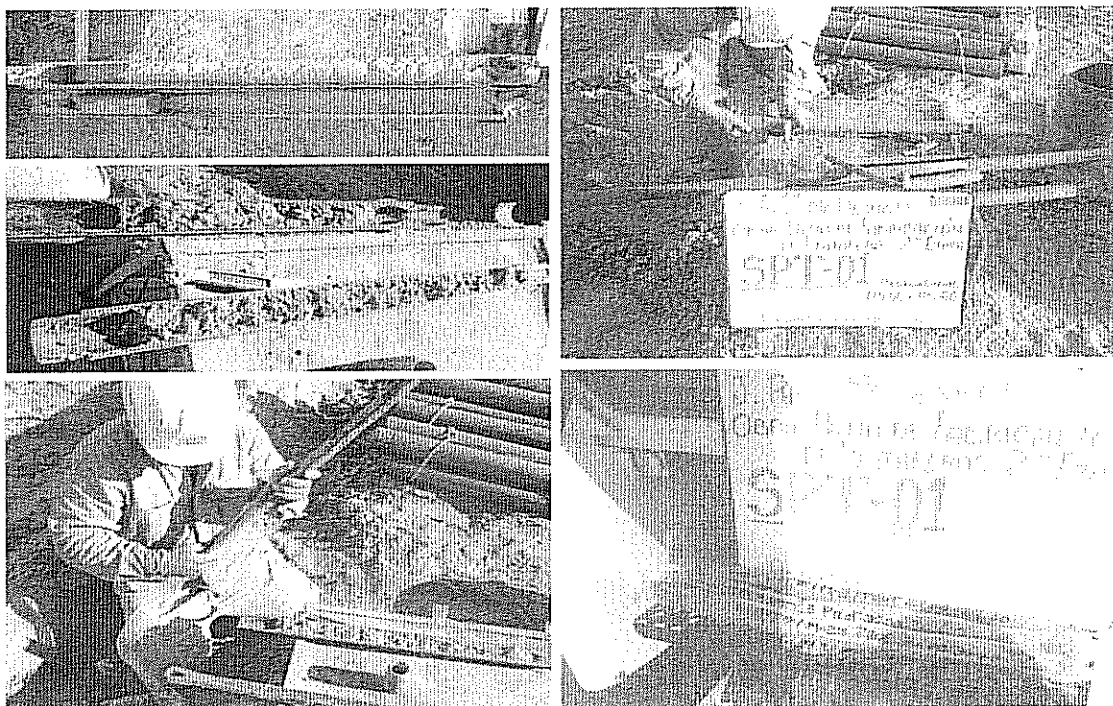


*Photos 1 to 3. Location and execution of the SPT-1 borehole.*



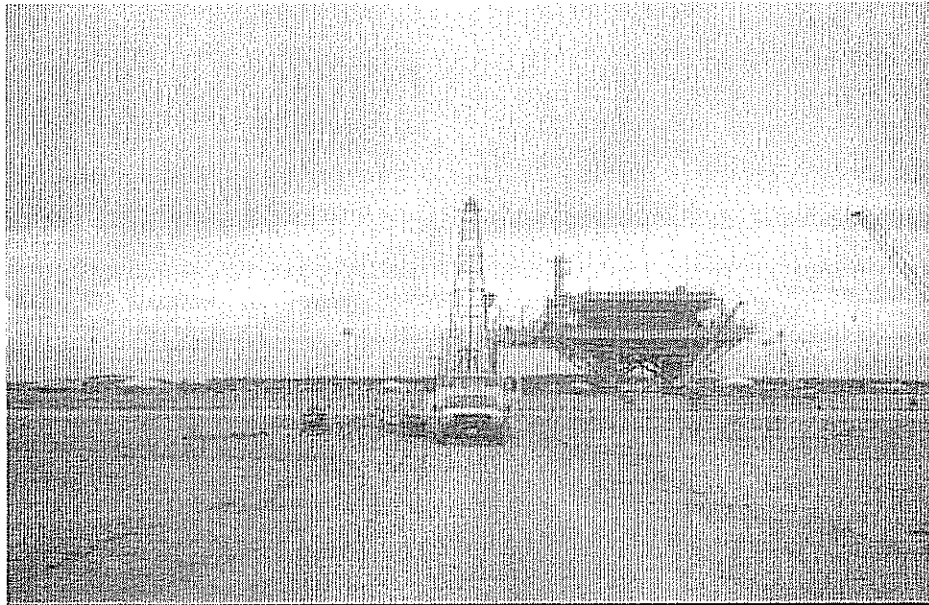


*Photos 4 and 5. Aspects of the execution of the SPT-1 borehole.*



*Photos 6 to 11. Aspects of the soils samples from the SPT-1 borehole.*



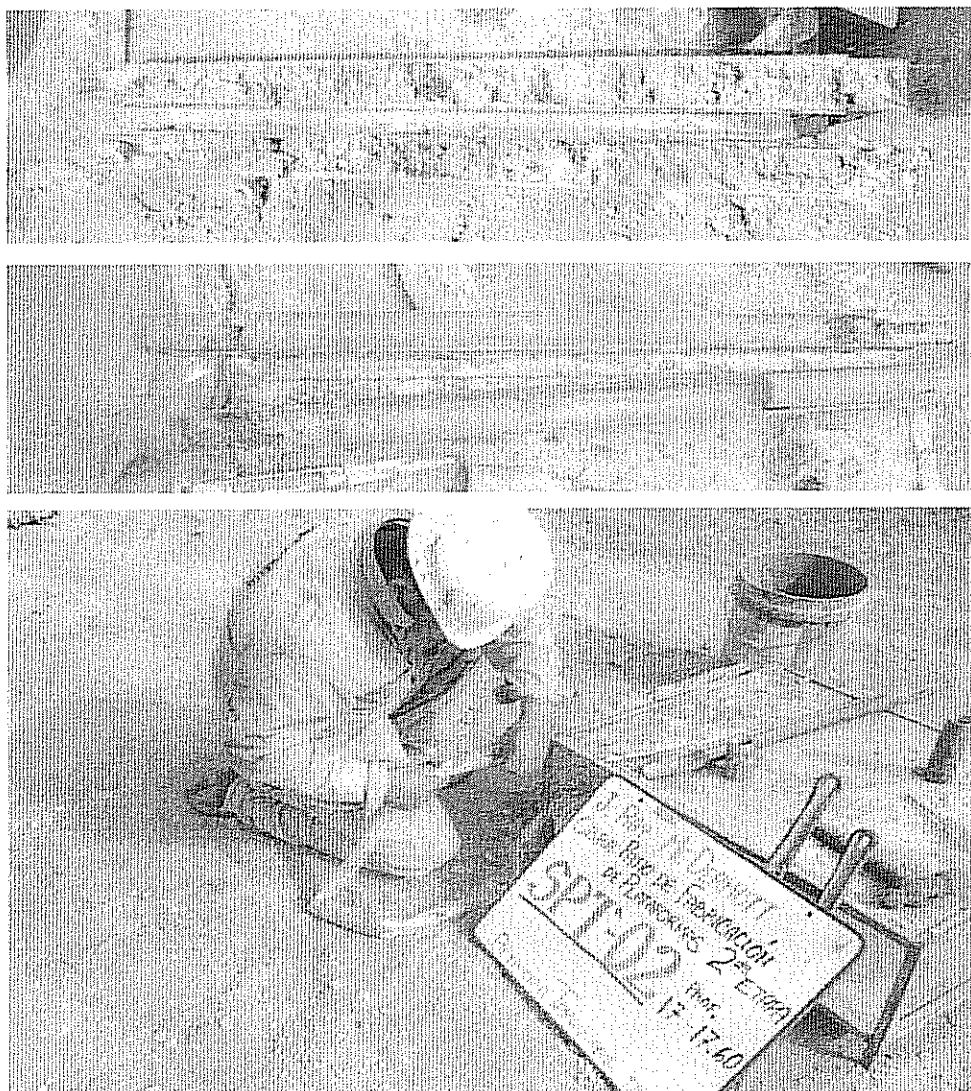


*Photo 12. Location of the SPT-2 borehole.*



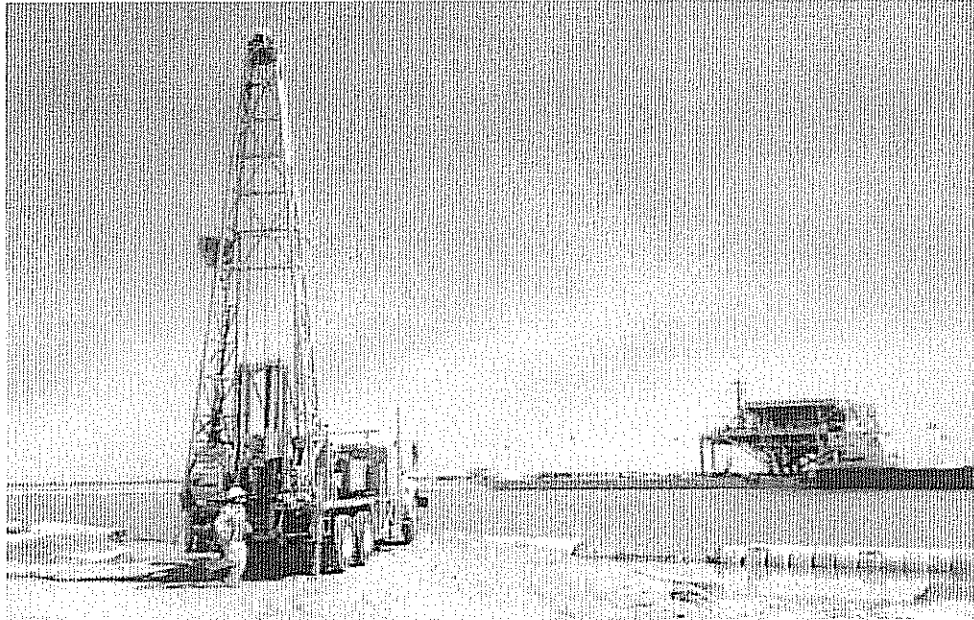
*Photos 13 to 15. Aspect of the execution of the SPT-2 borehole.*



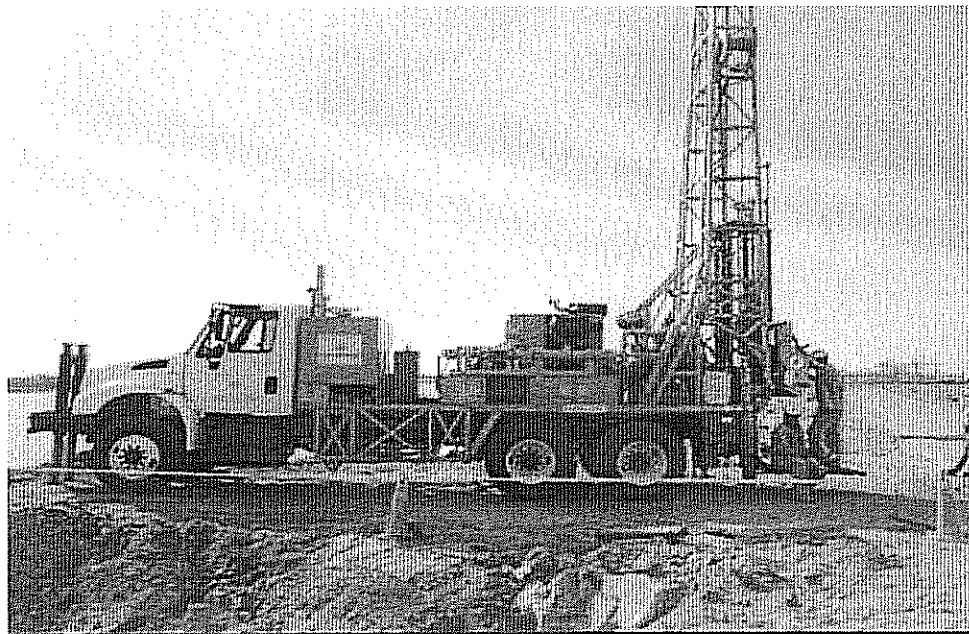


**Photos 16 to 18. Aspects of the soils samples from the SPT-2 borehole.**



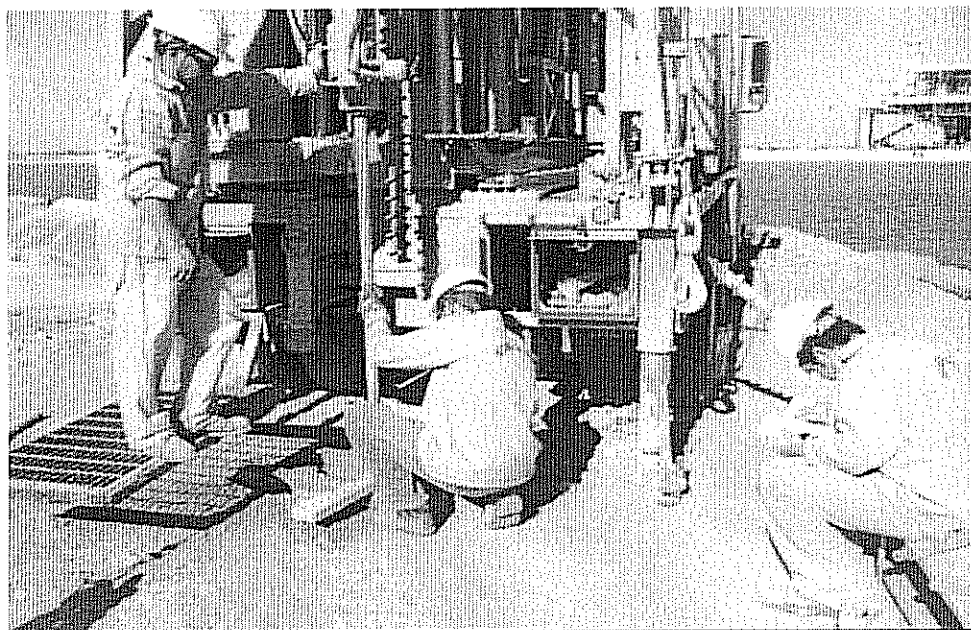


*Photo 19. Location of the SPT-3 borehole.*

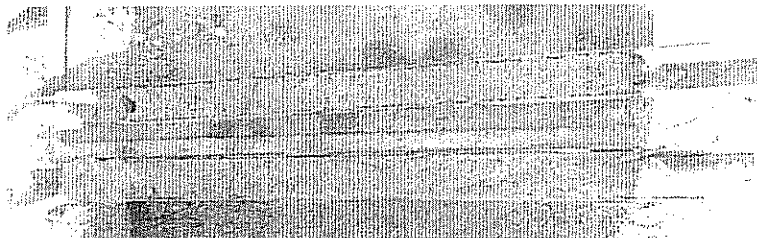
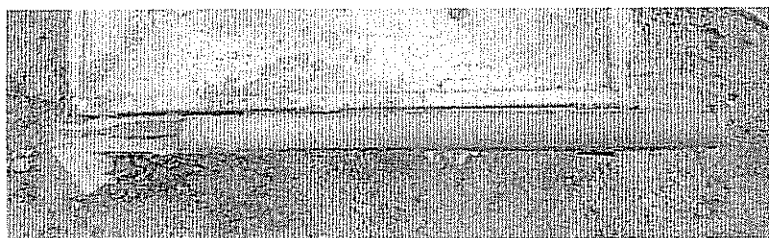


*Photo 20. Aspect of the execution of the SPT-3 borehole.*



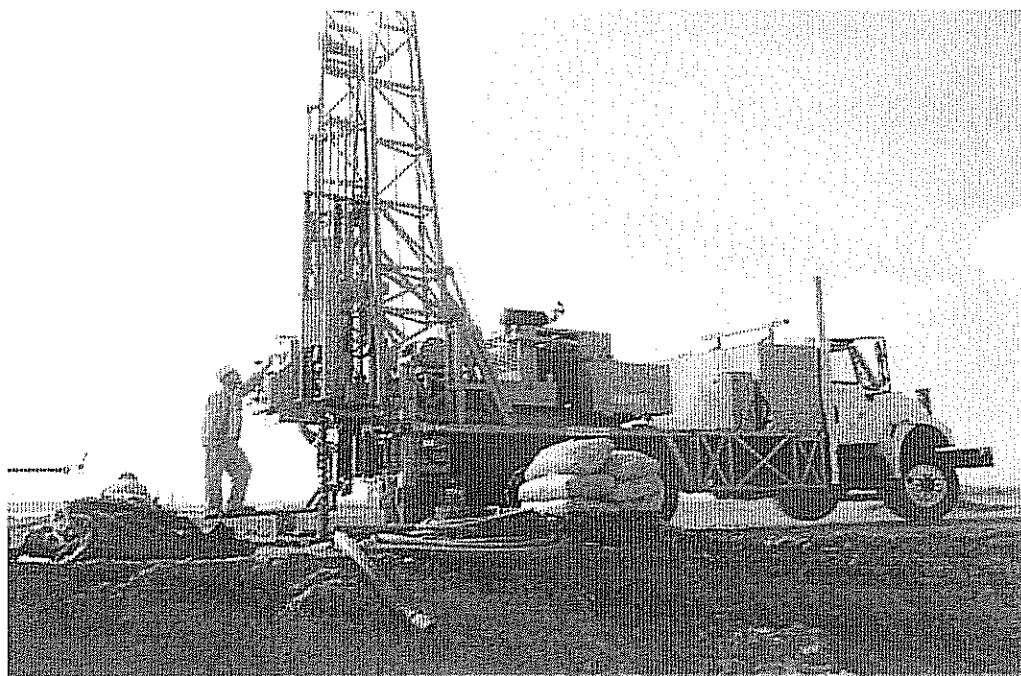
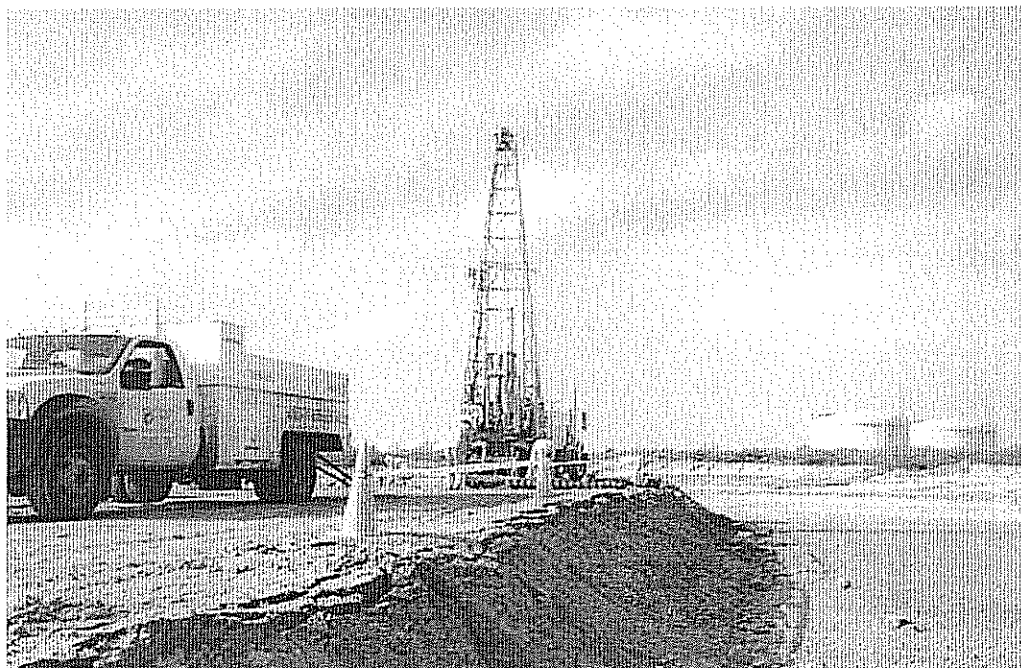


*Photo 21. Another aspect of the execution of the SPT-3 borehole.*



*Photos 22 to 24. Aspects of the soils samples from the SPT-3 borehole.*





*Photos 25 and 26. Location and execution of the SPT-4 borehole.*

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*Photo 27. Another aspect during the execution of the SPT-4 borehole*



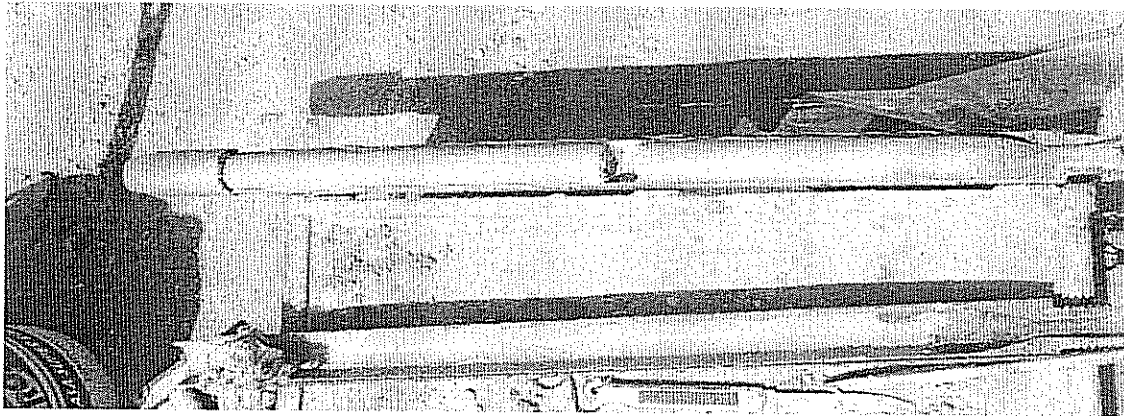
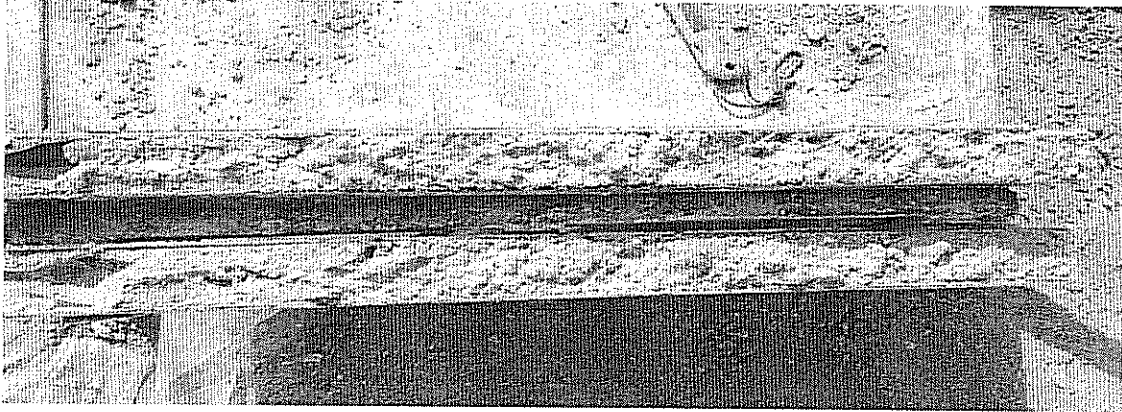
*Photo 28. Aspect of an undisturbed sample obtained from the borehole 4*





*Photo 29. Aspect of the execution of the standard penetration test in the SPT-4 borehole.*

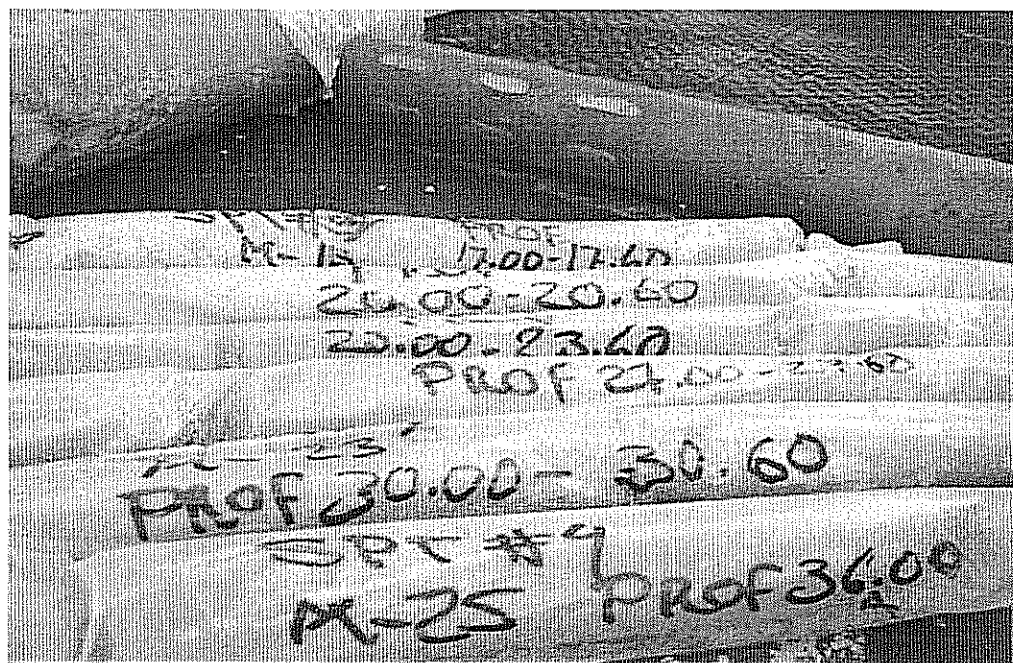




*Photos 30 to 32. Aspect of different disturbed samples obtained from the SPT-4 borehole.*

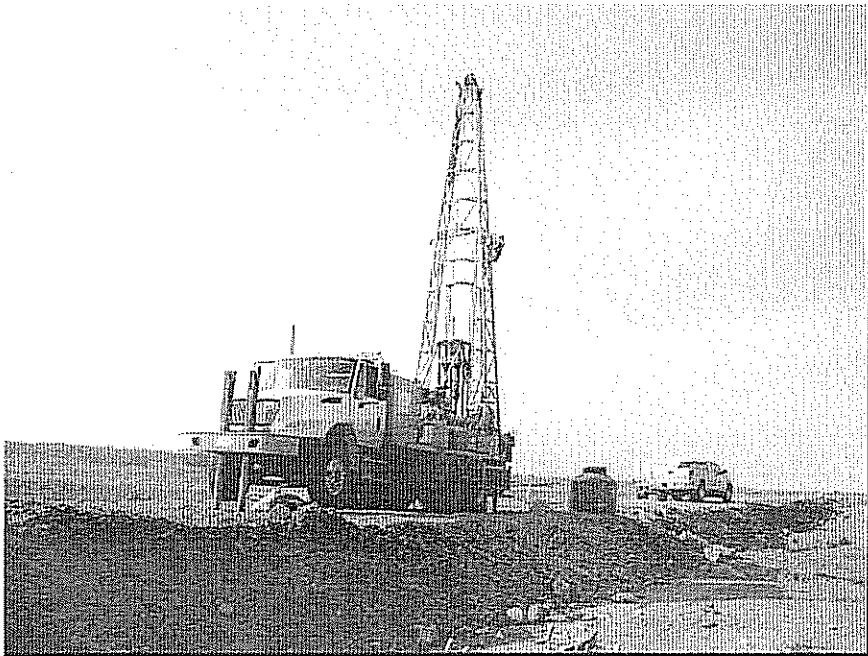
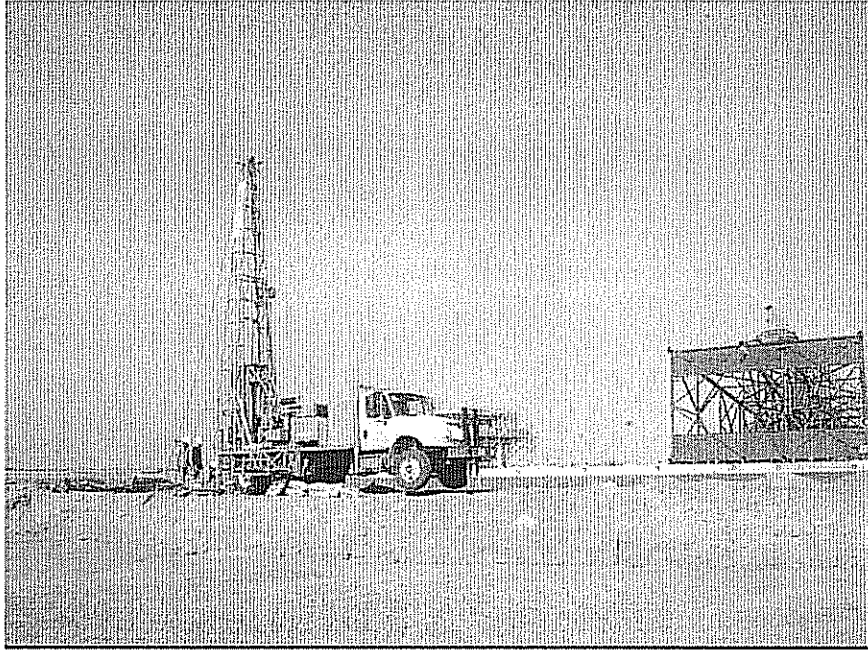


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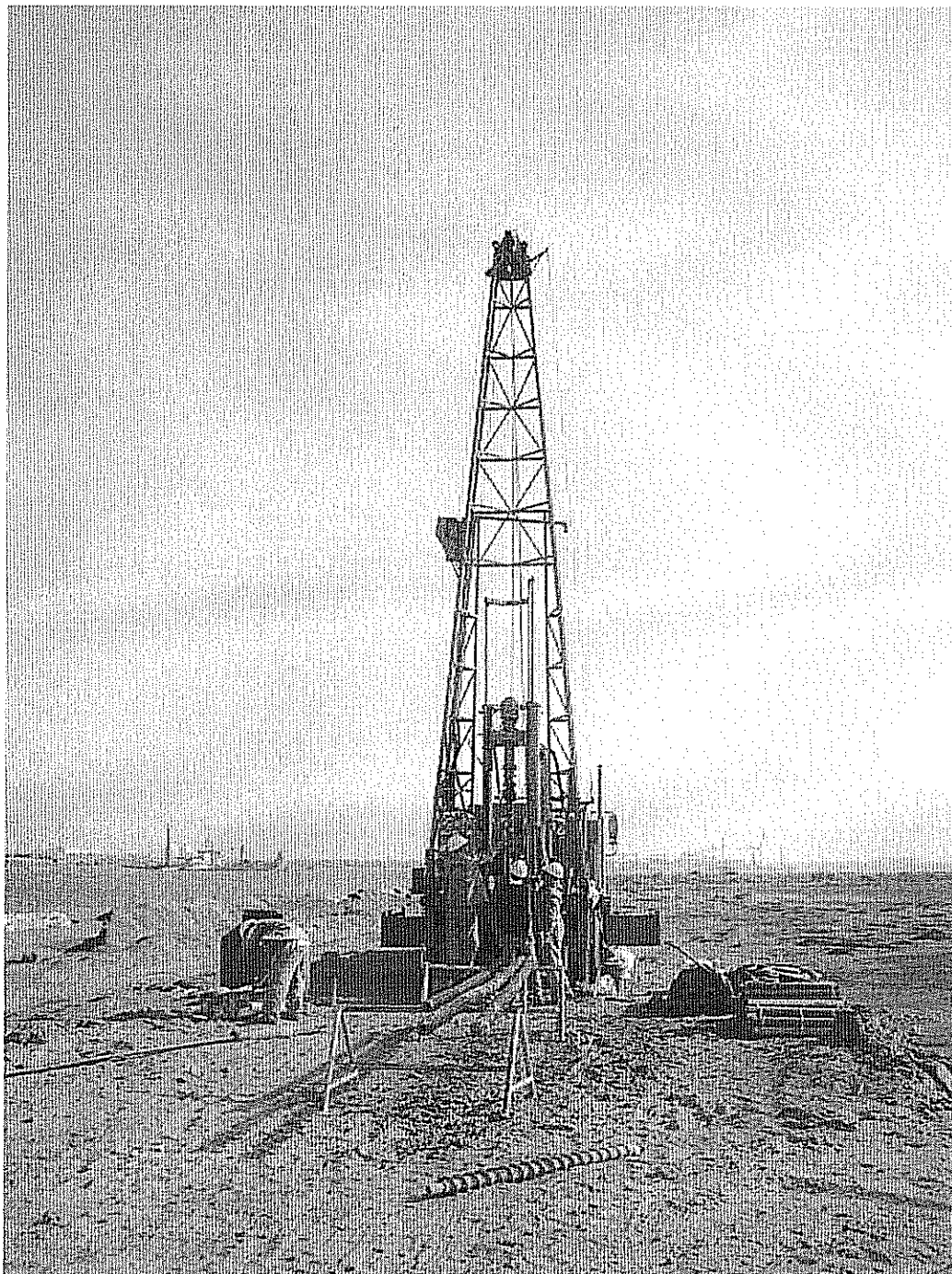
*Photos 33 and 34. Aspect of disturbed and undisturbed samples obtained from the borehole 4, properly identified.*





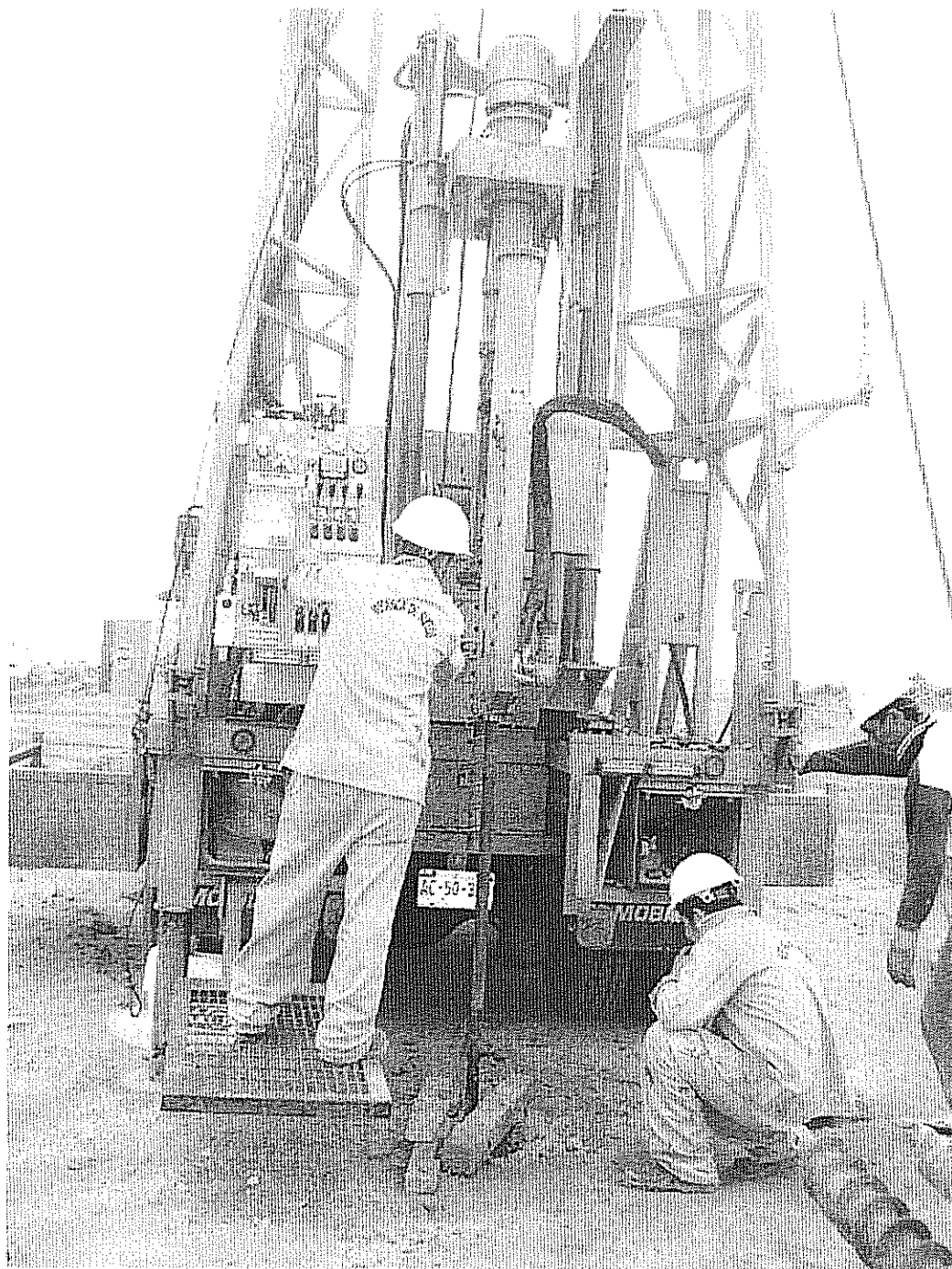
*Photos 35 and 36. Location of the SPT-5 borehole.*





*Photo 37. Aspect during the execution of the SPT-5 borehole.*

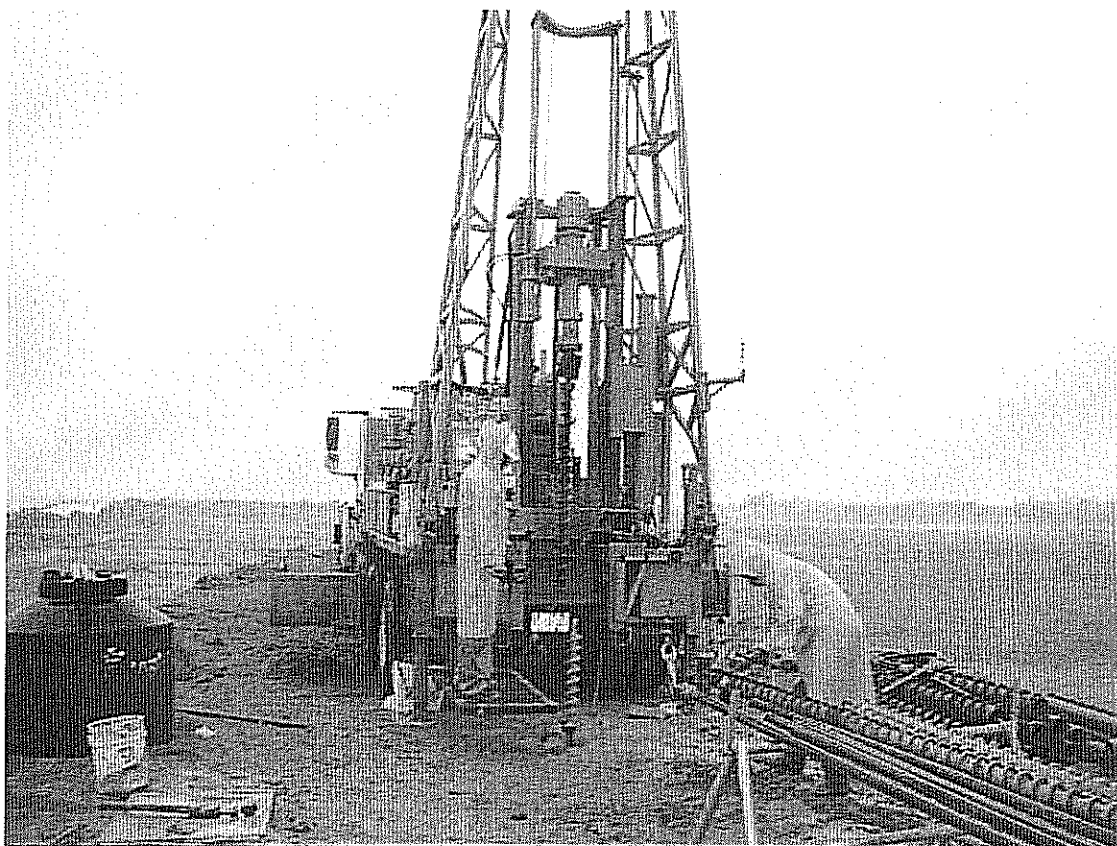




*Photo 38. Another aspect during the execution of the SPT – 5.*

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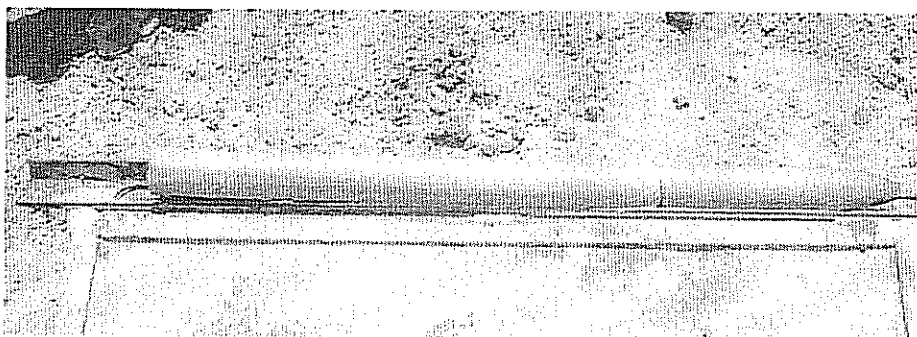
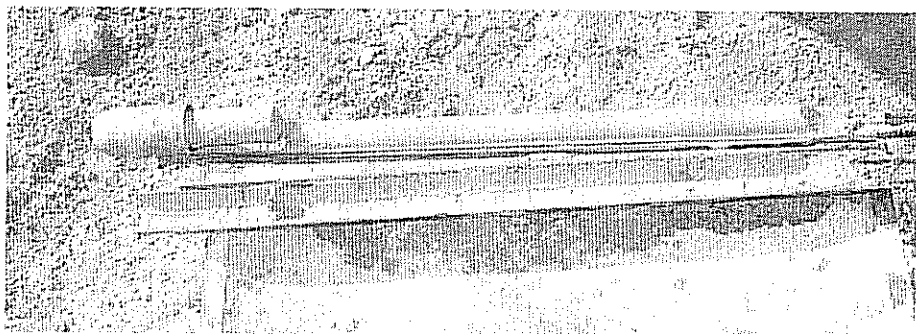
*Photo 39. Another aspect during the execution of the SPT -5.*





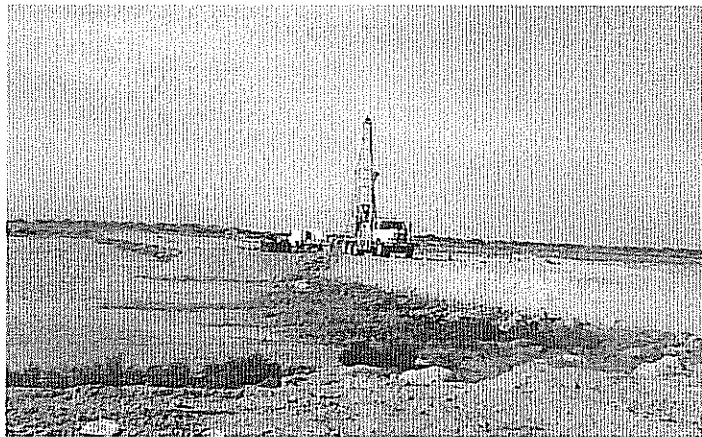
*Photo 40. Aspect during the visual and handily classification of soil sample.*





*Photos 41 to 43. Different aspects of a disturbed samples from the SPT – 5.*





*Photos 44 to 46. Location of the SPT-6 borehole*