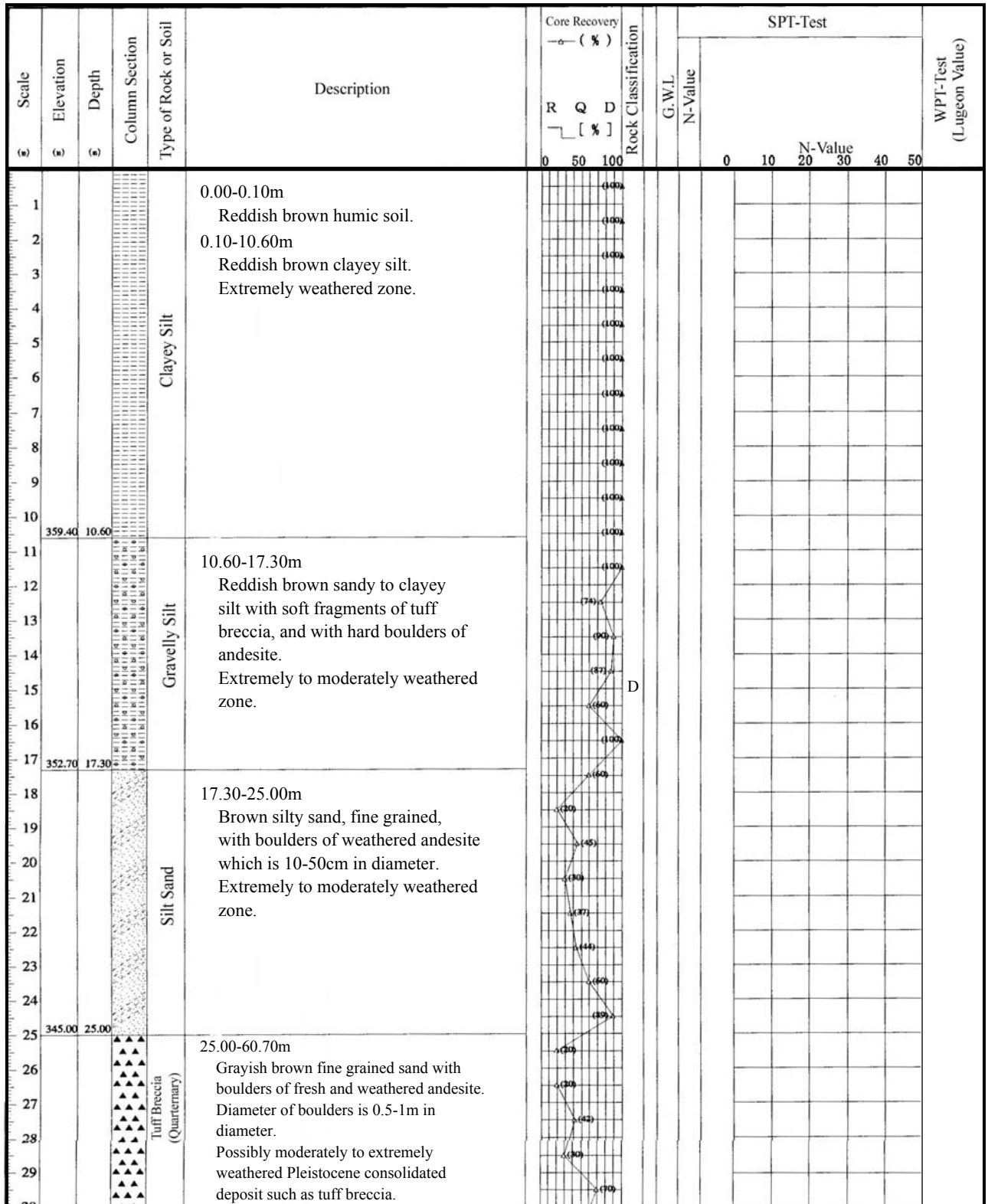
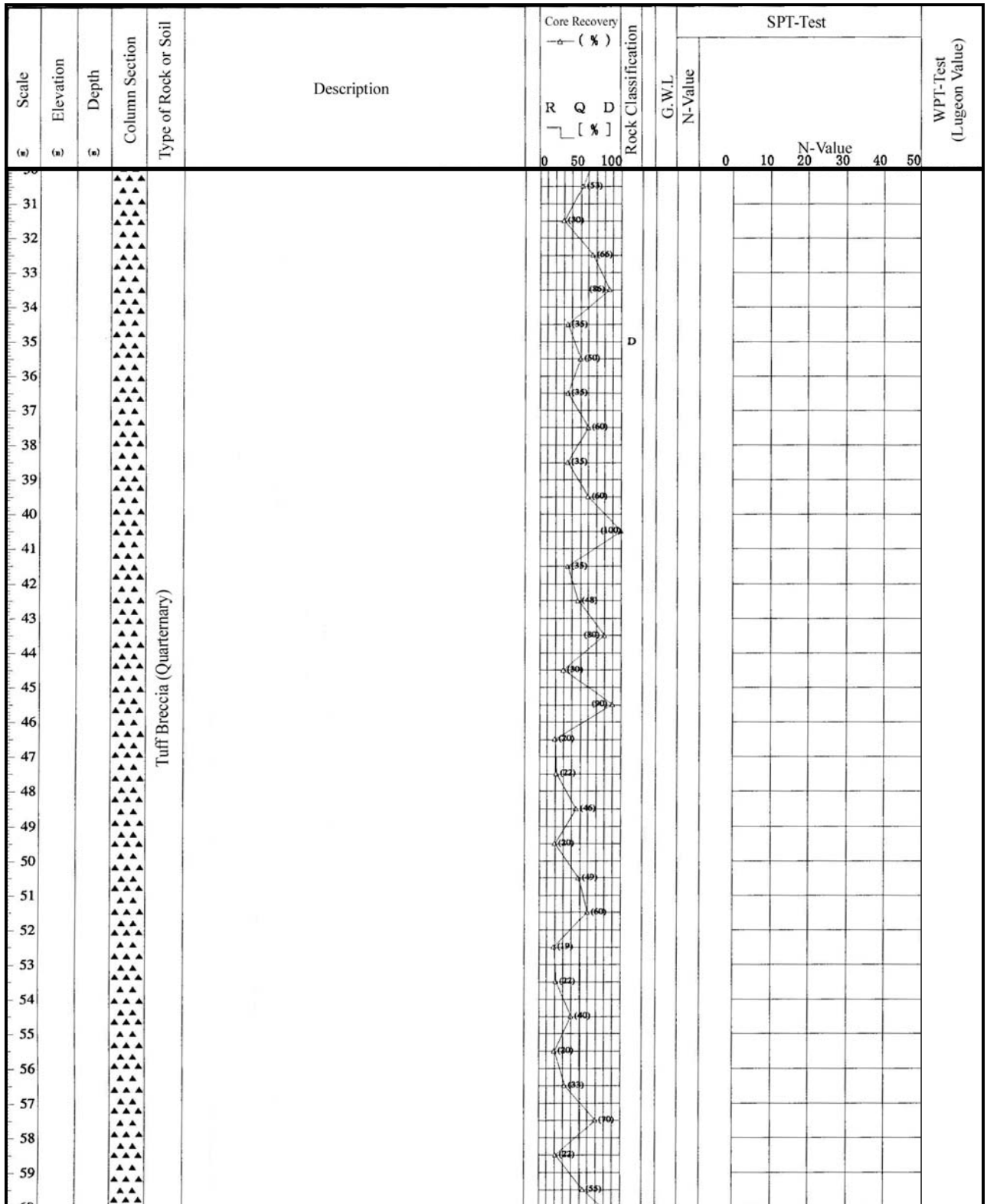


PROJECT	Study on Water Resources Development for Metro Manila		DEPTH	200.00m	ELEVATION	370.00m	
SITE	Daraitan Limestone Area	COORDINATE	N 14°34'19.2"; E 121°26'13.2"	INCLINATION	Vertical	DRILL RIG	LY 44
CASING DEPTH	90.00m	DATE		DRILLED	Palma		



PROJECT	Study on Water Resources Development for Metro Manila		DEPTH	200.00m	ELEVATION	370.00m	
SITE	Daraitan Limestone Area	COORDINATE	N 14°34'19.2"; E 121°26'13.2"	INCLINATION	Vertical	DRILL RIG	LY 44
CASING DEPTH	90.00m	DATE		DRILLED	Palma		



PROJECT	Study on Water Resources Development for Metro Manila		DEPTH	200.00m	ELEVATION	370.00m
SITE	Daraitan Limestone Area	COORDINATE	N 14°34'19.2"; E 121°26'13.2"		INCLINATION	Vertical
CASING DEPTH	90.00m	DATE		DRILLED	Palma	

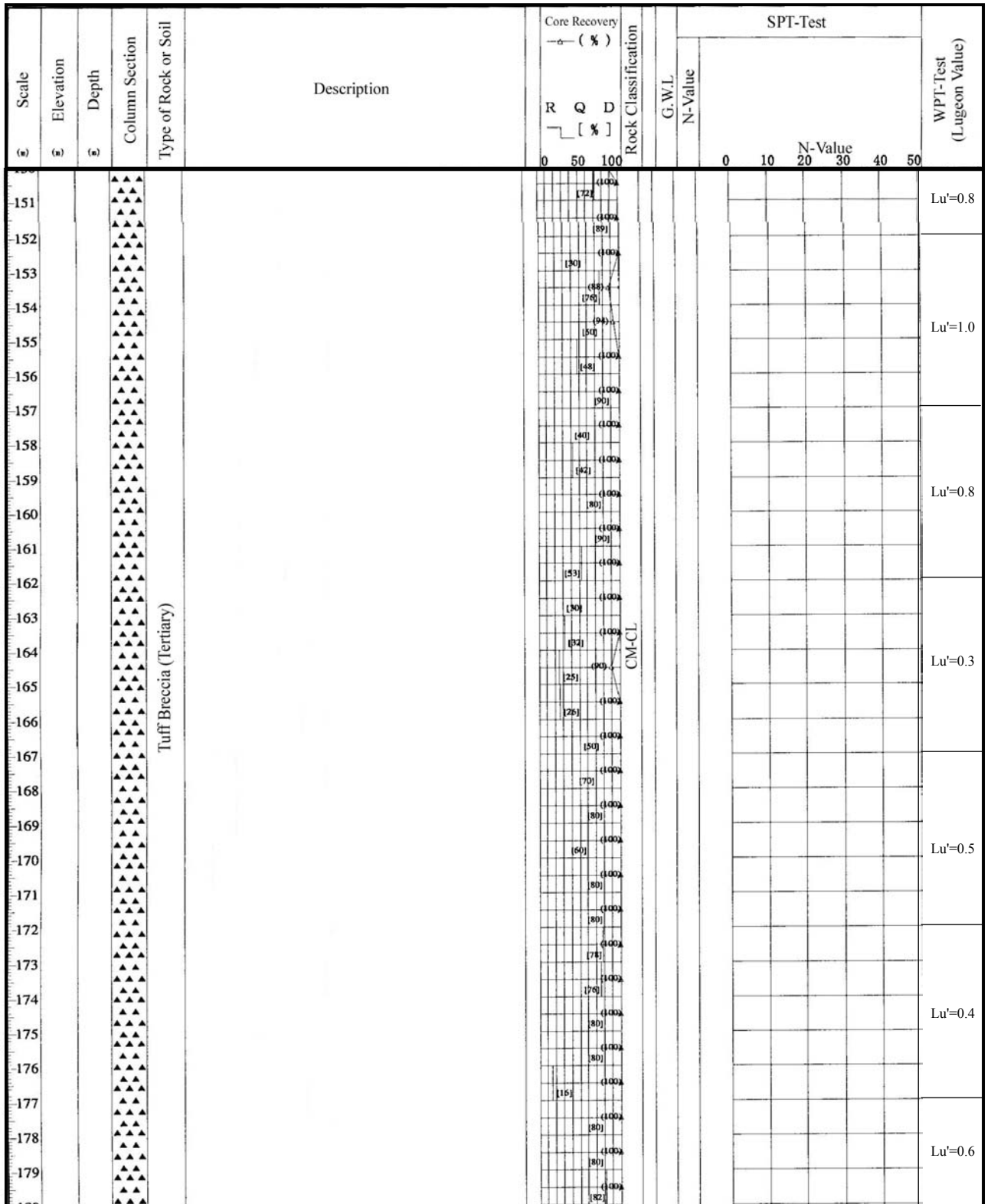
Scale (m)	Elevation (m)	Depth (m)	Column Section	Type of Rock or Soil	Description	Core Recovery — ( % ) R Q D [ % ]	Rock Classification	SPT-Test		WPT-Test (Lu-geon Value)
								G.W.L. N-Value	N-Value	
60				Tuff Breccia (Quaternary)		(100)				
61					60.70-70.00m	(44)				
62					Gray brown sand and fragments of hard andesite and soft tuff breccia.	(80)				Water Inflow
63					Weathered layer of old Tertiary tuff breccia.	(80)				
64						(100)				
65						(21)	D			
66						(70)				
67						(35)				
68						(80)				
69						(90)				Water Inflow
70					70.00-200.00m	(92)				
71					Gray or light brown tuff breccia with rubbles of 1-30cm in average and 60cm in maximum diameter.	(100)				
72					Fresh part is hard. In 70.00-117.00m, cracky and iron stains noted on surface of all cracks.	(80)				
73				Tuff Breccia (Tertiary)		(100)				Lu=3.7
74						(80)				
75						(60)				
76						(20)				
77						(30)				
78						(60)				
79						(50)	CL			Lu=3.6
80						(70)				
81						(45)				
82						(55)				
83						(12)				
84						(100)				
85						(100)				Lu=5.1
86						(25)				
87						(14)				
88						(100)				Water Inflow
89						(23)				
90						(100)				



PROJECT	Study on Water Resources Development for Metro Manila		DEPTH	200.00m	ELEVATION	370.00m	
SITE	Daraitan Limestone Area	COORDINATE	N 14°34'19.2"; E 121°26'13.2"	INCLINATION	Vertical	DRILL RIG	LY 44
CASING DEPTH	90.00m	DATE		DRILLED	Palma		

Scale (m)	Elevation (m)	Depth (m)	Column Section	Type of Rock or Soil	Description	Core Recovery — ( % )  R Q D [ % ]	Rock Classification	G.W.L. N-Value	SPT-Test					WPT-Test (Lu-geon Value)		
									N-Value							
121			▲▲▲▲▲	Tuff Breccia (Tertiary)	In 136.00-200.00m, highly fractured parts making up 50% in whole section, while fresh massive parts 50%. Possibly fractured zone caused by release of in-situ stress by drilling and/or by fault passing nearby the borehole.	(118)	(100)								Lu'=0.3	
122			▲▲▲▲▲			(100)	(100)									
123			▲▲▲▲▲			(69)	(100)									
124			▲▲▲▲▲			(89)	(100)									
125			▲▲▲▲▲			(59)	(100)									Lu'=0.4
126			▲▲▲▲▲			(36)	(100)									
127			▲▲▲▲▲			(38)	(100)CM									
128			▲▲▲▲▲			(56)	(100)									
129			▲▲▲▲▲			(70)	(100)									Lu'=0.4
130			▲▲▲▲▲			(100)	(100)									
131			▲▲▲▲▲			(100)	(100)									
132			▲▲▲▲▲			(100)	(100)									
133			▲▲▲▲▲			(100)	(100)									
134			▲▲▲▲▲			(100)	(100)									Lu'=0.5
135			▲▲▲▲▲			(100)	(100)									
136			▲▲▲▲▲			(100)	(100)									
137			▲▲▲▲▲			(100)	(100)									
138			▲▲▲▲▲			(15)	(85)									
139			▲▲▲▲▲			(19)	(90)									
140			▲▲▲▲▲			(14)	(86)									Lu'=0.5
141			▲▲▲▲▲	(10)	(90)											
142			▲▲▲▲▲	(40)	(60)											
143			▲▲▲▲▲	(76)	(24)											
144			▲▲▲▲▲	(10)	(90)									Lu'=0.8		
145			▲▲▲▲▲	(19)	(81)											
146			▲▲▲▲▲	(10)	(90)											
147			▲▲▲▲▲	(50)	(50)											
148			▲▲▲▲▲	(52)	(48)											
149			▲▲▲▲▲	(52)	(48)									Lu'=0.8		
150			▲▲▲▲▲	(50)	(50)											

PROJECT	Study on Water Resources Development for Metro Manila		DEPTH	200.00m	ELEVATION	370.00m	
SITE	Daraitan Limestone Area	COORDINATE	N 14°34'19.2"; E 121°26'13.2"	INCLINATION	Vertical	DRILL RIG	LY 44
CASING DEPTH	90.00m	DATE		DRILLED	Palma		



PROJECT	Study on Water Resources Development for Metro Manila		DEPTH	200.00m	ELEVATION	370.00m
SITE	Daraitan Limestone Area	COORDINATE	N 14°34'19.2"; E 121°26'13.2"		INCLINATION	Vertical
CASING DEPTH	90.00m	DATE		DRILLED	Palma	

Scale (m)	Elevation (m)	Depth (m)	Column Section	Type of Rock or Soil	Description	Core Recovery — ( % )	R Q D [ % ]	Rock Classification	G.W.L. N-Value	SPT-Test					WPT-Test (Lu-geon Value)		
										N-Value							
										0	10	20	30	40	50		
180			▲▲▲			(100)											Lu'=0.6
181			▲▲▲			(82)											
182			▲▲▲			(100)											
183			▲▲▲			(70)											
184			▲▲▲			(100)											
185			▲▲▲			(86)											
186			▲▲▲			(100)											
187			▲▲▲			(60)											
188			▲▲▲			(100)											
189			▲▲▲			(50)											
190			▲▲▲			(100)											
191			▲▲▲			(100)											
192			▲▲▲			(75)											
193			▲▲▲			(100)											
194			▲▲▲			(76)											
195			▲▲▲			(100)											
196			▲▲▲			(80)											
197			▲▲▲			(100)											
198			▲▲▲			(90)											
199			▲▲▲			(100)											
	170.00	200.00				(100)											

PROJECT	Study on Water Resources Development for Metro Manila		DEPTH	30.00m	ELEVATION	135.00m	
SITE	Transfer Tunnel No.1 Route	COORDINATE	N 1,616,300 ; E 550,915	INCLINATION	$\theta = 45^\circ$	DRILL RIG	LY 24
CASING DEPTH	0.50m	DATE		DRILLED	Diaz		

Scale (m)	Elevation (m)	Depth (m)	Column Section	Type of Rock or Soil	Description	Core Recovery — ( % )			Rock Classification	G.W.L	SPT-Test					W/P-T-Test (Lugeon Value)			
						R	Q	D			N-Value	N-Value							
						0	50	100	0 10 20 30 40 50										
1				Sand Stone	0.00-10.00m Gray to dark gray sandstone, medium grained. In 0.00-4.60m, cracky and observed chlorite and striation on crack surface. Below 4.60m, firm with some calcite veins of 30° and 70° in dip. In 7.60m, observed slickenside on surface of sharp crack dipping 70°.				4.50										
2																			
3																			
4																			
5																			
6																			
7																			
8																			Lu'=4.0 (Pc=8.3)
9																			
10																			
11				Conglomerate	10.00-15.00m Dark gray sandstone, medium to coarse grained.														
12																			
13																			
14																			
15	120.00	15.00																	
16				Conglomerate	15.00-20.00m Gray firm conglomerate, with rubbles of 1cm in maximum diameter.														
17																			
18																			
19																			
20	115.00	20.00		Sand Stone	20.00-30.00m Dark gray to gray sandstone, medium to coarse grained, with a few cracks dipping 60-80° in 23.70m, 24.80m and 27.40m.														
21																			
22																			
23																			
24																			
25																			
26																			
27																			
28																			
29	105.00	30.00																	



PROJECT	Study on Water Resources Development for Metro Manila		DEPTH	70.00m	ELEVATION	180.00m
SITE	Transfer Tunnel No.1 Route	COORDINATE	N 1,616,180 ; E 550,570	INCLINATION	Vertical	DRILL RIG LY 24
CASING DEPTH	3.0m	DATE		DRILLED	Diaz	

Scale (m)	Elevation (m)	Depth (m)	Column Section Type of Rock or Soil	Description	Core Recovery - ( % ) R Q D [ % ]	Rock Classification	G.W.L. N-Value	SPT-Test					WPT-Test (Lugeon Value)								
								N-Value													
								0	10	20	30	40	50								
1			Conglomerate	0.00-6.50m Greenish gray conglomerate, with rubbles of granule. Many cracks in which surface is brownish in whole of this section.	(92)	D															
2					(93)																
3					(100)																
4					(89)																
5					(90)																
6	173.50	6.50							(90) CL												
7			Sand Stone	6.50-14.00m Gray firm sandstone, medium grained, with bedding planes of 45-50° in dip. Above 9.00m, surface of cracks dipping 30° and 70° indicates brownish color. A few calcite veins in whole of this section.	(94)	CM-CL	11.00										Lu=4.2				
8					(95)																
9					(100)																
10					(100)																
11					(100)																
12					(100) CM																Lu=4.0 (Pc=9.7)
13					(100)																
14	166.00	14.00							(100)												
15			Conglomerate	14.00-30.00m Greenish gray conglomerate, with rubbles of andesite, sandstone and mudstone. Size of rubbles is 4cm in maximum diameter. Comparatively cracky in total. A few calcite veins observed.	(100)	CL-CM															
16					(100)																
17					(100)																Lu=3.7 (Pc=9.4)
18					(100)																
19					(96)																
20					(97)																
21					(100)																
22					(95)																Lu=3.8 (Pc=9.6)
23					(96)																
24					(100)																
25					(100)																
26					(100)																
27					(100)																
28					(100)																Lu=3.5 (Pc=9.1)
29			(100)																		
30	150.00	30.00			(100)																

PROJECT	Study on Water Resources Development for Metro Manila		DEPTH	70.00m	ELEVATION	180.00m	
SITE	Transfer Tunnel No.1 Route	COORDINATE	N 1,616,180 ; E 550,570	INCLINATION	Vertical	DRILL RIG	LY 24
CASING DEPTH	3.0m	DATE		DRILLED	Diaz		

Scale (m)	Elevation (m)	Depth (m)	Column Section Type of Rock or Soil	Description	Core Recovery — ( % )  R Q D [ % ]	Rock Classification	G.W.L.	SPT-Test		WPT-Test (Lugeon Value)						
								N-Value	N-Value							
					0	50	100	0	10	20	30	40	50			
31			Sand Stone	30.0-60.00m	(100) [100]										Lu'=2.7 (Pc=4.6)	
32				Gray to greenish gray sandstone, fine to medium grained.	(100) [100]											
33				In whole of this section, a few chlorite observed.	(100) [100]											
34				In fine grained part, easy to be cracky by drilling operation.	(100) [100]											
35					(100) [100]											
36				Below 35.00m, calcite veins dipping 45° and 90° rich.	(100) [100]											Lu'=3.1 (Pc=7.5)
37					(100) [100]											
38					(100) [90]											
39					(100) [100]											
40					(100) [100]											
41					(100) [100]											
42					(100) [100]											Lu'=3.0 (Pc=8.7)
43					(100) [100]											
44					(100) [100]											
45					(100) [100]											
46					(100) [100]											
47					(100) [100]											Lu'=4.5
48					(100) [92]											
49					(100) [100]											
50					(100) [94]											
51				(100) [100]												
52				(100) [100]											Lu'=3.3	
53				(100) [96]												
54				(100) [100]												
55				(100) [100]												
56				(100) [100]												
57				(100) [100]												
58				(100) [100]											Lu=3.1	
59				(100) [100]												
60				(100) [100]												

DRILL LOG

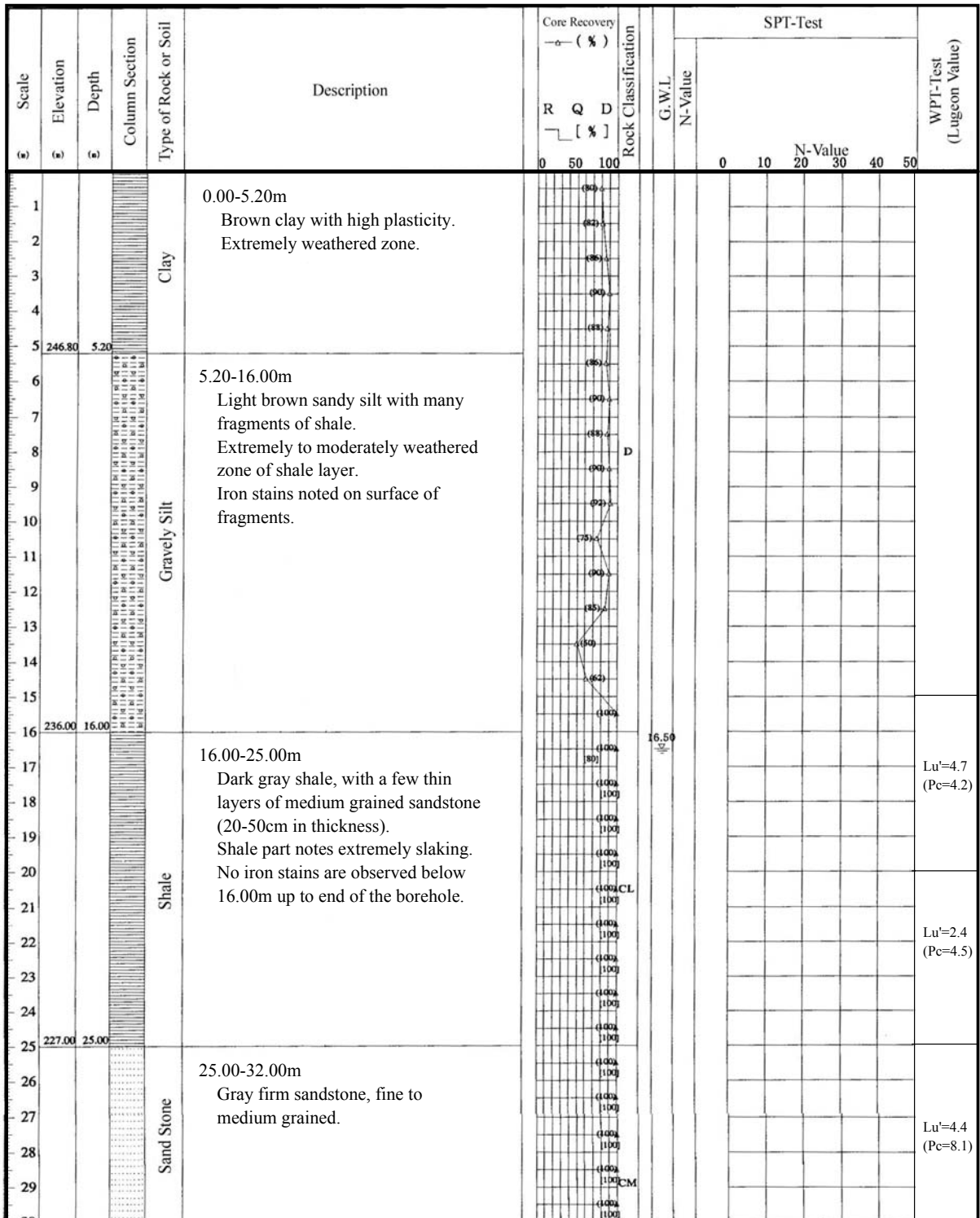
HOLE NO. TD-2

SHEET NO. 3 OF 3

PROJECT	Study on Water Resources Development for Metro Manila		DEPTH	70.00m	ELEVATION	180.00m
SITE	Transfer Tunnel No.1 Route	COORDINATE	N 1,616,180 ; E 550,570	INCLINATION	Vertical	DRILL RIG LY 24
CASING DEPTH	3.0m	DATE		DRILLED	Diaz	

Scale	Elevation	Depth	Column Section	Type of Rock or Soil	Description	Core Recovery			Rock Classification	G.W.L.	SPT-Test					WPT-Test (Lugeon Value)					
						R (%)	Q (%)	D (%)			N-Value										
(m)	(m)	(m)									0	10	20	30	40	50					
60					60.00-66.00m																
61				Sand Stone	Gray sandstone, medium to fine grained, stiff and fresh, with bedding planes of 45-50° in dip.													Lu=3.1			
62																					
63																					
64																					
65																					
66							66.00-70.00m														Lu=4.2
67							Dark gray sandstone, very fine grained.														
68							In 67.50m, slickenside on surface of sharp crack dipping 90°.														
69							Partially like a mylonite with chlorite, possibly old stable fault.														
70	110.00	70.00																			

PROJECT	Study on Water Resources Development for Metro Manila		DEPTH	200.00m	ELEVATION	252.00m	
SITE	Transfer Tunnel No.1 Route	COORDINATE	N 14°34'24"; E 121°26'13.2"	INCLINATION	Vertical	DRILL RIG	LY 44
CASING DEPTH	96.00m	DATE		DRILLED	Palma		



PROJECT	Study on Water Resources Development for Metro Manila		DEPTH	200.00m	ELEVATION	252.00m	
SITE	Transfer Tunnel No.1 Route	COORDINATE	N 14°34'24"; E 121°26'13.2"	INCLINATION	Vertical	DRILL RIG	LY 44
CASING DEPTH	96.00m	DATE		DRILLED	Palma		

Scale (m)	Elevation (m)	Depth (m)	Column Section	Type of Rock or Soil	Description	Core Recovery — ( % ) R Q D [ ]	Rock Classification	G.W.L	SPT-Test					WPT-Test (Lu-gcon Value)			
									N-Value								
									0	10	20	30	40	50			
31	220.00	32.00		Sand Stone													
32	219.20	32.80		Conglomerate	32.00-32.80m Dark gray conglomerate with slightly soft muddy matrix, and rubbles of 0.5-1cm in diameter. Bedding plane dipping 65°.												Lu=6.7
33																	
34																	
35																	
36				Shale	32.80-43.10m Dark gray shale, with a few thin layers of medium grained sandstone. Extremely slaking noted.												Lu=8.0
37																	
38																	
39																	
40																	
41																	
42																	
43	208.90	43.10															Lu=4.6 (Pc=8.2)
44																	
45																	
46																	
47																	
48																	
49																	
50																	
51																	
52	199.20	52.80															Lu=4.5 (Pc=7.2)
53																	
54																	
55																	
56	196.00	56.00															
57																	
58																	
59																	
60																	