Appendix-2 Request Letter from MOC



THE REPUBLIC OF THE UNION OF MYANMAR MINISTRY OF CONSTRUCTION DEPARTMENTOF BRIDGE NAY PYI TAW

Date: 18, August, 2016

Dear Mr. Masataka Fujikuma,

First of all, thank you for your preparation of the Draft Final Report for the Phase II Survey (Pre-F/S) and our side tentatively agree upon your report.

Secondly, our side would like to inform to you is that the end destination of East West Economic Corridor (EWEC) should be the Thilawa SEZ. So please consider the connectivity and we have one route to connect Thilawa SEZ and EWEC. I herewith attached the tentative route Google plan and we would like to request to your side to do the Feasibility Study of that route.

Attached -

Route of Thilawa SEZ and EWEC.

Your kind response to the above will be highly appreciated. Sincerely yours,

(Aung Myat Oo) Acting Director General Department of Bridge

Cc;

Permanent Secretary, Ministry of Construction.
 Deputy Director General (Planning, Construction, Maintenance).
 Copy.



Proposal of Thanlyin-Thonegwa-Khayan-Kamarsai-Kyaikhto Road





Appendix-3

Initial Study on the Alternative Route Proposed by MOC

Initial Study on the Alternative Route Proposed by MOC

1. General

Upon receipt of new alternative route from MOC after the explanation of Draft Final Report for Phase-II Survey in August 2016 as shown in Figure 1.1, JICA Survey Team (JST) studied on the validity of the road alignment which is directly connected from Kyaito (Kyakhto) to Thanlyin (Thilawa SEZ) as the final destination of EWEC (See yellow alignment in Figure 1.1). The study includes the clarification for the consistency with Arterial Road Network Development (KOICA) and the comparative study for the crossing points of New Sittaung Bridge.



Source: The request letter to JICA Survey Team issued by MOC (18th August 2016) Figure 1.1 Thanlyin-Thonegwa-Khayan-Kamarsai-Kyaikhto Road (MOC, Aug 2016)

2. Consistency with Master Plan for Arterial Road Network Development in Myanmar (ARND-MP)

The ARND-MP was developed by the assistance of KOICA August 2015 that demonstrates the master plan for the establishment of arterial road network in Myanmar. The ARND-MP consists of i) the new 7x5 expressway network to support economic growth, ii) the 12x6 main arterial road network to promote region's economic development and regional integration, and iii) the sub arterial road network to enhance efficiency of road networks by connecting main arterial roads. It is planned that the arterial road length of 15,309km (44.5%) among the entire length, 34,378km will be constructed or improved by 2035 and the rest of it, 19,069 (54.5%), will be after 2035. The ARND-MP recommends the phasing development of arterial road network based on the prioritization of the road sections are given in Figure 2.1.



Source: Master Plan for Arterial Road Network Development in Myanmar (KOICA)

Figure 2.1 Phasing Development Plan for Arterial Highways (Four Phases from 2016 to 2035)

In the ARND-MP, the construction of new expressway (R10) from Pathein to Kyaito via Bago is scheduled in Phase-1 during the period between 2016 and 2020. The alignment of JICA Pre-F/S Road connected from northern Yangon to Kyaito via Bago, almost traces the proposed route of R10 expressway. JICA Pre-F/S is expected to work for a bypass (or alternative national road) of the existing EWEC from Kyaito to Bago via Payagyi, however, the level of services, access control and toll operation, etc. has not been discussed and that will be subject to the further study in the future. More justification will be required however the road alignment is consistent to the ARND-MP as such JICA Pre-F/S Road regards as the proposed alignment of R10 expressway. On the other hand, Thalyin – Thonegwa – Khayan – Kamarsai – Kyaito Road, which is proposed by MOC is scheduled to improve the existing road in Phase 1 of ARND-MP. This road will be upgraded to an arterial road (R8) from Thalyin (Thilawa SEZ) to Bago after the completion of improvement. However, it is not described in ARND-MP as MOC proposes that the improved existing road (R8) is directly connected to Kyaito across Sittaung River.

3. Crossing Point of Sittaung River

JST recommends the crossing point of Sittaung River upon the study of three possible comparative points as described in 6.2.2. It was justified that the route crossing upstream side is more preferable due to lower cost and lower risk from future scouring by tidal water. The area near the river mouth is intensively scoured by tidal water from Andaman sea. JST identified from the available satellite images that the riverside area near the river mouth was severely scoured and became further widened in the past as given in Figure 3.1. The massive scouring and changing of the river trail has been progressed year by year until now. JST thereby recommends that new Sittaung Bridge should be located further upstream to avoid the risk from scouring by tidal water although the distance of road becomes longer.



Source : Prepared by JICA Survey Team based on Google Earth

Figure 3.1 Past River Course Shifting of Sittaung River

In addition, the cost comparison for both bridges was roughly conducted based on the respective bridge lengths as shown in Table 3.1. The crossing point proposed by MOC is located at about 8km downstream side from the proposed crossing point by JST and the bridge length is thereby required approximately 15km (See Fig. 4). If new Sittaung Bridge is constructed along with the route proposed by MOC, the cost would be about 7 times different from the cost of JST proposed bridge.

Item	Bridge Length (km)	Construction Cost (million USD)	Remark
Bridge A (JICA)	2.3	180.7	Refer to 8.2.1
Bridge B (MOC)	15.0	1,400	
		•	•

Table 3.1 Preliminary Estimated Construction Cost

Source : JICA Survey Team

4. Conclusion

According to the clarifications above, the JICA Pre-F/S Road is possible to meet the development plan of ARND-MP and the crossing point of new Sittaung Bridge was justified reasonable. It is therefore recommended that the road alinement should follow the JICA Pre-F/S Road extended from northern Yangon to Kyaito via Bago maintained preferable. However, the improvement of logistics route in Yangon area is urgently required before commencing the full scaled operation of Thilawa SEZ. It is expected to avoid unfavorable traffic congestion in Yangon urban area which is caused by the logistic traffic derived from Thilawa SEZ. The logistics road, which is exclusively functioned as a bypass for the freight vehicles not to pass through Yangon urban area and directly access to other arterial roads, should be provided to secure smooth logistic link with Thilawa SEZ. In this context, the improvement of the existing roads of Thalyin – Thonegwa – Khayan – Kamarsai – Bago road (R8) which is proposed in the ARND-MP would be effective. The objective and function for each proposed road would be justified as given below;

- Construction of New Bago- Kyaito Road (JICA Pre-F/S Road) is to avoid the future severe bottleneck around Bago area and secure redundancy of EWEC with providing shortest route to the southeast region of Myanamar (Yangon – Bago – Myawaddy)
- Improvement of the existing Thalyin Thonegwa Khayan Kamarsai –Bago road is to provide logistic access from Thilawa SEZ connecting to other arterial highways including the EWEC, Yangon-Mandalay Highway (NH1) and Yangon-Mandalay expressway.
- Intersection of these roads around the south Bago area is to develop a logistic hub, which could contribute to the regional development and provide synergy of multi-modal shift with railway transport in the future.



Figure 4.1 Proposed Future Road Network in Yangon Region and Southeastern Myanmar

Source : Prepared by JICA Survey Team based on Google Earth

5. Way Forward to Following Surveys

In order to set out robust road network related to the EWEC around Bago and Yangon area, further study should be conducted to clarify the subjects below.

① Justification for the Final Destination of EWEC at Thilawa SEZ

As shown in Annex-1, MOC has proposed to be the final destination of EWEC at Thilawa SEZ. However there is no technical study result to justify the MOC's proposal which is also not consistency with ARND-MP by KOICA. Thus justification for the final destination of EWEC at Thilawa SEZ is necessary by the placement of functions on each related road for demarcating logistics and passenger traffic taking into account the accessibility between major transportation hubs and New Bago-Kyaito Road of the core towns located in Bago region (Thanatpin and Kamarse, etc.)

2 Consistency with Other Related Master Plan and Development Plan

There are related transportation master plans and development plans, such as 1) Arterial Road Network Master Plan (KOICA), 2) Comprehensive Urban Transport Plan of the Urban Transport Plan of the Greater Yangon (YUTRA) (JICA). It is also planned to rehabilitate the existing Thalyin – Thonegwa – Khayan – Kamarsai – Bago road by an aid of ADB and proposed to extend the EWEC to be the final destination of EWEC at Thilawa SEZ by MOC. Moreover there are other sector's development plan, such as Project for New Hanthawaddy International Airport and Yangon-Mandalay Railway Improvement Project. However there is no comprehensive road development plan covering the related master plans and development plans so that the objected and function for each road is only given by each plan. It is therefore necessary to justify comprehensively the objective and function for each road to secure consistency with related master plans and development plans.

③ Route Justification of New Bago-Kyaito Road

In the Pre-F/S, the road alignment of New Bago-Kyaito road is planned to be shortest route between Bago and Kyaito taking into account the control points such as the optimum crossing point at Sittaung River and avoiding towns. It is however based on the limited information obtained from the satellite map. Therefore, in following surveys, route justification should be examined by mutual discussion with expected implementation agency and local government taking into account the further technical study based on natural condition surveys (distribution of soft soil layer and flooding area in the projected area) and existing and future plan for irrigation facilities etc.

④ Type of intersection of Thalyin – Thonegwa – Khayan – Kamarsai – Bago Road (R8) and New Bago-Kyaito Road

The clover type junction is proposed in the Pre-F/S. But the selection of optimum intersection type should be conducted taking into account directional traffic volume based on further traffic demand forecast and available land for intersection in following surveys.

Appendix-4 Boring Logs

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6					mottled gray and	Soft	CLAY	Soft, mottled gray and reddish l low to medium plasticity, CLAY, fine lateritic gravel					6.00					U T-2	$\frac{6.00}{\binom{45}{80}}$ cm			6
6 7					reddish brown			mie internie gravei					7.00	3/30				P-5	6.45 7.00			17
8	1.00	8.00	3.00										8.00	11/30				P-6	7.45 8.00			8
9													9.00						8.45 9.00			9
9 10 11 12 12 13 14 14 15 1					mottled gray	Loose to	Clayey SAND	Loose to medium dense, mottl reddish brown, moist, fine to me	dium grained,				10.00						(50) cm 9.50 10.00			12 12 13 14 14 14 14 14 14 14 14 14 14 14 14 14
					and reddish brown	medium dense		low plastic Clayey SAND with fin GL-(13.00 ~ 13.45)m, thin sandy						11/30	 			P-7	10.00 10.45 11.00			
					biown			observed as intercalated layer.	clay layer is				11.00	9/30	4			P-8	11.45			
12													12.00	12/30	Ì			P-9	12.00 12.45			<u>E1</u> 2
1 <u>3</u>													13.00	11/30	+			P-10	13.00 13.45			<u>1</u> 3
14										11.03.16 14.00			14.00	9/30	¢			P-11	14.00 14.45			
15													15.00	22/30				P-12	15.00 15.45			15
16	-7.00	16.00	8.00										16.00	12/30				P-13	16.00			16
17					mottled	Firm	CLAY	Firm to very stiff, mottled gray a	nd red, moist.				17.00	13/30				P-14	16.45 17.00			17
18					gray and	to very		low to medium plasticity, CLAY, fine lateritic gravel					18.00		Τ			P-15	17.45 18.00			
19					red	stiff							19.00	5/30					18.45 19.00			
														13/30				P-16	19.45			
20													20.00	21/30				P-17	20.00 20.45			120
17 18 19 20 21													21.00	20/30		Þ		P-18	21.00 21.45			E21
1 7													22.00	14/30				P-19	22.00 22.45			<u>2</u> 22
2 <u>3</u>	-14.00	23.00	7.00										23.00	30/30				P-20	23.00 23.45			E23
24					brownish yellow	Loose to	Clayey SAND	Loose to medium dense, brow moist, fine to medium grained					24.00	8/30	•	1		P-21	24.00 24.45			24
2 <u>4</u> 2 <u>5</u>						medium dense		Clayey SAND with fine gravel	-	12.03.16 25.00			25.00	16/30				P-22	25.00			25
	-17.00	26.00	3.00										26.00	24/30				P-23	25.45 26.00			26
1 3					mottled	Very	CLAY	Very stiff, mottled gray and red,	moist low to				27.00					P-24	26.45 27.00			27
28					gray and	stiff		medium plasticity, CLAY, with lateritic gravel					28.00	28/30					27.45 28.00			1.25
201					red			-						24/30				P-25	28.45			
29													29.00	25/30				P-26	29.00 29.45			129 11
2 <u>7</u> 2 <u>8</u> 2 <u>9</u> 3 <u>0</u>								Carriero en el const		14.03.16 30.00			30.00	17/30	•			P-27	30.00 30.45			17 18 19 19 20 23 23 24 24 24 24 24 24 24 24 24 24
31	NOT	_						Continue to next sheet Sample key			anner stru		31.00			scontinuities			_			31
		lative den ve density		T N-Value	Consis Consisten	tency descrip	N-Value	Undisturbed Sample VS Vane SI	bility Test	Term Very thicl Thick		Spacing > 600 -	2000		Term ry widely s Widely spa		Spacing (1 > 20 600 - 20	000			1	
		y loose	_	0 - 4 4 - 10	Very sof Soft		under 2 2 - 4	PMT Pressur D-1 Undisturbed Sample D-1 (Denison sampler) Rock core sample ROD (%	emeter Test	Medium	+	200 - 60 -	- 600	2	Aedium spa Closely spa	ced	200 - 20	500	Const	ramayri ruction	Co., Ľ	.td.
	Medi E	um dense Dense]	10 - 30 30 - 50	Firm Stiff		5 - 8 9 - 15	Rock core sample (Single core tube) Rock core sample (Double core tube) 25 - 50	Very poor Poor T	Very thii nickly lami	nated	20 -	60	Ve	ry closely s mely close	paced	20 - 6	0	Revision N Revision D		Rev: (25.04.	
	Ver	y dense		over 50	Very stif Hard		6 - 30 over 30	(Double core tube) Rock core sample (Core Loss) (Core Loss)	Good	hinly lamir	nated	<	6	Remai	ks							$\overline{}$
L								w-1 Water sample 90 - 10	00 Excellent													

в	ORE H	OLE N	(o. B I	H-02				<u>B (</u>	DRING	L O G	r -							Job N	_	4F-201 eet No.	-	OF 2
								Bypass Road	BORING EQ				10 "D1"			DA	TE	: 11	.03.2016	~ 17.0	3.2016	_
	DCATIC	ON DEVEL			Sittaung R	iver, Near	Sut Pa Nu V	illage, Kyaikto Township	BORING ME			: <u>Rota</u> : Vert		t Circulatio	<u>n</u> <u>c</u>	LIENT						
				76632.000 ; 1	N 1924814.	000 DE	EPTH :_	60.00m	GROUND W		VEL						JICA	STU	DYTE	EAM		
						<u>≻</u> ≻					n) &		5	STANDARD TEST M	PENETRA ETHOD (.		Т		SAM	PLING		
	(m) V	(m)	(II)			RELATIVE DENSITY (or) CONSISTENCY	ш	SOIL DESCRIPTION		DATE & DEPTH (m)	CASING (DEPTH (m) & DIAMETER (mm))	WATER DEPTH (m)	(m)	(H	CURVE	OF BLOW	•	3 [0.)	(m)			
SCALE (m)	ELEVATION (m)	DEPTH GL - (m)	THICKNESS (m)	DIAGRAM	COLOUR	ATIVE	NAME	SOL DESCRIPTION		E & DE	ING (D	TER DE	DEPTH GL - (m)	N-Value (Blows / 30cm)		N-Value ows / 30cm)		SAMPLE (Type & No.)	DEPTH GL - (m)	TCR (%)	SCR (%)	RQD (%) SCALE (m)
		DEP	THI	DIA	COL	REL (or	SOIL			DA1	CAS	WW	DEP	0 ^(B)		30 40		, E	DEP	TCR	SCR	RQE
3 <u>1</u> 32 3 <u>3</u>					mottled	Very	CLAY	Very stiff, mottled gray and red,	moist low to				31.00	24/30	$ \rangle$			P-28	31.00			<u>3</u> 1
32					gray and	stiff	CLAI	medium plasticity, CLAY, with lateritic gravel					32.00						31.45 32.00			32
					red									25/30		°		P-29	32.45			
1 3													33.00	17/30	Í			P-30	33.00 33.45			33
34		34.00	8.00										34.00	18/30	þ			P-31	34.00 34.45			<u>=3</u> 4
35					mc+41 1	T	Class	Loose to medium development 1	arou and1				35.00	12/30	¢			P-32	35.00 35.45			35
36					mottled gray and	Loose to medium	Clayey SAND	Loose to medium dense, mottled moist, fine to medium grained Clayey SAND with fine gravel					36.00	9/30				P-33	36.00			<u>3</u> 6
37					red	dense		Chayey Ortivo with this gravel					37.00	16/30				P-34	36.45 37.00			37
38													38.00					P-35	37.45 38.00			38
36 37 38 39 40 41														20/30					38.45			1
299													<u>39.00</u>	29/30		Y		P-36	39.00 39.45			<u>13</u> 9
40										15.03.16 40.00			40.00	30/30		1		P-37	40.00 40.45			40
41													41.00	28/30		•		P-38	41.00 41.45			41
42		42.00	8.00										42.00	31/30				P-39	42.00 42.45			42
43													43.00	25/30				P-40	43.00			43
43 44 45 46					mottled	Very	CLAY	Very stiff to hard, mottled gray a					 44.00					P-41	43.45 44.00			44
45					gray and red	stiff to hard		low to medium plasticity, CLAY, fine fine grained sand and fine late					45.00	25/30		7			44.45 45.00			45
					iou	mart								21/30	ľ			P-42	45.45			E
46													46.00	21/30				P-43	46.00 46.45			46
													47.00	20/30	•			P-44	47.00 47.45			47
48													48.00	28/30				P-45	48.00 48.45			48
47 48 49 50 51													49.00	39/30				P-46	49.00			49
50										16.03.16			50.00	31/30				P-47	49.45 50.00			50
51										50.00			51.00						50.45 51.00			51
														29/30		/		P-48	51.45			51 52
1 4														20/30	//			P-49	52.00 52.45			E
53		53.00	11.00		mottled	Medium	Clayey	Medium dense to dense, mottled g					53.00	13/30				P-50	53.00 53.45			<u>5</u> 3
54					gray and red to	dense to	SAND	brownish yellow, moist, fine grained, low plastic Clayey SANE					54.00	41/30		\mathbb{N}		P-51	54.00 54.45			54
		55.00	2.00		brownish yellow	dense							55.00	29/30				P-52	55.00 55.45			55
56					yellowish brown	Very stiff	CLAY	Very stiff, yellowish brown, r medium plasticity CLAX with					 56.00	27/30				P-53	56.00			<u>5</u> 6
5 <u>7</u>					orowii	3011		medium plasticity, CLAY, with lateritic gravel and fine grained sa					57.00	50/30				P-54	56.45 57.00			57
58								Sand percent is increased downwa	ırds				58.00						57.45 58.00			58
								GL-(57.00 ~ 59.00)m, fine grained	d sand layer is					39/30		И		P-55	58.45			E
56 57 58 59								observed as intercalated layer					59.00	28/30		é		P-56	59.00 59.45			59
60		60.45	5.45					This borehole is terminated	<u>at 60.00m,</u>	17.03.16 60.00			60.00	28/30		•		P-57	60.00 60.45			<u>6</u> 0
61	NOT	ES						according to the termination criter Sample key		<u>P</u> la	nner stru	icture	61.00		Disco	ontinuities						61
	Re	lative den	ana	ription F N-Value	Consistenc	tency descrip	N-Value	P-1 Disturbed sample PBT Permea (SPT sample) PBT VS Vane S	ibility Test	Term Very thick		Spacing >	2000	Very v	Term /idely spac	ed S	Spacing (mm > 2000			Â	4	
	Ver	y loose		(meas) 0 - 4	Very soft	۶ ۱	(meas) inder 2	D-1 (Piston sampler) D-1 Undisturbed Sample (Denison sampler)	remeter Test	Thick Medium	+	600 - 200 -	600	Med	ely spaced	1	600 - 2000 200 - 600		Sar Const	amayr ruction		
	Medi	um dense	1	4 - 10	Soft Firm		2 - 4 5 - 8	Rock core sample (Single core tube) 0 - 2:	5 Very poor	Thin Very thin		60 - 20 -	60	Very c	ely spaced losely spac	ed	60 - 200 20 - 60		Revision Ne Revision De		Rev: 1	
		ense y dense		30 - 50 over 50	Stiff Very stiff Hard	. 1	9 - 15 6 - 30 over 30	Rock core sample (Double core tube) 25 - 50 Rock core sample (Core Loss) 50 - 7. 75 - 90 75 - 90	5 Fair	hickly lamin Thinly lamin		6 - < 0		Extreme Remarks	y closely s	paced	< 20				20.04	
				L	naru	((Core Loss) 75 - 9 W-1 Water sample 90 - 1														

вс	RE H	OLE N	(o. B I	H-03				<u>B C</u>	RING	LOG	2							Job N		MF-201 eet No.	-	OF 2
PR	OJECT	NAME	: <u>Soil</u>	Investigatio	on for Phase	-II of Kya	kto ~ Bago	Bypass Road	BORING EQ	JIPMEN	Г	: <u>TO</u> F	10 "D1"			E	DATE	: 26	5.03.2016			
LC	CATIC	N	: <u>We</u> s	stern Bank o	f Sittaung F	liver, Near	Sut Pa Nu V	/illage, Waw Township	BORING ME	THOD		: <u>Rota</u>	ary Direc	t Circulati	on a	LIENT						
		LEVEL							ORIENTATIO	DN		: <u>Ver</u>	ical		— [⁻		JIC	A STU	DYTI	EAM		
CC	ORDIN	NATE	: <u>E 2</u>	75873.000 ; :	N 1922257.	000 DE	^{ертн} : _	31.00m	GROUND W.	ATER LE	-	: 2.00	_	STANDARI			TOT					
	0		_			VSITY				(III)	H (m) & mm))	(m)		TEST N	AETHOD	(ASTM)			SAM	PLING		
(II)	IION (III	(m) - JE	THICKNESS (m)	M	~	RELATIVE DENSITY (or) CONSISTENCY	NAME	SOIL DESCRIPTION		DATE & DEPTH (m)	i (DEPT	DEPTH	(m) - JE	alue 30cm)	CURV	E OF BLO		SAMPLE (Type & No.)	3L - (m)) (ii
SCALE (m)	ELEVATION (m)	DEPTH GL - (m)	THICKN	DIAGRAM	COLOUR	RELATI (or) CC	N TIOS			DATE &	CASING (DEPTH (m) DIAMETER (mm))	WATER DEPTH (m)	DEPTH GL - (m)	N-Value (Blows/30cm)		N-Value Blows / 30c 0 30	cm) 40 50	SAN (Type	DEPTH GL - (m)	TCR (%)	SCR (%)	RQD (%) SCALE (m)
1													1.00	2/20				P-1	1.00			
					brownish gray	Soft	CLAY	Soft, brownish gray to gray, wet plasticity, CLAY with silt, with					2.00	3/30					1.45 2.00			
, 1					to gray			mineral				¥		2/30				P-2 ₩-1	2.45			l.
3													3.00	3/30				P-3	3.00 3.45			
4											4.00 Ø115		4.00	3/30				P-4	4.00			4
5													5.00	3/30				P-5	5.00 5.45			- Line
6													 6.00	3/30				P-6	6.00			e
7	2.00	7.00	7.00										 7.00		V. I			P-7	6.45 7.00			17
-				× × × × × ×]			8.00	13/30					7.45			أسسله
linit				× × × × × ×	gray	Very loose	Silty SAND	Very loose to medium dense, gra grained, Silty SAND	y, moist, fine					7/30	٩			P-8	8.45			م سارہ
9				× × ×		to medium dense							9.00	11/30	h			P-9	9.00 9.45			<u>19</u>
101mm				× × × × × ×									10.00	12/30	•			P-10	10.00 10.45			
11				× × ×									11.00	13/30				P-11	11.00			1
12	-3.00	12.00	5.00	× × × × × ×									 12.00	34/30		\searrow		P-12	11.45 12.00			1
13				× × × × × ×	brownish	Medium	Silty	Medium dense to very dense, b	rownish grav				13.00			X		P-13	12.45 13.00			
				× × × × × ×	gray	dense to	SAND	moist, fine to medium grained, with trace mica mineral						27/30		Ĩ			13.45			
14				××××		very dense							14.00	27/30		٩		P-14	14.00 14.45			
1 <u>3</u> 14 15 16				× × ×									15.00	37/30				P-15	15.00 15.45			անհատումիստումիստումիստունիստունիստութիստումիստունիստունիստունիստունիստունիստունիստունիստունիստունիստունիստունի
16				× × ×									16.00	26/30		۰		P-16	16.00 16.45			10
				× × × × × ×									17.00	29/30		Å		P-17	17.00			1
17 18 19 19				× × × × × ×									 18.00	50/30				P-18	17.45 18.00			1
19				× × × × × ×									19.00				И		18.45 19.00			
				× × × × × ×										38/30		\vee		P-19	19.45			- Line
201				× × × × × ×						26.03.16	-		20.00	28/30				P-20	20.00 20.45			
2 <u>1</u>				× × ×									21.00	50/20				P-21	21.00 21.35			12
22	-13.00	22.00	10.00	×××						-			22.00	38/30				P-22	22.00 22.45			2
23				x x x x x x									23.00	48/30				P-23	23.00			12
2 <u>4</u>				× × × × × ×	brownish	Medium	Silty	Medium dense to very dense, b						30/30			T I	P-24	23.45 24.00			12
25				× × × × × ×	gray	dense to very	SAND	moist, fine to medium grained, with trace mica mineral	Silty SAND,				25.00			Ĭ			24.45 25.00			- III.
				× × ×		dense		GL (20.00 21.45)m; Thin (They have in					25/30				P-25	25.45			
261				× × ×				GL- $(30.00 \sim 31.45)$ m; Thin 0 observed as intercalated layer at th					26.00	31/30				P-26	26.00 26.45			120 11
2 <u>7</u>				× × × × × ×									27.00	31/30		k		P-27	27.00 27.45			<u>2</u>
28				× × ×									28.00	35/30				P-28	28.00 28.45			12 ⁹
2 <u>9</u>				× × × × × ×										50/28			\mathbb{N}	P-29	29.00			2
30				x x x x x x									30.00				\downarrow		29.43 30.00			E 3
23 24 25 26 27 28 29 30 30				× × × × × ×				Continue to next sheet					31.00	32/30			\mathbb{N}	P-30	30.45			
512	<u>NOT</u> Re	E <u>S</u> lative den	sity desc		Consis	ency descrip	tion	Sample key P-1 Disturbed sample (SPT sample) PBT Permea	bility Test	Pl: Term	anner stru	icture Spacing			<u>Dis</u> Term	continuitie	s Spacing (m	um)		Δ.	4	<u>F3</u>
		ve density		T N-Value	Consistenc		N-Value	T-1 Undisturbed Sample VS Vane Si (Piston sampler) PMT Processor	near Test	Very thick		> 600 -	2000 2000	W	widely sp dely space	ed	> 200 600 - 200	00		ramayri		
		y loose oose		0 - 4 4 - 10	Very soft Soft		inder 2 2 - 4	U D-1 (Denison sample) Rock core sample) Term	Medium Thin		200 -	200	Cle	dium spac osely space	ed	200 - 60		Const	ruction		.td.
	D	um dense ense	3	0 - 30 30 - 50	Firm Stiff		5 - 8 9 - 15	(Single core tube) 0 - 25 Rock core sample (Double core tube) 25 - 50	Poor T	Very thii hickly lami	nated	20 - 6 -	20		closely sp ely closely		20 - 60 < 20		Revision N Revision D		Rev: (25.04.	
	Ver	y dense	C	over 50	Very stiff Hard		6 - 30 wer 30	Rock core sample (Core Loss)	Good	'hinly lamir	nated	<	6	Remarks								
								w-1 Water sample 90 - 10	00 Excellent													

вс	RE H	OLE N	o. BE	1-03				BO	RING	LOG	<u> </u>								Job N		MF-20. eet No.	-	OF 2
PR	OJECT	NAME	: Soil	Investigati	on for Phase	-II of Kyai	kto ~ Bago	Bypass Road	BORING EQ	JIPMENT		: <u>tof</u>	IO "D1"				DAT	E	: 26	.03.2016		-	
	CATIC				of Sittaung F	liver, Near	Sut Pa Nu V	Village, Waw Township	BORING ME					t Circulati	ion	CLIE	NT						
	ROUND DORDIN	LEVEL			N 1922257.	000 DE	PTH :	31.00m	ORIENTATIO			: <u>Vert</u> : <u>2.00</u>						JIC	A STU	DYT	EAM		
h						_								TANDAR	D PENE	TRATIO	N TEST			SAM	PLING		
	(m		Ê			RELATIVE DENSITY (or) CONSISTENCY				(III (III)	CASING (DEPTH (m) & DIAMETER (mm))	(m) H.	÷			DD (AST	BLOW	•					
(II)	ELEVATION (m)	DEPTH GL - (m)	THICKNESS (m)	taM	Ĕ	UVE DI	NAME	SOIL DESCRIPTION		DATE & DEPTH (m)	G (DEI METEF	WATER DEPTH (m)	DEPTH GL - (m)	/alue / 30cm)		N-Va		-	SAMPLE (Type & No.)	DEPTH GL - (m)	()	0	(m)
SCALE (m)	ELEV/	DEPTH	THICK	DIAGRAM	COLOUR	RELA1 (or) C	SOIL NAME			DATE	CASIN	WATE	DEPTH	(Blows / 30cm)	10	(Blows /	/ 30cm) 0 40	50	SA (Typ	DEPTH	TCR (%)	SCR (%)	RQD (%) SCALE (m)
				× × ×													\swarrow						
31		31.45	19.45	* * *						28.03.16 31.00			31.00	50/30				6	P-31	31.00 31.45			<u>3</u> 1
32								This borehole is terminated according to the termination criteria					32.00										<u>3</u> 2
33													33.00										33
34													34.00										<u>3</u> 4
35													35.00										35
20													36.00										130
$\begin{array}{c} 32 \\ 33 \\ 34 \\ 35 \\ 36 \\ 37 \\ 37 \\ 38 \\ 39 \\ 40 \\ 41 \\ 42 \\ 43 \\ 41 \\ 41 \\ 41 \\ 41 \\ 41 \\ 41 \\ 41$													37.00										<u>3</u> 6 <u>3</u> 7
38													38.00										38
39													39.00										39
40													40.00										E40
41													41.00										41
																							E
42													42.00										42
4 <u>3</u>													43.00										43
44													44.00										44
45													45.00										45
46													46.00										46
47													47.00										E47
48													48.00										48
49													49.00										49
50													50.00										50
51													51.00										51 52 53
52													52.00										<u>5</u> 2
5 <u>3</u>													53.00										53
54													54.00										54
55													55.00										55
													56.00										
20																							100
57													57.00										55 56 57
58													58.00										58
59													 59.00										59
60													 60.00										60
4/1 48 50 51 51 52 53 54 55 55 56 57 58 59 60 61													61.00										61
	NOT	_	oitur 4	intio:		anar 4	tion	Sample key			unner stru	icture Spacing				Discontin	_	acing (m		۱ <u> </u>	A		F 01
		lative den: /e density	SPT	N-Value	Consist		N-Value (meas)	UT-1 (SPT sample) PB1 Permeab UT-1 (Piston sample) VS Vane Sh	ear Test	Term Very thick Thick			2000		Term widely idely sp	spaced		> 200 > 200	00			4	
		y loose oose		0 - 4 4 - 10	Very soft Soft	υ	nder 2 2 - 4	D-1 Undisturbed Sample (Denison sampler)		Medium	+	200 -	600	Me	edium sp osely sp	paced	20	00 - 200 00 - 60 50 - 200)0	Const	ruction	ri - Fuj 1 Co., I	.td.
	Medi	im dense ense	þ	0 - 30	Firm		5 - 8 9 - 15	(Single core sample (Single core tube) Rock core sample 25 - 50	Very poor	Very thir hickly lamit		20 - 6 -	60	Very	closely			20 - 60		Revision N Revision E		Rev: 25.04	01 .2016
		y dense	_	ver 50	Very stiff Hard	1	6 - 30 ver 30	(Double core tube) 50 - 75 Rock core sample 75 - 90	Fair 1	'hinly lamin		<(Remarks									\exists
				L				9 w-1 Water sample															

BC	RE H	OLE N	o. BI	I-04				<u>B C</u>	RING	L O C	2							Job N		MF-201 eet No.	-	OF 1
PR	OJECT	NAME	: <u>Soil</u>	Investigatio	n for Phase	-II of Kya	ikto ~ Bago	Bypass Road	BORING EQU	JIPMEN	r	: <u>tof</u>	10 "D1"			DA	ATE	: 01	.04.2016			
	CATIC				go - Sittaung	Channel, be	tween Waw To	wnship & Thanatpin Township	BORING ME					et Circulat	ion <u>c</u>	LIENT						
		LEVEL			N 1022257	000 11	EPTH :	30.00m	ORIENTATIO GROUND WA			: <u>Vert</u>			—		JIC	A STU	DYTI	EAM		
	OKDIN	AIE	: <u>E 24</u>	9007.000 ; 1	N 1922257.		-:	30.00m	GROUND W		1	: <u>3.50</u>				ATION TE	ST		SAM	PLING		\neg
	â	-	Ê			RELATIVE DENSITY (or) CONSISTENCY				(m) H	CASING (DEPTH (m) & DIAMETER (mm))	(m) H			CURV	(ASTM)	N O					_
(II)	NOIT (GL - (m	THICKNESS (m)	WV	×	IVE DE DNSIST	NAME	SOIL DESCRIPTION		è dept	3 (DEP METER	R DEPT	GL - (m	/ 30cm)	CORVI	N-Value	••••	SAMPLE (Type & No.)	GL - (n			(ii)
SCALE (m)	ELEVATION (m)	DEPTH GL - (m)	THICK	DIAGRAM	COLOUR	RELAT (or) C(SOIL N			DATE & DEPTH (m)	CASING	WATER DEPTH (m)	DEPTH GL - (m)	N-Value (Blows/30cm)		lows / 30cm		SAA (Type	DEPTH GL - (m)	TCR (%)	SCR (%)	RQD (%) SCALE (m)
					brownish	Soft	CLAY	Soft, brownish gray, moist, low	v to medium													- H.
1					gray			plasticity, CLAY					1.00	3/30				P-1	1.00 1.45			
2	6.00	2.00	2.00							-			2.00	1/30				P-2	2.00 2.45			2
3					gray	Very	CLAY	Very soft to soft, gray, moist to w	et, medium to		3.00 Ø115		3.00					U D T-1	3.00 $(\frac{80}{80})$ cm			3
4						soft to soft		high plasticity, CLAY			0115	¥	4.00	3/30				₿w-1 ₽-3	3.80 4.00			4
2 3 4 5	3.00	5.00	3.00			5011							5.00		\mathbb{N}				4.45 5.00			
	5.00	2.00	5.00	x x x						1				11/30				P-4	5.45			Ĭ.
6				× × × × × ×	gray	Loose to	Silty SAND	Loose to dense, gray, moist, fin grained, Silty SAND with clay pat					6.00	7/30				P-5	6.00 6.45			-6
7				* * * * * *		dense							7.00	19/30				P-6	7.00			7
8				x				GL- (9.00 ~ 9.45)m; hard, gray, lo plasticity, CLAY with silt layer i		01.04.16			8.00	22/30				P- 7	8.00			1118
101111				× × × × × ×				intercalated layer		0.00			9.00	31/30		N		P-8	8.45 9.00			1 19
10				x									10.00			\wedge			9.45 10.00			
				× × × × × ×										17/30	٩			P-9	10.45			
11	-3.00	11.00	6.00	x									11.00	39/30				P-10	11.00 11.45			
12 13 14 15				* * * * * *	gray	Medium dense	Silty SAND	Medium dense to very dense, gra to medium grained, Silty SAND,					12.00	24/30		<		P-11	12.00 12.45			<u>1</u> 2
13				* * ×		to very		mica mineral					13.00	32/30				P-12	13.00			13
14				* * *		dense		GL- (16.00 ~ 16.45)m; hard, medium plasticity, CLAY with					 14.00	25/20		Δ		P-13	13.45 14.00			∎ 14
				× × × × × ×				observed as intercalated layer	-					25/30		Ĭ.			14.45			
15				× × × × × ×									15.00			•		P-14	15.00 15.45			<u>-1</u> 3
16				× × ×									16.00	31/30				P-15	16.00 16.45			
				× × ×									17.00	50/15				P-16	17.00 17.30			17
1 <u>8</u>				× × × × × ×									18.00	31/30				P-17	18.00			<u>1</u> 8
19				× × × × × ×									19.00			\square			18.45 19.00			
				* * * * * *										40/30		/		P-18	19.45			
17 18 19 20				* * *									20.00	31/30		K		P-19	20.00 20.45			=20
2 <u>1</u>				× × ×									21.00	42/30				P-20	21.00 21.45			21
22	14.00	22.00	11.00	× × × × × ×						-			22.00	27/30				P-21	22.00			22
23					gray	Hard	CLAY	Hard to firm, gray, moist, low	to medium				23.00	32/30				P-22	22.45 23.00			23
24						to firm		plasticity, CLAY with silt and t mineral	race of mica				24.00			$\left \right $			23.45 24.00			1 1 2
- H														16/30				P-23	24.45			1 min
2 <u>3</u> 2 <u>4</u> 2 <u>5</u> 2 <u>6</u> 2 <u>7</u> 2 <u>8</u> 2 <u>9</u> 2 <u>9</u> 30													25.00	34/30				P-24	25.00 25.45			E25
2 <u>6</u>													26.00	20/30	 			P-25	26.00 26.45			26
2 <u>7</u>													27.00	17/30				P-26	27.00			27
28													28.00	13/30				P-27	27.45 28.00			28
20															Ĭ				28.45 29.00			
47													29.00	15/30				P-28	29.45			1
30	22.45	30.45	8.45					This borehole is terminated		02.04.16 30.00			30.00	8/30	6			P-29	30.00 30.45			<u>E3</u> 0
31	NOT							according to the termination criteri Sample key	a	Pl	anner stru	cture	31.00		Disc	continuities						E 31
		lative den	-	iption N-Value		tency descrip	otion FN-Value		bility Test	Term Very thicl		Spacing	g (mm) 2000	Ver	Term widely spa		Spacing (mr > 2000			Â	4	
	Ver	e density y loose		(meas) 0 - 4	Consistenc Very soft	, I	(meas) ander 2	D-1 Undisturbed Sample PMT Pressure	emeter Test	Thick Medium	\pm	600 - 200 -	- 600	М	idely space	ed	600 - 200 200 - 600)		ramayr ruction		
	Mediu	oose um dense	1	4 - 10 0 - 30	Soft Firm		2 - 4 5 - 8	Rock core sample (Single core tube) 0 - 25	Very poor	Thin Very thi		60 - 20 -	60	Ver	osely space closely spa	aced	60 - 200 20 - 60		Revision N	<i>o</i> .	Rev:	01
		ense / dense	_	0 - 50 ver 50	Stiff Very stiff	1	9 - 15 6 - 30	Rock core sample (Double core tube) 25 - 50 Rock core sample (Core Loss) 50 - 75 75 - 90 75 - 90	Fair T	hickly lami hinly lamir		6 -		Extren Remark	ely closely	spaced	< 20		Revision D	ate	25.04	4.2016
L				L	Hard		over 30	(Core Loss) 75 - 90	0 Good 0 Excellent													