Appendix-1

SCHEDULE OF ITEMS

FOR

GEOTECHNICAL INVESTIGATION

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(A Government of India Enterprise)
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Appendix- 1

SCHEDULE OF ITEMS

Sl. No.	Description of work	Quantity (Q)	Unit	Unit Rate (R)	Total Rate (T = RXQ)	Total GST (G=GST% of T)	Final Rate (G+T)
1	Shifting of boring rigs, other in-situ test equipment, personnel etc. for carrying out investigation on land from old test location to new test location within the test site area after completion of work at the previous test location (Bidder shall indicate quantity of machinery, men and equipment required to be shifted from one test location to new location).	200	Locations				
2	Making Bore Holes from natural ground to 5 m depth at specified locations marked in reference drawing. Bore Holes shall be as per the Technical Specifications and below details depending on the type of sub-strata: (i) In all types of soil, performing Standard Penetration Tests as per specifications, collection of soil and water samples complete including storing, transporting of sample to laboratory, back-filling of boreholes all complete as per specifications and as directed by the Engineer in charge.	150	No				

	(ii) Core drilling in rock strata using double tube core barrel using Nx size diamond bit and collection of rock cores and water samples, keeping record of core recovery, RQD, conducting SPT if core recovery is less than 20%, keeping cores in standard samplers including storing, transportation of samples to laboratory, backfilling of bore holes all complete as per specifications and as per the direction of Engineer in charge.						
3	Making Bore Holes from natural ground to 15 m depth at specified locations marked in reference drawing. Bore Holes shall be as per the Technical Specifications and below details depending on the type of sub-strata: (i) In all types of soil, performing Standard Penetration Tests as per specifications, collection of soil and water samples complete including storing, transporting of sample to laboratory, back-filling of boreholes all complete as per specifications and as directed by the Engineer in charge. (ii) Core drilling in rock strata using double tube core barrel using Nx size diamond bit and collection of rock cores and water samples, keeping	50	No				

	record of core recovery, RQD, conducting SPT if core recovery is less than 20%, keeping cores in standard samplers including storing, transportation of samples to laboratory, backfilling of bore holes all complete as per specifications and as per the direction of Engineer in charge. **Note:** Starting depth of SPT/UDS collection shall be 1.5 m.						
4	Conducting Electrical Resistivity test as per technical specifications at locations to be directed by Engineer in charge.	200	No				
5	Conducting Ordinary Plate Load test at 2.5 m depth at various locations marked in reference drawing including excavation of test pit, sample collection, providing and erecting equipment, supporting beams, kentledge, jacks and instruments and removing the same and clearing site after test all complete as per specification and direction of Engineer in Charge.	25	No				
6	Making Trial Pits of specified size (3 M X 3 M) at various location up to 3.0 m depth in all type of soil/ weathered rock formations, including sheeting	50	No				

	or shoring the sides if required for the purpose of stability, dewatering and maintaining the pit dry at all times, collecting disturbed/undisturbed samples at 1.0 m interval, conducting in-situ density etc., testing by pocket penetrometer, collecting water samples and transporting all soil and water sample to laboratory, backfilling of the pits all complete as per the specification and direction of the Engineer in charge. Trial pits shall be backfilled and compacted with the excavated soil. **Note:** Lab test samples shall be collected at top surface, 1.5m and 3.0 m depth. Samples collected at surface and 1.5m depth shall be used for Proctor and lab CBR test.						
7	Conducting field CBR tests as per specification, at specified location as shown in reference drawing and /or directed by Engineer.	50	No				
8	Conducting various Laboratory Tests on soil samples at an approved laboratory including preparation of soil sample to determine the following properties-						
(a)	Bulk Density and Moisture Content	425	No				

(b)	Sieve Analysis	650	No				
(c)	Hydrometer Analysis	650	No				
(d)	Liquid Limit, Plastic Limit, Shrinkage Limit and Plasticity Index	325	No				
(e)	Specific Gravity	650	No				
(f)	Standard Proctor Compaction Test	100	No				
(g)	Swell Pressure and Free Swell Index (samples up to 6m depth below GL)	-	-				
(h)	Relative Density (for sand)	-	-				
(i)	Unconfined Compressive Strength Test	-	-				
(j)	Tri-axial Shear Test						
	i) Unconsolidated Undrained Test	-	-				
	ii) Consolidated Undrained Test with Pore Water Pressure Measurement	-	-				
	iii) Consolidated Drained Test	-	-				
(k)	Direct Shear Test	425	No				
(l)	California Bearing Ratio (CBR) (Both Soaked & Unsoaked)	100	No				
(m)	Chemical Analysis of soil as per specification	250	No				
(n)	Consolidation test	-	-				
9	Chemical Test on water samples for Carbonate, Sulphate, Chloride, pH value, organic matter, and turbidity complete as per specification	10	No				

10	Laboratory Test on rock samples as per specification for determining the following properties-						
(a)	Moisture Content, Porosity and Density	675	No				
(b)	Specific Gravity	675	No				
(c)	Hardness	200	No				
(d)	Slake Durability Index	200	No				
(e)	Unconfined Compressive Strength (both saturated and in- situ water content)	400	No				
(f)	Point Load Strength Index	400	No				
(g)	Deformability Test (both saturated and dry samples)	200	No				
11	Taking photographs of rock samples of rock cores, rock exposures, geological features, pits all complete to cover field testing. Submission shall be in soft copy and as hard copy post approval of report.	1	LS				
12	Submitting Report (soft copies of draft & final report, 3 hard copies of final report) with all field and laboratory test records, graphs, charts, recommendations complete as specified.	1	LS				
TOTAL EVALUATED BID VALUE (TEBV) (in figures) (Sum of Final Rate of all line items)							
TOTAL EVALUATED BID VALUE (TEBV) (in words) (Sum of Final Rate of all line items)							

Notes:

(a) The bidder shall furnish the unit rate without fail.

(b) Number of samples, number of laboratory tests, etc. is tentative and may change depending upon the soil / actual site condition.

(c) Total amount will be worked out based on the 'Actual Quantity'.

ANNEXURE-A

Sample for record:

Summary of Laboratory Test Results - Rock Core Samples

BORE HOLE NO.	
DEPTH	
CORE PIECE NO.	
MOISTURE CONTENT	
SPECIFIC GRAVITY	
HARDNESS	
POROSITY	
DRY DENSITY	
SLAKE DURABILITY	
POINT LOAD STRENGTH INDEX	
DEFORMABILITY (DRY /SATURATED)	
UNCONFINED COMPRESSIVE STRENGTH (INSITU/SATURATED)	
CORE DESCRIPTION	
REMARKS	

ANNEXURE-B

Sample for record

Boreholes

LOCATION	BH NO.	CO-ORDINATE (M)			TERMINATING DEPTH	DEPTH OF WATER TABLE	TOP OF ROCK BELOW
		EASTING	NORTHING	G.L.	(M)	(M)	EGL (M)

Sample for Borelog:

CLIENT: **BORE HOLE NUMBER: TIME:**						**DIA. OF HOLE:RL:** **TYPE OF BORE / DRILL:**						
DESCRIPTION OF STRATA	SYMBOL	THICKNESS (M)		COLLECTION OF SAMPLES		SPT 'N' VALUE	ROCK DRILLING		CORE RECOVERY (%)	RQD (%)	Q_U (KN/M^2) VANE SHEAR TEST	REMARK
		FROM (M)	TO (M)	TYPE	DEPTH		FROM (M)	TO (M)				

ANNEXURE-C

Sample format of record: Trial Pit:

Trial Pit No.	Co-ordinate (M)		G.L.(M)	Depth (M)	DWT (M)
	Easting	Northing			

ANNEXURE-D

Sample format of record:

Electrical Resistivity Tests Table – 1

Location	ERT No.	Co-ordinates (M)		Ground Level, (M)
		Easting	Northing	

Electrical Resistivity Tests Table – 2

Sl. No.	S (M)	(N - S)	(E - W)	Mean resistivity (Ohm-m)

ANNEXURE-E

Sample format of record: Laboratory Rock Test Result

BH No.	Run No.	Depth (M)	Description	Bulk Density (gm/cm^3)	Dry Density (gm/cm^3)	Water Absorption (Natural)%	Porosity (%)	Specific gravity	Unconfined Compressive Strength (N/mm^2)		Coefficient of Softening	Point Load Index, (N/mm^2)	Slake Durability Index (%)
									Dry	Saturated			

ANNEXURE-F

Sample format of record:

Standard Proctor Compaction & CBR Values

SL No.	Location	Sample No	Depth (M)	Description	Standard Proctor Compaction Test		CBR (%) Unsoaked Condition		CBR (%) Soaked Condition		Recommended CBR Value (%)
					OMC (%)	MDD (gm/cm^3)	2.50mm Penetration	5.00mm Penetration	2.50mm Penetration	5.00mm Penetration	

ANNEXURE-G

Sample format of record:

Swelling Index & Swelling Pressure Test Results

Bore Hole No.	Sample No.	Depth (M)	Description	Swelling Index (%)	Swelling Pressure (N/mm^2)	Plasticity Index (%)

Pressure meter Tests Record Sheet

Sl. No.	Test Location No.	Test No.	Test depth below existing ground surface (M)	Corrected Limit pressure (N/mm^2)	Menard's Modulus of Deformation, Em (N/mm^2)

ANNEXURE-H

Sample format of record:

Recommended Net Allowable Bearing Capacity

Borehole No.	Structure/ Building	NGL (M)	Depth of Foundation below NGL (M)	Founding Level (R.L. in M)	Recommended Net Allowable Bearing Capacity (kN/m^2)			
					Isolated / Strip		Raft	
					S = 25mm	S = 40mm	S = 40mm	S = 75mm

ANNEXURE-I

Sample format of record: Field Permeability Test

Test Locations	Co-ordinates (M)			Type of Test	Depth of Test (M)
	Easting	Northing	G.L.		
				Falling Head	
				Double Packer	
				Double Packer	

ANNEXURE-J

Sample format of record: Plate Load Test

Test No.	Depth (M)	Recommended SBC (kN/m^2)	Settlement at Safe Load (mm)	Young's Modulus N/mm^2	Subgrade Modulus for Plate, N/mm^3

ANNEXURE-K

Sample format of record: CHEMICAL TEST

Chemical Test On Soil

BH No	Depth (M)	pH value	Sulphate(%)as		Chloride as Cl %	Nitrate as %	Carbonate as %	Organic Matter as %
			SO3	SO4				

Chemical Test On Water

BH No.	Depth (M)	pH value	Sulphate as mg/litr	Chloride as mg/litr	Carbonate as mg/litr	Nitrate as mg/litr	Organic matter as mg/litr	Turbidity (JTU)

ANNEXURE-L

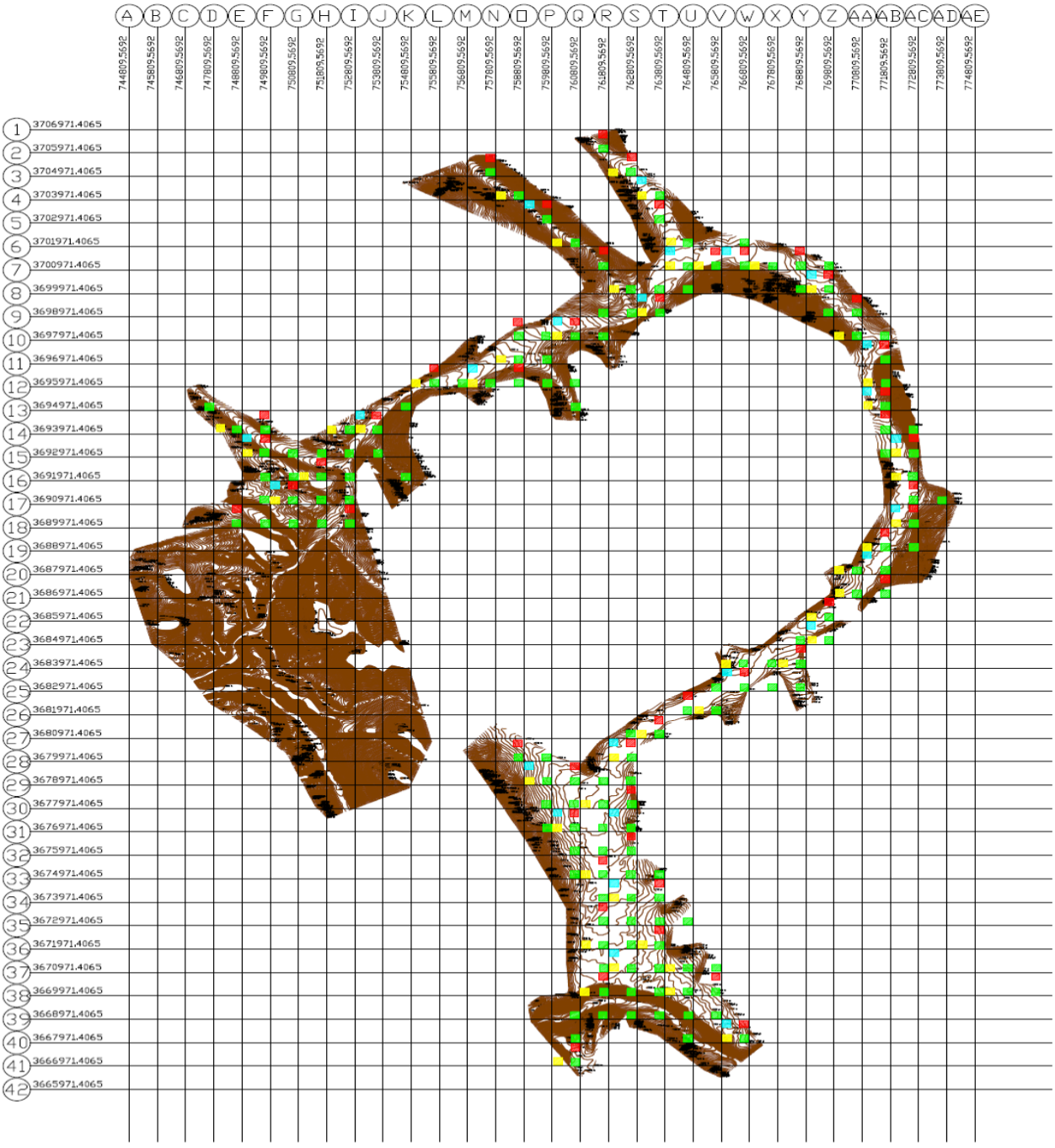
Sample format of record: Laboratory Test

Bore Hole	Sample Number	Depth (M)	Sample Description	Bulk Dens.	Dry Density	Spec. Gravity	Nat. Mois.	Void Ratio	Strength Test Results				Atterberg's Limits			Soil Classification	Grain Size			
									Pc/Pn	Shear	Cohesion	Friction	LL	PL	SL		Gravel	Sand	Silt	Clay
				gms/cm 3	gms/cm 3		%		N/ mm^2	N/ mm^2	N/ mm^2	Deg	%	%	%		%	%	%	%

ANNEXURE-M

Site Map with Indicative Test Locations:

Attached site map shows indicative locations for bore hole, plate load test and CBR test. The map has been prepared in a grid of 1km x 1km. Final locations will, however, be decided at the site by the Engineer In charge as per site conditions based on considerations of topography, accessibility, proper distribution of test locations over site area, etc.



	BH 5m	150 No's
	BH 15m	50 No's
	CBR Test	50 No's
	Plate Load Test	25 No's