WORK INSTRUCTIONS FOR ENGINEERS

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CH-011. CHECKLIST FOR BOREHOLE TESTING

30.0 CHECKLIST FOR BOREHOLE TESTING

No.	CHECKLIST ITEMS	ACKNOWLEDGED BY	CHECKED BY	
		S.I. Contractor	G&P GEOTECHNICS SDN BHD (G&P)	
1.0	**EQUIPMENT APPRAISAL**	**SIGNATURE**	**YES**	**NO**
1.1	Casing: ● NW (I.D 76mm, O.D 89mm) ● HW (I.D 101mm, O.D 115mm)		❑ ❑	❑ ❑
1.2	Rod: ● AW (O.D 44mm) ● Drill rods in standard length (e.g. 3.0m, 1.5m, 1.0m).		❑ ❑	❑ ❑
1.3	Split Spoon: ● Driving shoe is in good condition (not dented). ● Sample head has a ball check valve.		❑ ❑	❑ ❑
1.4	Undisturbed Sampling Tube: ● U75 (I.D 75mm) for piston and thin wall tube ● U72 (I.D. 72mm) for mazier sampler tube and make sure the spring inside the tube is functioning. ● UD tube and cutting edge are free from surface irregularities (dents, rust, etc.) and in good conditions ● Make sure all type of undisturbed sample tubes shall have 1m in length		❑ ❑ ❑ ❑	❑ ❑ ❑ ❑
1.5	Chart for visual description ● For Soil ● For Rock		❑ ❑	❑ ❑
1.6	<u>REMARKS:</u> Contractor must make available Hydrochloric acid (diluted to 10% concentration) at site (especially when working at the site underlain by limestone formation) for testing and confirmation of limestone or other rocks containing carbonate minerals.		❑	❑
2.0	**STANDARD PENETRATION TEST (SPT)**	**SIGNATURE**	**YES**	**NO**
2.1	General procedures: ● Borehole advances by rotary wash boring method. **(Note: percussive drilling is not allowed)** ● SPT to be carried out below casing. ● Keep borehole water level equal to or higher than elevation of groundwater for silty and sandy soils to prevent 'boiling'. ● Check the water source for the boring works. Dirty water (with rubbish, dirty colour and smelly) totally cannot be used. Water used for wash boring shall be clean water. Use pH paper (to be provided by contractor) to check the pH value of the water used.		❑ ❑ ❑ ❑ ❑	❑ ❑ ❑ ❑ ❑

	● Marked clearly and accurately the interval for seating and test drive with chalk. ● Use sand trap inside split spoon if the soil is sandy soil and recovery in the split spoon is very low. ● The seating drive is inclusive of initial penetration under dead weight of the split spoon, rods, and hammer. ● Record the blow counts in the field borehole log. ● Second attempt to retrieve sample with retainer in the split spoon for granular soil if there is no recovery during the initial attempt. ● Store collected sample under cover from direct sunlight. ● Supervisor to carry out immediate logging of sample. ● Daily measurement of water level (morning and evening) using dipmeter. ● Supervisor and driller to endorse field borehole log. ● Backfill of borehole with suitable material (specify type of material:_____).		❑ ❑ ❑ ❑ ❑ ❑ ❑ ❑ ❑ ❑	❑ ❑ ❑ ❑ ❑ ❑ ❑ ❑ ❑ ❑
2.2	REMARKS: ● Split soil sample into two parts horizontally to see the soil profile clearly. ● Before allowing the demobilization of wash boring machine, G&P representative should confirm with Project Engineer.			
3.0	**UNDISTURBED SAMPLING**	**SIGNATURE**	**YES**	**NO**
3.1	General procedures: ● Minimum 500mm clearance of wash boring after SPT to obtain undisturbed sample (UD), e.g. SPT from 1.5m to 1.95m and UD at 2.5m. ● Use only tube dimensions: U75 (for piston and thin wall) or U72 (for mazier sampler tube). ● UD tube and cutting edge are free from surface irregularities (dents, rust, etc.) ● Tube advance by continuous and steady motion. ● Seal UD tube with non-shrinking microcrystalline wax. Direct burn the paraffin wax to seal the UD tube is not allowed. ● Plastic sheets are used and shall act as a separator for soil and the wax. ● Store UD sample under cover from direct sunlight.		❑ ❑ ❑ ❑ ❑ ❑ ❑	❑ ❑ ❑ ❑ ❑ ❑ ❑
3.2	Transportation: ● Sampler tubes lifted slowly and placed with care on board the transport. ● Sampler tubes rested on transport's seat cushion.		❑ ❑	❑ ❑

3.3	REMARKS: ● The contractor shall try hard to get the UD recovery with minimum of 600mm so that there are sufficient soil samples for laboratory tests.			
4.0	**ROCK CORING**	**SIGNATURE**	**YES**	**NO**
4.1	General Procedures: ● Determine coring depth when lowering down rods and core barrel. ● Coring by using triple tube core barrel (NMLC) for minimum 54mm dia. ● Drillers are to stay close at machine. ● If less than 50% core recovery, the following run to be reduced to 0.5m coring length to improve recovery ● Record the time taken for every 1.5 m rock coring in the borehole logging form. ● The rock description should follow B.S Standard (type of rock, color, fracture, RQD, CRR, dip angle, spacing and GSI) and record in borehole log if there's more than one type of rocks in one core.		❑ ❑ ❑ ❑ ❑ ❑ ❑	❑ ❑ ❑ ❑ ❑ ❑
4.2	Extraction and Storage of Cores: ● Remove cores from barrel by hydraulic pressure. ● Place cores in standard core box systematically and follow the angle of the joints. ● Show core loss by spacer –spun or woods with label its either core loss or cavities. ● Store core box under cover from rain and sunlight. ● Photograph cores in core box with legible information (label the depth, recovery and RQD of each rock core samples) and arranged the core boxes systematically according to its depth. ● Carry out acid test in order to confirm those rock core samples are limestone/marble or not.		❑ ❑ ❑ ❑ ❑ ❑	❑ ❑ ❑ ❑ ❑ ❑
4.3	<u>REMARKS:</u>			
5.0	**VANE SHEAR TEST (VST)**	**SIGNATURE**	**YES**	**NO**
5.1	Equipment: ● Vane type: Geonor/Acker ● Vane diameter: 50mm/65mm (for Geonor Vane)		❑ ❑	❑ ❑
5.2	Calibration:		❑	❑

	● Calibration certificate for equipment (last calibration must be within 3 months). ● Calibration chart for vane. **(Note: Testing cannot proceed without the certificate)** ● Calibration the vane in water to check the functionality of the equipment.		❑ ❑	❑ ❑
5.3	General Procedures: ● Torque head measuring instrument firmly secured against movement with respect to ground level. ● Applicable vane size (for Geonor Vane): 55mm X 110mm for S_{uv}= 50 to 100 kPa; 65mm X 130mm for S_{uv}= 0 to 60 kPa. ● Vane to rotate at a rate of 6 degrees/min. ● Elapse time of 5 minutes before remoulding test.		❑ ❑ ❑ ❑	❑ ❑ ❑ ❑
5.4	REMARKS:			
	NOTE: **Once this copy is signed, the above guidelines have been clearly defined and understood by the contractor. Therefore, there shall be no problems in repeating the testing procedures for the borehole without the presence of G&P representation.**			

FIELD DAILY WATER LEVEL RECORD

Project No :
Project Title :
SI Contractor :
Borehole No. :

Measuring Device :
Nearby Water Source And Approx. Distance :
Reported By :
Reduced Level :

Date	Well Type	Water Level in meter b.g.l (Time Recorded)		Weather Condition and Remarks
		Morning	Afternoon	

Note : - Well Type (N / H Casing, Uncased, PVC, Standpipe)
Nearby Water Resource (River, Pond, Drain etc.)

GEOTECHNICAL
PERUNDING

PROJECT NO :
PROJECT TITLE :
SI CONTRACTOR :

COMMENCEMENT DATE :
COMPLETION DATE :

Location :

Elevation :

Sheet No: of

Date/ Time	Sample No.	Depth (m) From	Depth (m) To	Method	Recovery (mm)	S.P.T. 1st 15cm	S.P.T. 2nd 15cm	S.P.T. 3rd 15cm	N	Vane Shear $C_{u,p}$ KN/m²	Vane Shear $C_{u,r}$ KN/m²	G.W.L Below G.L. (m)	Remarks	Soil Description & Any Other Remarks

NON PRODUCTIVE TIME	Time	Time	Hrs
Mobilization & Demobilization			
Equipment Break Down			
Total Non Productive Time			
Total Productive Time			

SOIL or ROCK BORING		QUANTITY	REMAINING
Total Meters Drilled	Soil		
	Rock		
Total Soil Samples	HA		
	TW		
	PS		
	MZ		
	SPT		
	C		

FINE GRAIN MATERIALS

Consistency	SPT,N	Undrained Shear Strength (kN/m²)
Very Soft	<2	<20
Soft	2-4	20-40
Firm	4-8	40-75
Stiff	8-15	75-150
Very Stiff	15-30	>150
Hard	>30	>150

COARSE GRAIN MATERIALS

Consistency	SPT,N
Very loose	<4
Loose	4-10
Medium	10-30
Dense	30-50
Very Dense	>50

Crew No : Report by :

FIELD DAILY BORING RECORD

ABBREVIATIONS
HA – Hand Auger
TW – Thin Wall
SS – Split Spoon
ST – Shelby Tube
PS – Piston Sampler
MZ – Mazier Sampler
VS – Vane Shear
WO – Wash Out
C – Core

CASING
Size: NW / HW / PW / SW Depth: m

UD TUBE
Size: U1 / U2 / U3 / φ60mm / MZφ 73mm

DRILLING ROD
Size: BW/NW/HW
Flushing Medium : Water / Foam / Air

R&D DOCUMENT REVISION LOG

REV	VERSION	DATE	LOGGER	AMENDMENTS
0	0	11/9/2001	GKH	Initial release
1	1	11/9/2001	GKH	-
2	2	19/8/2020	TCN	Update Items 1.4,2.1, 3.1, 4.1 and 4.2 Add Items 1.6, 2.2 and 3.2.