

第4章 橋梁設計

4.1 設計条件

4.1.1 設計基準

橋梁の設計基準は、構造設計等は基本的に道路橋示方書に準拠する。活荷重及び船舶衝突荷重については AASHTO LRFD に準拠し、気象条件等の自然条件に係る設計条件については、個別に検討し設定する。

4.1.1.1 設計地震動及び耐震設計

本橋は日本の道路橋示方書に準拠した設計を実施するが、耐震設計法については、日本と違いレベル2相当の地震が橋梁の供用期間中に発生する確率が非常に低いため、そのまま適用することは過大設計となる。また供用期間中に発生する可能性がある地震の地表面水平加速度（設計震度）が低く、レベル1相当の地震に対して耐震設計（従前の震度法による設計）を行えば十分な耐震性能が確保できると考える。

一方で、供用期間中に発生する最大の地震より大きい地震動が発生した場合についても、その地震に対して要求性能を定義し、最低限落橋をさせないための方策を講じておくのがよいと考えた。

以上より、バゴ橋の耐震設計は、要求性能を下記の2段階とする。

表 4.1.1 バゴ橋の地震に対する要求性能

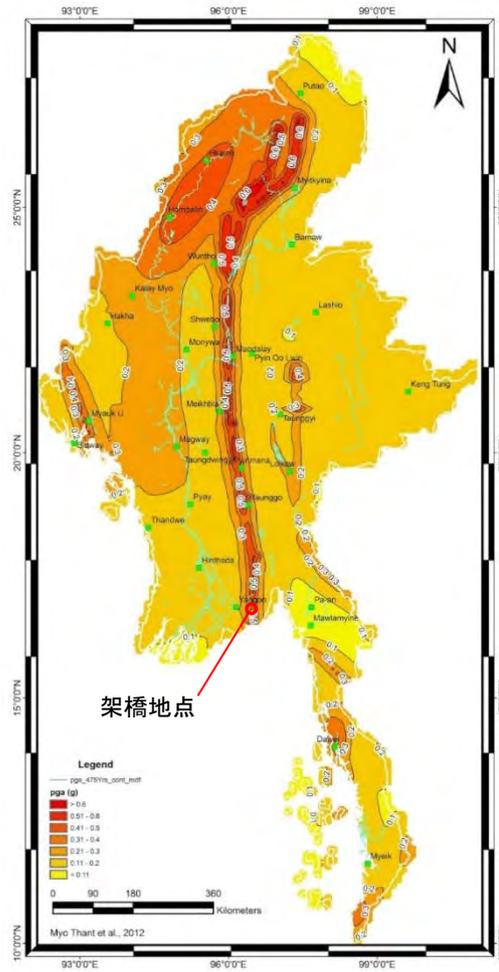
耐震性能1	供用期間中に発生する可能性がある最大の地震動を対象として設計を行う。地震によって橋としての健全性を損なわない性能を確保する。
耐震性能2	供用期間中に発生する可能性は極めて小さいが、発生した場合にも橋梁が落橋することを防止するため、耐震設計上想定する。地震による損傷が橋として致命的にならない性能を確保する。

出典 JICA 調査団

(1) 設計水平加速度（震度）

「供用期間中に発生する可能性がある最大の地震動」として、ミャンマー地震工学会が作成した地震加速度マップから、475年確率（50年以内に地震が起こる可能性が10%となる確率）による架橋地点付近の地表面加速度（300gal）を設計水平震度 $kh=0.30$ として採用した。

また、「供用期間中に発生する可能性は極めて小さい」地震としては、上記の地表面水平加速度を1.5倍した0.45を使用する。これは、建築物の基準である Myanmar Building Code 2012 においても、供用期間中に発生する可能性は極めて小さい地震動の水平加速度として、最大加速度の1.5倍を採用していることから、これを耐震性能2の設計震度とする。



出典: Seismic Hazards Assessment for Myanmar, Myo Thant et al. 2012

図 4.1.1 ミャンマー国 475 年確率地表面加速度

(2) 耐震性能と耐震設計

(1)で定義した要求性能を満足するために、具体的に下記の耐震設計を実施する。

表 4.1.2 耐震性能と耐震設計の相関

	耐震性能 1	耐震性能 2
設計水平震度	$k_{h1}=0.30$	$k_{h2}=1.5 \times k_{h1}=1.5 \times 0.3=0.45$
上部工	壊れない	安全率・靱性を確保することで壊れない事を期待する
下部工	壊れない	安全率・靱性を確保することで壊れない事を期待する
支承	壊れない	他の落橋防止構造を設置する場合、耐震性能 2 を考慮した設計を行わない
落橋防止構造	(設計を行わない)	許容応力度割増を行った設計を行い、壊れない事を保証する
伸縮装置	地震による移動量を確保する	耐震性能 2 を考慮した設計を行わない

出典 JICA 調査団

ハッチング部分が設計対象である。ここで「落橋防止構造」とは、上部工と下部工をつなぎ、耐震性能 2 による地震において、上部工が下部工から外れ落橋することを防止する構造を想定し、耐震性能 2 の設計水平震度を用いて設計を行う。具体的には、アンカーバーや耐震性能 2 の設計水平震度で設計する支承を想定する。また、道路橋示方書 V 耐震設計編 16.1 に記載される、橋軸方向に 4 基以上の下部構造において弾性支持又は固定支持される一連の上部構造を有する橋梁については、耐震性能 2 による落橋防止構造の設計は行わない。

4.1.1.2 船舶の衝突荷重

船舶の衝突荷重は、AASHTO に規定される船舶衝突荷重を載荷する。

(1) 設計対象船舶

バゴ橋を曳航する最大の船舶サイズは、DWIR からのヒアリングにより以下の値を用いる。

大きさ：65.5m x 15.9m x 3.0m (バージ船)

Deadweight Tonnage (DWT, 載貨重量トン)：1,118 トン

最大速度：10knot (5.14m/s)

なお、満載時ドラフトは同様なバージ船の例から 2.2m と想定する。

(2) 衝突速度の算出は、AASHTO LRFD 3.14.6 による。

3.14.6—Design Collision Velocity

The design collision velocity may be determined as specified in Figure 3.14.6-1, for which:

V = design impact velocity (ft/s)
 V_T = typical vessel transit velocity in the channel under normal environmental conditions but not taken to be less than V_{MIN} (ft/s)
 V_{MIN} = minimum design impact velocity taken as not less than the yearly mean current velocity for the bridge location (ft/s)
 X = distance to face of pier from centerline of channel (ft)
 X_C = distance to edge of channel (ft)
 X_L = distance equal to 3.0 times the length overall of the design vessel (ft)

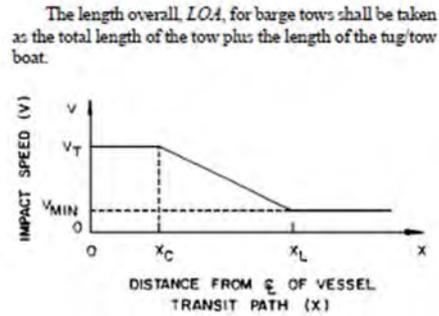
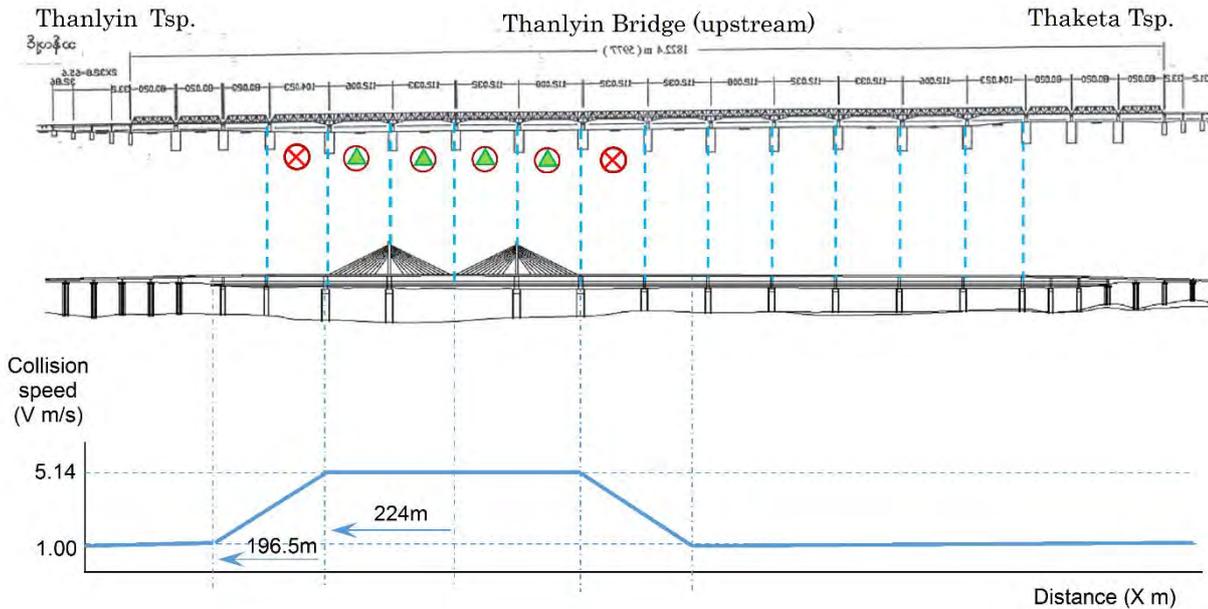


Figure 3.14.6-1—Design Collision Velocity Distribution

出典 AASHTO LRFD

図 4.1.2 設計衝突速度



出典 JICA 調査団

図 4.1.3 バゴ-橋における設計衝突速度の設定

表 4.1.3 バゴ-橋における設計衝突速度

橋脚	衝突時速度 (V)	備考
P10, P11, P12, P13	5.14 m/s	Maximum vessel speed
P6	1.34 m/s	
P7	2.95 m/s	
P14	1.84 m/s	
P15-P21	1.00 m/s	Mean current speed

出典 JICA 調査団

なお、P5,P22 は平均満潮位 HL EL+2.679 から河床までの水深がドラフトより小さいため、バージ航行不可として衝突荷重対象外とした。

(3) 衝突荷重

衝突荷重は、AASHTO LRFD 3.14.11 による。

3.14.11—Barge Collision Force on Pier

For the purpose of Article 3.14, the standard hopper barge shall be taken as an inland river barge with:

- width = 35.0 ft
- length = 195.0 ft
- depth = 12.0 ft
- empty draft = 1.7 ft
- loaded draft = 8.7 ft
- DWT = 1,700 tons

The collision impact force on a pier for a standard hopper barge shall be taken as:

• If $a_B < 0.34$ then:

$$P_B = 4,112a_B \quad (3.14.11-1)$$

• If $a_B \geq 0.34$ then:

$$P_B = 1,349 + 110a_B \quad (3.14.11-2)$$

where:

- P_B = equivalent static barge impact force (kip)
- a_B = barge bow damage length specified in Eq. 3.14.12-1 (ft)

C3.14.11

There is less reported data on impact forces resulting from barge collisions than from ship collision. The barge collision impact forces determined by Eqs. 3.14.11-1 and 3.14.11-2 were developed from research conducted by Meir-Dornberg (1985) in West Germany. Meir-Dornberg's study included dynamic loading with a pendulum hammer on barge bottom models in scale 1:4.5, static loading on one bottom model in scale 1:6, and numerical analysis. The results for the standard European Barge, Type IIa, which has a similar bow to the standard hopper barge in the United States, are shown in Figure C3.14.11-1 for barge deformation and impact loading. No significant difference was found between the static and dynamic forces measured during the study. Typical barge tow impact forces using Eqs. 3.14.11-1 and 3.14.11-2 are shown in Figure C3.14.11-2.

where:

- E_B = deformation energy (kip-ft)
- \bar{P}_B = average equivalent static barge impact force resulting from the study (kip)

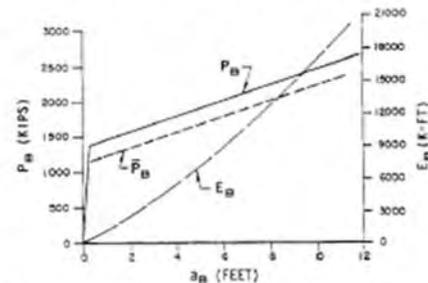


Figure C3.14.11-1—Barge Impact Force, Deformation Energy, and Damage Length Data

出典 AASHTO LRFD

図 4.1.4 バージによる橋脚への衝突荷重

表 4.1.4 衝突荷重の算出

橋脚	衝突時速度 (m/s)	フィート換算 (ft/s)	KE (kip-ft)	aB (ft)	PB (kip)	PB (kN)
P9, P10, P11, P12	5.14	16.9	11,4333	7.51	2,175	9,658
P7	2.08	6.8	1,872	1.56	1,521	6,752
P8	3.60	11.8	5,608	4.18	1,809	8,032
P13	1.84	6.0	1,465	1.24	1,486	6,595
P6, P14-P21	1.00	3.3	433	0.38	1,391	6,175

出典 JICA 調査団

なお、AASHTO LRFD 3.14.14 より、橋軸直角方向に衝突荷重 PB の 100%、橋軸方向に 50% を作用させる。

(4) 衝突時水位と橋脚衝突高さ

AASHTO LRFD の下図より、平均満潮位 MHW (MSL から+3.18m) からバージの水面上高さ (0.8m) の位置を衝突高さとする。

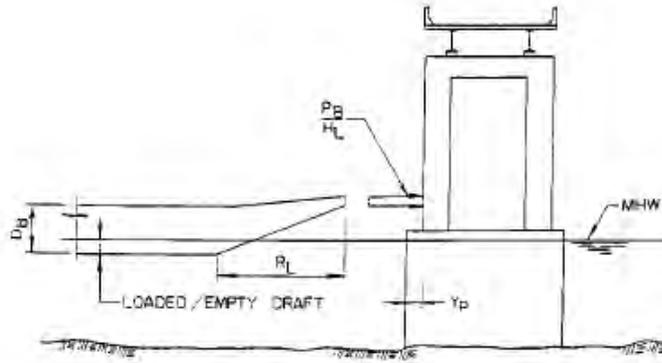


Figure 3.14.14.1-3—Barge Impact Force on Pier

出典 AASHTO LRFD

図 4.1.5 バージの衝突高さ

表 4.1.5 衝突荷重及び衝突高さ

Pier		P5,P6	P7	P8	P9,P10, P11,P12	P13	P14,P15,P16,P17,P18, P19,P20,P21,P22
Impact force (kN)	Trans.	6,175	6,752	8,032	9,658	6,595	6,175
	Long.	3,088	3,376	4,016	4,829	3,298	3,088
Impact height (m)		3.98	3.98	3.98	3.98	3.98	3.98

出典 JICA 調査団

4.1.1.3 航空機航路との関係

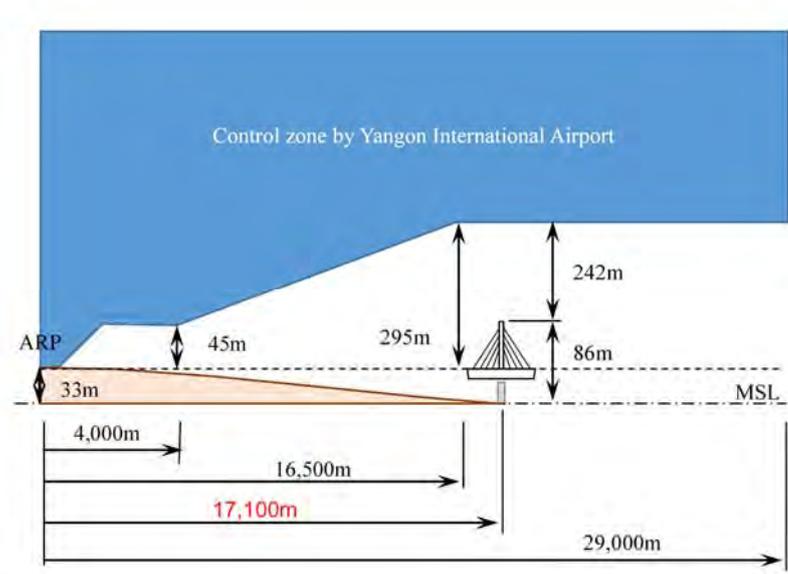
架橋地点はヤンゴン国際空港からの距離が比較的近いことから、航空機に対する空頭制限の可否について検討を行う。

(1) 検討条件

空頭制限を受ける可能性があるのは、斜張橋の主塔架設時のクレーンである。よって、ヤンゴン国際空港から近い側の主塔までの距離について下記のように算出した。

- ・ ヤンゴン国際空港の標点は、滑走路の中心付近と仮定
- ・ 主塔 (P12) と空港標点との直線距離を地図上で計測
- ・ 国際空港の制限表面については、ICAO (International Civil Aviation Organization、国際民間航空機関) に準拠した制限表面を想定

(2) 検討結果



出典 JICA 調査団

図 4.1.6 ICAO による制限表面と架橋地点との関係

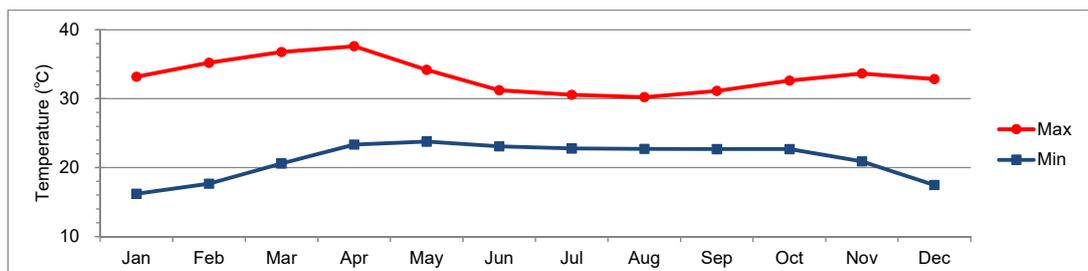
P12 橋脚はヤンゴン国際空港の標点から 17.1km に位置する。空頭制限としては、制限表面のうち「外側水平表面」として 295m の高さを確保する必要がある。また、空港標点は+33m MSL にあり、斜張橋主塔頂部は MSL から 86m の高さにあるため、 $295+33-86=242\text{m}$ となり、主塔頂部から制限表面は 242m の余裕がある。主塔架設用のクレーンの到達高さは主塔頂部+数 10m 程度であることから、空頭制限には十分な余裕があると言える。

なお、ICAO では 200ft 以上 650ft 未満 (60m 以上 200m 未満) の高さの構造物には航空障害灯の設置を義務付けているため、主塔頂部に航空障害灯を設置する。

4.1.1.4 気象条件

(1) 気温

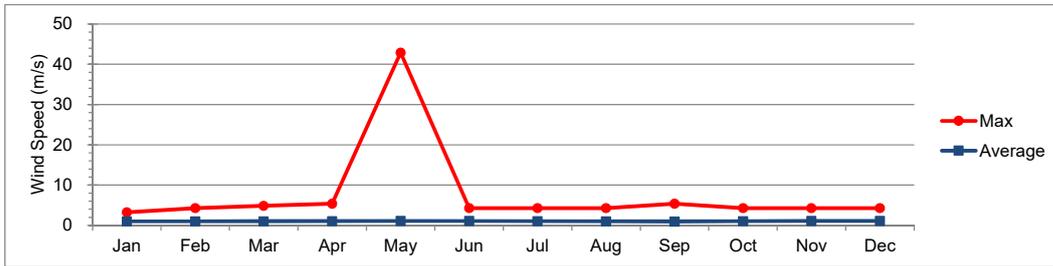
ヤンゴン市における月平均最高気温及び最低気温はそれぞれ 39.2°C 及び 11.3°C となっている。設計用として、平均気温を 25°C として、上昇/下降を 15°C ずつ考慮することとする。



出典: 気象水文局

図 4.1.7 Kaba-Aye 観測所(ヤンゴン市内)における月平均気温(1991-2015)

(2) 風



出典: 気象水文局

図 4.1.8 Kaba-Aye 観測所(ヤンゴン市内)における最大・平均風速(1991-2015)

図はヤンゴン市内における最大及び平均風速である。5月に極大となっているものは、サイクロン・ナルギスによる風速 96.5mph (42.9m/s) である。設計用風速としては、MOC がヤンゴン地区の設計風速として設定している 100mph (44.4m/s) を用いることとする。

なお、サイクロンが到来する5月以外の月の最大風速は 12.0mph (5.3m/s)、年間平均風速は 2.5mph (1.1m/s) 程度である。

(3) 降雨量

降雨量についても、ヤンゴン市内における観測結果から作成された降雨強度により設定する。3年確率 10分降雨強度は 149mm/h である。

Return Period (Probability) (Year, %)	Dairy Rainfall: R ₂₄ (mm/day)	Rainfall intensity each rainfall duration (mm/hr): It = R ₂₄ /24*(24/t) ^m , m=2/3												
		24	12	8	6	3	2	1.5	1	0.75	0.5	0.333	0.167	
Kaba Aye	1,440 min.	1,440	720	480	360	180	120	90	60	45	30	20	10	
2	50.0%	112.9	4.7	7.5	9.8	11.9	18.8	24.7	29.9	39.1	47.4	62.1	81.4	129.2
3	33.3%	130.1	5.4	8.6	11.3	13.7	21.7	28.4	34.4	45.1	54.6	71.6	93.8	148.9
5	20.0%	152.1	6.3	10.1	13.2	16.0	25.4	33.2	40.2	52.7	63.9	83.7	109.7	174.1
10	10.0%	184.3	7.7	12.2	16.0	19.4	30.7	40.3	48.8	63.9	77.4	101.4	132.9	211.0
20	5.0%	220.4	9.2	14.6	19.1	23.1	36.7	48.1	58.3	76.4	92.6	121.3	158.9	252.3
25	4.0%	233.0	9.7	15.4	20.2	24.5	38.8	50.9	61.6	80.8	97.9	128.2	168.0	266.7
30	3.33%	243.7	10.2	16.1	21.1	25.6	40.6	53.2	64.5	84.5	102.3	134.1	175.7	279.0
50	2.0%	275.5	11.5	18.2	23.9	28.9	45.9	60.2	72.9	95.5	115.7	151.6	198.7	315.4
80	1.25%	307.3	12.8	20.3	26.6	32.3	51.2	67.1	81.3	106.5	129.1	169.1	221.6	351.8
100	1.0%	323.4	13.5	21.4	28.0	34.0	53.9	70.6	85.6	112.1	135.8	178.0	233.2	370.2
150	0.667%	354.1	14.8	23.4	30.7	37.2	59.0	77.3	93.7	122.8	148.7	194.9	255.4	405.3
200	0.5%	377.1	15.7	24.9	32.7	39.6	62.9	82.4	99.8	130.7	158.4	207.5	271.9	431.7
300	0.33%	411.4	17.1	27.2	35.7	43.2	68.6	89.8	108.8	142.6	172.8	226.4	296.7	470.9
400	0.25%	436.9	18.2	28.9	37.9	45.9	72.8	95.4	115.6	151.5	183.5	240.4	315.1	500.1
500	0.2%	457.5	19.1	30.3	39.7	48.0	76.3	99.9	121.0	158.6	192.1	251.8	329.9	523.7
Calculation formula of Probable rainfall = Generalized extreme value distribution														

出典: 気象水文局

図 4.1.9 Kaba-Aye 観測所(ヤンゴン市内)における降雨強度(1968-2015)

4.1.2 使用材料

使用材料は、バゴ橋の設計を道路橋示方書に準拠することや、主要な調達を本邦関連企業から行う事を想定していることなどから、日本工業規格（JIS）に準拠した材料を想定する。但し技術仕様書には「JIS と等価な材料」と記述し、国際調達の可能性を排除しない。

4.1.3 設計荷重及び荷重組合せ

設計荷重は後述の設計条件表に記載したとおりである。活荷重については、橋梁については AASHTO HL-93 及び特殊荷重（735kN 集中荷重）を用いた。

荷重組合せのうち、河川内橋梁の風荷重時については、本橋が感潮域にあること、サイクロン来襲時には風荷重と水位が最大になることなどを考慮して組合せを考慮した。また地震時は河川水位と洗掘深の影響を考慮した。

4.1.4 構造最適化のための比較設計項目

準備調査（F/S）及び追加調査で実施された構造形式は、事業概要や事業費の算出を目的として橋梁形式等を選定し、橋梁計画を立案した。基本設計では橋梁計画細目について見直し、構造最適化のための比較検討を行う。

表 4.1.6 比較検討項目

項目	検討項目
鋼斜張橋	主塔高さ
	桁断面（桁高、ブラケット、リブ形状等）
	主塔形式（逆 Y 型、H 型、1 本柱）
	吊ケーブル配置
	ケーブル本数
	ケーブル形式
	支承支持条件
	橋脚形状
鋼箱桁橋	基礎形状（鋼管矢板井筒の構成）
	主桁断面検討（桁高、ブラケット、リブ等）
	下部工
	基礎工
PC 箱桁橋（スパンバイスパン工法）	橋梁付属物の検討
	橋長の検討
	径間長・径間配置の検討
	主桁形式の検討
	下部工の検討
	基礎工の検討
橋梁付属物の検討	

オンランプ橋	径間長・径間配置の検討
	上部工形式の検討
	架設方法検討
	主桁の検討
	下部工の検討
	基礎工の検討
	橋梁付属物の検討
高架橋	橋長の検討
	径間長・径間配置の検討
	上部工形式の検討
	基礎工形式の検討

出典：JICA 調査団

4.1.5 河川内橋梁の支間割・航路高

河川内橋梁の支間割は、水理学的な影響および航行船舶の安全性を考慮して、既設タンリン橋の橋脚の見通し線上にバゴ橋の橋脚を設置する。バゴ川は、水深は浅いものの滞筋に沿って中小船舶の往来が盛んである。現在の航路は、図 4.1.10 に示すタンリン側の 4 径間が割り当てられており、既設タンリン橋で 100m 以上の支間が割り当てられている主要支間について、同じ支間割とすることにする。

また、航路高はバゴ橋の縦断が最も低い P20 橋脚位置の桁下高が、同位置のタンリン橋の桁下高 GH=11.41 より高い位置になるように計画した。

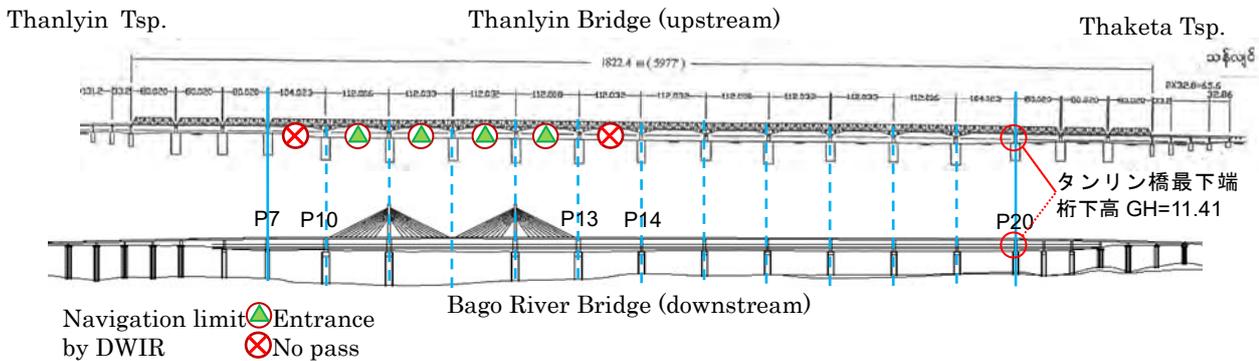


図 4.1.10 タンリン橋及びバゴ橋の橋脚配置

出典：JICA 調査団

4.1.6 バゴ橋の設計条件

バゴ橋の設計条件を次頁以降に示す。

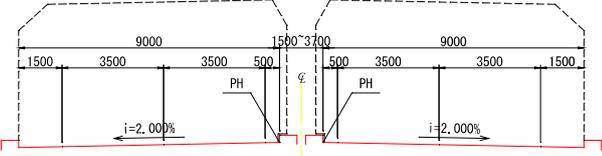
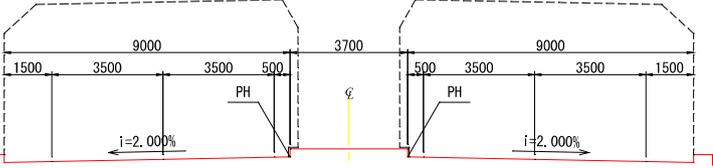
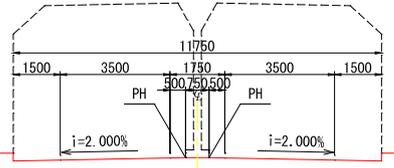
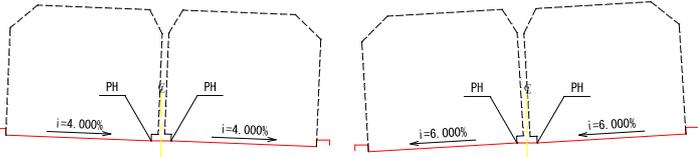
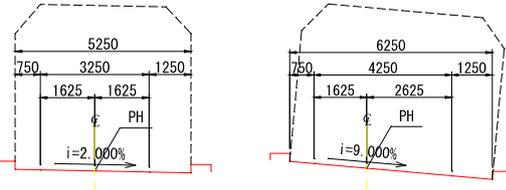
表 4.1.7 一般項目設計条件

項目	設計条件	摘要	
設計対象	新橋建設及びタンリン・ティンカット道路の道路改良		
	路線延長	3,644.341m	
	河川橋梁	橋長	2031.000m
		上部工	鋼斜張橋 448.000m 鋼箱桁橋 1,033.000m (257m, 776m) PC 箱桁橋 550.000m (250m, 300m)
		下部工	壁式橋脚、張出式橋脚、逆 T 式橋台
		基礎工	鋼管矢板井筒基礎、場所打ち杭
	高架橋	橋長	602.000m
		上部工	鋼箱桁橋 180.000m 鋼板桁橋 122.000m PC コンポ桁 300.000m (60m, 180m, 60m)
		下部工	張出式橋脚、逆 T 式橋台
		基礎工	場所打ち杭
	オンランプ橋	橋長	115.200m
		上部工	PC コンポ桁 115.200m
		下部工	張出式橋脚、逆 T 式橋台
基礎工		場所打ち杭	
道路建設	アプローチ道路 タンリン側 357m, タケタ側 430m		
	街路 834.341m		
交差点改良	スターシティ交差点 (仮称)、シュキンタール交差点、ヤダナー交差点		
料金徴収施設	タケタ側 1 か所 (北向き・南向き)		
橋梁名	バゴ橋 (Bago River Bridge)、高架橋は名称未定		
路線名	タンリン・ティンカット道路		
道路適用基準	道路構造令 (平成 27 年 6 月) AASHTO A Policy on Geometric Design of Highways and Streets, 6th Edition (2011) ※建築限界鉛直高さ 5.0m を採用 アセアン・ハイウェイ基準 ※車線幅員に 3.5m を採用 Road Design Criteria in Myanmar, Department of Highway, Ministry of Construction (2015) ※参考		
構造物適用基準	AASHTO LRFD Bridge Design 7 th Edition (2014) ※活荷重 HL-93、盛土部の Live load surcharge、船舶衝突荷重を採用 道路橋示方書・同解説 (I~V) (平成 24 年) ※耐震設計は本調査で検討した方法を採用し、設計水平震度はミャンマー地震工学会の地表面加速度を地震時応答加速度として採用する 道路土工要領 (平成 21 年 6 月) 道路土工盛土工指針 (平成 22 年 4 月) 道路土工擁壁工指針 (平成 24 年 7 月) 道路土工軟弱地盤対策工指針 (平成 24 年 8 月) 杭基礎設計便覧 (H27.3) 鋼管矢板基礎設計施工便覧 (H9.12) その他必要な設計基準/指針等		
	許容応力度法による設計を行う。 各道路土工指針の耐震設計については、レベル 1 地震動の静的照査を行う (Ⅲ種地盤の設計水平震度を用いる)		

出典: JICA 調査団

表 4.1.8 道路幾何構造条件

項目	設計条件	摘要																																																																																										
道路規格	バゴ橋本橋 第2種第1級相当 高架橋区間 第4種第1級相当 オンランプ C規格相当 タンリン・ティンカット道路改良 第4種第1級相当	道路構造令による																																																																																										
設計速度	バゴ橋本橋、高架橋区間 60km/h オンランプ 30km/h タンリン・ティンカット道路改良 40km/h																																																																																											
計画交通量	バゴ橋本橋 44,356台日（北向き25,352台日、南向き19,004台日） 大型車6,173台日（北向き2,829台日、南向き3,344台日） 高架橋区間 21,723台日（北向き12,061台日、南向き9,662台日） 大型車3,639台日（北向き1,549台日、南向き2,090台日）	追加F/S YUTRA Master Plan Case 2035年予測 値、大型車はBus 及びTrackを集計																																																																																										
平面線形	バゴ橋本橋、高架橋区間 <table border="1"> <thead> <tr> <th>SP</th> <th>1</th> <th>2</th> <th>3</th> <th>4</th> <th>5</th> </tr> </thead> <tbody> <tr> <td>0+000.000</td> <td>0+024.970</td> <td>0+076.170</td> <td>0+161.513</td> <td>0+212.713</td> <td>0+521.900</td> </tr> <tr> <td>R=∞</td> <td>A=160</td> <td>R=-500</td> <td>A=160</td> <td>R=∞</td> <td>R=-2000</td> </tr> <tr> <th>6</th> <th>7</th> <th>8</th> <th>9</th> <th>10</th> <th>11</th> </tr> <tr> <td>0+857.522</td> <td>2+627.420</td> <td>2+680.992</td> <td>2+724.080</td> <td>2+777.651</td> <td>2+782.486</td> </tr> <tr> <td>R=∞</td> <td>A=150</td> <td>R=-420</td> <td>A=150</td> <td>R=∞</td> <td>A=130</td> </tr> <tr> <th>12</th> <th>13</th> <th>14</th> <th>EP</th> <td></td> <td></td> </tr> <tr> <td>2+835.298</td> <td>2+961.571</td> <td>3+014.383</td> <td>3+644.341</td> <td></td> <td></td> </tr> <tr> <td>R=320</td> <td>A=130</td> <td>R=∞</td> <td>-</td> <td></td> <td></td> </tr> </tbody> </table> オンランプ <table border="1"> <thead> <tr> <th>SP</th> <th>1</th> <th>2</th> <th>3</th> <th>4</th> <th>5</th> </tr> </thead> <tbody> <tr> <td>0+000.000</td> <td>0+004.472</td> <td>0+058.045</td> <td>0+105.007</td> <td>0+148.111</td> <td>0+367.483</td> </tr> <tr> <td>R=∞</td> <td>R=-140</td> <td>R=∞</td> <td>A=50</td> <td>R=-58</td> <td>A=50</td> </tr> <tr> <th>6</th> <th>7</th> <th>EP</th> <td></td> <td></td> <td></td> </tr> <tr> <td>0+410.587</td> <td>0+535.778</td> <td>0+643.083</td> <td></td> <td></td> <td></td> </tr> <tr> <td>R=∞</td> <td>R=-1000</td> <td>-</td> <td></td> <td></td> <td></td> </tr> </tbody> </table>	SP	1	2	3	4	5	0+000.000	0+024.970	0+076.170	0+161.513	0+212.713	0+521.900	R=∞	A=160	R=-500	A=160	R=∞	R=-2000	6	7	8	9	10	11	0+857.522	2+627.420	2+680.992	2+724.080	2+777.651	2+782.486	R=∞	A=150	R=-420	A=150	R=∞	A=130	12	13	14	EP			2+835.298	2+961.571	3+014.383	3+644.341			R=320	A=130	R=∞	-			SP	1	2	3	4	5	0+000.000	0+004.472	0+058.045	0+105.007	0+148.111	0+367.483	R=∞	R=-140	R=∞	A=50	R=-58	A=50	6	7	EP				0+410.587	0+535.778	0+643.083				R=∞	R=-1000	-				図参照
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縦断線形	バゴ橋本橋、高架橋区間 <table border="1"> <thead> <tr> <th>0+0.000</th> <th>0+228.000</th> <th>0+700.000</th> <th>1+88.000</th> <th>2+140.000</th> <th>2+517.727</th> </tr> </thead> <tbody> <tr> <td>5.695</td> <td>5.467</td> <td>17.267</td> <td>18.431</td> <td>15.275</td> <td>5.832</td> </tr> <tr> <td>-0.100</td> <td>2.500</td> <td>0.300</td> <td>-0.300</td> <td>-2.500</td> <td>3.000</td> </tr> <tr> <th>2+830.000</th> <th>2+960.000</th> <th>3+160.000</th> <th>3+475.000</th> <th>3+500.000</th> <td></td> </tr> <tr> <td>15.200</td> <td>15.850</td> <td>14.420</td> <td>4.970</td> <td>4.895</td> <td></td> </tr> <tr> <td>0.500</td> <td>-0.715</td> <td>-3.000</td> <td>-0.300</td> <td>-</td> <td></td> </tr> </tbody> </table> オンランプ <table border="1"> <thead> <tr> <th>0+0.000</th> <th>0+150.000</th> <th>0.329.942</th> <th>0+490.000</th> <th>0+540.000</th> <td></td> </tr> </thead> <tbody> <tr> <td>4.470</td> <td>4.470</td> <td>5.010</td> <td>13.780</td> <td>14.878</td> <td></td> </tr> <tr> <td>level</td> <td>0.300</td> <td>5.479</td> <td>2.197</td> <td>-</td> <td></td> </tr> </tbody> </table>	0+0.000	0+228.000	0+700.000	1+88.000	2+140.000	2+517.727	5.695	5.467	17.267	18.431	15.275	5.832	-0.100	2.500	0.300	-0.300	-2.500	3.000	2+830.000	2+960.000	3+160.000	3+475.000	3+500.000		15.200	15.850	14.420	4.970	4.895		0.500	-0.715	-3.000	-0.300	-		0+0.000	0+150.000	0.329.942	0+490.000	0+540.000		4.470	4.470	5.010	13.780	14.878		level	0.300	5.479	2.197	-		図参照																																				
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横断勾配	バゴ橋本橋 2%拌み勾配（最大4%片勾配） 高架橋区間 2%拌み勾配（最大6%片勾配） オンランプ 2%片勾配（最大9%片勾配）																																																																																											

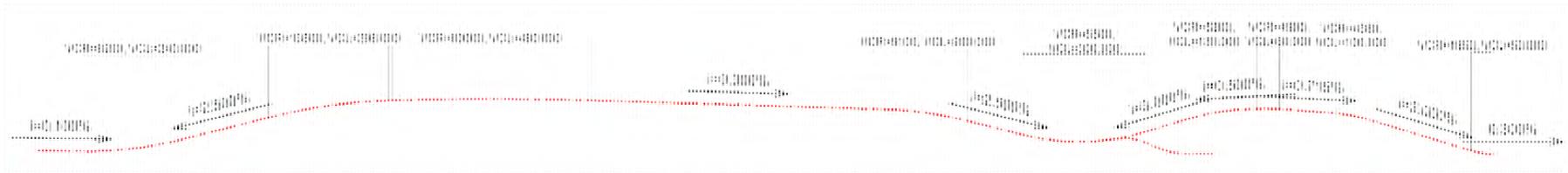
<p>幅員構成</p>	<p>バゴ橋本橋 (PC 箱桁橋、鋼箱桁橋区間)</p>  <p>バゴ橋本橋 (斜張橋区間)</p>  <p>高架橋区間 (標準区間、右 4%片勾配、左 6%片勾配)</p>   <p>オンランプ (標準区間、9%片勾配区間)</p> 	
<p>幅員変化</p>	<p>バゴ橋本橋 拡幅なし、斜張橋区間のみ中央分離帯を拡幅 高架橋 拡幅なし オンランプ R=58 区間は右 1m 拡幅</p>	<p>道路構造令 p.543</p>

出典: JICA 調査団



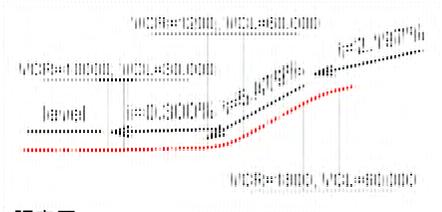
出典: JICA 調査団

図 4.1.13 平面線形



出典: JICA 調査団

図 4.1.12 本線～高架橋縦断線形



出典: JICA 調査団

図 4.1.11 オンランプ縦断線形

表 4.1.9 河川条件

項目	設計条件				摘要			
河川名	バゴ-川							
航路	竣工時は、P10～P13 を航路とする。航路標識も P10～P13 に設置する。 将来的には、濤筋の変化を考慮して、P7～P20 を航路として確保する。				DWIR との合意事項			
航路限界	P7～P20 について、既存タンリン橋の橋脚の見通し線を確保するとともに、既存タンリン橋の桁下高以上を確保する。				DWIR との合意事項			
計画洪水流量	16, 169m ³ /s (100 年洪水確率)							
計画高水位	荷重組合せ	想定水位	高水位 (MSL+m)	流速 (m/s)				
	常時	大潮の満潮／干潮	+3. 18／-2. 39	0				
	風時	最高水位	+4. 99	0				
	航路上の衝突荷重	大潮の満潮	+3. 18	0				
	航路以外の衝突荷重	100 年確率高水位	+2. 53	1. 19				
	地震時	平均水位	+0. 29	0. 60				
	施工時	5 年確率高水位	+4. 34	0. 65				
設計河床高及び設計洗掘深		P6	P7	P8	P9	P10		
	Riverbed height	0.41	-3.59	-5.35	-4.82	-4.55		
	Foundation height	-2.48	-6.38	-6.34	-6.35	-9.10		
	Maximum scouring depth	-3.41	-8.91	-9.42	-9.31	-11.27		
	P11	P12	P13	P14	P15	P16	P17	P18
	-5.41	-7.96	-8.02	-6.28	-5.09	-5.26	-6.70	-6.99
	-9.10	-9.10	-9.10	-8.06	-8.06	-8.06	-8.06	-8.06
	-12.13	-13.67	-13.48	-11.43	-10.84	-10.36	-9.70	-10.00
	P19	P20	P21	P22	P23	P24	P25	
	-6.88	-6.55	-6.15	-4.61	-0.05	4.11	4.04	
	-8.06	-7.28	-7.55	-7.59	-2.39	3.73	3.78	
	-9.78	-9.53	-8.56	-7.48	-2.07	3.98	3.92	
	地震時の洗掘深は、最大洗掘深の 1/2 を用いた。							
基準高さ	モンキーポイントにおけるベンチマーク調査結果 MSL=CDL+2. 814m 全ての高さは、MSL からの高さとして表す。							

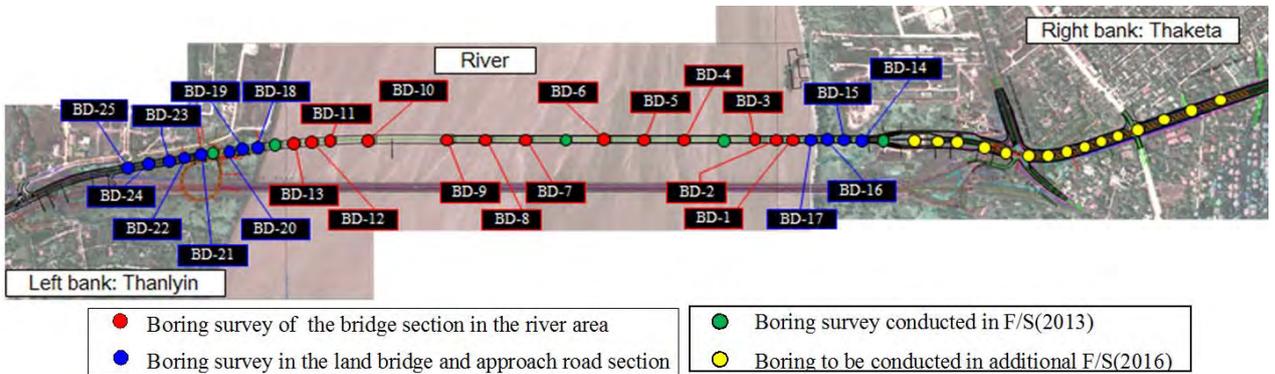
出典: JICA 調査団

表 4.1.10 地形・地質条件

項目	設計条件	摘要							
調査概要	次頁に示す。								
地質縦断図	次頁に示す。								
設計用土質定数	1. タンリン地区陸上部 (A1~P6、オンランプ橋)								
	No.	Soil name	N-value	Unit weight (kN/m ³)			Internal friction angle	Cohesive strength	Deformation Modulus
				γ_t	γ_{sat}	γ'	ϕ (°)	c (kN/m ²)	E_{50} (kN/m ²)
	1	Filled Soil	1	18.0	18.0	8.0	-	6	700
	2	CLAY-I	1	17.5	17.5	7.5	-	15	900
	3	Sandy CLAY-I	3	17.5	17.5	7.5	-	15	2,000
	4	Silty CLAY-I	15	16.5	17.5	7.5	33	-	6,000
	5	Clayey SAND-A	3	17.0	18.0	8.0	28	-	1,200
	6	CLAY-AII	5	17.5	17.5	7.5	-	30	3,200
	7	Clayey SAND-B	17	17.0	18.0	8.0	33	-	11,900
	8	CLAY-AIII	7	17.6	17.6	7.6	-	42	4,900
	9	Clayey SAND-C	20	17.0	18.0	8.0	32	-	14,000
	10	Clayey SAND-I	22	17.0	18.0	8.0	31	-	15,400
	11	Clayey SAND-II	50	19.0	20.0	10.0	34	-	35,000
	2. 河川内 (P7~P22)								
	No.	Soil name	N-value	Unit weight (kN/m ³)			Internal friction angle	Cohesive strength	Deformation Modulus
				γ_t	γ_{sat}	γ'	ϕ (°)	c (kN/m ²)	E_{50} (kN/m ²)
	1	River sediments	3	17.0	18.0	8.0	29	-	1,200
	2	CLAY-I	1	17.5	17.5	7.5	-	10	900
	3	Clayey SAND-A	3	17.5	18.5	8.5	28	-	1,200
	4	Silty SAND-I	13	17.0	18.0	8.0	33	-	5,200
	5	Sandy CLAY-II	9	17.5	17.5	7.5	-	54	6,300
	6	CLAY-AII	7	17.5	17.5	7.5	-	42	4,900
	7	Clayey SAND-B	13	17.0	18.0	8.0	32	-	9,100
	8	Silty SAND-A	25	17.0	18.0	8.0	33	-	17,500
	9	CLAY-AIII	18	18.0	18.0	8.0	-	108	12,600
	10	Clayey SAND-C	20	17.0	18.0	8.0	33	-	14,000
	11	Silty SAND-II	30	17.0	18.0	8.0	34	-	21,000
	12	Clayey SAND-I	35	19.0	20.0	10.0	34	-	24,500
	13	Clayey SAND-II	50	19.0	20.0	10.0	35	-	35,000
	3. タケタ地区陸上部 (P23~A2)								
	No.	Soil name	N-value	Unit weight (kN/m ³)			Internal friction angle	Cohesive strength	Deformation Modulus
				γ_t	γ_{sat}	γ'	ϕ (°)	c (kN/m ²)	E_{50} (kN/m ²)
	1	Filled Soil	3	19.0	20.0	10.0	-	18	2,100
	2	CLAY-I	1	17.5	17.5	7.5	-	15	900
	3	Silty SAND-I	13	17.0	18.0	8.0	33	-	6,500
	4	Sandy SILT	5	17.0	17.0	7.0	-	30	3,500
	5	Silty SAND-II	25	17.0	18.0	8.0	35	-	17,500
	6	Clayey SAND-I	30	17.0	18.0	8.0	34	-	21,000
	7	Clayey SAND-II	50	19.0	20.0	10.0	35	-	35,000
	4. 高架橋								

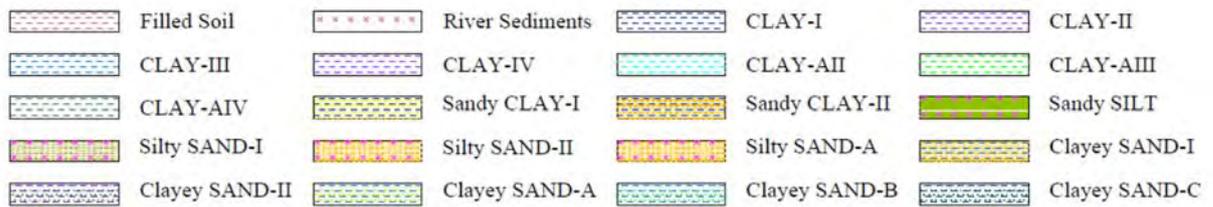
	No.	Soil name	N-value	Unit weight (kN/m ³)			Internal friction angle ϕ (°)	Cohesive strength c (kN/m ²)	Deformation Modulus E ₅₀ (kN/m ²)
				γ_t	γ_{sat}	γ'			
	1	Filled Soil	4	18.0	18.0	8.0	-	24	1,300
	2	CLAY-I	4	18.0	18.0	8.0	-	24	1,300
	3	Silty SAND-I	10	18.0	18.0	8.0	32	-	5,000
	4	Sandy SILT	8	17.0	17.0	7.0	-	48	5,600
	5	Silty SAND-II	22	17.0	19.0	9.0	33	-	15,400
	6	CLAY-II	21	18.0	18.0	8.0	-	126	14,700
	7	Clayey SAND-I	35	17.0	19.0	9.0	33	-	24,500
	8	CLAY-III	35	18.0	18.0	8.0	-	210	24,500
	9	Clayey SAND-II	50	19.0	19.0	9.0	37	-	35,000
	10	CLAY-IV	50	18.0	18.0	8.0	-	300	35,000
支持層の設定	道路橋示方書に準拠する。								
液状化判定	考慮する。								
広域地盤沈下の影響	本事業では考慮しない。								

出典: JICA 調査団



出典: JICA 調査団

図 4.1.14 地質調査位置図



出典: JICA 調査団

図 4.1.15 地質調査凡例

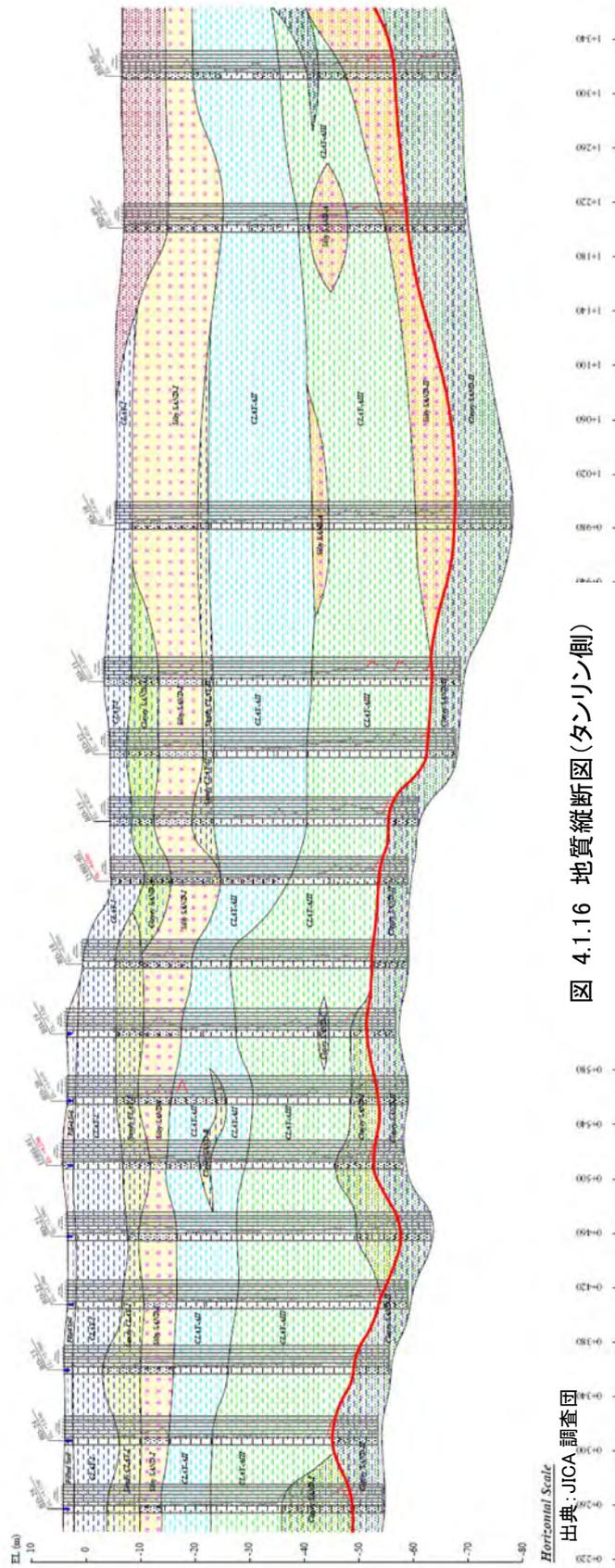


図 4.1.16 地質縦断面(タンリン側)

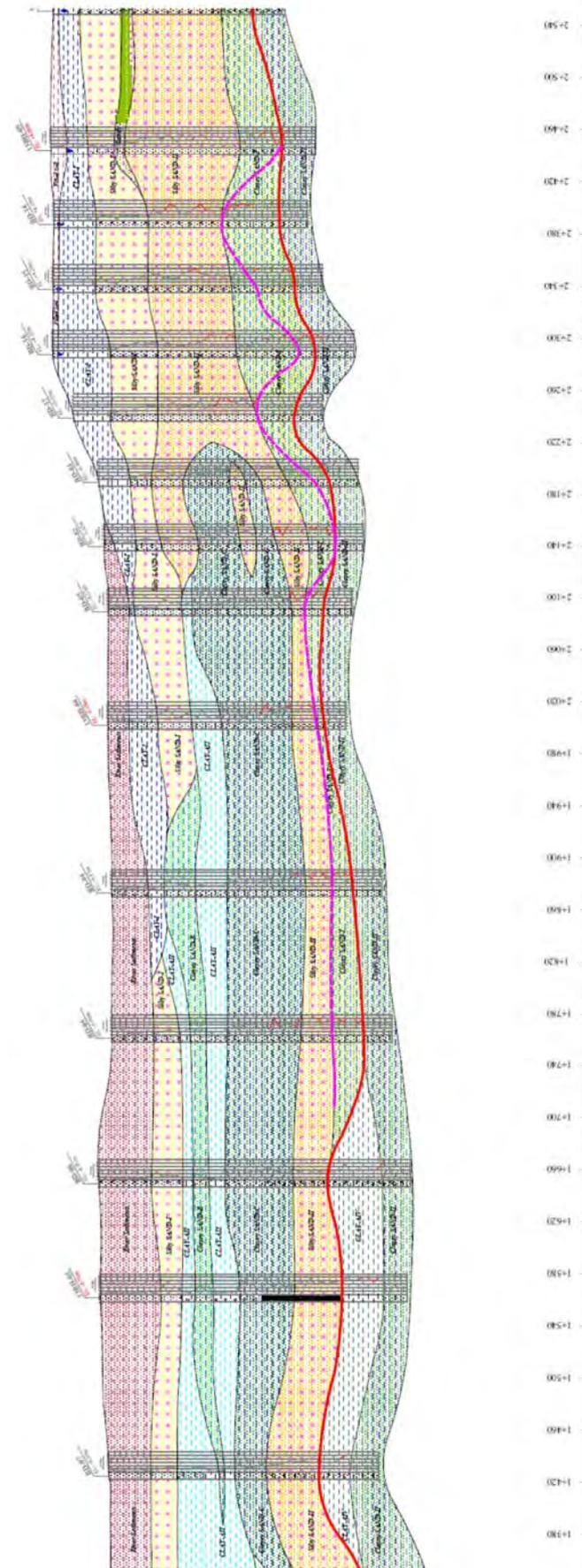


図 4.1.17 地質縦断面図(バゴー川河川内)

出典: JICA 調査団

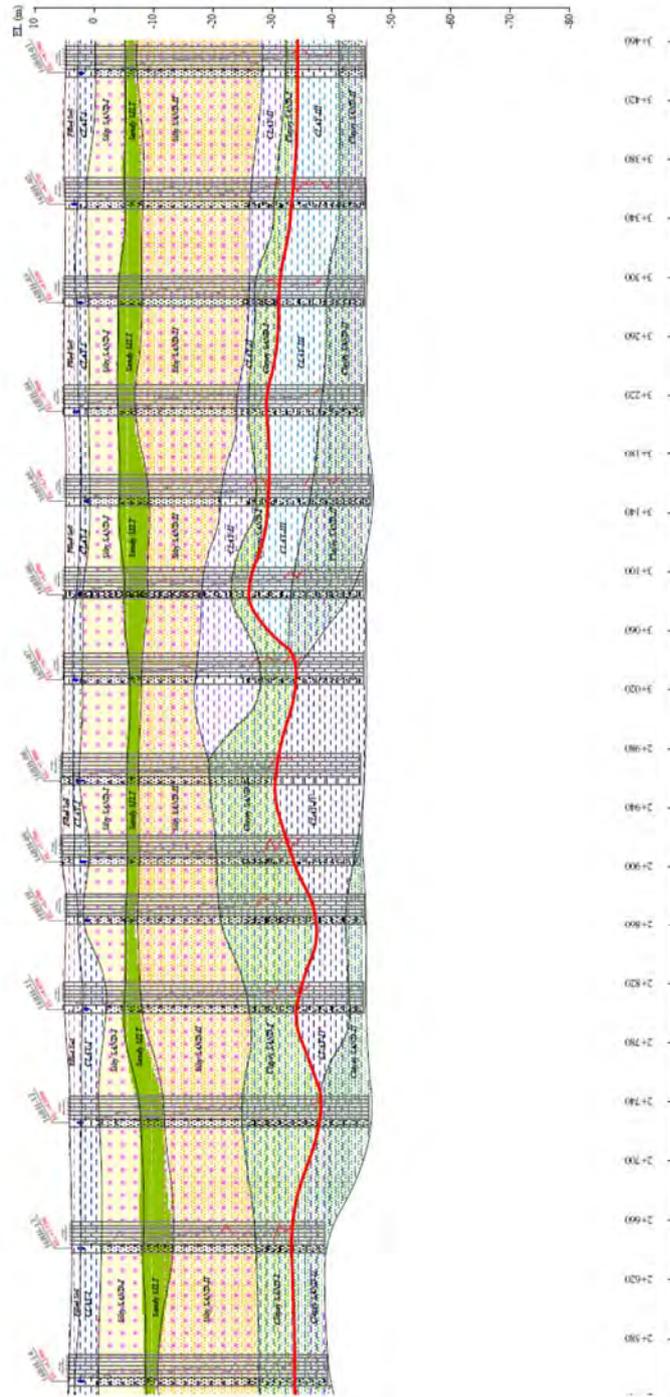


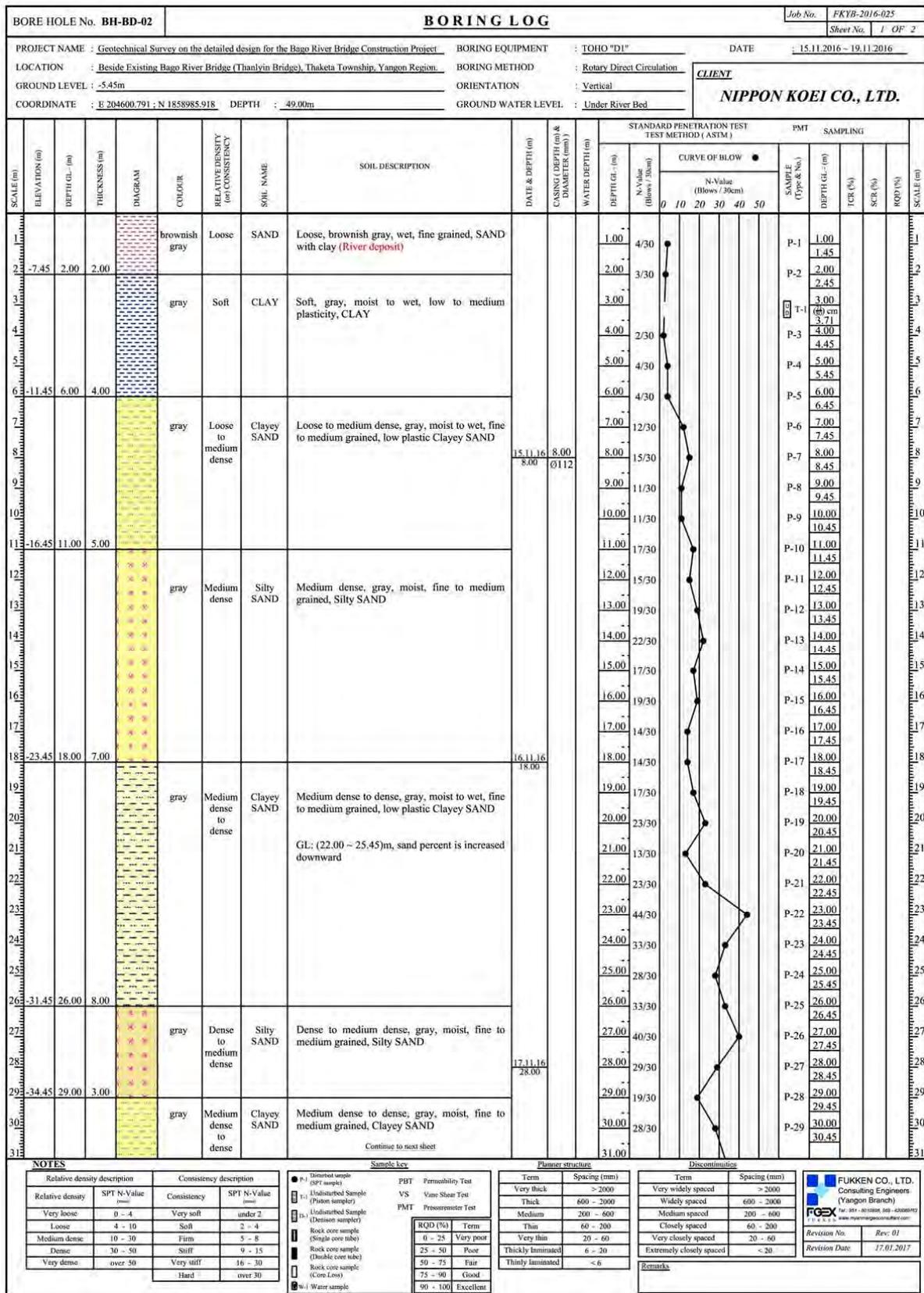
図 4.1.18 地質縦断面図(タケタ側)

出典: JICA 調査団

BORE HOLE No. BH-BD-01										BORING LOG										Job No. FKYB-2016-025		
PROJECT NAME : Geotechnical Survey on the detailed design for the Bago River Bridge Construction Project										BORING EQUIPMENT : TOHO "D1"										DATE : 15.11.2016 - 19.11.2016		
LOCATION : Beside Existing Bago River Bridge (Thanlyin Bridge), Thaketa Township, Yangon Region										BORING METHOD : Rotary Direct Circulation										CLIENT		
GROUND LEVEL : -4.40m										ORIENTATION : Vertical										NIPPON KOEI CO., LTD.		
COORDINATE : E 204573.197 ; N 1859026.672 DEPTH : 49.00m										GROUND WATER LEVEL : Under River Bed												
SCALE (m)	ELEVATION (m)	DEPTH (GL - (m))	THICKNESS (m)	DIAGRAM	COLOUR	RELATIVE DENSITY (%)	CONSISTENCY	SOIL NAME	SOIL DESCRIPTION	DATE & DEPTH (m)	CASING (DEPTH (m) & DIAMETER (mm))	WATER DEPTH (m)	STANDARD PENETRATION TEST TEST METHOD (ASTM)					PMT	SAMPLING	SCALE (m)		
													DEPTH (GL - (m))	N-Value (Blows / 30cm)	CURVE OF BLOW						SAMPLE (Type & No.)	DEPTH (GL - (m))
0	10	20	30	40	50																	
1.00	-6.90	2.50	2.50		brownish gray	Soft	Sandy CLAY	Soft, brownish gray, moist to wet, low to medium plasticity, Sandy CLAY (River deposit)	15.11.16	Ø112	6.00	1.00	2/30			P-1	1.00					1.00
2.00					gray	Very soft	CLAY	Very soft, gray, moist to wet, low to medium plasticity, CLAY, with trace of fine grained sand				2.00	3/30			P-2	2.00					2.00
3.00					gray	Very soft	CLAY	Very soft, gray, moist to wet, low to medium plasticity, CLAY, with trace of fine grained sand				3.00	3/30			T-1	3.00					3.00
4.00					gray	Very soft	CLAY	Very soft, gray, moist to wet, low to medium plasticity, CLAY, with trace of fine grained sand				4.00	0/45			P-3	4.00					4.00
5.00					gray	Very soft	CLAY	Very soft, gray, moist to wet, low to medium plasticity, CLAY, with trace of fine grained sand				5.00	0/45			P-4	5.00					5.00
6.00	-10.40	6.00	3.50		gray	Loose to medium dense	Clayey SAND	Loose to medium dense, gray, moist to wet, fine to medium grained, low plastic Clayey SAND	15.11.16	Ø112	7.00	6.00	6/30			P-5	6.00					6.00
7.00					gray	Loose to medium dense	Clayey SAND	Loose to medium dense, gray, moist to wet, fine to medium grained, low plastic Clayey SAND				7.00	5/30			P-6	7.00					7.00
8.00					gray	Loose to medium dense	Clayey SAND	Loose to medium dense, gray, moist to wet, fine to medium grained, low plastic Clayey SAND				8.00	13/30			P-7	8.00					8.00
9.00					gray	Loose to medium dense	Clayey SAND	Loose to medium dense, gray, moist to wet, fine to medium grained, low plastic Clayey SAND				9.00	14/30			P-8	9.00					9.00
10.00	-14.40	10.00	4.00		gray	Medium dense	Silty SAND	Medium dense, gray, moist, fine to medium grained, Silty SAND				10.00	19/30			P-9	10.00					10.00
11.00					gray	Medium dense	Silty SAND	Medium dense, gray, moist, fine to medium grained, Silty SAND				11.00	22/30			P-10	11.00					11.00
12.00					gray	Medium dense	Silty SAND	Medium dense, gray, moist, fine to medium grained, Silty SAND				12.00	28/30			P-11	12.00					12.00
13.00					gray	Medium dense	Silty SAND	Medium dense, gray, moist, fine to medium grained, Silty SAND				13.00	18/30			P-12	13.00					13.00
14.00					gray	Medium dense	Silty SAND	Medium dense, gray, moist, fine to medium grained, Silty SAND				14.00	12/30			P-13	14.00					14.00
15.00					gray	Medium dense	Silty SAND	Medium dense, gray, moist, fine to medium grained, Silty SAND				15.00	21/30			P-14	15.00					15.00
16.00	-20.40	16.00	6.00		gray	Medium dense to dense	Clayey SAND	Medium dense to dense, gray, moist, fine to medium grained, low plastic Clayey SAND	15.11.16	Ø112	16.00	13/30				P-15	16.00					16.00
17.00					gray	Medium dense to dense	Clayey SAND	Medium dense to dense, gray, moist, fine to medium grained, low plastic Clayey SAND				17.00	12/30			P-16	17.00					17.00
18.00					gray	Medium dense to dense	Clayey SAND	Medium dense to dense, gray, moist, fine to medium grained, low plastic Clayey SAND				18.00	19/30			P-17	18.00					18.00
19.00					gray	Medium dense to dense	Clayey SAND	Medium dense to dense, gray, moist, fine to medium grained, low plastic Clayey SAND				19.00	15/30			P-18	19.00					19.00
20.00					gray	Medium dense to dense	Clayey SAND	Medium dense to dense, gray, moist, fine to medium grained, low plastic Clayey SAND				20.00	14/30			P-19	20.00					20.00
21.00					gray	Medium dense to dense	Clayey SAND	Medium dense to dense, gray, moist, fine to medium grained, low plastic Clayey SAND				21.00	19/30			P-20	21.00					21.00
22.00					gray	Medium dense to dense	Clayey SAND	Medium dense to dense, gray, moist, fine to medium grained, low plastic Clayey SAND				22.00	12/30			P-21	22.00					22.00
23.00					gray	Medium dense to dense	Clayey SAND	Medium dense to dense, gray, moist, fine to medium grained, low plastic Clayey SAND	16.11.16	Ø112	23.00	31/30				P-22	23.00					23.00
24.00					gray	Medium dense to dense	Clayey SAND	Medium dense to dense, gray, moist, fine to medium grained, low plastic Clayey SAND				24.00	25/30			P-23	24.00					24.00
25.00	-29.40	25.00	9.00		gray	Medium dense to dense	Silty SAND	Medium dense to dense, gray, moist, fine to medium grained, Silty SAND				25.00	20/30			P-24	25.00					25.00
26.00					gray	Medium dense to dense	Silty SAND	Medium dense to dense, gray, moist, fine to medium grained, Silty SAND				26.00	24/30			P-25	26.00					26.00
27.00					gray	Medium dense to dense	Silty SAND	Medium dense to dense, gray, moist, fine to medium grained, Silty SAND				27.00	34/30			P-26	27.00					27.00
28.00					gray	Medium dense to dense	Silty SAND	Medium dense to dense, gray, moist, fine to medium grained, Silty SAND				28.00	23/30			P-27	28.00					28.00
29.00	-33.40	29.00	4.00		gray	Medium dense	Clayey SAND	Medium dense, gray, moist, fine to medium grained, low plastic Clayey SAND				29.00	13/30			P-28	29.00					29.00
30.00					gray	Medium dense	Clayey SAND	Medium dense, gray, moist, fine to medium grained, low plastic Clayey SAND				30.00	18/30			P-29	30.00					30.00
31.00					gray	Medium dense	Clayey SAND	Medium dense, gray, moist, fine to medium grained, low plastic Clayey SAND				31.00	18/30			P-29	30.45					30.45

出典: JICA 調査団

図 4.1.19 ボーリング調査結果 BH-BD-01(1)



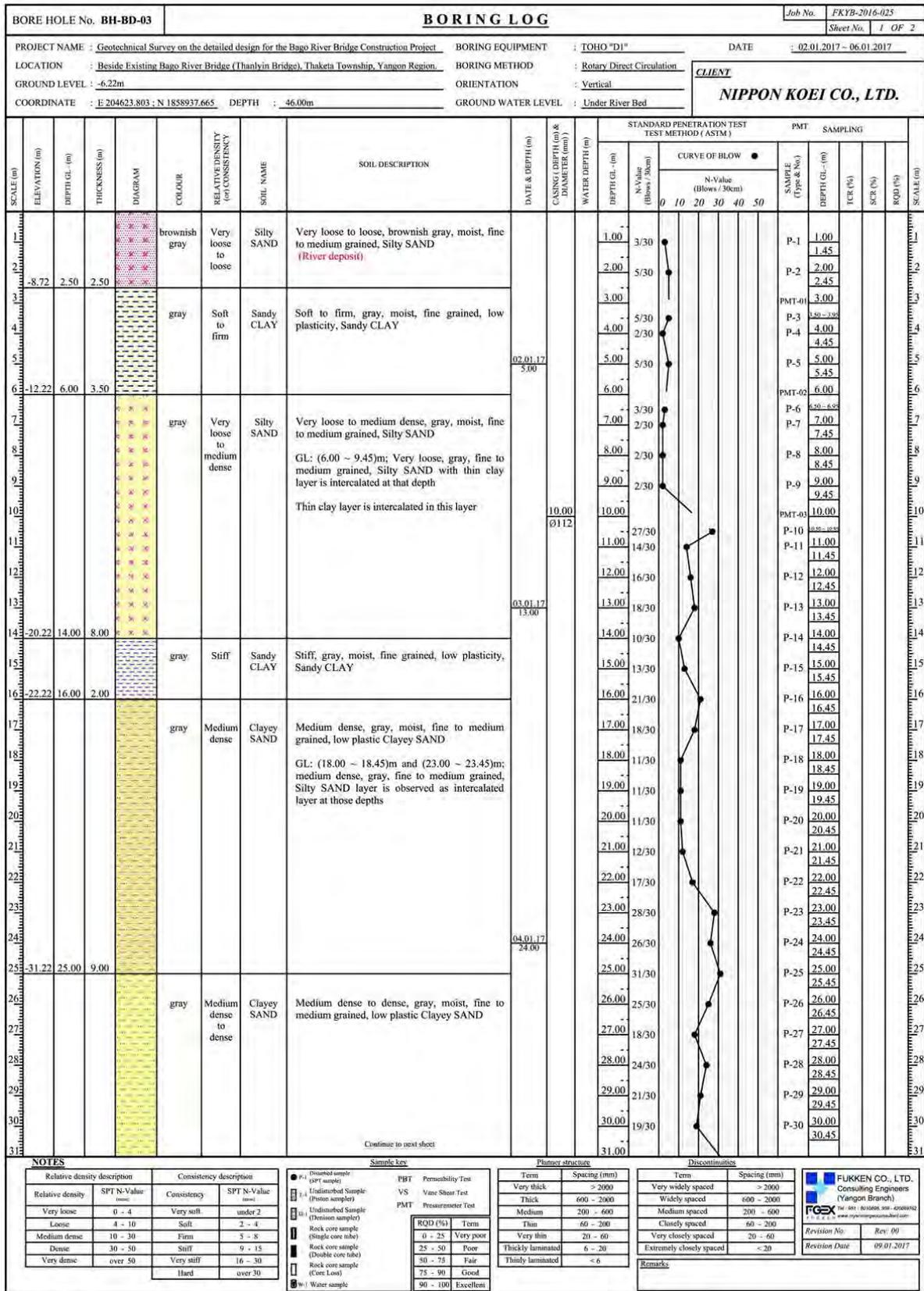
出典: JICA 調査団

図 4.1.21 ボーリング調査結果 BH-BD-02(1)

BORE HOLE No. BH-BD-02		BORING LOG				Job No.	FKYB-2016-025												
						Sheet No.	2 OF 2												
PROJECT NAME : Geotechnical Survey on the detailed design for the Bago River Bridge Construction Project				BORING EQUIPMENT : TOHO "D1"		DATE : 15.11.2016 - 19.11.2016													
LOCATION : Beside Existing Bago River Bridge (Thanlyin Bridge), Thaketa Township, Yangon Region				BORING METHOD : Rotary Direct Circulation		CLIENT													
GROUND LEVEL : -5.45m				ORIENTATION : Vertical		NIPPON KOEI CO., LTD.													
COORDINATE : E 204600.791 ; N 1858985.918		DEPTH : 49.00m		GROUND WATER LEVEL : Under River Bed															
SCALE (m)	ELEVATION (m)	DEPTH (GL - (m))	THICKNESS (m)	DIAGRAM	COLOUR	RELATIVE DENSITY (%) CONSISTENCY	SOIL NAME	SOIL DESCRIPTION	DATE & DEPTH (m)	CASING (DEPTH (m) & DIAMETER (mm))	WATER DEPTH (m)	STANDARD PENETRATION TEST TEST METHOD (ASTM)		SAMPLING				SCALE (m)	
												DEPTH (GL - (m))	N-Value (Blows / 30cm)	SAMPLE (Type & No.)	DEPTH (GL - (m))	TCR (%)	SCR (%)		ROD (%)
31.00	-38.45	33.00	4.00	[Yellow pattern]	gray	Medium dense to dense	Clayey SAND	Medium dense to dense, gray, moist, fine to medium grained, Clayey SAND	18.11.16	39.00		31.00	33/30	P-30	31.00				31
32.00												32.00	28/30	P-31	31.45				32
33.00												33.00	50/25	P-32	32.00				33
34.00												34.00	26/30	P-33	32.45				34
35.00												35.00	50/29	P-34	33.00				35
36.00												36.00	50/29	P-35	33.40				36
37.00												37.00	50/27	P-36	34.00				37
38.00												38.00	50/28	P-37	34.45				38
39.00	-44.45	39.00	6.00	[Green pattern]	reddish brown to yellowish brown	Very dense	Silty SAND	Very dense, gray, moist, fine to medium grained, Silty SAND GL: (34.00 ~ 34.45)m, medium dense, gray, fine to medium grained, low plastic Clayey SAND layer is observed as intercalated layer at that depth	18.11.16	39.00		39.00	50/20	P-38	35.00				39
40.00												40.00	42/30	P-39	35.44				40
41.00												41.00	50/25	P-40	36.00				41
42.00												42.00	50/28	P-41	36.44				42
43.00												43.00	26/30	P-42	37.00				43
44.00	-49.45	44.00	5.00	[Green pattern]	yellowish brown to reddish brown	Very dense	Clayey SAND	Medium dense to very dense, reddish brown to yellowish brown, moist, fine to medium grained, low plastic Clayey SAND GL: (39.00 ~ 39.45)m, the color of Clayey SAND layer is changed to light gray	18.11.16	39.00		44.00	50/29	P-43	37.42				44
45.00												45.00	50/29	P-44	38.00				45
46.00												46.00	50/20	P-45	38.43				46
47.00												47.00	50/28	P-46	39.00				47
48.00												48.00	50/29	P-47	39.33				48
49.00	-54.89	49.44	5.44	[Green pattern]	yellowish brown to reddish brown	Very dense	Clayey SAND	Very dense, yellowish brown to reddish brown, moist, fine to coarse grained, low plastic Clayey SAND GL: (44.00 ~ 44.44)m, trace of fine gravel is including at that depth	19.11.16	49.00		49.00	50/29	P-48	40.00				49
50.00								This borehole is terminated at 49.00m, according to the termination criteria.				50.00			40.45				50
51.00												51.00			41.00				51
52.00												52.00			41.40				52
53.00												53.00			42.00				53
54.00												54.00			42.43				54
55.00												55.00			43.00				55
56.00												56.00			43.45				56
57.00												57.00			44.00				57
58.00												58.00			44.44				58
59.00												59.00			45.00				59
60.00												60.00			45.44				60
61.00												61.00			46.00				61

出典: JICA 調査団

図 4.1.22 ボーリング調査結果 BH-BD-02(2)



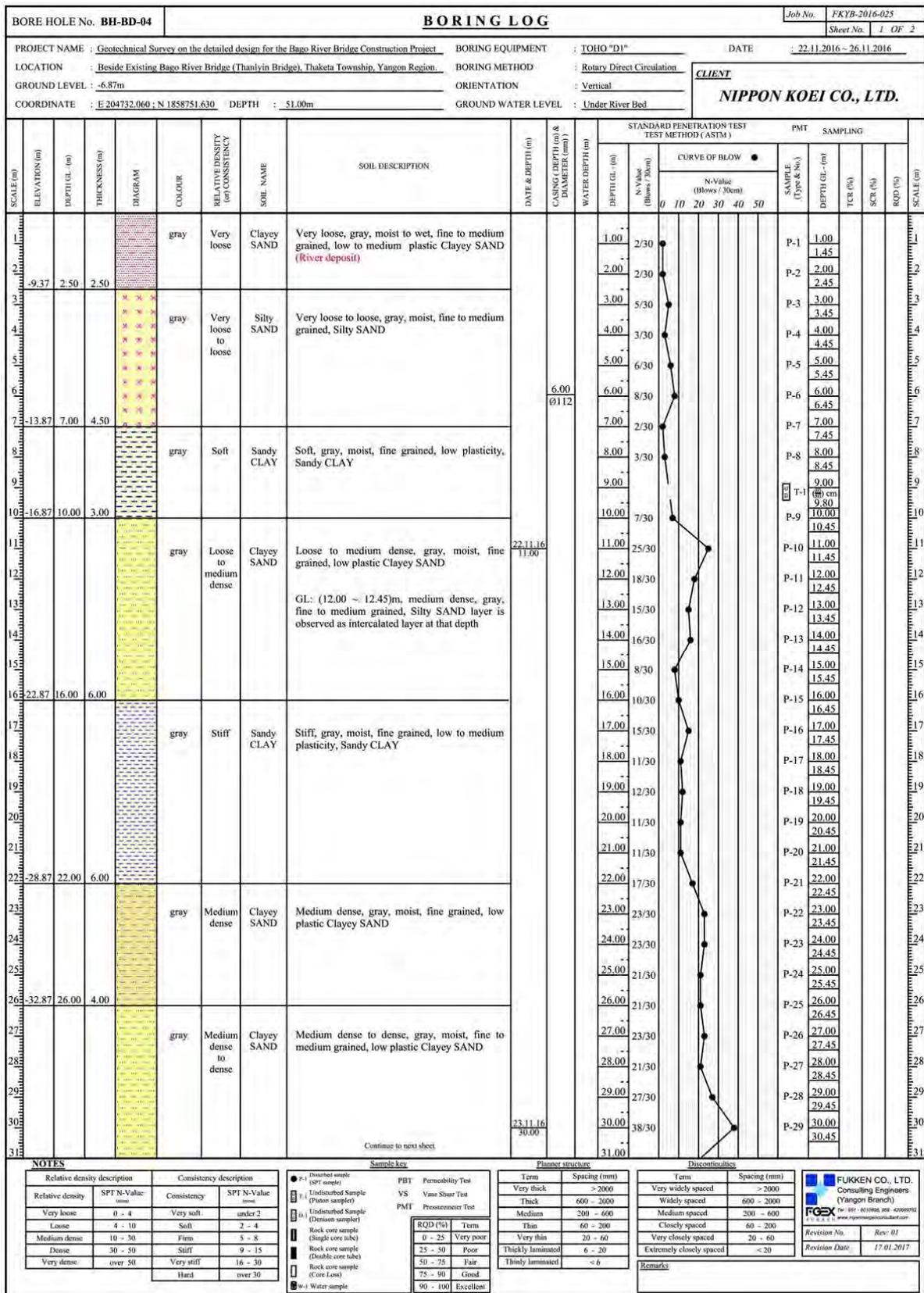
出典: JICA 調査団

図 4.1.23 ボーリング調査結果 BH-BD-03(1)

BORING LOG										Job No.	FKYB-2016-025											
										Sheet No.	2 OF 2											
PROJECT NAME : Geotechnical Survey on the detailed design for the Bago River Bridge Construction Project					BORING EQUIPMENT : TOHO "D1"		DATE : 02.01.2017 - 06.01.2017															
LOCATION : Beside Existing Bago River Bridge (Thunlyin Bridge), Thaketa Township, Yangon Region					BORING METHOD : Rotary Direct Circulation		CLIENT															
GROUND LEVEL : -6.22m					ORIENTATION : Vertical		NIPPON KOEI CO., LTD.															
COORDINATE : E 204623.803 ; N 1858937.665 DEPTH : 46.00m					GROUND WATER LEVEL : Under River Bed																	
SCALE (m)	ELEVATION (m)	DEPTH (GL - (m))	THICKNESS (m)	DIAGRAM	COLOUR	RELATIVE DENSITY (%) CONSISTENCY	SOIL NAME	SOIL DESCRIPTION	DATE & DEPTH (m)	CASING (DEPTH (m) & DIAMETER (mm))	WATER DEPTH (m)	STANDARD PENETRATION TEST TEST METHOD (ASTM)				SAMPLING						
												DEPTH (GL - (m))	N-Value (Blows / 30cm)	CURVE OF BLOW		SAMPLE (Type & No.)	DEPTH (GL - (m))	TCR (%)	SCR (%)	RQD (%)	SCALE (m)	
31.00	-40.22	34.00	9.00	[Diagram]	gray	Medium dense to dense	Clayey SAND	Medium dense to dense, gray, moist, fine to medium grained, low plastic Clayey SAND				31.00	31/30				P-31	31.00				
32.00												32.00	36/30				P-32	32.00				
33.00												33.00	34/30				P-33	33.00				
34.00												34.00	26/30				P-34	34.00				
35.00									05.01.17			35.00	50/29				P-35	35.00				
36.00									37.00			36.00	22/30				P-36	36.00				
37.00												37.00	33/30				P-37	37.00				
38.00												38.00	50/26				P-38	38.00				
39.00												39.00	34/30				P-39	39.00				
40.00	-47.22	41.00	7.00	[Diagram]	gray	Medium dense to very dense	Silty SAND	Medium dense to very dense, gray, moist, fine to medium grained, Silty SAND				40.00	50/29				P-40	40.00				
41.00												41.00	50/28				P-41	41.00				
42.00												42.00	50/28				P-42	42.00				
43.00												43.00	50/29				P-43	43.00				
44.00												44.00	50/25				P-44	44.00				
45.00												45.00	50/25				P-45	45.00				
46.00	-52.60	46.38	5.38	[Diagram]	greenish gray to yellowish brown	Very dense	Clayey SAND	Very dense, greenish gray to yellowish brown, moist, fine to medium grained, low plastic Clayey SAND GL: (45.00 ~ 46.38)m; Clayey SAND with fine to medium gravel is observed at that depth	06.01.17			46.00	50/23				P-46	46.00				
47.00								This borehole is terminated at 46.00m, according to the termination criteria.				47.00										
48.00												48.00										
49.00												49.00										
50.00												50.00										
51.00												51.00										
52.00												52.00										
53.00												53.00										
54.00												54.00										
55.00												55.00										
56.00												56.00										
57.00												57.00										
58.00												58.00										
59.00												59.00										
60.00												60.00										
61.00												61.00										

出典: JICA 調査団

図 4.1.24 ボーリング調査結果 BH-BD-03(2)



出典: JICA 調査団

図 4.1.25 ボーリング調査結果 BH-BD-04(1)

BORE HOLE No. BH-BD-04		BORING LOG				Job No. FKYB-2016-025																	
PROJECT NAME : Geotechnical Survey on the detailed design for the Bago River Bridge Construction Project		BORING EQUIPMENT : TOHO "D1"		DATE : 22.11.2016 - 26.11.2016																			
LOCATION : Beside Existing Bago River Bridge (Thunlvin Bridge), Thaketa Township, Yangon Region		BORING METHOD : Rotary Direct Circulation		CLIENT																			
GROUND LEVEL : -6.87m		ORIENTATION : Vertical		NIPPON KOEI CO., LTD.																			
COORDINATE : E 204732.060 ; N 1858751.630		DEPTH : 51.00m		GROUND WATER LEVEL : Under River Bed																			
SCALE (m)	ELEVATION (m)	DEPTH (GL - (m))	THICKNESS (m)	DIAGRAM	COLOUR	RELATIVE DENSITY (ρ) (% CONSISTENCY)	SOIL NAME	SOIL DESCRIPTION	DATE & DEPTH (m)	CASING DEPTH (m) & DIAMETER (mm)	WATER DEPTH (m)	STANDARD PENETRATION TEST TEST METHOD (ASTM)				SAMPLING			SCALE (m)				
												DEPTH (GL - (m))	N-Value (Blows / 30cm)	SAMPLE (Type & No.)	DEPTH (GL - (m))	TCR (%)	SCR (%)	RQD (%)					
													0	10	20	30	40	50					
31.12					gray	Medium dense to dense	Clayey SAND	Medium dense to dense, gray, moist, fine to medium grained, low plastic Clayey SAND					31.00	21/30					P-30	31.00			31
32													31.45							31.45			32
32.5													32.00	20/30					P-31	32.00			33
33													32.45							32.45			34
33.5													33.00	27/30					P-32	33.00			35
34													33.45							33.45			36
34.5													34.00	34/30					P-33	34.00			37
35													34.45							34.45			38
35.5													35.00	50/30					P-34	35.00			39
36													35.45							35.45			40
36.5													36.00	40/30					P-35	36.00			41
37	-43.87	37.00	11.00										36.45							36.45			42
37.5													37.00	44/30					P-36	37.00			43
38					gray	Dense to very dense	Silty SAND	Dense to very dense, gray, moist, fine to medium grained, Silty SAND						37.45						37.45			44
38.5													38.00	33/30					P-37	38.00			45
39													38.45							38.45			46
39.5													39.00	50/20					P-38	39.00			47
40													39.35							39.35			48
40.5									24.11.16				40.00	50/30					P-39	40.00			49
41									40.00				40.45							40.45			50
41.5													41.00	31/30					P-40	41.00			51
42	-48.87	42.00	5.00										41.45							41.45			52
42.5													42.00	41/30					P-41	42.00			53
43					greenish gray	Dense to very dense	Clayey SAND	Dense to very dense, greenish gray, moist, fine to medium grained, low plastic Clayey SAND						42.45						42.45			54
43.5													43.00	50/28					P-42	43.00			55
44													43.43							43.43			56
44.5													44.00	50/29					P-43	44.00			57
45													44.44							44.44			58
45.5													45.00	42/30					P-44	45.00			59
46	-52.87	46.00	4.00										45.45							45.45			60
46.5													46.00	50/30					P-45	46.00			61
47					yellowish brown	Dense to very dense	Clayey SAND	Dense to very dense, yellowish brown, moist, fine to medium grained, low plastic Clayey SAND						46.45						46.45			62
47.5													47.00	50/30					P-46	47.00			63
48													47.45							47.45			64
48.5													48.00	50/30					P-47	48.00			65
49													48.45							48.45			66
49.5													49.00	50/27					P-48	49.00			67
50													49.42							49.42			68
50.5													50.00	50/27					P-49	50.00			69
51	-58.25	51.38	5.38										50.42							50.42			70
51.5													51.00	50/23					P-50	51.00			71
52								This borehole is terminated at 51.00m, according to the termination criteria.					51.38							51.38			72
52.5																							73
53																							74
53.5																							75
54																							76
54.5																							77
55																							78
55.5																							79
56																							80
56.5																							81
57																							82
57.5																							83
58																							84
58.5																							85
59																							86
59.5																							87
60																							88
60.5																							89
61																							90

出典: JICA 調査団

図 4.1.26 ボーリング調査結果 BH-BD-04(2)

BORE HOLE No. BH-BD-05										BORING LOG										Job No. FKYB-2016-025			
PROJECT NAME : Geotechnical Survey on the detailed design for the Bago River Bridge Construction Project										BORING EQUIPMENT : TOHO "D1"										DATE : 22.11.2016 - 26.11.2016			
LOCATION : Beside Existing Bago River Bridge (Thanlyin Bridge), Thaketa Township, Yangon Region.										BORING METHOD : Rotary Direct Circulation										CLIENT			
GROUND LEVEL : -6.90m										ORIENTATION : Vertical										NIPPON KOEI CO., LTD.			
COORDINATE : E 204790.571 ; N 1858656.661 DEPTH : 53.00m										GROUND WATER LEVEL : Under River Bed													
SCALE (m)	ELEVATION (m)	DEPTH GL. (m)	THICKNESS (m)	DIAGRAM	COLOUR	RELATIVE DENSITY (%)	CONSISTENCY	SOIL NAME	SOIL DESCRIPTION	DATE & DEPTH (m)	CASING DEPTH (m) & DIAMETER (mm)	WATER DEPTH (m)	STANDARD PENETRATION TEST TEST METHOD (ASTM)				SAMPLING						
													DEPTH GL. (m)	N-Value (Blows / 30cm)	CURVE OF BLOW		SAMPLE (Type & No.)	DEPTH GL. (m)	TCR (%)	SCR (%)	ROD (%)	SCALE (m)	
31					gray	Medium dense to very dense		Clayey SAND	Medium dense to very dense, gray, moist, fine to medium grained, low plastic Clayey SAND				31.00	50/24			P-29	31.00					31
32													32.00	19/30			P-30	32.00					32
33													33.00	39/30			P-31	33.00					33
34													34.00	34/30			P-32	34.00					34
35													35.00	26/30			P-33	35.00					35
36	-42.90	36.00	10.00										36.00	50/29			P-34	36.00					36
37					gray	Very dense to dense		Silty SAND	Very dense to dense, gray, moist, fine to medium grained, Silty SAND	24.11.16			37.00	50/27			P-35	37.00					37
38													38.00	50/29			P-36	38.00					38
39													39.00	50/29			P-37	39.00					39
40													40.00	37/30			P-38	40.00					40
41													41.00	43/30			P-39	41.00					41
42	-48.90	42.00	6.00										42.00	44/30			P-40	42.00					42
43					greenish gray to yellowish brown	Dense to very dense		Clayey SAND	Dense to very dense, greenish gray to yellowish brown, moist, fine to medium grained, low plastic Clayey SAND				43.00	50/29			P-41	43.00					43
44													44.00	40/30			P-42	44.00					44
45													45.00	50/30			P-43	45.00					45
46													46.00	50/30			P-44	46.00					46
47													47.00	36/30			P-45	47.00					47
48	-54.90	48.00	6.00										48.00	50/29			P-46	48.00					48
49					yellowish brown	Very dense		Clayey SAND	Very dense, yellowish brown, moist, fine to medium grained, low plastic Clayey SAND	25.11.16			49.00	50/29			P-47	49.00					49
50													50.00	50/28			P-48	50.00					50
51													51.00	50/27			P-49	51.00					51
52													52.00	50/29			P-50	52.00					52
53	-60.30	53.40	5.40							26.11.16			53.00	50/25			P-51	53.00					53
54									This borehole is terminated at 53.00m, according to the termination criteria.														
55													55.00										55
56													56.00										56
57													57.00										57
58													58.00										58
59													59.00										59
60													60.00										60
61													61.00										61

Relative density description		Consistency description		Sample keys		Permeability Test		Placer structure		Discontinuities	
Relative density	SPT N-Value (cm)	Consistency	SPT N-Value (cm)	Symbol	Description	Term	Spacing (mm)	Term	Spacing (mm)		
Very loose	0 - 4	Very soft	under 2	○	Disturbed sample (SPT sampler)	Very thick	> 2000	Very widely spaced	> 2000		
Loose	4 - 10	Soft	2 - 4	□	Undisturbed Sample (Piston sampler)	Thick	600 - 2000	Widely spaced	600 - 2000		
Medium dense	10 - 30	Firm	5 - 8	△	Undisturbed Sample (Distress sampler)	Medium	200 - 600	Medium spaced	200 - 600		
Dense	30 - 50	Stiff	9 - 15	◇	Rock core sample (Single core tube)	Thin	60 - 200	Closely spaced	60 - 200		
Very dense	over 50	Very stiff	16 - 30	●	Rock core sample (Double core tube)	Very thin	20 - 60	Very closely spaced	20 - 60		
		Hard	over 30	■	Rock core sample (Core Loss)	Thickly laminated	6 - 20	Extremely closely spaced	< 20		
				○	Water sample	Thinly laminated	< 6				

ROD (%)	Term
0 - 25	Very poor
25 - 50	Poor
50 - 75	Fair
75 - 90	Good
90 - 100	Excellent

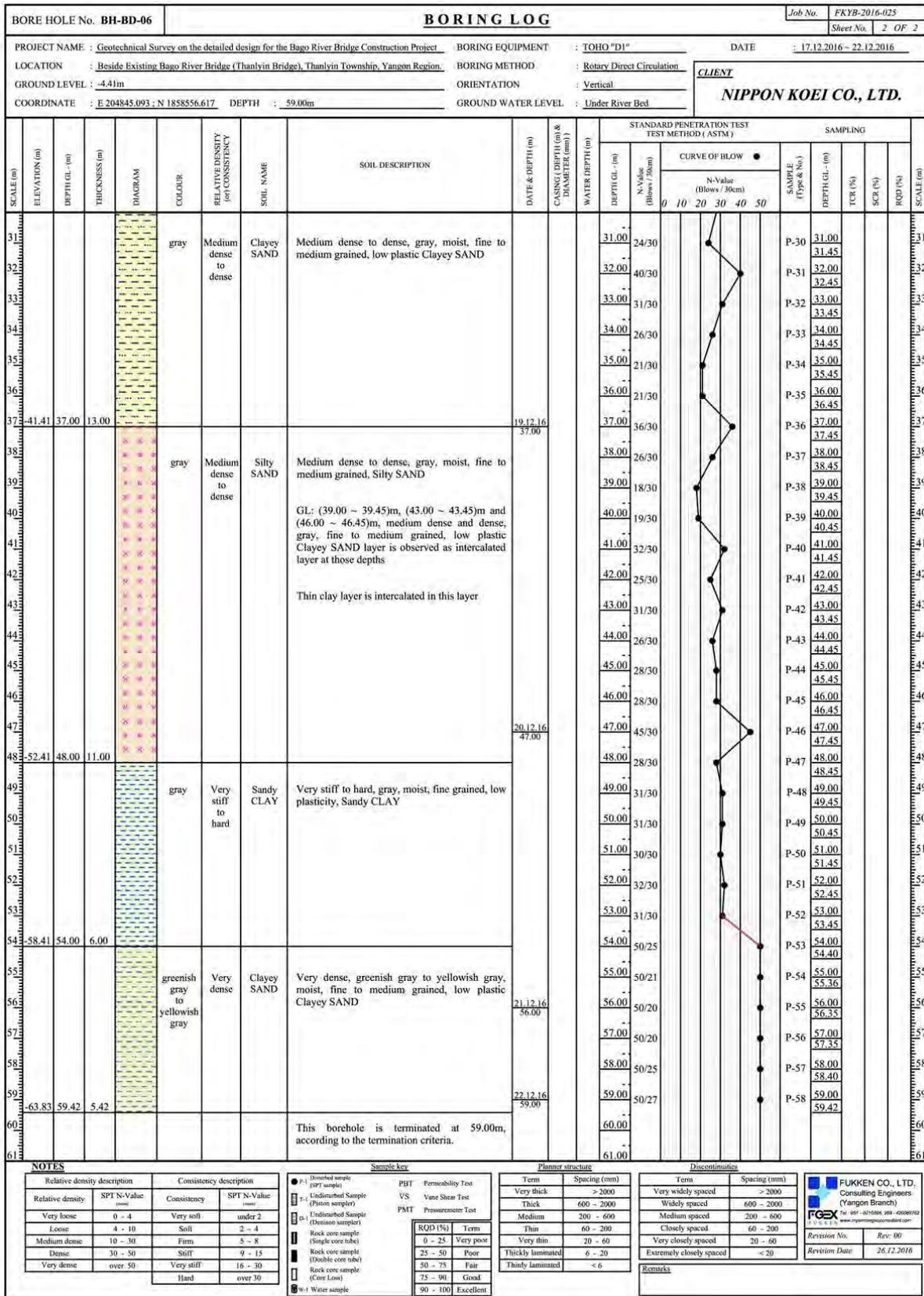
Term	Spacing (mm)
Very thick	> 2000
Thick	600 - 2000
Medium	200 - 600
Thin	60 - 200
Very thin	20 - 60
Thickly laminated	6 - 20
Thinly laminated	< 6

Term	Spacing (mm)
Very widely spaced	> 2000
Widely spaced	600 - 2000
Medium spaced	200 - 600
Closely spaced	60 - 200
Very closely spaced	20 - 60
Extremely closely spaced	< 20

Revision No.	Rev. 00
Revision Date	12.12.2016

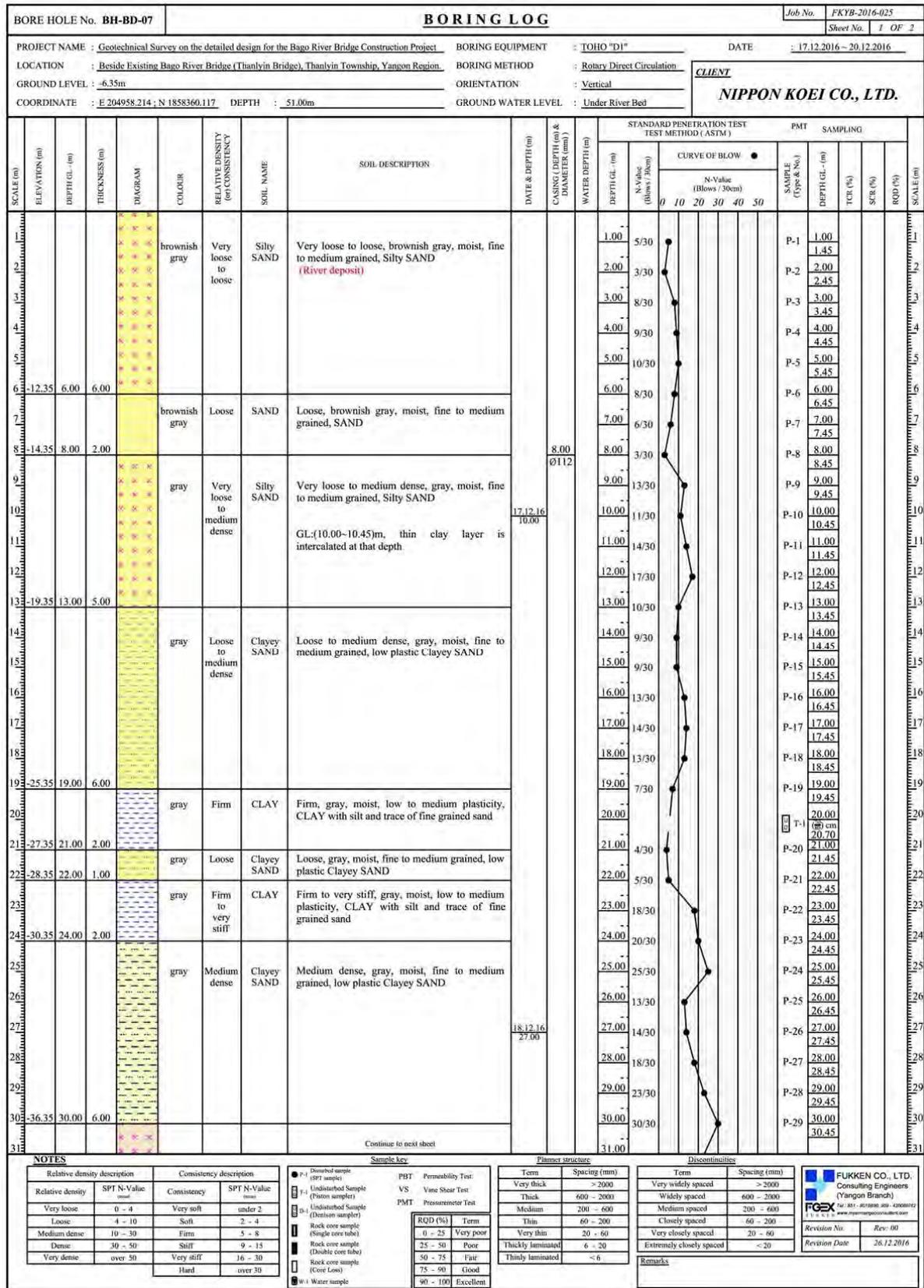
出典: JICA 調査団

図 4.1.28 ボーリング調査結果 BH-BD-05(2)



出典: JICA 調査団

図 4.1.30 ボーリング調査結果 BH-BD-06(2)



出典: JICA 調査団

図 4.1.31 ボーリング調査結果 BH-BD-07(1)

BORE HOLE No. BH-BD-07										BORING LOG										Job No. FKYB-2016-025		
PROJECT NAME : Geotechnical Survey on the detailed design for the Bago River Bridge Construction Project										BORING EQUIPMENT : TOHO "D1"										DATE : 17.12.2016 ~ 20.12.2016		
LOCATION : Beside Existing Bago River Bridge (Thanlyin Bridge), Thanlyin Township, Yangon Region										BORING METHOD : Rotary Direct Circulation										CLIENT		
GROUND LEVEL : -6.35m										ORIENTATION : Vertical										NIPPON KOEI CO., LTD.		
COORDINATE : E 204958.214 ; N 1858360.117 DEPTH : 51.00m										GROUND WATER LEVEL : Under River Bed												
SCALE (m)	ELEVATION (m)	DEPTH (GL - (m))	THICKNESS (m)	DIAGRAM	COLOUR	RELATIVE DENSITY (97 CONSISTENCY)	SOIL NAME	SOIL DESCRIPTION	DATE & DEPTH (m)	CASING (DEPTH (m) & DIAMETER (mm))	WATER DEPTH (m)	STANDARD PENETRATION TEST TEST METHOD (ASTM)					SAMPLING					
												DEPTH (m)	N-Value (Blows / 30cm)	CURVE OF BLOW			SAMPLE (Type & No.)	DEPTH (GL - (m))	TCR (%)	SCR (%)	RQD (%)	SCALE (m)
31					gray	Medium dense to dense	Silty SAND	Medium dense to dense, gray, moist, fine to medium grained, Silty SAND	19.12.16 41.00			31.00	23/30				P-30	31.00				31
32												32.00	24/30				P-31	31.45				32
33								GL: (36.00 ~ 36.45)m and (38.00 ~ 38.45)m, dense, gray, fine to medium grained, low plastic Clayey SAND layer is observed as intercalated layer at those depths				33.00	25/30				P-32	32.00				33
34								Thin clay layer is intercalated in this layer				34.00	30/30				P-33	32.45				34
35												35.00	38/30				P-34	33.00				35
36												36.00	31/30				P-35	33.45				36
37												37.00	34/30				P-36	34.00				37
38												38.00	31/30				P-37	34.45				38
39												39.00	29/30				P-38	35.00				39
40												40.00	35/30				P-39	35.45				40
41												41.00	30/30				P-40	36.00				41
42												42.00	29/30				P-41	36.45				42
43												43.00	31/30				P-42	37.00				43
44	-50.35	44.00	14.00									44.00	40/30				P-43	37.45				44
45					gray	Hard	Sandy CLAY	Hard, gray, moist, fine grained, low plasticity, Sandy CLAY				45.00	50/30				P-44	38.00				45
46	-52.35	46.00	2.00									46.00	50/29				P-45	38.45				46
47					greenish gray to yellowish gray	Very dense	Clayey SAND	Very dense, greenish gray to yellowish gray, moist, fine to medium grained, low plastic Clayey SAND				47.00	50/29				P-46	39.00				47
48												48.00	50/26				P-47	39.45				48
49												49.00	50/28				P-48	40.00				49
50												50.00	50/25				P-49	40.45				50
51	-57.75	51.40	5.40					This borehole is terminated at 51.00m, according to the termination criteria.	20.12.16 51.00			51.00	50/25				P-50	41.00				51
52												52.00										52
53												53.00										53
54												54.00										54
55												55.00										55
56												56.00										56
57												57.00										57
58												58.00										58
59												59.00										59
60												60.00										60
61												61.00										61

出典: JICA 調査団

図 4.1.32 ボーリング調査結果 BH-BD-07(2)

BORE HOLE No. BH-BD-08										BORING LOG										Job No. FKYB-2016-025		
PROJECT NAME : Geotechnical Survey on the detailed design for the Bago River Bridge Construction Project										BORING EQUIPMENT : TOHO "D1"										DATE : 24.12.2016 - 29.12.2016		
LOCATION : Beside Existing Bago River Bridge (Thanlyin Bridge), Thaketa Township, Yangon Region										BORING METHOD : Rotary Direct Circulation										CLIENT		
GROUND LEVEL : -6.56m										ORIENTATION : Vertical										NIPPON KOEI CO., LTD.		
COORDINATE : E 205013.754 ; N 1858268.627										DEPTH : 61.00m										GROUND WATER LEVEL : Under River Bed		
SCALE (cm)	ELEVATION (m)	DEPTH (GL - (m))	THICKNESS (m)	DIAGRAM	COLOUR	RELATIVE DENSITY (or) CONSISTENCY	SOIL NAME	SOIL DESCRIPTION	DATE & DEPTH (m)	CASING (DEPTH (m) & DIAMETER (mm))	WATER DEPTH (m)	STANDARD PENETRATION TEST TEST METHOD (ASTM)					SAMPLING					
												DEPTH (GL - (m))	CURVE OF BLOW					SAMPLE (Type & No.)	DEPTH (GL - (m))	TCE (%)	SCR (%)	RQD (%)
N-Value (Blows / 30cm)	0	10	20	30	40	50																
31					gray	Stiff	CLAY	Stiff, gray, moist, low to medium plasticity, CLAY with silt and trace of fine grained sand				31.00	14/30		P-30	31.00						31
32	-38.56	32.00	2.00		gray	Very stiff to stiff	Sandy CLAY	Very stiff to stiff, gray, moist, fine grained, low plasticity, Sandy CLAY				32.00	17/30		P-31	32.00						32
33					gray	Medium dense	Silty SAND	Medium dense, gray, moist, fine to medium grained, Silty SAND	25.12.16			33.00	11/30		P-32	33.00						33
34	-40.56	34.00	2.00		gray	Very stiff	Sandy CLAY	Very stiff, gray, moist, fine grained, low plasticity, Sandy CLAY				34.00	16/30		P-33	34.00						34
35					gray	Medium dense to very dense	Silty SAND	Medium dense to very dense, gray, moist, fine to medium grained, Silty SAND	26.12.16			35.00	23/30		P-34	35.00						35
36					gray	Very stiff	Sandy CLAY	Thin clay layer is intercalated in this layer				36.00	23/30		P-35	36.00						36
37	-43.56	37.00	3.00		gray	Very stiff	Sandy CLAY	Thin clay layer is intercalated in this layer				37.00	25/30		P-36	37.00						37
38					gray	Medium dense to very dense	Silty SAND	Medium dense to very dense, gray, moist, fine to medium grained, Silty SAND	26.12.16			38.00	16/30		P-37	38.00						38
39					gray	Very stiff	Sandy CLAY	Thin clay layer is intercalated in this layer				39.00	25/30		P-38	39.00						39
40					gray	Medium dense to very dense	Silty SAND	Medium dense to very dense, gray, moist, fine to medium grained, Silty SAND				40.00	26/30		P-39	40.00						40
41	-47.56	41.00	4.00		gray	Very stiff	Sandy CLAY	Thin clay layer is intercalated in this layer	26.12.16			41.00	34/30		P-40	41.00						41
42					gray	Medium dense to very dense	Silty SAND	Medium dense to very dense, gray, moist, fine to medium grained, Silty SAND	41.00			42.00	30/30		P-41	42.00						42
43					gray	Very stiff	Sandy CLAY	Thin clay layer is intercalated in this layer				43.00	27/30		P-42	43.00						43
44					gray	Medium dense to very dense	Silty SAND	Medium dense to very dense, gray, moist, fine to medium grained, Silty SAND				44.00	44/30		P-43	44.00						44
45					gray	Very stiff	Sandy CLAY	Thin clay layer is intercalated in this layer				45.00	32/30		P-44	45.00						45
46					gray	Medium dense to very dense	Silty SAND	Medium dense to very dense, gray, moist, fine to medium grained, Silty SAND				46.00	50/30		P-45	46.00						46
47					gray	Very stiff	Sandy CLAY	Thin clay layer is intercalated in this layer				47.00	37/30		P-46	47.00						47
48					gray	Medium dense to very dense	Silty SAND	Medium dense to very dense, gray, moist, fine to medium grained, Silty SAND				48.00	39/30		P-47	48.00						48
49					gray	Very stiff	Sandy CLAY	Thin clay layer is intercalated in this layer	27.12.16			49.00	50/27		P-48	49.00						49
50	-56.56	50.00	9.00		greenish gray to yellowish brown	Very dense	Clayey SAND	Very dense, greenish gray to yellowish brown, moist, fine to medium grained, low plastic Clayey SAND	49.00			50.00	50/26		P-49	50.00						50
51					greenish gray to yellowish brown	Very dense	Clayey SAND	Very dense, greenish gray to yellowish brown, moist, fine to medium grained, low plastic Clayey SAND				51.00	50/28		P-50	51.00						51
52					greenish gray to yellowish brown	Very dense	Clayey SAND	Very dense, greenish gray to yellowish brown, moist, fine to medium grained, low plastic Clayey SAND				52.00	50/15		P-51	52.00						52
53					greenish gray to yellowish brown	Very dense	Clayey SAND	Very dense, greenish gray to yellowish brown, moist, fine to medium grained, low plastic Clayey SAND				53.00	50/28		P-52	53.00						53
54					greenish gray to yellowish brown	Very dense	Clayey SAND	Very dense, greenish gray to yellowish brown, moist, fine to medium grained, low plastic Clayey SAND				54.00	50/28		P-53	54.00						54
55	-61.56	55.00	5.00		yellowish brown	Hard	CLAY	Hard, yellowish brown, moist, low to medium plasticity, CLAY	28.12.16			55.00	45/30		P-54	55.00						55
56					yellowish brown	Very dense	Clayey SAND	Very dense, yellowish brown, moist, fine to medium grained, low plastic Clayey SAND	55.00			56.00	44/30		P-55	56.00						56
57					yellowish brown	Very dense	Clayey SAND	Very dense, yellowish brown, moist, fine to medium grained, low plastic Clayey SAND				57.00	44/30		P-56	57.00						57
58	-64.56	58.00	3.00		yellowish brown	Very dense	Clayey SAND	Very dense, yellowish brown, moist, fine to medium grained, low plastic Clayey SAND				58.00	50/23		P-57	58.00						58
59					yellowish brown	Very dense	Clayey SAND	Very dense, yellowish brown, moist, fine to medium grained, low plastic Clayey SAND				59.00	50/18		P-58	59.00						59
60					yellowish brown	Very dense	Clayey SAND	Very dense, yellowish brown, moist, fine to medium grained, low plastic Clayey SAND				60.00	50/10		P-59	60.00						60
61					yellowish brown	Very dense	Clayey SAND	Very dense, yellowish brown, moist, fine to medium grained, low plastic Clayey SAND				61.00	50/10		P-59	60.25						61

出典: JICA 調査団

図 4.1.34 ボーリング調査結果 BH-BD-08(2)

BORE HOLE No. BH-BD-08		BORING LOG					Job No. FKYB-2016-025															
PROJECT NAME : Geotechnical Survey on the detailed design for the Bago River Bridge Construction Project						BORING EQUIPMENT : TOHO "D1"	DATE : 24.12.2016 - 29.12.2016															
LOCATION : Beside Existing Bago River Bridge (Thanlyin Bridge), Thaketa Township, Yangon Region						BORING METHOD : Rotary Direct Circulation	CLIENT NIPPON KOEI CO., LTD.															
GROUND LEVEL : -6.56m						ORIENTATION : Vertical																
COORDINATE : E 205013.754 ; N 1858268.627			DEPTH : 61.00m		GROUND WATER LEVEL : Under River Bed																	
SCALE (m)	ELEVATION (m)	DEPTH (GL - (m))	THICKNESS (m)	DIAGRAM	COLOUR	RELATIVE DENSITY (ρ) (CONSISTENCY)	SOIL NAME	SOIL DESCRIPTION	DATE & DEPTH (m)	CASING DEPTH (m) & DIAMETER (mm)	WATER DEPTH (m)	STANDARD PENETRATION TEST TEST METHOD (ASTM)					SAMPLING			SCALE (m)		
												DEPTH (GL - (m))	N-Value (Blows / 30cm)	DEPTH (GL - (m))	TCR (%)	SCR (%)	ROD (%)	DEPTH (GL - (m))	DEPTH (GL - (m))		DEPTH (GL - (m))	
61	-67.86	61.30	3.30		yellowish brown	Very dense	Clayey SAND	Very dense, yellowish brown, moist, fine to medium grained, low plastic Clayey SAND	29.12.16 61.00			61.00	50/15				P-60	61.00 61.30				61
62								This borehole is terminated at 61.00m, according to the termination criteria.				62.00										62
63												63.00										63
64												64.00										64
65												65.00										65
66												66.00										66
67												67.00										67
68												68.00										68
69												69.00										69
70												70.00										70
71												71.00										71
72												72.00										72
73												73.00										73
74												74.00										74
75												75.00										75
76												76.00										76
77												77.00										77
78												78.00										78
79												79.00										79
80												80.00										80
81												81.00										81
82												82.00										82
83												83.00										83
84												84.00										84
85												85.00										85
86												86.00										86
87												87.00										87
88												88.00										88
89												89.00										89
90												90.00										90
91												91.00										91

出典: JICA 調査団

図 4.1.35 ボーリング調査結果 BH-BD-08(3)

BORE HOLE No. BH-BD-09										BORING LOG										Job No. FKYB-2016-025		Sheet No. 1 OF 3	
PROJECT NAME : Geotechnical Survey on the detailed design for the Bago River Bridge Construction Project										BORING EQUIPMENT : TOHO "D1"										DATE : 22.12.2016 - 29.12.2016			
LOCATION : Beside Existing Bago River Bridge (Thanlyin Bridge), Thaketa Township, Yangon Region										BORING METHOD : Rotary Direct Circulation										CLIENT			
GROUND LEVEL : -6.97m										ORIENTATION : Vertical										NIPPON KOEI CO., LTD.			
COORDINATE : E 205073.242; N 1858170.312										DEPTH : 62.00m										GROUND WATER LEVEL : Under River Bed			
SCALE (cm)	ELEVATION (m)	DEPTH (GL - (m))	THICKNESS (m)	DIAGRAM	COLOUR	RELATIVE DENSITY (or) CONSISTENCY	SOIL NAME	SOIL DESCRIPTION	DATE & DEPTH (m)	CASING (DEPTH (m) & DIAMETER (mm))	WATER DEPTH (m)	STANDARD PENETRATION TEST TEST METHOD (ASTM)					PMT	SAMPLING	SCALE (m)				
												DEPTH (GL - (m))	N-Value (Blows / 30cm)	CURVE OF BLOW						SAMPLE (Type & No.)	DEPTH (GL - (m))	TCR (%)	SCR (%)
0	-14.97	8.00	8.00		brownish gray	Very loose to loose	Silty SAND	Very loose to loose, brownish gray, moist, fine to medium grained, Silty SAND (River deposit)	22.12.16 6.50			1.00	2/30				P-1	1.00				1	
1												1.45	1/45									2	
2												2.00	4/30					P-2	2.00			3	
3												2.45										4	
4												3.00	2/30					PMT-01	3.00			5	
5												3.30	3/30					P-3	3.30			6	
6												3.45						P-4	4.00			7	
7												3.50							4.45			8	
8												5.00	3/30					P-5	5.00			9	
9												5.45							5.45			10	
10												6.00						PMT-02	6.00			11	
11												6.50	7/30					P-6	6.50			12	
12												7.00	7/30					P-7	7.00			13	
13												7.45							7.45			14	
14												8.00	32/30					P-8	8.00			15	
15												8.45							8.45			16	
16												9.00	18/30					P-9	9.00			17	
17												9.45							9.45			18	
18												10.00						PMT-03	10.00			19	
19												10.85	16/30					P-10	10.85			20	
20												11.00	17/30					P-11	11.00			21	
21												11.45							11.45			22	
22												12.00	16/30					P-12	12.00			23	
23												12.45							12.45			24	
24												13.00	6/30					P-13	13.00			25	
25												13.45							13.45			26	
26												14.00	11/30					P-14	14.00			27	
27												14.45							14.45			28	
28												15.00	28/30					P-15	15.00			29	
29												15.45							15.45			30	
30												16.00	22/30					P-16	16.00			31	
31												16.45							16.45			32	
32												17.00	20/30					P-17	17.00			33	
33												17.45							17.45			34	
34												18.00	14/30					P-18	18.00			35	
35												18.45							18.45			36	
36												19.00	6/30					P-19	19.00			37	
37												19.45							19.45			38	
38												20.00	6/30					T-1	20.00			39	
39												20.70							20.70			40	
40												21.00							21.00			41	
41												21.45							21.45			42	
42												22.00							22.00			43	
43												22.75							22.75			44	
44												23.00							23.00			45	
45												23.45							23.45			46	
46												24.00	12/30					P-22	24.00			47	
47												24.45							24.45			48	
48												25.00	23/30					P-23	25.00			49	
49												25.45							25.45			50	
50												26.00	27/30					P-24	26.00			51	
51												26.45							26.45			52	
52												27.00							27.00			53	
53												27.45	13/30					P-25	27.45			54	
54												28.00							28.00			55	
55												28.45	10/30					P-26	28.00			56	
56												28.85							28.45			57	
57												29.00	11/30					P-27	29.00			58	
58												29.45							29.45			59	
59												30.00	10/30					P-28	30.00			60	
60												30.45							30.45			61	

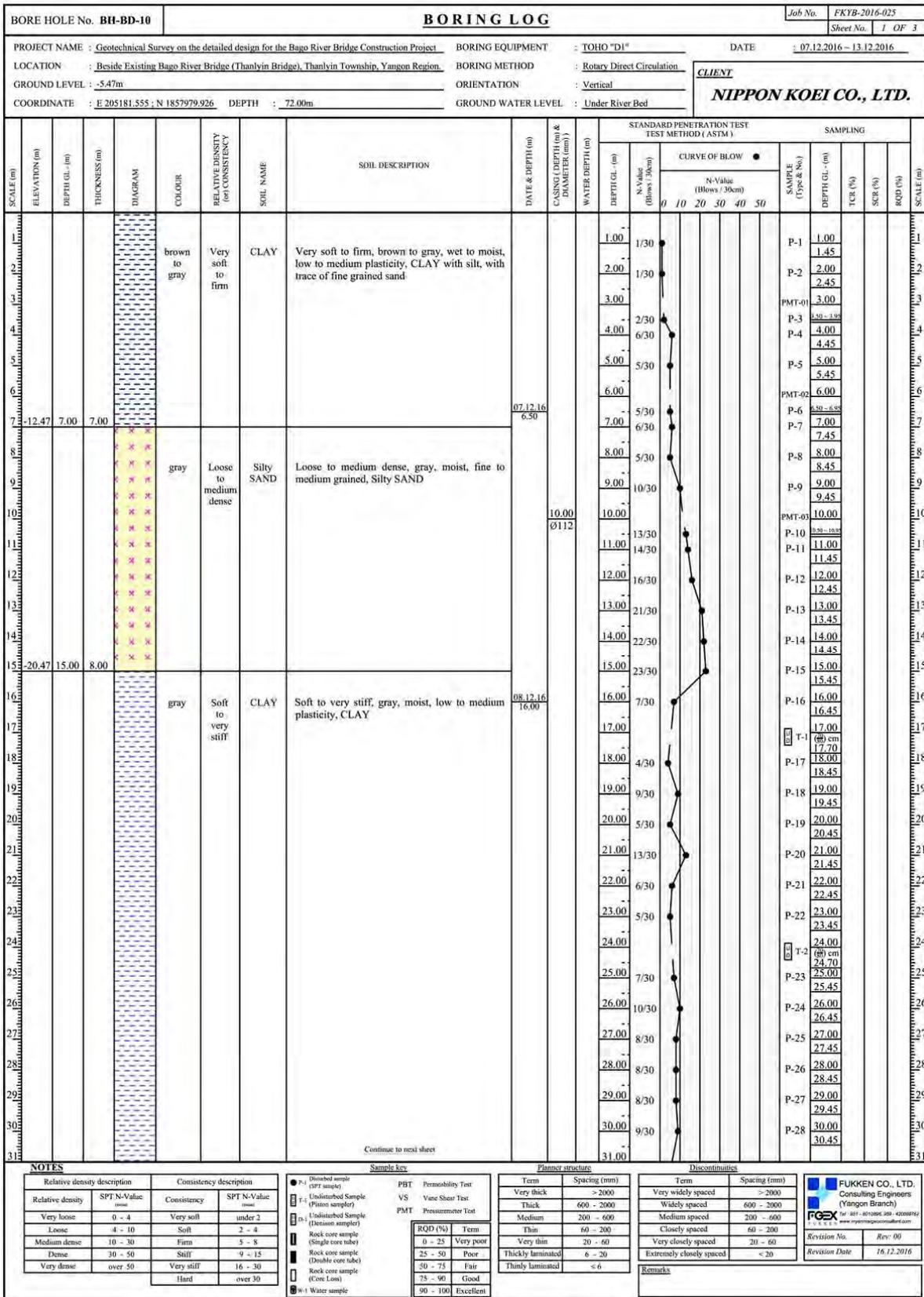
出典: JICA 調査団

図 4.1.36 ボーリング調査結果 BH-BD-09(1)

BORE HOLE No. BH-BD-09		BORING LOG										Job No. FKYB-2016-025											
PROJECT NAME : Geotechnical Survey on the detailed design for the Bago River Bridge Construction Project												BORING EQUIPMENT : TOHO "D1"	DATE : 22.12.2016 - 29.12.2016										
LOCATION : Beside Existing Bago River Bridge (Thanlyin Bridge), Thaketa Township, Yangon Region.												BORING METHOD : Rotary Direct Circulation	CLIENT NIPPON KOEI CO., LTD.										
GROUND LEVEL : -6.97m												ORIENTATION : Vertical											
COORDINATE : E 205073.242 ; N 1858170.312 DEPTH : 62.00m												GROUND WATER LEVEL : Under River Bed											
SCALE (m)	ELEVATION (m)	DEPTH (GL -) (m)	THICKNESS (m)	DIAGRAM	COLOUR	RELATIVE DENSITY (60% CONSISTENCY)	SOIL NAME	SOIL DESCRIPTION	DATE & DEPTH (m)	CASING (DEPTH (m) & DIAMETER (mm))	WATER DEPTH (m)	STANDARD PENETRATION TEST TEST METHOD (ASTM)					SAMPLING						
												DEPTH (GL -) (m)	N-Value (Blows / 30cm)	CURVE OF BLOW			SAMPLE (Type & No.)	DEPTH (GL -) (m)	TCR (%)	SCR (%)	ROD (%)	SCALE (m)	
61.00					gray	Dense to very dense	Silty SAND	Dense to very dense, gray, moist, fine to coarse grained, Silty SAND with fine gravel	29.12.16 62.00			61.00	50/20					P-59	61.00 61.35				
62.00	-69.97	62.30	10.30									62.00	50/15					P-60	62.00 62.30				
63.00								This borehole is terminated at 62.00m, according to the termination criteria.				63.00											
64.00												64.00											
65.00												65.00											
66.00												66.00											
67.00												67.00											
68.00												68.00											
69.00												69.00											
70.00												70.00											
71.00												71.00											
72.00												72.00											
73.00												73.00											
74.00												74.00											
75.00												75.00											
76.00												76.00											
77.00												77.00											
78.00												78.00											
79.00												79.00											
80.00												80.00											
81.00												81.00											
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86.00												86.00											
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89.00												89.00											
90.00												90.00											
91.00												91.00											

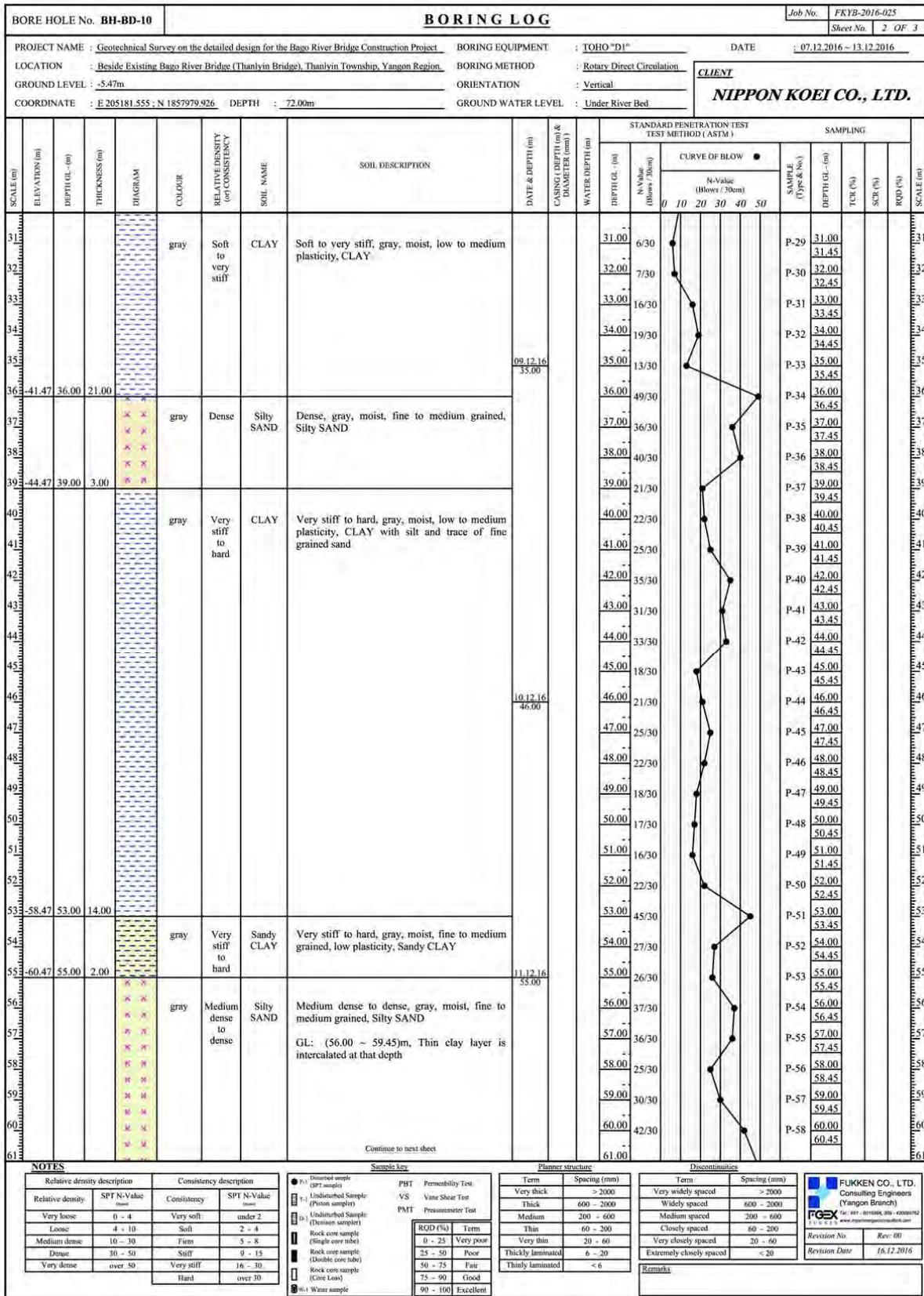
出典: JICA 調査団

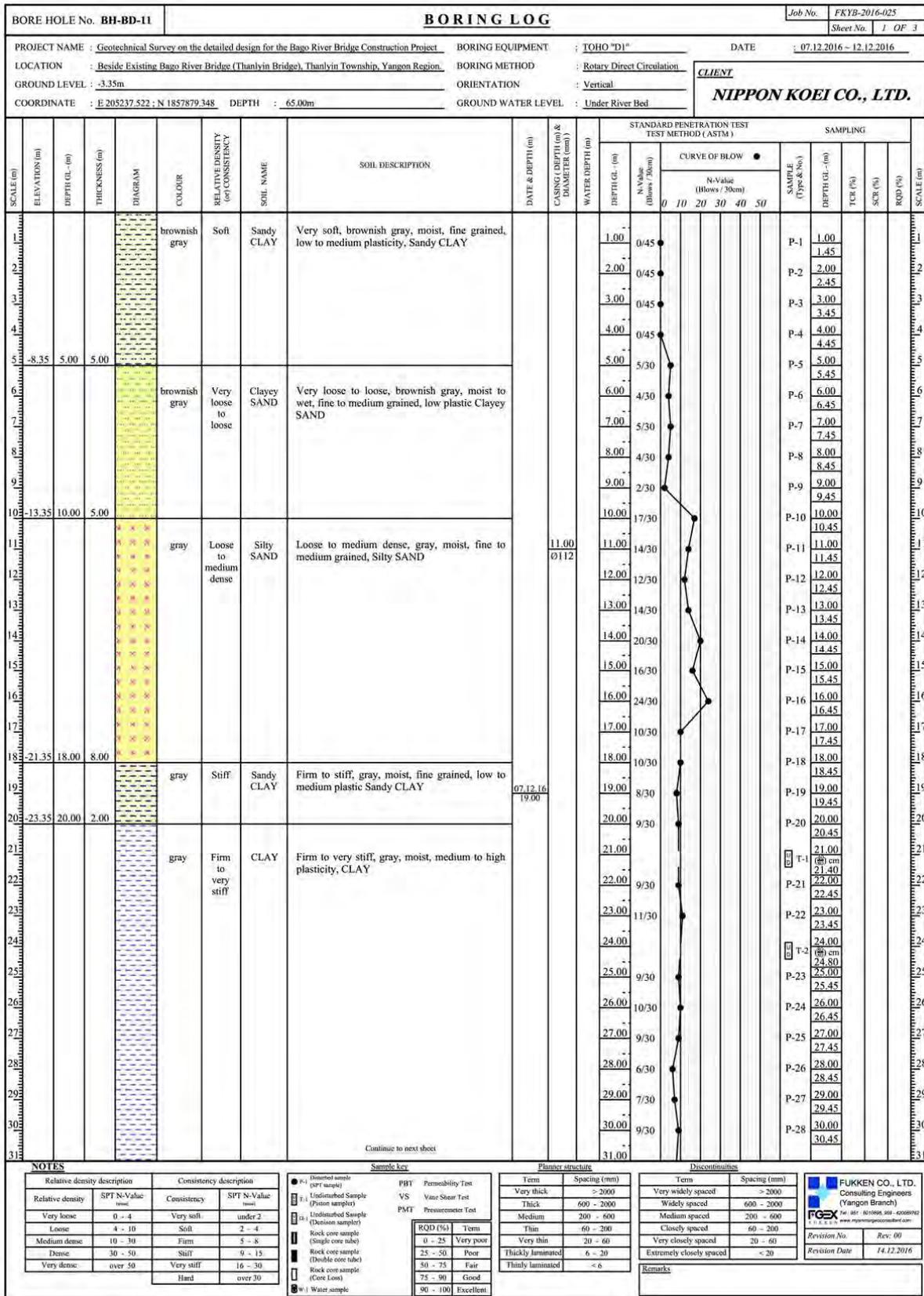
図 4.1.38 ボーリング調査結果 BH-BD-09(3)



出典: JICA 調査団

図 4.1.39 ボーリング調査結果 BH-BD-10(1)





出典: JICA 調査団

図 4.1.42 ボーリング調査結果 BH-BD-11(1)

BORE HOLE No. BH-BD-11		BORING LOG				Job No.	FKYB-2016-025															
						Sheet No.	3 OF 3															
PROJECT NAME : Geotechnical Survey on the detailed design for the Bago River Bridge Construction Project				BORING EQUIPMENT : TOHO "D1"		DATE : 07.12.2016 - 12.12.2016																
LOCATION : Beside Existing Bago River Bridge (Thanlyin Bridge), Thanlyin Township, Yangon Region				BORING METHOD : Rotary Direct Circulation		CLIENT																
GROUND LEVEL : -3.35m				ORIENTATION : Vertical		NIPPON KOEI CO., LTD.																
COORDINATE : E 205237.522 ; N 1857879.348 DEPTH : 65.00m				GROUND WATER LEVEL : Under River Bed																		
SCALE (m)	ELEVATION (m)	DEPTH (CL - (m))	THICKNESS (m)	DIAGRAM	COLOUR	RELATIVE DENSITY (95) CONSISTENCY	SOIL NAME	SOIL DESCRIPTION	DATE & DEPTH (m)	CASING DEPTH (m) & DIAMETER (mm)	WATER DEPTH (m)	STANDARD PENETRATION TEST TEST METHOD (ASTM)					SAMPLING				SCALE (m)	
												DEPTH (CL - (m))	N-Value (Blows / 30cm)	0	10	20	30	40	50	SAMPLE TYPE (S-100)		DEPTH (CL - (m))
6	-68.63	65.28	5.28		greenish gray to yellowish gray	Very dense	Clayey SAND	Very dense, greenish gray to yellowish gray, moist, fine to medium grained, low plastic Clayey SAND	12.12.16	65.00		61.00	50/20									61
6												61.35	50/20									62
6												62.00	50/20									62
6												62.35	50/20									63
6												63.00	50/20									63
6												63.35	50/22									64
6												64.00	50/13									64
6												64.37										65
6												65.00										65
6												65.28										66
6								This borehole is terminated at 65.00m, according to the termination criteria.				66.00										66
6												67.00										67
6												68.00										68
6												69.00										69
7												70.00										70
7												71.00										71
7												72.00										72
7												73.00										73
7												74.00										74
7												75.00										75
7												76.00										76
7												77.00										77
7												78.00										78
7												79.00										79
8												80.00										80
8												81.00										81
8												82.00										82
8												83.00										83
8												84.00										84
8												85.00										85
8												86.00										86
8												87.00										87
8												88.00										88
8												89.00										89
9												90.00										90
9												91.00										91

NOTES

Relative density description		Consistency description	
Relative density	SPT N-Value (mm)	Consistency	SPT N-Value (mm)
Very loose	0 - 4	Very soft	under 2
Loose	4 - 10	Soft	2 - 4
Medium dense	10 - 30	Firm	5 - 8
Dense	30 - 50	Stiff	9 - 15
Very dense	over 50	Very stiff	16 - 30
		Hard	over 30

Sample key

- Discarded sample (SPT sample)
- Undisturbed Sample (Piston sampler)
- Undisturbed Sample (Disturbance sampler)
- Rock core sample (Single core tube)
- Rock core sample (Double core tube)
- Rock core sample (Core Loss)
- Water sample

Planner structure

Term	Spacing (mm)
Very thick	> 2000
Thick	600 - 2000
Medium	200 - 600
Thin	60 - 200
Very thin	20 - 60
Thickly laminated	6 - 20
Thinly laminated	< 6

Discontinuities

Term	Spacing (mm)
Very widely spaced	> 2000
Widely spaced	600 - 2000
Medium spaced	200 - 600
Closely spaced	60 - 200
Very closely spaced	20 - 60
Extremely closely spaced	< 20

RQD (%) Term

0 - 25	Very poor
25 - 50	Poor
50 - 75	Fair
75 - 90	Good
90 - 100	Excellent

Remarks

FUKKEN CO., LTD.
Consulting Engineers (Yangon Branch)
Revision No. Rev: 00
Revision Date: 14.12.2016

出典: JICA 調査団

図 4.1.44 ボーリング調査結果 BH-BD-11(3)

BORE HOLE No. BH-BD-12		BORING LOG					Job No.	FKYB-2016-025													
						Sheet No.	3 OF 3														
PROJECT NAME : Geotechnical Survey on the detailed design for the Bago River Bridge Construction Project				BORING EQUIPMENT : TOHO "D1"		DATE : 28.11.2016 - 05.12.2016															
LOCATION : Beside Existing Bago River Bridge (Thanlyin Bridge), Thanlyin Township, Yangon Region.				BORING METHOD : Rotary Direct Circulation		CLIENT															
GROUND LEVEL : -4.41m				ORIENTATION : Vertical		NIPPON KOEI CO., LTD.															
COORDINATE : E 205261.919 ; N 1857832.226				DEPTH : 63.00m		GROUND WATER LEVEL : Under River Bed															
SCALE (m)	ELEVATION (m)	DEPTH GL. (m)	THICKNESS (m)	DIAGRAM	COLOUR	RELATIVE DENSITY (or) CONSISTENCY	SOIL NAME	SOIL DESCRIPTION	DATE & DEPTH (m)	CASING (DEPTH (m) & DIAMETER (mm))	WATER DEPTH (m)	STANDARD PENETRATION TEST TEST METHOD (ASTM)					SAMPLING			SCALE (m)	
												DEPTH GL. (m)	N-Value (Blows / 30cm)	N-Value (Blows / 30cm)	N-Value (Blows / 30cm)	N-Value (Blows / 30cm)	SAMPLE (Type & No.)	DEPTH GL. (m)	TCR (%)		SCR (%)
61.00					greenish gray to yellowish gray	Very dense	Clayey SAND	Very dense, greenish gray to yellowish gray, moist, fine to medium grained, low plastic Clayey SAND	05.12.16			61.00	50/15				P-61	61.00			61
62.00												62.00	50/17				P-62	62.00			62
63.00	-67.72	63.31	5.31						63.00			63.00	50/16				P-63	63.00			63
64.00								This borehole is terminated at 63.00m, according to the termination criteria.				64.00									64
65.00												65.00									65
66.00												66.00									66
67.00												67.00									67
68.00												68.00									68
69.00												69.00									69
70.00												70.00									70
71.00												71.00									71
72.00												72.00									72
73.00												73.00									73
74.00												74.00									74
75.00												75.00									75
76.00												76.00									76
77.00												77.00									77
78.00												78.00									78
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80.00												80.00									80
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87.00												87.00									87
88.00												88.00									88
89.00												89.00									89
90.00												90.00									90
91.00												91.00									91

NOTES		Sample key		Planner structure		Discontinuities	
Relative density description	Consistency description	● F-1 (Disturbed sample - SPT sample)	PBT Permeability Test	Term	Spacing (mm)	Term	Spacing (mm)
Relative density	SPT N-Value (total)	○ U-1 (Undisturbed Sample - Piston sampler)	VS Vane Shear Test	Very thick	> 2000	Very widely spaced	> 2000
Very loose	0 - 4	○ U-2 (Undisturbed Sample - Distress sampler)	PMT Pressuremeter Test	Thick	600 - 2000	Widely spaced	600 - 2000
Loose	4 - 10	○ R-1 (Rock core sample - Single core tube)		Medium	200 - 600	Medium spaced	200 - 600
Medium dense	10 - 30	○ R-2 (Rock core sample - Double core tube)		Thin	60 - 200	Closely spaced	60 - 200
Dense	30 - 50	○ W-1 (Water sample)		Very thin	20 - 60	Very closely spaced	20 - 60
Very dense	over 50			Thickly laminated	6 - 20	Extremely closely spaced	≤ 20
				Thinly laminated	≤ 6		
						Remarks	

出典: JICA 調査団

図 4.1.47 ボーリング調査結果 BH-BD-12(3)

BORE HOLE No. BH-BD-13		BORING LOG				Job No. FKYB-2016-025												
PROJECT NAME : Geotechnical Survey on the detailed design for the Bago River Bridge Construction Project		BORING EQUIPMENT : TOHO "D1"		DATE : 28.11.2016 ~ 05.12.2016														
LOCATION : Beside Existing Bago River Bridge (Thanlyin Bridge), Thanlyin Township, Yangon Region		BORING METHOD : Rotary Direct Circulation		CLIENT														
GROUND LEVEL : -4.42m		ORIENTATION : Vertical		NIPPON KOEI CO., LTD.														
COORDINATE : E 205289.363 ; N 1857790.671		DEPTH : 56.00m		GROUND WATER LEVEL : Under River Bed														
SCALE (m)	ELEVATION (m)	DEPTH GL. (m)	THICKNESS (m)	DIAGRAM	COLOUR	RELATIVE DENSITY (%) CONSISTENCY	SOIL NAME	SOIL DESCRIPTION	DATE & DEPTH (m)	CASING DEPTH (m) & DIAMETER (mm)	WATER DEPTH (m)	STANDARD PENETRATION TEST TEST METHOD (ASTM)				PMT	SAMPLING	SCALE (m)
												DEPTH (GL. - (m))	N-Value (Blows / 30cm)	DEPTH (GL. - (m))	DEPTH (GL. - (m))			
	-8.42	4.00	4.00		brownish gray	Very soft to soft	Sandy CLAY	Very soft to soft, brownish gray, moist, fine grained, low to medium plasticity, Sandy CLAY	28.11.16			1.00	1/30	P-1	1.00			
												1.45			1.45			
												2.00	2/30	P-2	2.00			
												2.45			2.45			
												3.00	2/30	P-3	3.00			
												3.45			3.45			
												4.00	2/30	P-4	4.00			
												4.45			4.45			
												5.00	3/30	P-5	5.00			
												5.45			5.45			
												6.00	4/30	P-6	6.00			
												6.45			6.45			
												7.00			7.00			
												7.80		T-1	7.80			
												8.00	5/30	P-7	8.00			
												8.45			8.45			
												9.00	4/30	P-8	9.00			
												9.45			9.45			
												10.00	23/30	P-9	10.00			
												10.45			10.45			
												11.00	15/30	P-10	11.00			
												11.45			11.45			
												12.00	15/30	P-11	12.00			
												12.45			12.45			
												13.00	19/30	P-12	13.00			
												13.45			13.45			
												14.00	15/30	P-13	14.00			
												14.45			14.45			
												15.00	7/30	P-14	15.00			
												15.45			15.45			
												16.00	9/30	P-15	16.00			
												16.45			16.45			
												17.00	10/30	P-16	17.00			
												17.45			17.45			
												18.00	14/30	P-17	18.00			
												18.45			18.45			
												19.00	9/30	P-18	19.00			
												19.45			19.45			
												20.00	12/30	P-19	20.00			
												20.45			20.45			
												21.00	10/30	P-20	21.00			
												21.45			21.45			
												22.00	10/30	P-21	22.00			
												22.45			22.45			
												23.00	5/30	P-22	23.00			
												23.45			23.45			
												24.00	5/30	P-23	24.00			
												24.45			24.45			
												25.00	7/30	P-24	25.00			
												25.45			25.45			
												26.00	5/30	P-25	26.00			
												26.45			26.45			
												27.00	9/30	P-26	27.00			
												27.45			27.45			
												28.00	10/30	P-27	28.00			
												28.45			28.45			
												29.00	6/30	P-28	29.00			
												29.45			29.45			
												30.00	9/30	P-29	30.00			
												30.45			30.45			
												31.00						

出典: JICA 調査団

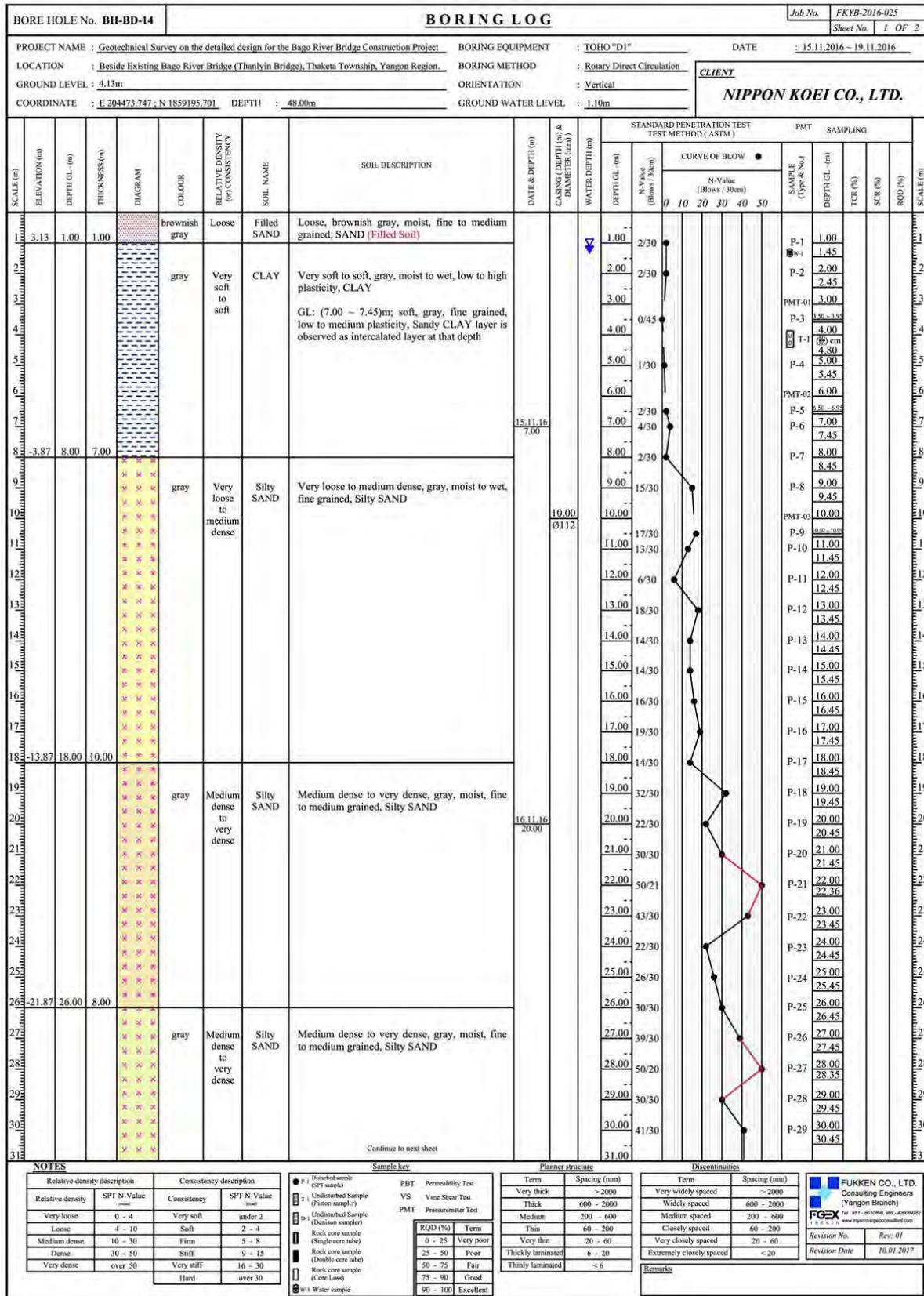
図 4.1.48 ボーリング調査結果 BH-BD-13(1)

BORE HOLE No. BH-BD-13										BORING LOG										Job No. FKYB-2016-025		
PROJECT NAME : Geotechnical Survey on the detailed design for the Bago River Bridge Construction Project										BORING EQUIPMENT : TOHO "D1"										DATE : 28.11.2016 - 05.12.2016		
LOCATION : Beside Existing Bago River Bridge (Thanlyin Bridge), Thanlyin Township, Yangon Region										BORING METHOD : Rotary Direct Circulation										CLIENT		
GROUND LEVEL : -4.42m										ORIENTATION : Vertical										NIPPON KOEI CO., LTD.		
COORDINATE : E 205289.363 ; N 1857790.671										DEPTH : 56.00m										GROUND WATER LEVEL : Under River Bed		
SCALE (m)	ELEVATION (m)	DEPTH (GL - (m))	THICKNESS (m)	DIAGRAM	COLOUR	RELATIVE DENSITY (or CONSISTENCY)	SOIL NAME	SOIL DESCRIPTION	DATE & DEPTH (m)	CASING DEPTH (m) & DIAMETER (mm)	WATER DEPTH (m)	STANDARD PENETRATION TEST TEST METHOD (ASTM)					SAMPLING					
												DEPTH (m)	N-Value (Blows / 30cm)	CURVE OF BLOW				SAMPLE (Type & No.)	DEPTH (GL - (m))	TCR (%)	SCR (%)	RQD (%)
31					gray	Firm to stiff	CLAY	Firm to very stiff, gray, moist, medium to high plasticity, CLAY GL: (31.00 ~ 31.45)m, very stiff, fine grained, low to medium plasticity, Sandy CLAY layer is observed as intercalated layer at that depth	01.12.16 31.00			31.00	26/30				P-30	31.00				31
32												32.00	7/30				P-31	32.00				32
33												33.00	9/30				P-32	33.00				33
34												34.00	15/30				P-33	34.00				34
35												35.00	8/30				P-34	35.00				35
36	-40.42	36.00	17.00									36.00	11/30				P-35	36.00				36
37					gray	Stiff to hard	CLAY	Stiff to hard, gray, moist, medium to high plasticity, CLAY with silt Thin sand layers are well observed as intercalated layer	02.12.16 40.00			37.00	23/30				P-36	37.00				37
38												38.00	23/30				P-37	38.00				38
39												39.00	19/30				P-38	39.00				39
40												40.00	20/30				P-39	40.00				40
41												41.00	25/30				P-40	41.00				41
42												42.00	24/30				P-41	42.00				42
43												43.00	38/30				P-42	43.00				43
44												44.00	40/30				P-43	44.00				44
45												45.00	32/30				P-44	45.00				45
46												46.00	26/30				P-45	46.00				46
47												47.00	27/30				P-46	47.00				47
48												48.00	27/30				P-47	48.00				48
49												49.00	13/30				P-48	49.00				49
50												50.00	14/30				P-49	50.00				50
51	-55.42	51.00	15.00		greenish gray to yellowish gray	Dense to very dense	Clayey SAND	Dense to very dense, greenish gray to yellowish gray, moist, fine to medium grained, low plastic Clayey SAND	03.12.16 48.00			51.00	50/30				P-50	51.00				51
52												52.00	50/30				P-51	52.00				52
53												53.00	50/30				P-52	53.00				53
54												54.00	50/30				P-53	54.00				54
55												55.00	50/22				P-54	55.00				55
56	-60.82	56.40	5.40					This borehole is terminated at 56.00m, according to the termination criteria.	04.12.16 54.00			56.00	50/25				P-55	56.00				56
57												57.00										57
58												58.00										58
59												59.00										59
60												60.00										60
61												61.00										61

NOTES		Sample key		Penetration Test		Planner structure		Discontinuities	
Relative density description	Consistency description	Disturbed sample (SPT sample)	PBT	Permeability Test	Term	Spacing (mm)	Term	Spacing (mm)	FUKKEN CO., LTD. Consulting Engineers (Yangon Branch) 11th Floor, 11th Street, East Tower, Golden Square www.fukken.co.jp
Very loose	Very soft	Undisturbed Sample (Piston sampler)	VS	Vane Shear Test	Very thick	> 2000	Very widely spaced	> 2000	
Loose	Soft	Undisturbed Sample (Dilatometer sampler)	PMT	Presumptive Test	Thick	600 - 2000	Widely spaced	600 - 2000	
Medium dense	Firm	Rock core sample (Single core tube)			Medium	200 - 600	Medium spaced	200 - 600	
Dense	Stiff	Rock core sample (Double core tube)			Thin	60 - 200	Closely spaced	60 - 200	
Very dense	Very stiff	Rock core sample (Core Loss)			Very thin	20 - 60	Very closely spaced	20 - 60	
	Hard	Water sample			Thickly laminated	6 - 20	Extremely closely spaced	< 20	
					Thinly laminated	< 6			
					RQD (%)	Term			Revision No.
					0 - 25	Very poor			Revision Date
					25 - 50	Poor			12.12.2016
					50 - 75	Fair			
					75 - 90	Good			
					90 - 100	Excellent			

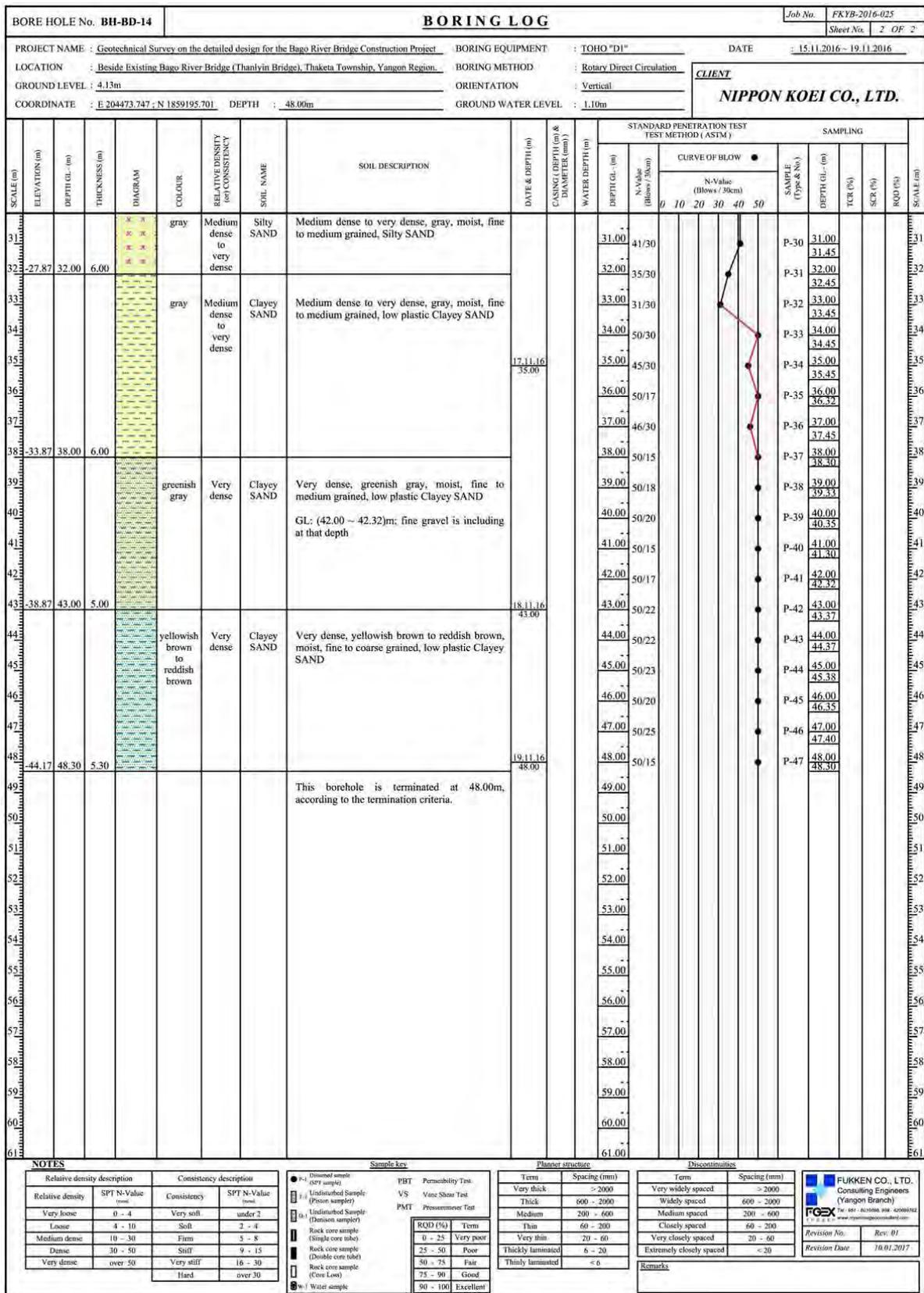
出典: JICA 調査団

図 4.1.49 ボーリング調査結果 BH-BD-13(2)



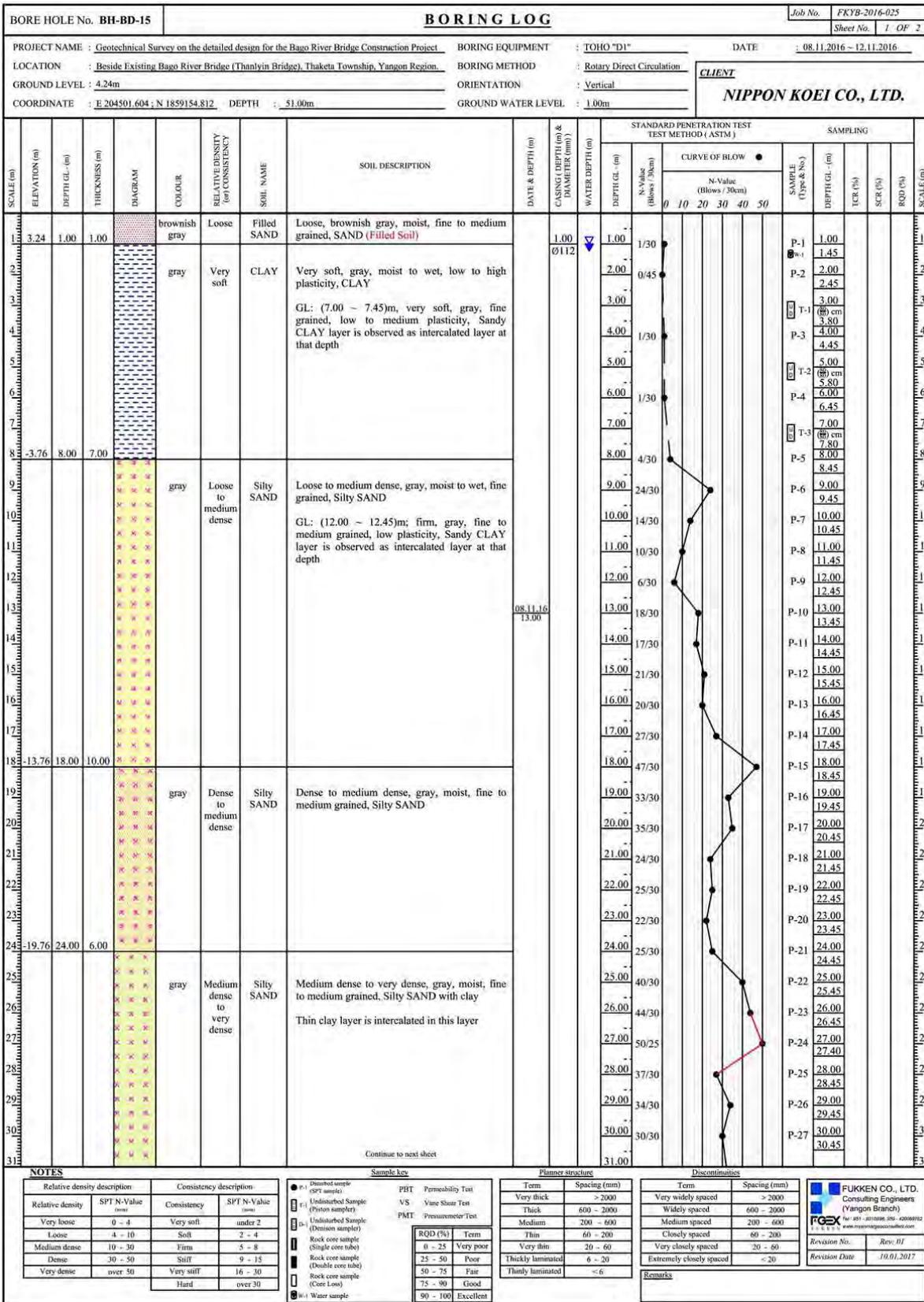
出典: JICA 調査団

図 4.1.50 ボーリング調査結果 BH-BD-14(1)



出典: JICA 調査団

図 4.1.51 ボーリング調査結果 BH-BD-14(2)



出典: JICA 調査団

図 4.1.52 ボーリング調査結果 BH-BD-15(1)

BORE HOLE No. BH-BD-16										BORING LOG										Job No. FKYB-2016-025		
PROJECT NAME : Geotechnical Survey on the detailed design for the Bago River Bridge Construction Project										BORING EQUIPMENT : TOHO "D1"										DATE : 08.11.2016 ~ 12.11.2016		
LOCATION : Beside Existing Bago River Bridge (Thanlyin Bridge), Thaketa Township, Yangon Region										BORING METHOD : Rotary Direct Circulation										CLIENT		
GROUND LEVEL : 4.35m										ORIENTATION : Vertical										NIPPON KOEI CO., LTD.		
COORDINATE : E 204526.627 ; N 185911.524 DEPTH : 57.00m										GROUND WATER LEVEL : 1.30m												
SCALE (m)	ELEVATION (m)	DEPTH (GL - (m))	THICKNESS (m)	DIAGRAM	COLOUR	RELATIVE DENSITY (or CONSISTENCY)	SOIL NAME	SOIL DESCRIPTION	DATE & DEPTH (m)	CASING DEPTH (m) & DIAMETER (mm)	WATER DEPTH (m)	STANDARD PENETRATION TEST TEST METHOD (ASTM)					SAMPLING					SCALE (m)
												DEPTH (GL - (m))	N-Value (Blows / 30cm)	N-Value (Blows / 30cm)	N-Value (Blows / 30cm)	N-Value (Blows / 30cm)	SAMPLE (Dp & No.)	DEPTH (GL - (m))	TCR (%)	SCR (%)	RQD (%)	
1	3.35	1.00	1.00		brownish gray	Loose	Filled SAND	Loose, brownish gray, moist, fine to medium grained, SAND (Filled Soil)				0.45	0.45	0.45	0.45	0.45	P-1	1.00				1
2					gray	Very soft to soft	CLAY	Very soft to soft, gray, moist to wet, low to high plasticity, CLAY, with silt Silt percent is increased downward.	3.00	0112		0.45	0.45	0.45	0.45	0.45	T-1	2.00				2
3												0.45	0.45	0.45	0.45	0.45	P-2	3.00				3
4												0.45	0.45	0.45	0.45	0.45	T-2	4.00				4
5												0.45	0.45	0.45	0.45	0.45	P-3	5.00				5
6												0.45	0.45	0.45	0.45	0.45	T-3	6.00				6
7												0.45	0.45	0.45	0.45	0.45	P-4	7.00				7
8												0.45	0.45	0.45	0.45	0.45	T-4	8.00				8
9												2/30	2/30	2/30	2/30	2/30	P-5	9.00				9
10												5/30	5/30	5/30	5/30	5/30	T-5	10.00				10
11	-6.65	11.00	10.00		gray	Loose to medium dense	Silty SAND	Loose to medium dense, gray, moist, fine grained, Silty SAND				5/30	5/30	5/30	5/30	5/30	P-6	11.00				11
12												5/30	5/30	5/30	5/30	5/30	P-7	12.00				12
13												15/30	15/30	15/30	15/30	15/30	P-8	13.00				13
14												13/30	13/30	13/30	13/30	13/30	P-9	14.00				14
15												14.45	14.45	14.45	14.45	14.45	P-10	15.00				15
16												15.45	15.45	15.45	15.45	15.45	P-11	16.00				16
17												16.45	16.45	16.45	16.45	16.45	P-12	17.00				17
18												17.45	17.45	17.45	17.45	17.45	P-13	18.00				18
19												18.45	18.45	18.45	18.45	18.45	P-14	19.00				19
20												19.45	19.45	19.45	19.45	19.45	P-15	20.00				20
21												20.45	20.45	20.45	20.45	20.45	P-16	21.00				21
22												21.45	21.45	21.45	21.45	21.45	P-17	22.00				22
23												22.45	22.45	22.45	22.45	22.45	P-18	23.00				23
24												23.45	23.45	23.45	23.45	23.45	P-19	24.00				24
25												24.45	24.45	24.45	24.45	24.45	P-20	25.00				25
26												25.45	25.45	25.45	25.45	25.45	P-21	26.00				26
27												26.45	26.45	26.45	26.45	26.45	P-22	27.00				27
28												27.45	27.45	27.45	27.45	27.45	P-23	28.00				28
29												28.45	28.45	28.45	28.45	28.45	P-24	29.00				29
30												29.45	29.45	29.45	29.45	29.45	P-25	30.00				30
31												30.44	30.44	30.44	30.44	30.44						31
NOTES										Planner structure										Discontinuities		
Relative density description Consistency description Sample key PBT Permeability Test VS Vane Shear Test PMT Pressuremeter Test RQD (%) Term 0 - 25 Very poor 25 - 50 Poor 50 - 75 Fair 75 - 90 Good 90 - 100 Excellent										Term Spacing (mm) Very thick > 2000 Thick 600 - 2000 Medium 200 - 600 Thin 60 - 200 Very thin 20 - 60 Thickly laminated 6 - 20 Thinly laminated < 6										Term Spacing (mm) Very widely spaced > 2000 Widely spaced 600 - 2000 Medium spaced 200 - 600 Closely spaced 60 - 200 Very closely spaced 20 - 60 Extremely closely spaced < 20		
FUKKEN CO., LTD. Consulting Engineers (Yangon Branch) PGEX Revision No. Rev-01 Revision Date 10.01.2017										Remarks												

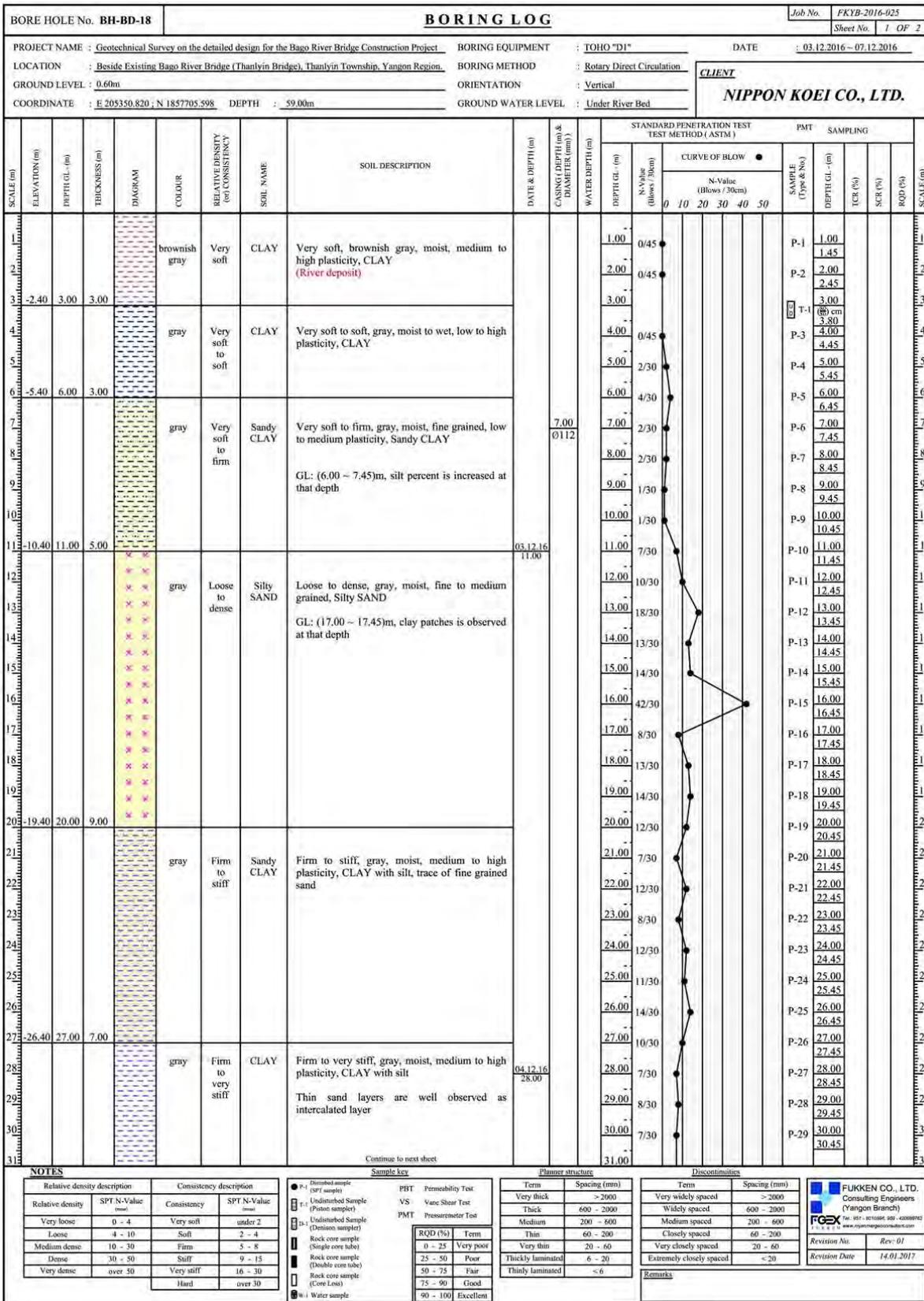
出典: JICA 調査団

図 4.1.54 ボーリング調査結果 BH-BD-16(1)

BORE HOLE No. BH-BD-17										BORING LOG										Job No. FKYB-2016-025			
																				Sheet No. 2 OF 2			
PROJECT NAME : Geotechnical Survey on the detailed design for the Bago River Bridge Construction Project										BORING EQUIPMENT : TOHO "D1"										DATE : 23.11.2016 - 26.11.2016			
LOCATION : Beside Existing Bago River Bridge (Thanlyin Bridge), Thaketa Township, Yangon Region										BORING METHOD : Rotary Direct Circulation										CLIENT NIPPON KOEI CO., LTD.			
GROUND LEVEL : 0.35m										ORIENTATION : Vertical													
COORDINATE : E 204551.650 ; N 1859068.236 DEPTH : 47.00m										GROUND WATER LEVEL : Under River Bed													
SCALE (m)	ELEVATION (m)	DEPTH (m)	THICKNESS (m)	DIAGRAM	COLOUR	RELATIVE DENSITY (%)	CONSISTENCY	SOIL NAME	SOIL DESCRIPTION	DATE & DEPTH (m)	CASING (DEPTH (m) & DIAMETER (mm))	WATER DEPTH (m)	STANDARD PENETRATION TEST TEST METHOD (ASTM)					SAMPLING				SCALE (m)	
													DEPTH (m)	N-Value (Blows / 30cm)	0	10	20	30	40	50	SAMPLE (Type & No.)		DEPTH (m)
31					gray	Medium dense to very dense		Silty SAND	Medium dense to very dense, gray, moist, fine to medium grained, Silty SAND Thin clay layer is intercalated layer				31.00	35/30				P-30	31.00				31
													31.45										
32													32.00	47/30				P-31	32.00				32
													32.45										
33													33.00	32/30				P-32	33.00				33
													33.45										
34													34.00	22/30				P-33	34.00				34
													34.45										
35	-34.65	35.00	9.00										35.00	50/28				P-34	35.00				35
													35.43										
36					gray to brownish gray	Dense to very dense		Clayey SAND	Dense to very dense, gray to brownish gray, moist, fine to coarse grained, low plastic Clayey SAND, with trace of fine gravel	24.11.16			36.00	50/30				P-35	36.00				36
													36.45										
37													37.00	50/28				P-36	37.00				37
													37.43										
38													38.00	50/28				P-37	38.00				38
													38.43										
39													39.00	50/30				P-38	39.00				39
													39.45										
40													40.00	50/14				P-39	40.00				40
													40.79										
41													41.00	50/26				P-40	41.00				41
													41.41										
42	-41.65	42.00	7.00										42.00	50/22				P-41	42.00				42
													42.37										
43					reddish brown to yellowish brown	Dense to very dense		Clayey SAND	Dense to very dense, reddish brown to yellowish brown, moist, fine to medium grained, low plastic Clayey SAND, with trace of fine gravel				43.00	50/27				P-42	43.00				43
													43.42										
44													44.00	50/30				P-43	44.00				44
													44.45										
45													45.00	50/26				P-44	45.00				45
													45.41										
46													46.00	50/30				P-45	46.00				46
													46.45										
47	-41.65	47.39	5.39										47.00	50/24				P-46	47.00				47
													47.39										
48									This borehole is terminated at 47.00m, according to the termination criteria.	25.11.16			48.00										48
													49.00										
49													50.00										49
													51.00										
50													52.00										50
													53.00										
51													54.00										51
													55.00										
52													56.00										52
													57.00										
53													58.00										53
													59.00										
54													60.00										54
													61.00										

出典: JICA 調査団

図 4.1.57 ボーリング調査結果 BH-BD-17(2)



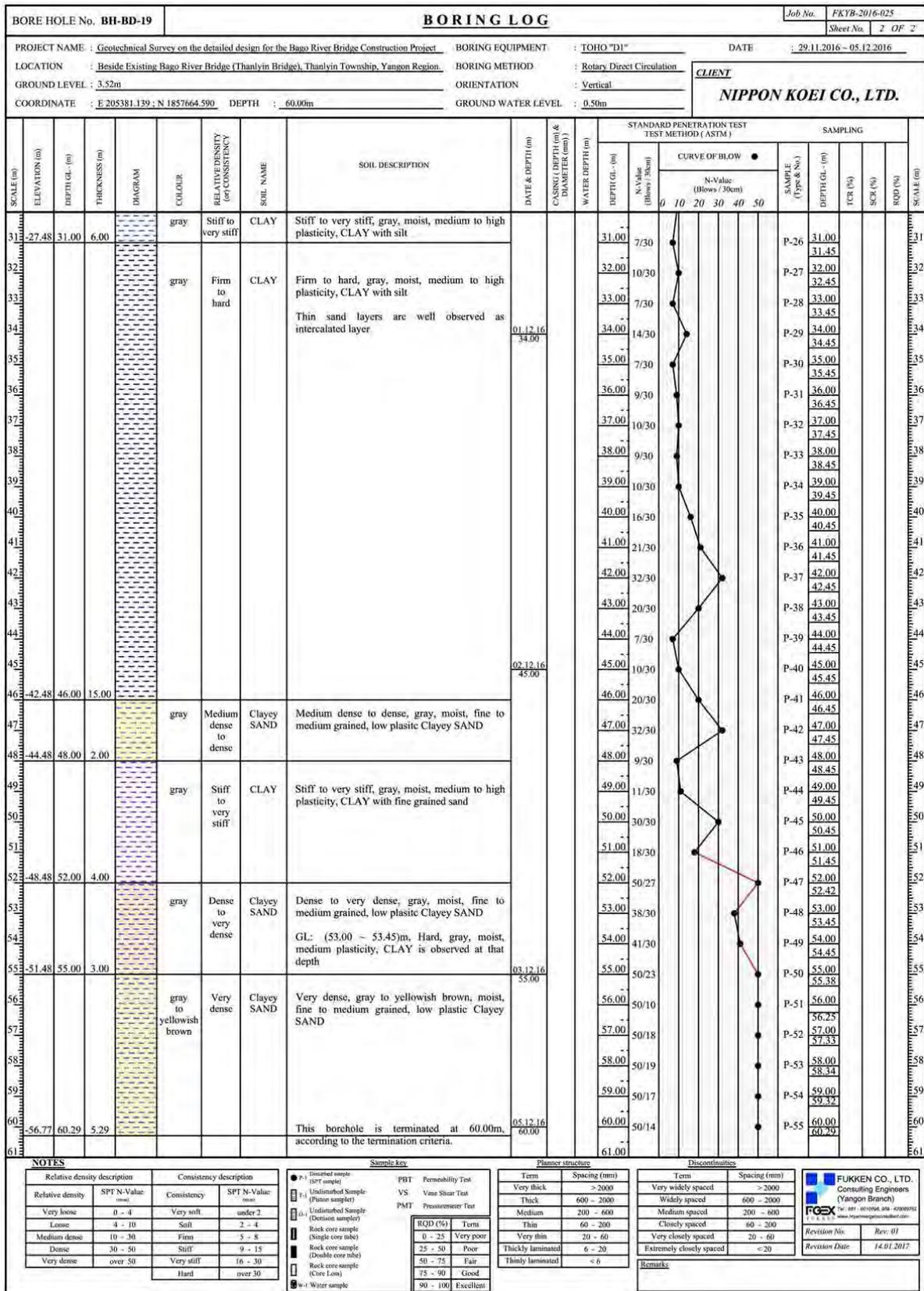
出典: JICA 調査団

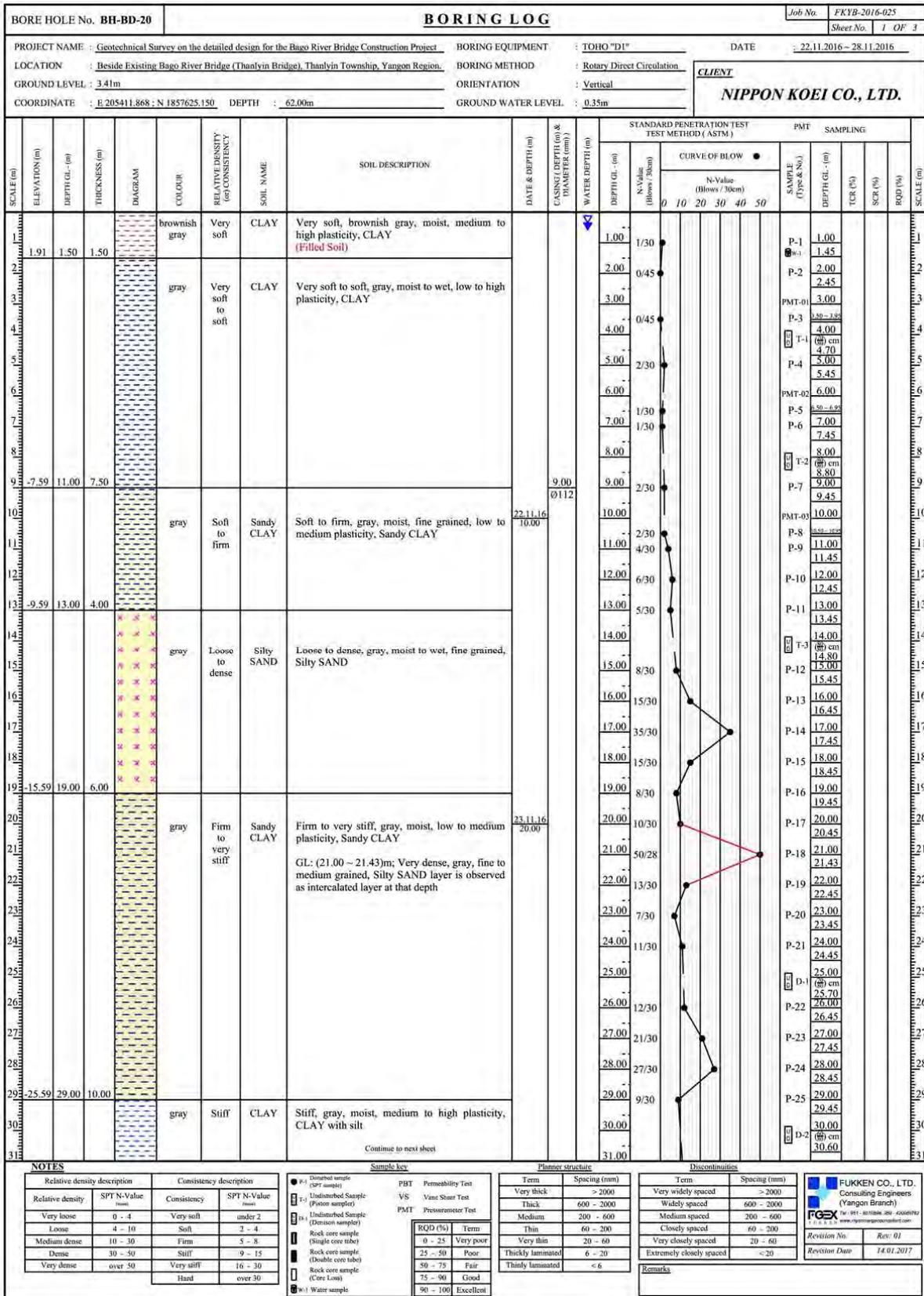
図 4.1.58 ボーリング調査結果 BH-BD-18(1)

BORE HOLE No. BH-BD-19		BORING LOG				Job No. FKYB-2016-025												
PROJECT NAME : Geotechnical Survey on the detailed design for the Bago River Bridge Construction Project		BORING EQUIPMENT : TOHO "D1"		DATE : 29.11.2016 - 05.12.2016														
LOCATION : Beside Existing Bago River Bridge (Thanlyin Bridge), Thanlyin Township, Yangon Region		BORING METHOD : Rotary Direct Circulation		CLIENT														
GROUND LEVEL : 3.52m		ORIENTATION : Vertical		NIPPON KOEI CO., LTD.														
COORDINATE : E 205381.139 ; N 1857664.590 DEPTH : 60.00m		GROUND WATER LEVEL : 0.50m																
SCALE (m)	ELEVATION (m)	DEPTH (GL - (m))	THICKNESS (m)	DIAGRAM	COLOUR	RELATIVE DENSITY (%) CONSISTENCY	SOIL NAME	SOIL DESCRIPTION	DATE & DEPTH (m)	CASING (DEPTH (m) & DIAMETER (mm))	WATER DEPTH (m)	STANDARD PENETRATION TEST TEST METHOD (ASTM)				PMT	SAMPLING	SCALE (m)
												DEPTH (m)	N-Value (Blows / 30cm)	DEPTH (m)	DEPTH (m)			
	1.52	2.00	2.00		brownish gray	Very soft	CLAY	Very soft, brownish gray, moist, medium to high plasticity, CLAY (Filled Soil)	29.11.16	3.00	0.112	0.45	0.45	0.45	P-1	1.00	1.45	
					gray	Very soft	CLAY	Very soft, gray, moist to wet, low to high plasticity, CLAY				0.45	0.45	0.45	P-2	2.00	2.45	
	-0.48	4.00	2.00		gray	Very soft to soft	CLAY	Very soft to soft, gray, moist to wet, low to high plasticity, CLAY				1/30	1/30	1/30	T-1	3.00	3.80	
					gray	Very soft to soft	CLAY	Very soft to soft, gray, moist to wet, low to high plasticity, CLAY				1/30	1/30	1/30	P-3	4.00	4.45	
					gray	Soft to firm	Sandy CLAY	Soft to firm, gray, moist, fine grained, low to medium plasticity, Sandy CLAY GL: (11.00 ~ 11.45)m; very loose, gray, fine grained, Silty SAND layer is observed as intercalated layer at that depth				6/30	6/30	6/30	P-4	5.00	5.45	
					gray	Loose to dense	Silty SAND	Loose to dense, gray, moist, fine to medium grained, Silty SAND GL: (19.00 ~ 20.45)m, trace of clay is observed at that depth				2/30	2/30	2/30	P-5	6.00	6.45	
					gray	Firm to stiff	CLAY	Firm to stiff, gray, moist, medium to high plasticity, CLAY with silt GL: (23.00 ~ 23.45)m, loose, gray, fine grained, Silty SAND layer is observed at that depth.				6/30	6/30	6/30	T-2	7.00	7.80	
					gray	Stiff to very stiff	CLAY	Stiff to very stiff, gray, moist, medium to high plasticity, CLAY with silt Thin sand layers are well observed as intercalated layer				4/30	4/30	4/30	P-6	8.00	8.45	
					gray	Stiff to very stiff	CLAY	Stiff to very stiff, gray, moist, medium to high plasticity, CLAY with silt Thin sand layers are well observed as intercalated layer				4/30	4/30	4/30	P-7	9.00	9.45	
					gray	Stiff to very stiff	CLAY	Stiff to very stiff, gray, moist, medium to high plasticity, CLAY with silt Thin sand layers are well observed as intercalated layer				4/30	4/30	4/30	P-8	10.00	10.45	
					gray	Stiff to very stiff	CLAY	Stiff to very stiff, gray, moist, medium to high plasticity, CLAY with silt Thin sand layers are well observed as intercalated layer				2/30	2/30	2/30	P-9	11.00	11.45	
					gray	Stiff to very stiff	CLAY	Stiff to very stiff, gray, moist, medium to high plasticity, CLAY with silt Thin sand layers are well observed as intercalated layer				4/30	4/30	4/30	P-10	12.00	12.45	
					gray	Stiff to very stiff	CLAY	Stiff to very stiff, gray, moist, medium to high plasticity, CLAY with silt Thin sand layers are well observed as intercalated layer				4/30	4/30	4/30	T-3	13.00	13.80	
					gray	Stiff to very stiff	CLAY	Stiff to very stiff, gray, moist, medium to high plasticity, CLAY with silt Thin sand layers are well observed as intercalated layer				7/30	7/30	7/30	P-11	14.00	14.45	
					gray	Stiff to very stiff	CLAY	Stiff to very stiff, gray, moist, medium to high plasticity, CLAY with silt Thin sand layers are well observed as intercalated layer				7/30	7/30	7/30	P-12	15.00	15.45	
					gray	Stiff to very stiff	CLAY	Stiff to very stiff, gray, moist, medium to high plasticity, CLAY with silt Thin sand layers are well observed as intercalated layer				27/30	27/30	27/30	P-13	16.00	16.45	
					gray	Stiff to very stiff	CLAY	Stiff to very stiff, gray, moist, medium to high plasticity, CLAY with silt Thin sand layers are well observed as intercalated layer				40/30	40/30	40/30	P-14	17.00	17.45	
					gray	Stiff to very stiff	CLAY	Stiff to very stiff, gray, moist, medium to high plasticity, CLAY with silt Thin sand layers are well observed as intercalated layer				21/30	21/30	21/30	P-15	18.00	18.45	
					gray	Stiff to very stiff	CLAY	Stiff to very stiff, gray, moist, medium to high plasticity, CLAY with silt Thin sand layers are well observed as intercalated layer				17/30	17/30	17/30	P-16	19.00	19.45	
					gray	Stiff to very stiff	CLAY	Stiff to very stiff, gray, moist, medium to high plasticity, CLAY with silt Thin sand layers are well observed as intercalated layer				12/30	12/30	12/30	P-17	20.00	20.45	
					gray	Stiff to very stiff	CLAY	Stiff to very stiff, gray, moist, medium to high plasticity, CLAY with silt Thin sand layers are well observed as intercalated layer				5/30	5/30	5/30	P-18	21.00	21.45	
					gray	Stiff to very stiff	CLAY	Stiff to very stiff, gray, moist, medium to high plasticity, CLAY with silt Thin sand layers are well observed as intercalated layer				5/30	5/30	5/30	T-4	22.00	22.50	
					gray	Stiff to very stiff	CLAY	Stiff to very stiff, gray, moist, medium to high plasticity, CLAY with silt Thin sand layers are well observed as intercalated layer				9/30	9/30	9/30	P-19	23.00	23.45	
					gray	Stiff to very stiff	CLAY	Stiff to very stiff, gray, moist, medium to high plasticity, CLAY with silt Thin sand layers are well observed as intercalated layer				16/30	16/30	16/30	P-20	24.00	24.45	
					gray	Stiff to very stiff	CLAY	Stiff to very stiff, gray, moist, medium to high plasticity, CLAY with silt Thin sand layers are well observed as intercalated layer				16/30	16/30	16/30	P-21	25.00	25.45	
					gray	Stiff to very stiff	CLAY	Stiff to very stiff, gray, moist, medium to high plasticity, CLAY with silt Thin sand layers are well observed as intercalated layer				16/30	16/30	16/30	P-22	26.00	26.45	
					gray	Stiff to very stiff	CLAY	Stiff to very stiff, gray, moist, medium to high plasticity, CLAY with silt Thin sand layers are well observed as intercalated layer				19/30	19/30	19/30	D-1	27.00	27.50	
					gray	Stiff to very stiff	CLAY	Stiff to very stiff, gray, moist, medium to high plasticity, CLAY with silt Thin sand layers are well observed as intercalated layer				10/30	10/30	10/30	P-23	28.00	28.45	
					gray	Stiff to very stiff	CLAY	Stiff to very stiff, gray, moist, medium to high plasticity, CLAY with silt Thin sand layers are well observed as intercalated layer				9/30	9/30	9/30	P-24	29.00	29.45	
					gray	Stiff to very stiff	CLAY	Stiff to very stiff, gray, moist, medium to high plasticity, CLAY with silt Thin sand layers are well observed as intercalated layer				9/30	9/30	9/30	P-25	30.00	30.45	

出典: JICA 調査団

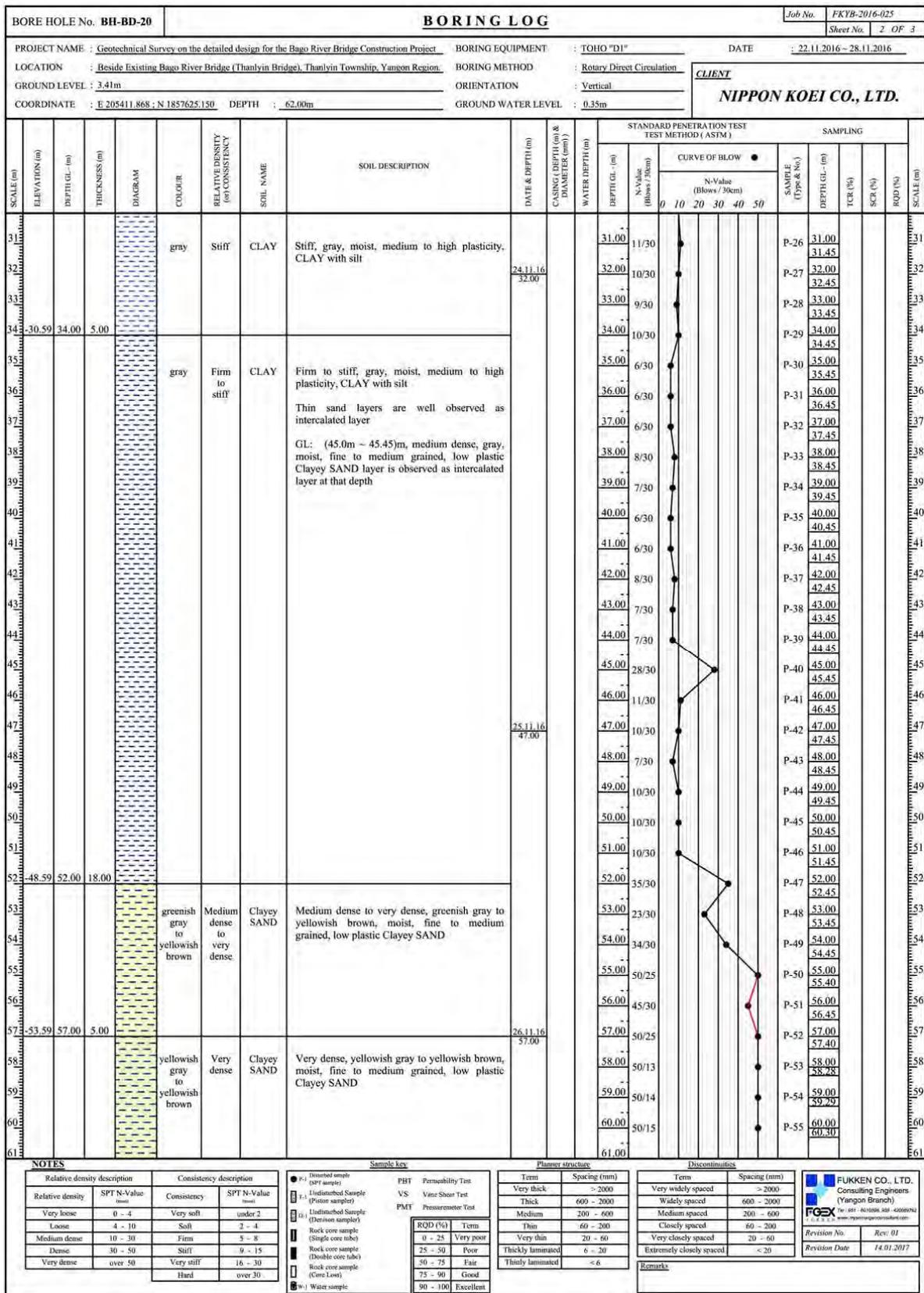
図 4.1.60 ボーリング調査結果 BH-BD-19(1)





出典: JICA 調査団

図 4.1.62 ボーリング調査結果 BH-BD-20(1)



出典: JICA 調査団

図 4.1.63 ボーリング調査結果 BH-BD-20(2)

BORE HOLE No. BH-BD-20		BORING LOG				Job No.	FKYB-2016-025																		
						Sheet No.	3 OF 3																		
PROJECT NAME : Geotechnical Survey on the detailed design for the Bago River Bridge Construction Project				BORING EQUIPMENT : TOHO "D1"		DATE : 22.11.2016 - 28.11.2016																			
LOCATION : Beside Existing Bago River Bridge (Thanlyin Bridge), Thanlyin Township, Yangon Region.				BORING METHOD : Rotary Direct Circulation		CLIENT																			
GROUND LEVEL : 3.41m				ORIENTATION : Vertical		NIPPON KOEI CO., LTD.																			
COORDINATE : E 205411.868 ; N 1857625.150 DEPTH : 62.00m				GROUND WATER LEVEL : 0.35m																					
SCALE (m)	ELEVATION (m)	DEPTH (GL - (m))	THICKNESS (m)	DIAGRAM	COLOUR	RELATIVE DENSITY (%) / CONSISTENCY	SOIL NAME	SOIL DESCRIPTION	DATE & DEPTH (m)	CASING DEPTH (m) & DIAMETER (mm)	WATER DEPTH (m)	STANDARD PENETRATION TEST TEST METHOD (ASTM)					SAMPLING				SCALE (m)				
												DEPTH (GL - (m))	N-Value (Blows / 30cm)	DEPTH (GL - (m))	TYPE	DEPTH (GL - (m))	TCR (%)	SCR (%)	RQD (%)						
61.00	-58.89	62.30	5.30		yellowish gray to yellowish brown	Very dense	Clayey SAND	Very dense, yellowish gray to yellowish brown, moist, fine to medium grained, low plastic Clayey SAND	28.11.16 62.00			61.00	50/13	0	10	20	30	40	50	P-56	61.00	61.28	61.00	61	
62.00												62.00	50/15							P-57	62.00	62.30	62.00	62	
63.00								This borehole is terminated at 62.00m, according to the termination criteria.				63.00												63	
64.00												64.00													64
65.00												65.00													65
66.00												66.00													66
67.00												67.00													67
68.00												68.00													68
69.00												69.00													69
70.00												70.00													70
71.00												71.00													71
72.00												72.00													72
73.00												73.00													73
74.00												74.00													74
75.00												75.00													75
76.00												76.00													76
77.00												77.00													77
78.00												78.00													78
79.00												79.00													79
80.00												80.00													80
81.00												81.00													81
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85.00												85.00													85
86.00												86.00													86
87.00												87.00													87
88.00												88.00													88
89.00												89.00													89
90.00												90.00													90
91.00												91.00													91

NOTES

<p>Relative density description:</p> <table border="1"> <tr> <th>Relative density</th> <th>SPT N-Value (mm)</th> <th>Consistency</th> <th>SPT N-Value (mm)</th> </tr> <tr> <td>Very loose</td> <td>0 - 4</td> <td>Very soft</td> <td>under 2</td> </tr> <tr> <td>Loose</td> <td>4 - 10</td> <td>Soft</td> <td>2 - 4</td> </tr> <tr> <td>Medium dense</td> <td>10 - 30</td> <td>Firm</td> <td>5 - 8</td> </tr> <tr> <td>Dense</td> <td>30 - 50</td> <td>Stiff</td> <td>9 - 15</td> </tr> <tr> <td>Very dense</td> <td>over 50</td> <td>Very stiff</td> <td>16 - 30</td> </tr> <tr> <td></td> <td></td> <td>Hard</td> <td>over 30</td> </tr> </table>	Relative density	SPT N-Value (mm)	Consistency	SPT N-Value (mm)	Very loose	0 - 4	Very soft	under 2	Loose	4 - 10	Soft	2 - 4	Medium dense	10 - 30	Firm	5 - 8	Dense	30 - 50	Stiff	9 - 15	Very dense	over 50	Very stiff	16 - 30			Hard	over 30	<p>Consistency description:</p> <table border="1"> <tr> <th>Consistency</th> <th>SPT N-Value (mm)</th> </tr> <tr> <td>Very soft</td> <td>under 2</td> </tr> <tr> <td>Soft</td> <td>2 - 4</td> </tr> <tr> <td>Firm</td> <td>5 - 8</td> </tr> <tr> <td>Stiff</td> <td>9 - 15</td> </tr> <tr> <td>Very stiff</td> <td>16 - 30</td> </tr> <tr> <td>Hard</td> <td>over 30</td> </tr> </table>	Consistency	SPT N-Value (mm)	Very soft	under 2	Soft	2 - 4	Firm	5 - 8	Stiff	9 - 15	Very stiff	16 - 30	Hard	over 30	<p>Sample key</p> <ul style="list-style-type: none"> Discarded sample (SPT sample) Undisturbed Sample (Piston sampler) Undisturbed Sample (Disturb sampler) Rock core sample (Single core tube) Rock core sample (Double core tube) Rock core sample (Core Loss) Water sample 	<p>Planner structure</p> <table border="1"> <tr> <th>Term</th> <th>Spacing (mm)</th> </tr> <tr> <td>Very thick</td> <td>> 2000</td> </tr> <tr> <td>Thick</td> <td>600 - 2000</td> </tr> <tr> <td>Medium</td> <td>200 - 600</td> </tr> <tr> <td>Thin</td> <td>60 - 200</td> </tr> <tr> <td>Very thin</td> <td>20 - 60</td> </tr> <tr> <td>Thickly laminated</td> <td>6 - 20</td> </tr> <tr> <td>Thinly laminated</td> <td>< 6</td> </tr> </table>	Term	Spacing (mm)	Very thick	> 2000	Thick	600 - 2000	Medium	200 - 600	Thin	60 - 200	Very thin	20 - 60	Thickly laminated	6 - 20	Thinly laminated	< 6	<p>Discontinuities</p> <table border="1"> <tr> <th>Term</th> <th>Spacing (mm)</th> </tr> <tr> <td>Very widely spaced</td> <td>> 2000</td> </tr> <tr> <td>Widely spaced</td> <td>600 - 2000</td> </tr> <tr> <td>Medium spaced</td> <td>200 - 600</td> </tr> <tr> <td>Closely spaced</td> <td>60 - 200</td> </tr> <tr> <td>Very closely spaced</td> <td>20 - 60</td> </tr> <tr> <td>Extremely closely spaced</td> <td>< 20</td> </tr> </table>	Term	Spacing (mm)	Very widely spaced	> 2000	Widely spaced	600 - 2000	Medium spaced	200 - 600	Closely spaced	60 - 200	Very closely spaced	20 - 60	Extremely closely spaced	< 20	<p>Notes</p> <p> FUKKEN CO., LTD. Consulting Engineers (Yangon Branch) Tel: 011-25008881 ext. 6000/6101 www.fukken.co.jp </p> <p> Revision No. Rev: 01 Revision Date 14.01.2017 </p>
Relative density	SPT N-Value (mm)	Consistency	SPT N-Value (mm)																																																																										
Very loose	0 - 4	Very soft	under 2																																																																										
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Very closely spaced	20 - 60																																																																												
Extremely closely spaced	< 20																																																																												

出典: JICA 調査団

図 4.1.64 ボーリング調査結果 BH-BD-20(3)

BORE HOLE No. BH-BD-21										BORING LOG										Job No. FKYB-2016-025	
PROJECT NAME : Geotechnical Survey on the detailed design for the Bago River Bridge Construction Project										BORING EQUIPMENT : TOHO "D1"										DATE : 08.11.2016 ~ 17.11.2016	
LOCATION : Beside Existing Bago River Bridge (Thanlyin Bridge), Thanlyin Township, Yangon Region.										BORING METHOD : Rotary Direct Circulation										CLIENT	
GROUND LEVEL : 3.34m										ORIENTATION : Vertical										NIPPON KOEI CO., LTD.	
COORDINATE : E 205475.433 ; N 1857547.954 DEPTH : 66.00m										GROUND WATER LEVEL : 0.30m											
SCALE (m)	ELEVATION (m)	DEPTH GL. (m)	THICKNESS (m)	DIAGRAM	COLOUR	RELATIVE DENSITY (or CONSISTENCY)	SOIL NAME	SOIL DESCRIPTION	DATE & DEPTH (m)	CASING (DEPTH (m) & DIAMETER (mm))	WATER DEPTH (m)	STANDARD PENETRATION TEST TEST METHOD (ASTM)					SAMPLING				
												DEPTH GL. (m)	N-Value (Blows / 30cm)	CURVE OF BLOW			SAMPLE (Type & No.)	DEPTH GL. (m)	TCR (%)	SCR (%)	RQD (%)
1.84	1.50	1.50		brownish gray	Very soft	CLAY	Very soft, brownish gray, moist, low to medium plasticity, CLAY (Filled Soil)				0/45	P-1	1.00								
				gray	Very soft	CLAY	Very soft, gray, moist, medium to high plasticity, CLAY				2.00	T-1	2.00								
											1/30	P-2	2.50								
											3/30	P-3	3.00								
											3/30	P-3	4.00								
											5.00	T-2	4.50								
											5.00	P-4	5.00								
											2/30	P-4	5.60								
											2/30	P-5	6.00								
											2/30	P-5	6.45								
											13/30	T-3	8.00								
											4/30	P-6	8.50								
											4/30	P-7	9.00								
											6/30	P-8	9.45								
											2/30	P-9	10.00								
											16/30	P-10	10.45								
											29/30	P-11	11.00								
											20/30	P-12	11.45								
											17/30	P-13	12.00								
											23/30	P-14	12.45								
											17/30	P-15	13.00								
											17/30	P-16	13.45								
											19/30	P-17	14.00								
											17/30	P-18	14.45								
											8/30	P-19	15.00								
											11/30	P-20	15.45								
											6/30	P-21	16.00								
											3/30	P-22	16.45								
											4/30	P-23	17.00								
											5/30	P-24	17.45								
											7/30	P-25	18.00								
											4/30	P-26	18.45								
											8/30	P-27	19.00								
											9/30	P-28	19.45								
											7/30	P-29	20.00								
											11/30	P-30	20.45								
											6/30	P-31	21.00								
											3/30	P-32	21.45								
											4/30	P-33	22.00								
											5/30	P-34	22.45								
											7/30	P-35	23.00								
											4/30	P-36	23.45								
											8/30	P-37	24.00								
											9/30	P-38	24.45								
											7/30	P-39	25.00								
											8/30	P-40	25.45								
											4/30	P-41	26.00								
											7/30	P-42	26.45								
											8/30	P-43	27.00								
											9/30	P-44	27.45								
											7/30	P-45	28.00								
											8/30	P-46	28.45								
											9/30	P-47	29.00								
											7/30	P-48	29.45								
											8/30	P-49	30.00								
											7/30	P-50	30.45								

出典: JICA 調査団

図 4.1.65 ボーリング調査結果 BH-BD-21(1)

BORE HOLE No. BH-BD-22		BORING LOG				Job No. FKYB-2016-025													
PROJECT NAME : Geotechnical Survey on the detailed design for the Bago River Bridge Construction Project		BORING EQUIPMENT : TOHO "D1"		DATE : 21.11.2016 - 28.11.2016															
LOCATION : Beside Existing Bago River Bridge (Thanlyin Bridge), Thanlyin Township, Yangon Region.		BORING METHOD : Rotary Direct Circulation		CLIENT															
GROUND LEVEL : 3.38m		ORIENTATION : Vertical		NIPPON KOEI CO., LTD.															
COORDINATE : E 205507.335 ; N 1857509.453		DEPTH : 62.00m		GROUND WATER LEVEL : 0.42m															
SCALE (m)	ELEVATION (m)	DEPTH (GL - (m))	THICKNESS (m)	DIAGRAM	COLOUR	RELATIVE DENSITY (%) / CONSISTENCY	SOIL NAME	SOIL DESCRIPTION	DATE & DEPTH (m)	CASING DEPTH (m) & DIAMETER (mm)	WATER DEPTH (m)	STANDARD PENETRATION TEST TEST METHOD (ASTM)				PMT	SAMPLING	SCALE (m)	
												DEPTH (GL - (m))	N-Value (Blows / 30cm)	N-Value (Blows / 30cm)	N-Value (Blows / 30cm)				SAMPLE (Type & No.)
1	1.88	1.50	1.50		brownish gray	Very soft	CLAY	Very soft, brownish gray, moist, medium to high plasticity, CLAY (Filled Soil)			0.45	0.45			P-1	1.00			
2					gray	Very soft to soft	CLAY	Very soft to soft, gray, moist to wet, low to high plasticity, CLAY GL: (8.00 ~ 8.45)m; loose, brownish gray, fine grained, Silty SAND layer is observed as intercalated layer at that depth	3.00	0112		0.45			P-2	2.00			
3												0.45			P-3	3.00			
4												0.45			P-4	4.00			
5												0.45			T-1	4.70			
6												1/30			P-5	5.00			
7												2/30			P-6	6.00			
8												4/30			P-7	7.00			
9												3/30			P-8	8.00			
10	-6.62	10.00	8.50									2/30			P-9	9.00			
11					gray	Soft to stiff	Sandy CLAY	Soft to stiff, gray, moist, fine grained, low to medium plasticity, Sandy CLAY				2/30			P-10	10.00			
12												2/30			T-2	11.00			
13												9/30			P-11	11.00			
14	-10.62	14.00	4.00									18/30			P-12	12.00			
15					brownish gray to gray	Medium dense	Silty SAND	Medium dense, brownish gray to gray, moist to wet, fine grained, Silty SAND	22.11.16	15.00		14/30			P-13	13.00			
16												16/30			P-14	14.00			
17												17/30			P-15	14.45			
18												28/30			P-16	15.00			
19												14/30			P-17	15.45			
20	-16.62	20.00	6.00									27/30			P-18	16.00			
21												4/30			P-19	16.45			
22												3/30			T-3	17.00			
23												4/30			P-20	17.45			
24												3/30			P-21	18.00			
25	-21.62	25.00	5.00									3/30			P-22	18.45			
26												4/30			P-23	19.00			
27												6/30			T-4	19.45			
28												4/30			P-24	20.00			
29												5/30			P-25	20.45			
30															P-26	21.00			
31																21.45			
																22.00			
																22.80			
																23.00			
																23.45			
																24.00			
																24.45			
																25.00			
																25.45			
																26.00			
																26.45			
																27.00			
																27.60			
																28.00			
																28.45			
																29.00			
																29.45			
																30.00			
																30.45			

出典: JICA 調査団

図 4.1.68 ボーリング調査結果 BH-BD-22(1)

BORE HOLE No. BH-BD-22		BORING LOG				Job No. FKYB-2016-025																		
PROJECT NAME : Geotechnical Survey on the detailed design for the Bago River Bridge Construction Project		BORING EQUIPMENT : TOHO "D1"		DATE : 21.11.2016 - 28.11.2016																				
LOCATION : Beside Existing Bago River Bridge (Thanlyin Bridge), Thanlyin Township, Yangon Region		BORING METHOD : Rotary Direct Circulation		CLIENT																				
GROUND LEVEL : 3.38m		ORIENTATION : Vertical		NIPPON KOEI CO., LTD.																				
COORDINATE : E 205507.335 ; N 1857509.453		DEPTH : 62.00m		GROUND WATER LEVEL : 0.42m																				
SCALE (m)	ELEVATION (m)	DEPTH GL. (m)	THICKNESS (m)	DIAGRAM	COLOUR	RELATIVE DENSITY (%) CONSISTENCY	SOIL NAME	SOIL DESCRIPTION	DATE & DEPTH (m)	CASING DEPTH (m) & DIAMETER (mm)	WATER DEPTH (m)	STANDARD PENETRATION TEST TEST METHOD (ASTM)				SAMPLING				SCALE (m)				
												DEPTH GL. (m)	N-Value (Blows / 30cm)	CURVE OF BLOW	N-Value (Blows / 30cm)	SAMPLE (Type & No.)	DEPTH GL. (m)	TCR (%)	SCR (%)		RDR (%)			
31	-27.62	31.00	6.00		gray	Soft to stiff	CLAY	Soft to stiff, gray, moist, medium to high plasticity, CLAY with silt																
32					gray	Soft to stiff	CLAY	Soft to stiff, gray, moist, medium to high plasticity, CLAY with silt																
33								Thin sand layers are well observed as intercalated layer																
34								GL: (52.0m ~ 52.45)m, sand percent is increased at that depth.																
35									24.11.16															
36									35.00															
37																								
38																								
39																								
40																								
41																								
42																								
43																								
44																								
45																								
46									25.11.16															
47									46.00															
48																								
49																								
50																								
51																								
52																								
53																								
54																								
55																								
56									26.11.16															
57	-53.62	57.00	26.00		greenish gray to yellowish gray	Very dense	Clayey SAND	Very dense, greenish gray to yellowish gray, moist, fine to medium grained, low plastic Clayey SAND																
58																								
59																								
60																								
61																								

NOTES		Sample key		Planner structure		Discontinuities	
Relative density description	Consistency description	Disturbed sample (SPT sampler)	PBT Permeability Test	Term	Spacing (mm)	Term	Spacing (mm)
Very loose 0 - 4	Very soft under 2	Undisturbed Sample (Patton sampler)	VS Vane Shear Test	Very thick > 2000	> 2000	Very widely spaced > 2000	> 2000
Loose 4 - 10	Soft 2 - 4	Undisturbed Sample (Diston sampler)	PMT Pressuremeter Test	Thick 600 - 2000	600 - 2000	Widely spaced 600 - 2000	600 - 2000
Medium dense 10 - 30	Firm 5 - 8	Rock core sample (Single core tube)		Medium 200 - 600	200 - 600	Medium spaced 200 - 600	200 - 600
Dense 30 - 50	Stiff 9 - 15	Rock core sample (Double core tube)		Thin 60 - 200	60 - 200	Closely spaced 60 - 200	60 - 200
Very dense over 50	Very stiff 16 - 30	Rock core sample (Core Loss)		Very thin 20 - 60	20 - 60	Very closely spaced 20 - 60	20 - 60
	Hard over 30	Water sample		Thickly laminated 6 - 20	6 - 20	Extremely closely spaced < 20	< 20
				Thinly laminated < 6	< 6		

Term	Spacing (mm)	Term	Spacing (mm)
Very thick	> 2000	Very widely spaced	> 2000
Thick	600 - 2000	Widely spaced	600 - 2000
Medium	200 - 600	Medium spaced	200 - 600
Thin	60 - 200	Closely spaced	60 - 200
Very thin	20 - 60	Very closely spaced	20 - 60
Thickly laminated	6 - 20	Extremely closely spaced	< 20
Thinly laminated	< 6		

Revision No.	Rev. 01
Revision Date	14.01.2017

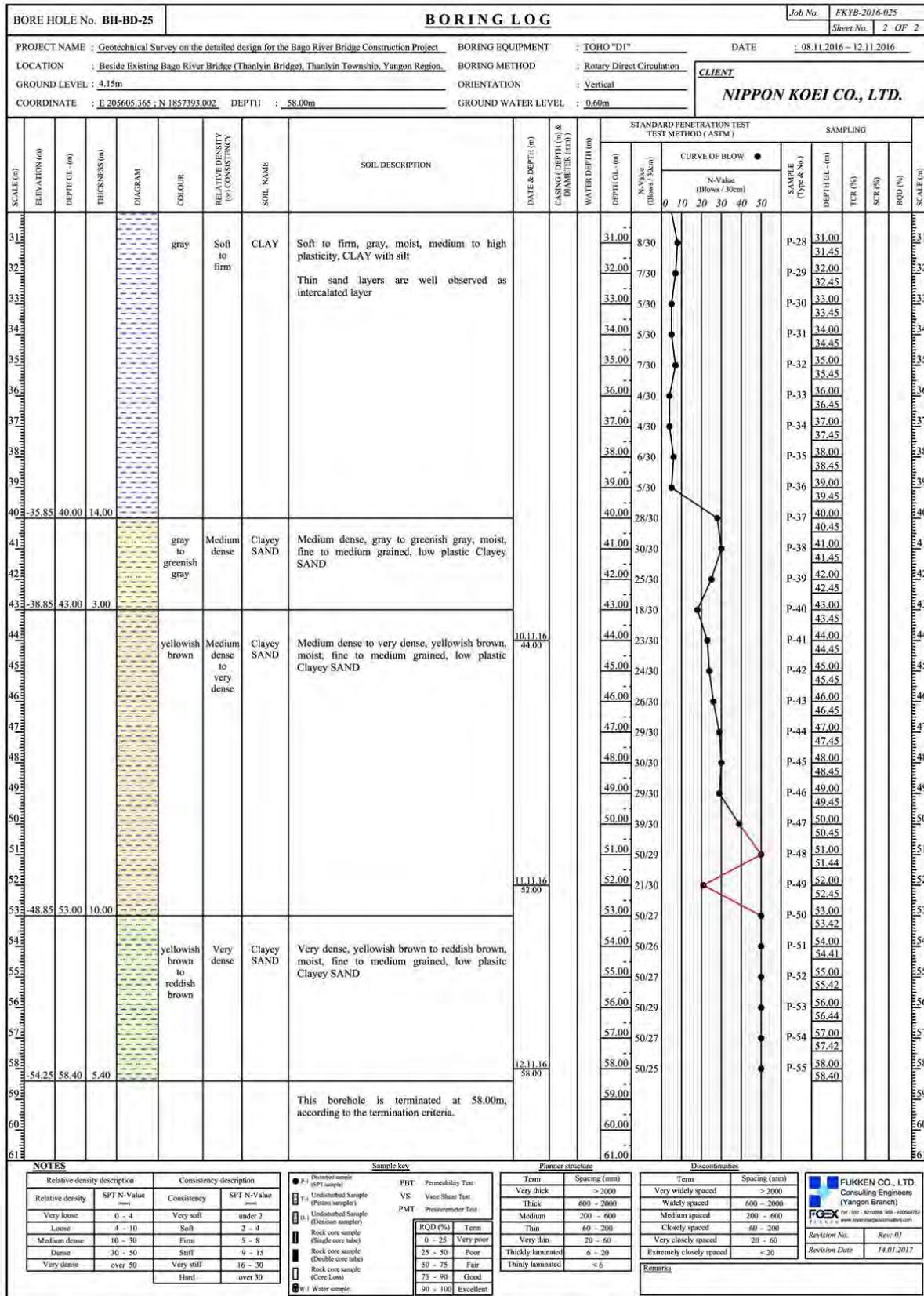
出典: JICA 調査団

図 4.1.69 ボーリング調査結果 BH-BD-22(2)

BORE HOLE No. BH-BD-23		BORING LOG				Job No. FKYB-2016-025																		
PROJECT NAME : Geotechnical Survey on the detailed design for the Bago River Bridge Construction Project		BORING EQUIPMENT : TOHO "D1"		DATE : 28.11.2016 - 05.12.2016																				
LOCATION : Beside Existing Bago River Bridge (Thanlyin Bridge), Thanlyin Township, Yanson Region.		BORING METHOD : Rotary Direct Circulation		CLIENT																				
GROUND LEVEL : 3.98m		ORIENTATION : Vertical		NIPPON KOEI CO., LTD.																				
COORDINATE : E 205541.753 ; N 1837475.540		DEPTH : 59.00m		GROUND WATER LEVEL : 0.42m																				
SCALE (m)	ELEVATION (m)	DEPTH (GL - (m))	THICKNESS (m)	DIAGRAM	COLOUR	RELATIVE DENSITY (%)	CONSISTENCY	SOIL NAME	SOIL DESCRIPTION	DATE & DEPTH (m)	CASING (DEPTH (m) & DIAMETER (mm))	WATER DEPTH (m)	STANDARD PENETRATION TEST TEST METHOD (ASTM)					SAMPLING					SCALE (m)	
													DEPTH (GL - (m))	N-Value (Blows / 30cm)	CURVE OF BLOW			SAMPLE (Type & No)	DEPTH (GL - (m))	TCR (%)	SCR (%)	RQD (%)		
0	10	20	30	40	50																			
31.00					gray		Soft to stiff	CLAY	Soft to stiff, gray, moist, medium to high plastic CLAY with silt Thin sand layers are well observed as intercalated layer	30.11.16 33.00			31.00 4/30		P-26	31.00								31
32.00													32.00 7/30		P-27	32.00								32
33.00													33.00 5/30		P-28	33.00								33
34.00													34.00 5/30		P-29	34.00								34
35.00													35.00 8/30		P-30	35.00								35
36.00													36.00 6/30		P-31	36.00								36
37.00													37.00 7/30		P-32	37.00								37
38.00													38.00 8/30		P-33	38.00								38
39.00													39.00 6/30		P-34	39.00								39
40.00													40.00 7/30		P-35	40.00								40
41.00													41.00 10/30		P-36	41.00								41
42.00													42.00 5/30		P-37	42.00								42
43.00													43.00 6/30		P-38	43.00								43
44.00										01.12.16 44.00			44.00 7/30		P-39	44.00								44
45.00													45.00 7/30		P-40	45.00								45
46.00													46.00 6/30		P-41	46.00								46
47.00													47.00 6/30		P-42	47.00								47
48.00													48.00 11/30		P-43	48.00								48
49.00													49.00 10/30		P-44	49.00								49
50.00													50.00 8/30		P-45	50.00								50
51.00										02.12.16 51.00			51.00 8/30		P-46	51.00								51
52.00													52.00 7/30		P-47	52.00								52
53.00													53.00 31/30		P-48	53.00								53
54.00					greenish gray to yellowish brown		Dense to very dense	Clayey SAND	Dense to very dense, greenish gray to yellowish brown, moist, fine to medium grained, low plastic Clayey SAND				54.00 50/27		P-49	54.00								54
55.00													55.00 50/23		P-50	55.00								55
56.00													56.00 50/19		P-51	56.00								56
57.00													57.00 50/24		P-52	57.00								57
58.00										03.12.16 58.00			58.00 50/29		P-53	58.00								58
59.00										05.12.16 59.00			59.00 50/28		P-54	59.00								59
60.00									This borehole is terminated at 59.00m, according to the termination criteria.				60.00											60
61.00													61.00											61

出典: JICA 調査団

図 4.1.72 ボーリング調査結果 BH-BD-23(2)



出典: JICA 調査団

図 4.1.76 ボーリング調査結果 BH-BD-25(2)

D(m)	AF1	PF1,PF2	PF3	PF4	PF5	PF6,PF7	PF8,PF9	PF10,PF11	PF12	PF13	PF14,PF15	AF2
1	BH-13	BH-12	BH-11	BH-10	BH-9	BH-8	BH-7	BH-6	BH-5	BH-4	BH-3	BH-2
2	Filled Soil	Filled Soil	Filled Soil	Filled Soil	Filled Soil	Filled Soil	Filled Soil	Filled Soil	Filled Soil	Filled Soil	Filled Soil	Filled Soil
3	CLAY-I	CLAY-I	CLAY-I	CL-I	CLAY-I	CL-I	CL-I	CL-I	CL-I	CLAY-I	CLAY-I	CL-I
4	-	-	-	-	-	-	-	-	-	-	-	-
5	Silty SAND-I	Silty SAND-I	Silty SAND-I	Silty SAND-I	Silty SAND-I	Silty SAND-I	Silty SAND-I	Silty SAND-I	Silty SAND-I	Silty SAND-I	Silty SAND-I	Silty SAND-I
6	1	1	1	1	1	1	1	1	1	1	1	1
7	-	-	-	-	-	-	-	-	-	-	-	-
8	Silty SAND-II	Silty SAND-II	Silty SAND-II	Silty SAND-II	Silty SAND-II	Silty SAND-II	Silty SAND-II	Silty SAND-II	Silty SAND-II	Silty SAND-II	Silty SAND-II	Silty SAND-II
9	-	-	-	-	-	-	-	-	-	-	-	-
10	-	-	-	-	-	-	-	-	-	-	-	-
11	Sandy SILT	Sandy SILT	Sandy SILT	Sandy SILT	Sandy SILT	Sandy SILT	Sandy SILT	Sandy SILT	Sandy SILT	Sandy SILT	Sandy SILT	Sandy SILT
12	1	1	1	1	1	1	1	1	1	1	1	1
13	-	-	-	-	-	-	-	-	-	-	-	-
14	-	-	-	-	-	-	-	-	-	-	-	-
15	-	-	-	-	-	-	-	-	-	-	-	-
16	-	-	-	-	-	-	-	-	-	-	-	-
17	-	-	-	-	-	-	-	-	-	-	-	-
18	-	-	-	-	-	-	-	-	-	-	-	-
19	-	-	-	-	-	-	-	-	-	-	-	-
20	-	-	-	-	-	-	-	-	-	-	-	-

D(m)	A1	P1	P2	P3	P4	P5	P6	P7	P10	P11	P12	P13	P14	P15	P16	P17	P18	P19	P20	P21	P22	P23	P24	P25	A2
1	BD-23	BD-22	BD-21	No13BH-01	BD-20	BD-19	BD-18	BD-13	BD-11	BD-10	BD-9	BD-8	BD-7	No13BH-03	BD-6	BD-5	BD-4	No13BH-04	BD-3	BD-2	BD-1	BD-17	BD-16	BD-15	BD-14
2	Filled Soil	Filled Soil	Filled Soil	Filled Soil	Filled Soil	Filled Soil	Filled Soil	Filled Soil	Filled Soil	Filled Soil	Filled Soil	Filled Soil	Filled Soil	Filled Soil	Filled Soil	Filled Soil	Filled Soil	Filled Soil	Filled Soil	Filled Soil	Filled Soil	Filled Soil	Filled Soil	Filled Soil	Filled Soil
3	CLAY-I	CLAY-I	CLAY-I	CLAY-I	CLAY-I	CLAY-I	CLAY-I	CLAY-I	CLAY-I	CLAY-I	CLAY-I	CLAY-I	CLAY-I	CLAY-I	CLAY-I	CLAY-I	CLAY-I	CLAY-I	CLAY-I	CLAY-I	CLAY-I	CLAY-I	CLAY-I	CLAY-I	CLAY-I
4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
7	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
8	-	1/3	-	2/3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
9	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
10	-	2/3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
11	Silty SAND-I	Silty SAND-I	Silty SAND-I	Silty SAND-I	Silty SAND-I	Silty SAND-I	Silty SAND-I	Silty SAND-I	Silty SAND-I	Silty SAND-I	Silty SAND-I	Silty SAND-I	Silty SAND-I	Silty SAND-I	Silty SAND-I	Silty SAND-I	Silty SAND-I	Silty SAND-I	Silty SAND-I	Silty SAND-I	Silty SAND-I	Silty SAND-I	Silty SAND-I	Silty SAND-I	Silty SAND-I
12	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
13	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
14	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
15	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
16	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
17	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
18	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
19	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
20	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

出典: JICA 調査団

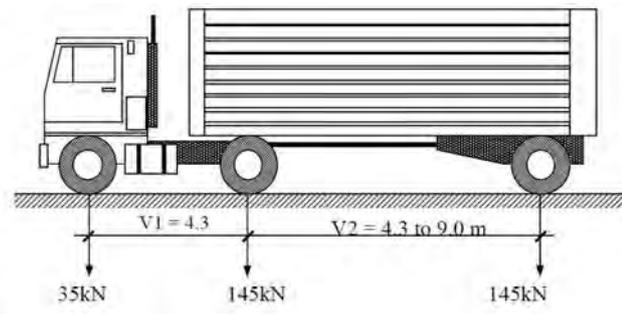
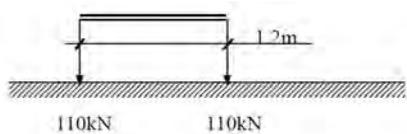
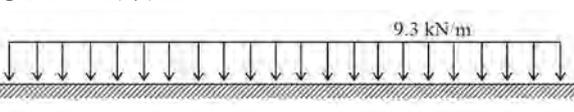
図 4.1.77 液状化による低減定数

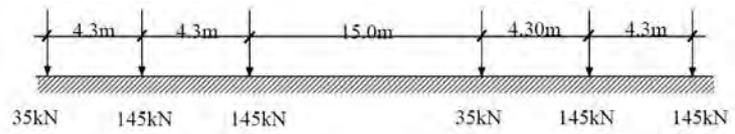
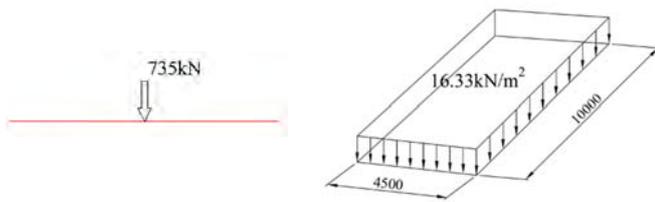
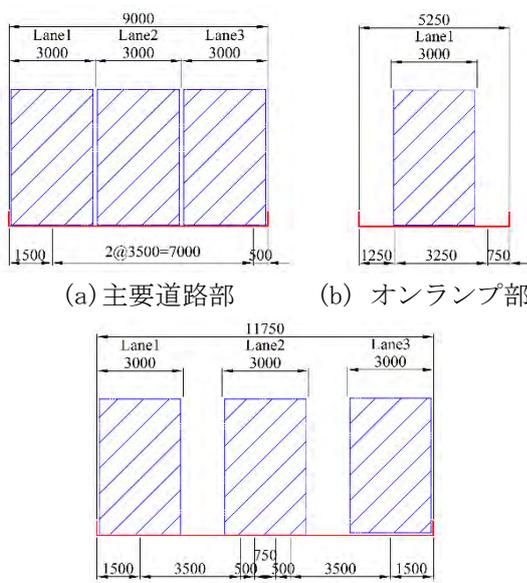
表 4.1.11 その他自然条件(設計値は別途設定)

項目	設計条件	摘要
温度変化	39.2°C~11.3°C (ヤンゴン市内 Kaba aye 観測所、1991~2015)	
風速	既往最大は Cyclone Nargis (2008/4/27) の観測値 42.9m/s。	
降雨量	149mm/h (3年確率10分降雨強度)	

出典: JICA 調査団

表 4.1.12 橋梁荷重条件

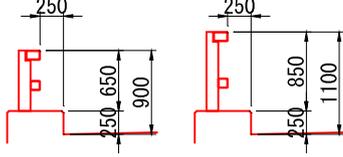
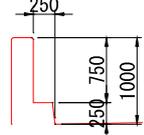
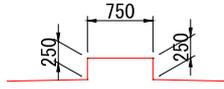
項目	設計条件	摘要																						
死荷重	<p>材料の単位体積重量は、下記の値を使用する。</p> <table border="1"> <thead> <tr> <th>材料</th> <th>単位体積重量(kN/m³)</th> </tr> </thead> <tbody> <tr> <td>鋼・铸鋼・鍛鋼</td> <td>77.0</td> </tr> <tr> <td>铸鉄</td> <td>71.0</td> </tr> <tr> <td>アルミニウム</td> <td>27.5</td> </tr> <tr> <td>鉄筋コンクリート</td> <td>24.5</td> </tr> <tr> <td>プレストレストコンクリート</td> <td>24.5</td> </tr> <tr> <td>コンクリート(無筋)</td> <td>23.0</td> </tr> <tr> <td>セメントモルタル</td> <td>21.0</td> </tr> <tr> <td>木材</td> <td>8.0</td> </tr> <tr> <td>瀝青剤(防水用)</td> <td>11.0</td> </tr> <tr> <td>アスファルト舗装</td> <td>22.5</td> </tr> </tbody> </table>	材料	単位体積重量(kN/m ³)	鋼・铸鋼・鍛鋼	77.0	铸鉄	71.0	アルミニウム	27.5	鉄筋コンクリート	24.5	プレストレストコンクリート	24.5	コンクリート(無筋)	23.0	セメントモルタル	21.0	木材	8.0	瀝青剤(防水用)	11.0	アスファルト舗装	22.5	道示 I 2.2.1
材料	単位体積重量(kN/m ³)																							
鋼・铸鋼・鍛鋼	77.0																							
铸鉄	71.0																							
アルミニウム	27.5																							
鉄筋コンクリート	24.5																							
プレストレストコンクリート	24.5																							
コンクリート(無筋)	23.0																							
セメントモルタル	21.0																							
木材	8.0																							
瀝青剤(防水用)	11.0																							
アスファルト舗装	22.5																							
活荷重	<p>1. AASHTO HL-93 以下①②の荷重の組合せとして作用させる。 ①設計車両 (design truck) または設計タンデム荷重 (design tandem) ②設計車線荷重 (design lane load)</p> <p>①-1 設計車両 (HS20-44 トラック)</p>  <p>①-2 設計タンデム荷重</p>  <p>②設計車線荷重</p> 	<p>AASHTO LRFD Bridge design specifications, 3.6.1</p> <p>3.6.1.3</p>																						

	<p>③設計車両 2 連 (負曲げ区間)</p>  <p>35kN 145kN 145kN 35kN 145kN 145kN</p> <p>組合せ方法</p> <ol style="list-style-type: none"> ①-1 + ② ①-2 + ② ③ × 0.9 + ② × 0.9 <p>車線載荷数による荷重係数 (multiple presence factor)</p> <p>Table 3.6.1.1.2-1—Multiple Presence Factors, <i>m</i></p> <table border="1" data-bbox="502 672 997 840"> <thead> <tr> <th>Number of Loaded Lanes</th> <th>Multiple Presence Factors, <i>m</i></th> </tr> </thead> <tbody> <tr> <td>1</td> <td>1.20</td> </tr> <tr> <td>2</td> <td>1.00</td> </tr> <tr> <td>3</td> <td>0.85</td> </tr> <tr> <td>>3</td> <td>0.65</td> </tr> </tbody> </table> <p>レーン荷重載荷幅は 3.0m とする。</p> <p>2. 特殊荷重として、75t (735kN) 集中荷重又は等価な分布荷重を主桁設計に考慮する (1 橋に 1 台。床版設計には使用しない)</p>  <p>(a) 75t 集中荷重 (b) 分布荷重</p>	Number of Loaded Lanes	Multiple Presence Factors, <i>m</i>	1	1.20	2	1.00	3	0.85	>3	0.65	<p>3.6.1.1</p> <p>MOC による指示</p>
Number of Loaded Lanes	Multiple Presence Factors, <i>m</i>											
1	1.20											
2	1.00											
3	0.85											
>3	0.65											
<p>設計車線幅員</p>	<p>設計車線幅員は 3.0m とし、車線数は総幅員 (地覆前面または壁高欄前面からの幅) を 3.0 で割った時の整数部分とする。高架橋の中央分離帯は将来撤去される可能性があるため、総幅員は中央分離帯を含めた 11.750m とする (車線数は 3 とする)。</p>  <p>(a) 主要道路部 (b) オンランプ部</p> <p>(c) 高架橋部</p>	<p>AASHTO 3.6.1.1.1</p>										

衝撃係数	道路橋示方書 I 共通編の L 荷重相当を載荷する。 鋼橋 $i=20/(50+L)$ PC 橋 $i=10/(25+L)$ 斜張橋の主塔及びケーブルは既往の実績値から別途設定する。主塔： $i=0.15$ 、ケーブル $i=0.20$	道示 I 2.2.3
温度変化	道路橋示方書に準拠するが、基準温度を 25℃とする。 主構造 RC, PC： $+10^{\circ}\text{C}\sim+40^{\circ}\text{C}$ ($25^{\circ}\text{C}\pm 15^{\circ}\text{C}$)・部材間の相対温度差 5℃ 鋼構造： $+10^{\circ}\text{C}\sim+40^{\circ}\text{C}$ ($25^{\circ}\text{C}\pm 15^{\circ}\text{C}$)・部材間の相対温度差 15℃ 支承、伸縮装置 RC, PC 桁： $+5^{\circ}\text{C}\sim+45^{\circ}\text{C}$ ($25^{\circ}\text{C}\pm 20^{\circ}\text{C}$) 鋼桁： $+0^{\circ}\text{C}\sim+50^{\circ}\text{C}$ ($25^{\circ}\text{C}\pm 25^{\circ}\text{C}$)	
コンクリートに作用する力	プレストレスト力、コンクリートのクリープ及び乾燥収縮の影響については、道路橋示方書に準拠する。	道示 I 2.2.4, 2.2.5
風荷重	100mph (44.4m/s) ※ヤンゴン市の基本風速 但しこれは「3秒ガスト風速(瞬間風速)」による表現であるため、これを「10分間平均風速」(耐風設計便覧で使用)に変換する。 $U_{10}=U_{\max}/G=44.7/1.51=29.6(\text{m/s}) \rightarrow \underline{30.0(\text{m/s})}$ ここに、 U_{10} : 10分間平均風速 (m/s) U_{\max} : 3秒ガスト風速 (m/s) G: ガスト係数 $G=1+k(\sigma/U_{10})=1+3\times(7.6/44.7)=1.51$ k: ピーク係数、 $k=3$ σ : 風速の標準偏差、 $\sigma=7.6$	MOCによる指示
流水圧	道路橋示方書に準拠して考慮する。	道示 I 2.2.7
地震時動水圧	考慮する	
船舶の衝突荷重	考慮する	
地震の影響	設計水平震度 $k_h=0.30$ 、 $k_{hg}=0.24$	ミャンマー地震工学会

出典: JICA 調査団

表 4.1.13 橋面工設計条件

項目	設計条件	摘要
防護柵	<p>バゴ-橋本橋（路側、中央分離帯）</p> <p>鋼製防護柵 設計強度 130kJ 以上 （A 種、Am 種） 設置高さ 路面から 1,100mm（路側）、900mm（中央分離帯）</p>  <p>高架橋、オンランプ橋（路側） コンクリート製防護柵 設計強度 160kJ 以上（Sc 種） 設置高さ 路面から 1000mm</p>  <p>高架橋の中央分離帯は、マウントアップのみとする。</p> 	
遮音壁	設置しない	
落下物防止柵	設置しない	
照明	設置する	
添架物	<p>バゴ-橋本橋 水道管（φ45cm×2 条） W=6.0kN/m オーバーレイ等を考慮し、付加荷重 0.7kN/m²を全幅員に考慮</p> <p>高架橋、オンランプ橋 設置しない</p>	水道管は YCDC 水道局からの要請
検査路	<p>バゴ-橋本橋 上部工検査路：鋼箱桁内部に設置 下部工検査路：設置しない。但し、掛け違い橋脚に橋面からの階段と、沓座に転落防止用手摺を設置。</p> <p>高架橋、オンランプ橋 上部工検査路・下部工検査路：設置しない</p>	
排水装置	<p>路側の排水枡で集水する（鋼製、製作品） 流末は、河川上は桁下まで鉛直管を下ろして垂れ流し、陸上は横引きして下部工位置で地上へ下ろす 設計降雨強度 149mm/h</p>	現地
舗装	<p>鋼斜張橋、鋼箱桁（鋼床版） 改質密粒アスファルト舗装、80mm PC 箱桁橋、オンランプ、高架橋 普通アスファルト舗装、80mm</p>	
防水層	設置する（塗布系）	

出典：JICA 調査団