

GEOTECHNICAL INVESTIGATION REPORT

FOR:

PROPOSED TOWER (B+G+5) CHAS Dist-BOKARO JHARKHAND

CLIENT:

SMT. SHOBHA DEVI AND Mr BACHCHHE KHAN

March2022

PREPARED BY:



Vishesh Lab Pvt. Ltd.

MATERIAL AND GEOTECH LABORATORY

NABL Accredited Laboratory

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P0	GeotechnicalInvestigationReport	AA	PSC	15.03.2022
REV.	DESCRIPTION	PREPARED	APPROVED	ISSUEDATE



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**PROPOSED TOWER (B+G+5) AT CHAS DIST-BOKARO
JHARKHAND**

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REPORT

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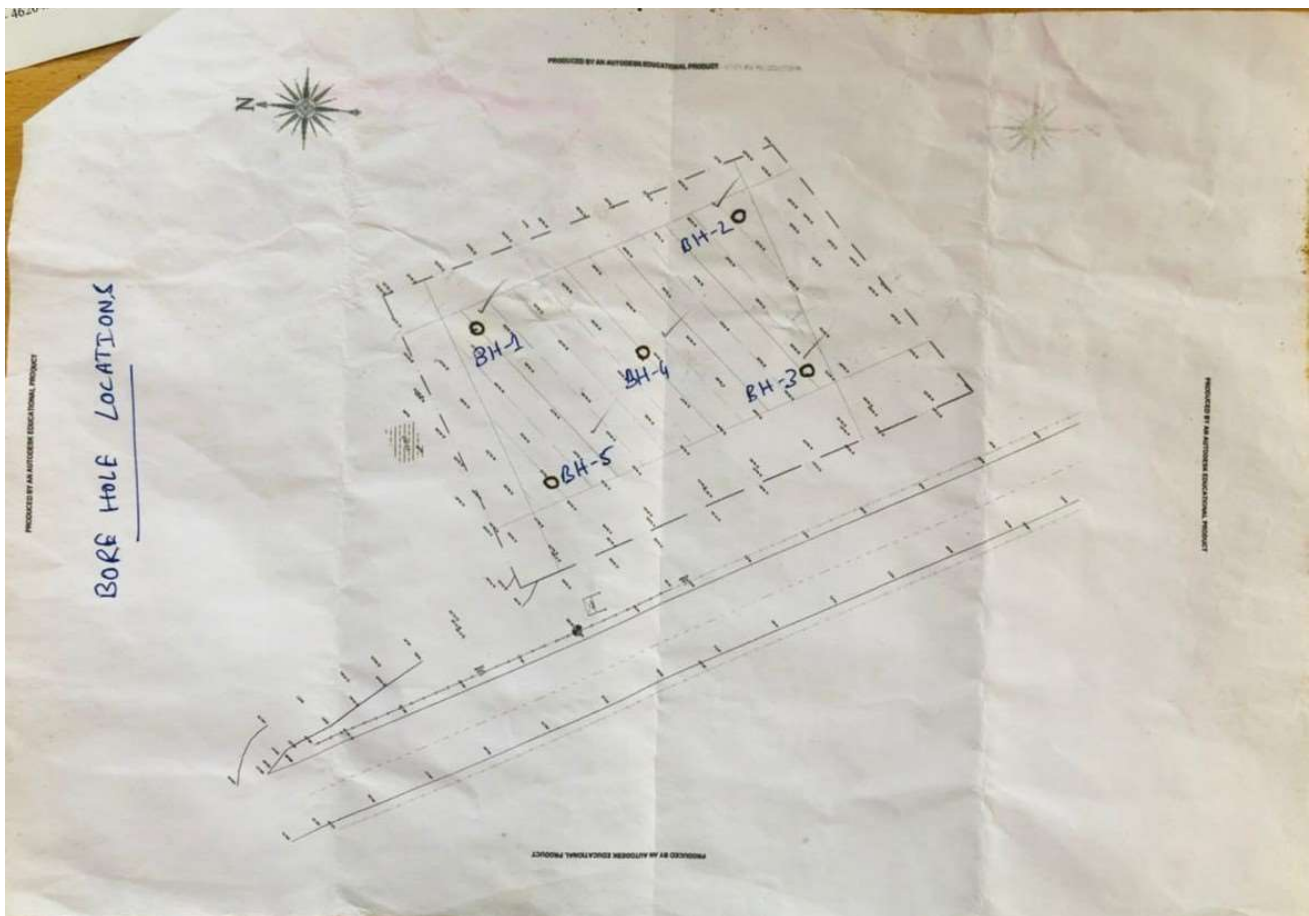
PROPOSED TOWER (B+G+5) AT CHAS DIST-BOKARO JHARKHAND

1.0 INTRODUCTION:

Smt shobha devi and bachchhe khan Proposed to construct a Proposed Tower (B+G+5) Chas Dist Bakaro Jharkhand . As a part of the project, in order to assess the sub soil profile and properties of the encountered strata Smt shobha devi and bachchhe entrusted the geotechnical investigation work to M/s. Vishesh Labs Pvt. Ltd. verbally communication.

1.1 SITELOCATION:

The projectsiteisChasdistBokaro,Jharkhand.





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1.2 PROPOSED CONSTRUCTION:

It is proposed to Construct Tower (B+G+5) on Chas Dist - Bokaro, Jharkhand Ranchi. It is anticipated that the structures will be constructed mainly from RCC Structure.

1.3 SCOPE OF SERVICES:

“Scope of this contract covers geotechnical investigation for the proposed “Proposed Tower (B+G+5) Chas Dist - Bokaro” The overall purpose of this study is to investigate the general stratigraphy of the ground along the proposed pipeline and to verify the competency of the encountered strata to support the proposed structural elements. In this regard, the scope of includes as

-

- (i) Drilling of total 05 nos. of bore holes throughout the stretch of pipe line up to a maximum depth of 10m natural ground level or up to a depth of weathered or hard rock encountered with *RQD* (Rock Quality Designation) > 25%.
- (ii) Conducting the standard penetration test at every 1.50m interval through soil as well as in weathered rock.
- (iii) Collecting disturbed and Un-Disturbed soil samples.
- (iv) Groundwater table observation.
- (v) Carrying out the relevant laboratory investigations on representative soil/rock samples.
- (vi) Preparation of detailed geotechnical investigation report along with the suitable recommendations.
- (vii) The entire stretch of the pipeline is divided in different segments based on the location of region.

2.0 FIELDWORK:

Drilling and sampling in soil and rock was carried out using rotary drilling rig. Borehole in soil was advanced using rotary drilling method, while NX size core barrel with diamond bit was used to drill in rock. Water was circulated to cool the drilling bit. Ground water table was recorded after 24 hours of completion of drilling. On completion of drilling, soil samples were packed in plastic containers with proper identification tags. Rock cores were numbered and kept in core boxes.



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Fieldwork was performed During Feb 2022. Representative of client indicated location of boreholes & details of coordinates. Following table summarizes the borehole location, its depth and other relevant information.

S. NO	BORE HOLE NO.	NORTHING (m)	EASTING (m)	R.L.	TOTAL DEPTH (m)
1.	BH-01	-	-	96.539	9.50
2.	BH-02	-	-	96.462	9.50
3.	BH-03	-	-	96.584	8.0
4.	BH-04	-	-	96.381	4.0
5.	BH-05	-	-	96.350	10.00

Table1:BoreholeLocationDetails

2.1 SUBSURFACEPROFILE:

Typically following type of stratum is encountered. It is possible that the stratum encountered may not be in the same order as tabulated. Details are furnished in the bore logs attached.

- (i) **StratumI:**clayey silty sand with gravel/silty sand with gravel,
- (ii) **StratumII:** Completely to Highly weathered Rock

Thickness of each layer encountered along with SPT (Standard Penetration Test – *N* value) or *RQD* range as the case may be at the locations is tabulated below. It shall be noted that the stratum listed below may not be encountered in the same order as listed.

BH. NO.	LAYER I		LAYER II	
	THICK(m)	SPTN	THICK(m)	RQD%
BH-01	6.00	15-<100	3.50	0
BH-02	4.50	<100	5.00	0
BH-03	4.50	<100	3.50	0
BH-04	1.50	<100	2.50	0
BH-05	6.00	35-<100	4.00	0

Table2:SubsurfaceProfile

(Above classification is based on driller's comments, our experience of the area and values of core recovery and Rock Quality Designation. They should not be considered for classifying rock from ease of excavation or payment point of view)



2.2 WATERLEVEL:

Water level was encountered in each boreholes . Correct method to determine ground water table is to install standpipe Piezometer and monitor over a long period. Following table show waterlevel observed after 24hr.

BHNO.	WATERLEVEL (m)
BH-01	1.00
BH-02	1.00
BH-03	1.00
BH-04	1.00
BH-05	1.00

Table3:Water Levelin Boreholes

3.0 ENGINEERINGANALYSIS:

Engineeringanalysisofthesubsoilwasperformedtodeterminenetsafebearingcapacity. Parametersobtainedarebasedonvariousfieldandlaboratorytests.

Engineeringanalysisofthesubsoilwasperformedtodeterminenetsafebearingcapacity. Parametersobtainedarebasedonvariousfieldandlaboratorytests.

Rockisencounteredatvariabledepth.Itisconsideredthatisolatedpadfoundationshallbe used. Two alternate foundations systems are considered.

AlternateI:Foundationsplacedonsiltysandyclay

Alternate II: Foundations placed on rockFollowing

formula are used.

3.1 ALTERNATEI:FOUNDATIONSPLACEDONSILTYSAND/CLAYEYSAND

3.1.1. BEARINGCAPACITYCALCULATIONFROMSHEARFAILURECONSIDERATION

Ultimatebearingcapacity= $q_u = C N_c + q(N_q - 1) S_q + 0.5 \gamma B N_\gamma$ Where, C =

Cohesion and ϕ = angle of internal friction

N_q, N_γ bearing capacity factors based on ϕ

S_c, S_q, S_γ Shape factors based on ϕ

q = Overburden stress at the bottom of the foundation

γ = Unit weight of subsoil

B = Width of foundation.



3.1.2 SETTLEMENT FOR OPEN FOUNDATIONS

The magnitude of settlement, when foundation loads are applied, depends upon the compressibility of the underlying strata and rigidity of the substructure. In cohesive deposition, the post construction settlement is caused by dissipation of pore pressures and hence is time dependent so that consolidation settlement is computed for such soils using Terzaghi's one-dimensional consolidation theory. The immediate settlements in clays are estimated using the elastic theory considering the effect of a rigid stratum underlying the foundation soils (Reference: "Foundation Analysis and Design" by J.E.Bowles). The immediate settlements in cohesion-less soil are estimated using elastic theory as mentioned above or using SPT value as per IS: 8009 (Part 1).

Settlement analysis has been performed based on S.P.T values in accordance with Clause 9. 1. 4 of I.S 8009 (Part-1) – 1976 RA Fig.9.

3.2 FOUNDATIONS PLACED ON COMPLETELY WEATHERED ROCK/ HIGHLY WEATHERED ROCK

- (i) Reference to "*IS 12070: Design and construction of shallow foundation on rocks*" and "*IS 13365 (Part I): Quantitative classification system of rock mass*". *RMR* (Rock Mass Rating) of the stratum at foundation depth is determined. Based on the *RMR*, *IS 12070* recommends safe bearing capacity value. According to *IS 12070*, allowable pressure will result (in raft up to 6m thickness) in settlement less than 12mm.

Depth of influence of one width is considered for foundations placed on rock. Calculation might indicate that higher bearing capacity is possible but lower value is recommended since water loss is noticed in the boreholes and *RQD* is reducing with depth in few boreholes.

IS 12070 does not mention width or size and shape of foundation for calculating *NSBC*. Also, in the referred IS code there is no mention of immediate settlement.

Whenever foundations are placed on rock, it is sound engineering practice to embed foundations for minimum 50cm in rock.

- (ii) Net safe bearing pressure as based on classification.
- (iii) Net safe bearing pressure as based on uniaxial compression strength/ point load index strength.



4.0 CONCLUSIONS&RECOMMENDATIONS:

Netsafebearingcapacityforfoundationsplacedatdifferentdepthbelowthegroundsurface existing at the time of investigation is tabulated below.

BH NO	DEPTH (M)	STRATIFICATION AT FOUNDATIONDEPTH	NET SAFE BEARINGCAPACITY (T/m²)
BH-01	3.00	YellowishClayeySiltySandwithgravel	29
	4.00	YellowishClayeySiltySandwithgravel	30
BH-02	3.00	YellowishClayeySiltySandwithgravel	29
	4.00	YellowishClayeySiltySandwithgravel	30
BH-03	3.00	YellowishClayeySiltySandwithgravel	29
	4.00	YellowishClayeySiltySandwithgravel	30
BH-04	3.00	YellowishClayeySiltySandwithgravel	29
	4.00	YellowishClayeySiltySandwithgravel	30
BH-05	3.00	YellowishClayeySiltySandwithgravel	29
	4.00	YellowishClayeySiltySandwithgravel	30

Table4:NetSafeBearingCapacity

ConclusionsandRecommendationsarebasedonfollowingacceptednorms.

- (i) Foundations should not fail in shear. Factor of safety of 3.0 is provided against bearing capacity failure for foundations placed on silty clay/ silty sand.
- (ii) Anticipated settlements should be less than allowable value of 25mm for foundations placed on silty clay/ silty sand.
- (iii) For foundations placed on rock, it is essential to ensure that there are no loose pockets on rock surface. In case of loose pockets or over excavation, it shall be filled by plain cement concrete.
- (iv) **Estimate of Magnitude and Rate of Settlement of Proposed Foundations:** Since foundations are placed on rock, time dependant settlements are not anticipated. About 95% settlement is expected during initial loading.
- (v) **Behaviour of Foundations under Seismic Conditions:** According to *IS 1893* Ranchi are located inzone II.Liquefaction is likelyto happen in presenceof high ground water table and sand. In case the stratification consists of silt / silty clay, liquefaction is not likely. In



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zone III as per table 1 desirable minimum filed, SPT *N* should be >5 upto 5m depth. Since foundations are placed on rock chances of liquefaction does not exist.

- (vi) **Recommendations for Road:** In order to provide recommendations for road/pavement it is necessary to collect bulk samples & perform relevant tests in the laboratory. This is as not in present scope of work hence no recommendations are provided. However based on our experience at majority of the locations flexible pavement can be designed for CBR of 12 except locations where black cotton soil is encountered.
- (vii) **Recommendations Regarding Any Special Construction Procedure:** Foundations shall be constructed as per relevant IS code.
- (viii) **Recommended Side Slopes For Cutting And Embankment:** It is advisable to provide suitable slope protection method to keep sides of deep excavation from sloughing. Side slopes will depend on actual site condition & extent of ingress of water. Safe Slopes for excavated surfaces as below: -
 - a. Slightly weathered to Fresh Rock -0.25H to 1.0V
 - b. Highly to moderately weathered Rock -0.50H to 1.0V
 - c. Completely disintegrated Rock as murrum -1.00 H to 1.0V
 - d. Silty Clay/sandy clayey silt -1.50H to 1.0V
- (ix) **Special Precautions:** It is essential to ensure that trees and other landscaped area will be about 3m away from the Pump house boundary.
- (x) **Modulus of subgrade reaction**

This is determined by performing plate load test. Following values are recommended based on standard references. Values in Kg/cm³

Granular soil

CONSISTENCY	LOOSE	MEDIUM	DENSE
Dry or moist sand	1.3	4.2	16.0
Submerged sand	0.8	2.5	9.6

Recompressed clays

CONSISTENCY	STIFF	VERY STIFF	HARD
Modulus of subgrade reaction	2.4	4.8	9.6



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(ReftableA-4.5.1.FoundationengineeringhandbookbyDr.N.V.Nayak)

Table5Modulusofsubgradereaction

(xi) Poissonratio

- (a) Saturatedclaysandsandsbeneathwatertable:= 0.5
(b) Nearly saturatedclays : =0.4
(c) Wetsilty sands : =0.35
(d) Nearly dry sands, stiff clays & rocks : =0.25
(Ref:FoundationengineeringhandbookeditedbyFang)

(xii) Frictioncoefficient (angle)betweenFormed concreteandvariousmaterial

- (a) Clean gravelsandmixtures, wellgradedrockfills:22-26⁰
(b) Cleansands,siltysands-gravelmixtures:17-22⁰
(c) Siltysand,gravel,orsandmixedwithsiltorclay: 17⁰
(d) Finesandysilt,non-plasticsilt:14⁰
(Ref:Foundationanalysis&designbyBowles)

(xiii) TypicalvaluesofdrainedYoung'smodulus(MN/m²)forsand

- (a) Loose:5-20
(b) Medium:20to50
(c) Dense:50-100

TypicalvalusofdrainedYoung'smodulus(MN/m²)forclay

- (a)Very soft : 2-15
(b)Soft : 5-25
(c)Medium : 15-50
(d)Hard : 50-100
(e)Sandy : 25-250

(Ref:Foundationanalysis&designbyBowles)

Notes:

1. This report is issued based on the subsoil condition revealed at the location of boreholes and laboratory tests performed on recovered samples. If during construction of foundations it is observed that sub soil conditions vary from those revealed during investigation it is essential that vishesh labs Pvt. Ltd, Bhopal shall be contacted so that on confirmation supplementary report shall be issued.
2. Structural designer should ensure overlap between adjacent foundations is minimum. To minimize overlap minimum clear distance between two adjacent foundations shall not be less than minimum width of the two.



**PushendraSinghChouhan
GeotechnicalConsultant**



5.0 TYPICAL CALCULATIONS FOR SAFE BEARING CAPACITY

SB CALCULATION				
Name of project	Soil Investigation for Proposed to construct a Proposed Tower (B+G+5) Chas (Bokaro)			
Location	(Bokaro)			
Design as per	IS:6403-1981 CLAUSE NO.5.2			
VOID RATIO: - Void ratio of a soil mass is defined as the ratio of volume of voids to the volume of solids.				
As per Fig. 1 of IS:6403-1981, the ϕ value for $N > 50$ is $41^\circ 00'$, As per classification, adapting ϕ as $32^\circ 00'$.				
In Case for SPT Sample	$Q_d = q \cdot (N_q - 1) \cdot s_q \cdot d_q \cdot i_q + 0.5 \cdot B \cdot \gamma \cdot N_r \cdot s_r \cdot d_r \cdot i_r \cdot W'$			
$Q_d =$	ULTIMATE BEARING CAPACITY IN (t/m²)			
$\phi =$	Angle of internal friction of soil in (degree)			32.00
$D_r =$	Depth of foundation in (m)			3
$\gamma =$	Unit weight of subsoil in submerged condition in (t/m ³)			0.8
$q =$	Effective surcharge = ($\gamma \cdot d_f$) in absence of external surcharge. d_f refer to depth of footing in (t/m ²) where r			2.4
$B =$	Width/diameter of footing in (m)			2
$L =$	Length of footing in (m)			2
$N_q =$	Bearing capacity factors due to cohesion, surcharge and weight of subsoil			24.36
$N_r =$	Bearing capacity factors due to cohesion, surcharge and weight of subsoil			32.652
$s_q =$	Shape factor for square footing =			1.2
$s_r =$	Shape factor for square footing =			0.60
DEPTH FACTOR CALCULATION				
$\sqrt{N_q} =$	$\sqrt{\tan^2(n/4 + \phi/2)} =$	$\tan(45 + \phi/2) =$	$\tan(45 + \phi/2) =$	1.8040
$d_c =$	$(1 + (0.2) \cdot (D_f/B)) \cdot (\sqrt{N_q})$			1.5412
$d_q =$	$d_r =$	$=$	1	FOR $\phi < 10^\circ$
$d_q =$	$d_r =$	$=$	$1 + (0.1 \cdot D_f/B) \cdot \sqrt{N_q}$	FOR $\phi > 10^\circ$
$i_c =$	$i_q =$	$=$	$(1 - a/90)^2$	1
$i_r =$	$=$		$(1 - a/\phi)^2$	1
$W' =$	Water table effect			0.5
$q'd = q \cdot (N_q - 1) \cdot s_q \cdot d_q \cdot i_q + 0.5 \cdot B \cdot \gamma \cdot N_r \cdot s_r \cdot d_r \cdot i_r \cdot W'$				95.44
considering factor of safety (FOS)				3
SAFE BEARING CAPACITY IN (t/m²) =				31.81
Therefore Safe Bearing Capacity say,				29 t/m²
Note: As per IS-1904-1986, The permissible Settlement for isolated resting on sand and hard clay is 50mm, Fig 9 of IS 8009-Part I (checking for 25mm settlement), Considering above N value 50 and width of the footing 2.00m and depth factor 0.85 and water table effect 0.5, the foundation settlement per unit pressure i.e. 10 T/m ² is 4.9mm. So for 29 t/m ² bearing pressure, settlement would be about 24.16mm (which is less than maximum permissible settlement 50mm)				
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**APPENDIXA:LIST OF IS CODES
REFERRED IN THE REPORT**



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A1. FIELDTESTS

Drillingandsamplinginsoilandrock	IS 1892
StandardPenetrationtest	IS 2131

A2. LABORATORYTESTS

Samplepreparation	IS2720(Part I)
Moisturecontent	IS2720(Part II)
Sieveanalysis	IS2720(Part IV)
LiquidandPlasticlimit	IS2720(Part V)
Soilclassification	IS 1498
Directsheartest	IS2720(Part XIII)
Consolidationtest	IS2720(Part XV)
Unconfinedcompressiononrock	IS 9143
Unitweight/densityof rock	

APPENDIX B: BORE LOGS

P0	GeotechnicalInvestigationReport	AA	PSC	15.03.2022
REV.	DESCRIPTION	PREPARED	APPROVED	ISSUEDATE

DRILLHOLE#BH-01

ProjectNo.0028

Date:11/03/2022

CLIENT : Krithikaconsultants

PROJECT:Geotechnical InvestigationforproposeTowerChas (BOKARO)

Co-ordinates:

Elevation:96.539

Core:Nx

DateHole Started:16/02/2022

Logged By:

WaterLevel: 1M

DrillingMethod:Rotary

Finished: 19/02/2022

Depth (m)	Run	Sampleno.	Symbols	LITHOLOGIC DESCRIPTION	Elevation(RL)	SPTNValue	SPT GRAPH	CoreRecovery%	RQD%	LABORATORYTESTRESULTS																
										Gravel%	Sand %	Silt+ Clay%	LiquidLimit	PlasticLimit	Plasticity Index	FreeswellIndex	C	Phi	Classification	UCS(Kg/cm2)						
1		DS	SC	Clayey sands, sand-clay mixtures.																						
2		SPT-1					15	•			5.1	64.1	30.9	31.9	17.5	14.4									SC	
3		WS																								
4		SPT-2					>100	•			7.8	70.8	21.4	34.1	18.5	15.6									SC	
5		WS																								
6		SPT-3					>100	•																		
7		WS		W5 Completely Disintegrated weathered graniticgneiss	90.54																					
8					6.00				7.0																	
9									13																	
10						87.04			71																	
				End of Borehole	9.50																					



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ROAD BHOPAL 462042
(M.P)

Prepared by: Mohit Singh Rajpoot Checked by :

DRILLHOLE#BH-02

ProjectNo.0028
Date:11/03/2022

CLIENT : Krithikaconsultants

PROJECT:Geotechnical InvestigationforproposedTowerChas (BOKARO)

Co-ordinates:

Elevation:96.462

Core:Nx

DateHole Started:20/02/2022

Logged By:

WaterLevel: 1M

DrillingMethod:Rotary

Finished: 21/02/2022

Depth (m)	Run	Sampleno.	Symbols	LITHOLOGIC DESCRIPTION	Elevation(RL)	SPTNValue	SPT GRAPH	CoreRecovery%	RQD%	LABORATORYTESTRESULTS														
										Gravel%	Sand %	Silt+ Clay%	LiquidLimit	PlasticLimit	Plasticity Index	FreeswellIndex	C	Phi	Classification	UCS(Kg/cm2)				
1		DS	[Symbol]	SC Clayey sands, sand-clay mixtures.			02060100																	
2		SPT-1																					>100	
3		WASH																						
4		SPT-2																					>100	
5		SP	[Symbol]	W5 Completely Disintegrated weathered granitic gneiss	91.96 4.50			5	0															
6		SP																					7	0
7		SP																					10	0
8		SP																					28	0
9		SP																						
10			End of Borehole	86.96 9.50																				



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Prepared by: Mohit Singh Rajpoot Checked by :

DRILLHOLE#BH-03

ProjectNo.0028

Date:11/03/2022

CLIENT : Krithikaconsultants

PROJECT:Geotechnical InvestigationforproposedTowerChas (BOKARO)

Co-ordinates:

Elevation:96.584

Core:Nx

DateHole Started:22/02/2022

Logged By:

WaterLevel: 1M

DrillingMethod:Rotary

Finished: 23/02/2022

Depth (m)	Run	Sampleno.	Symbols	LITHOLOGIC DESCRIPTION	Elevation(RL)	SPTNValue	SPT GRAPH	CoreRecovery%	RQD%	LABORATORYTESTRESULTS														
										Gravel%	Sand %	Silt+ Clay%	LiquidLimit	PlasticLimit	Plasticity Index	FreeswellIndex	C	Phi	Classification	UCS(Kg/cm2)				
1		DS	SC	Clayey sands, sand-clay mixtures.			02060100																	
2		SPT-1			>100																			
3		WASH																						
4		SPT-2			>100								1.6	61.0	37.3	36	18.5	17.4				SC		
5		WASH			92.08																			
6		SP	W5	Completely weathered granitic Gneiss	4.50			6																
7		SP							10															
8		SP					88.58			34														
8						End of Borehole	8.00																	
9																								
10																								



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Prepared by: Mohit Singh Rajpoot Checked by :

DRILLHOLE#BH-04

ProjectNo.0028
Date:11/03/2022

CLIENT : Krithikaconsultants

PROJECT:Geotechnical InvestigationforproposedTowerChas (BOKARO)

Co-ordinates: Elevation:96.381 Core:Nx DateHole Started:24/02/2022
Logged By: WaterLevel: 1M DrillingMethod:Rotary Finished: 25/02/2022

Depth (m)	Run	Sample no.	Symbols	LITHOLOGIC DESCRIPTION	Elevation(RL)	SPTN Value	SPT GRAPH	CoreRecovery%	RQD%	LABORATORY TEST RESULTS												
										Gravel%	Sand %	Silt+ Clay%	Liquid Limit	Plastic Limit	Plasticity Index	Freeswell Index	C	Phi	Classification	UCS(Kg/cm2)		
1		DS		SC Clayey sands, sand-clay mixtures.	94.88																	
2		SPT-1		W5 Completely weathered granatic gneiss	1.50	>100				0.9	69.3	29.9	34.1	18.6	15.6					SC		
3		SP						19														
4		SP			92.38			32														
4				End of Borehole	4.00																	
5																						
6																						
7																						
8																						
9																						
10																						



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Prepared by: Mohit Singh Rajpoot Checked by :

DRILLHOLE#BH-05

ProjectNo.0028

Date:11/03/2022

CLIENT : Krithikaconsultants

PROJECT:Geotechnical InvestigationforproposedTowerChas (BOKARO)

Co-ordinates:

Elevation:96.350

Core:Nx

DateHole Started:25/02/2022

Logged By:

WaterLevel: 1M

DrillingMethod:Rotary

Finished: 27/02/2022

Depth (m)	Run	Sampleno.	Symbols	LITHOLOGIC DESCRIPTION	Elevation(RL)	SPTN Value	SPT GRAPH	CoreRecovery%	RQD%	LABORATORYTESTRESULTS														
										Gravel%	Sand %	Silt+ Clay%	LiquidLimit	PlasticLimit	Plasticity Index	FreeswellIndex	C	Phi	Classification	UCS(Kg/cm2)				
1		DS		SC Clayey sands, sand-clay mixtures.																				
2		SPT-1				35					3.1	54.7	42.2	34.2	18.6	15.6							SC	
		WASH																						
3		SPT-2				>100																		
4																								
5		SPT-3				>100																		
6		SPT-4		W5 Completely weathered granitic Gneiss	90.35 6.00	>100																		
7									5	0														
8									11	0														
9																								
10					86.35 10.00				17	0														



VISHESH LAB SPVT.LTD 17
DK DANISH KUNJ KOLAR
ROAD BHOPAL 462042
(M.P)

Prepared by: Mohit Singh Rajpoot Checked by :

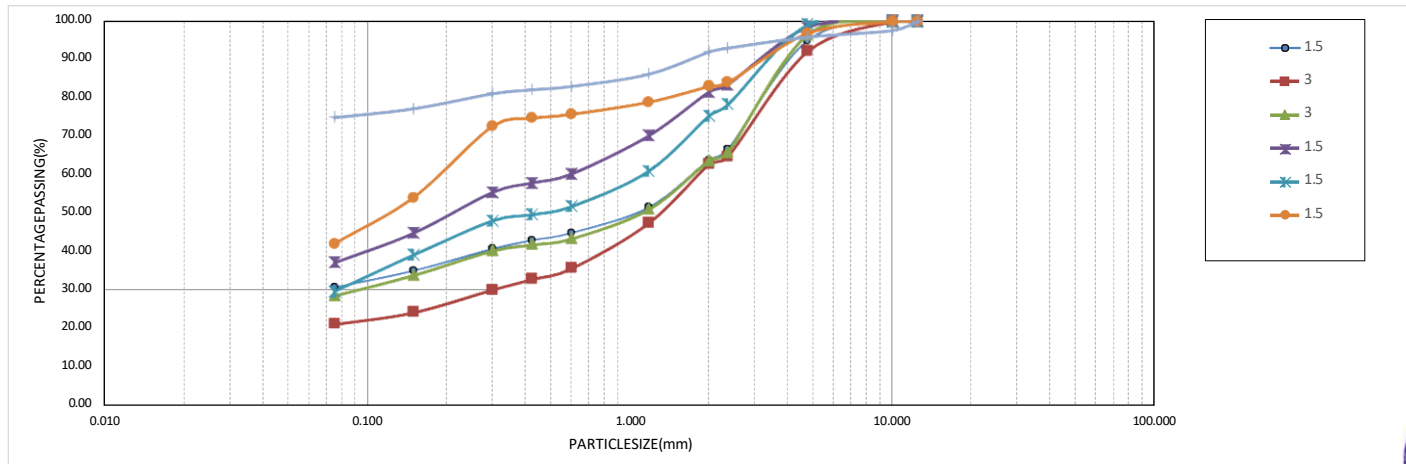
APPENDIX C: LABORATORY TEST RESULTS

P0	GeotechnicalInvestigationReport	AA	PSC	15.03.2022
REV.	DESCRIPTION	PREPARED	APPROVED	ISSUEDATE

Summary of Soil Test Results

Client:		M/s. smt shobha devi and mr bachche khan										Report No.	28		
Project:		Geotechnical Investigation for Proposed construct a Tower (B+G+5) Chas (Bokaro)													
			IS:2720(P29)		IS:2720(P2)	IS:2720(P5)			IS:2720(P4)			IS:2720(P40)	IS:2720(P13)		IS:1498
BHNo.	Sample Type	Depth(m)	Bulk	Dry	Moisture	Liquid	Plastic	Plasticity	Grain Size Analysis			Free Swell	Cohesion	Angle of Internal	IS
			Density	Density	Content	Limit	Limit	Index	Gravel	Sand	Silt/Clay	Index		Friction	Classification
			gm/cm ³	gm/cm ³	%	%	%	%	%	%	%	%	kg/cm ²	degree	-
1	SPT	1.5	-	-	-	31.9	17.5	14.4	5.1	64.1	30.9	-	-	-	SC
1	SPT	3	1.817	1.67	8.74	34.1	18.5	15.6	7.8	70.8	21.4	-	-	-	SC
2	SPT	3	-	-	-	33.1	18.7	14.3	3.4	67.7	28.8	-	-	-	SC
3	SPT	1.5	1.845	1.584	16.43	36.0	18.5	17.4	1.6	61.0	37.3	-	-	-	SC
4	SPT	1.5	-	-	-	34.1	18.6	15.6	0.9	69.3	29.9	-	-	-	SC
5	SPT	1.5	-	-	-	34.2	18.6	15.6	3.1	54.7	42.2	-	-	-	SC

PARTICLE SIZE DISTRIBUTION CURVE



For Vishish Lab

