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		50 MW SOLAR POWER PLANT, MANDSAUR, MP STATE
NAME OF CONTRACTOR	 Maharatna Company	BHARAT HEAVY ELECTRICALS LIMITED
		PROJECT ENGINEERING SYSTEMS DIVISION, Hyderabad
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**FINAL REPORT(REV-II)**

**TOPOGRAPHICAL SURVEY & GEOTECHNICAL  
INVESTIGATION AND RECOMMENDATION WORK  
FOR 1\*50MWP SOLAR PV PROJECT, NTPC,  
MANDSOUR. DIST : MANDSOUR.  
STATE : MADHYA PRADESH.**

**JOB NO. : MK/29/05-16  
MONTH & YEAR : MAY, 2016**

**FORWARDED TO,  
BHARAT HEAVY ELECTRICALS LIMITED.,  
RAMCHANDRAPURAM  
HYDERABAD.**

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**1.0 INTRODUCTION :**

**Bharat Heavy Electricals Limited., Hyderabad** proposes Topographical Survey & Soil Investigation for 1\*50MWp Solar PV Project, NTPC, Mandsour. Dist : Mandsour. State : Madhya Pradesh.

The purpose of the investigations was to determine the sub soil stratification of the soil, geotechnical information & safe bearing capacity of the soil, so as to provide information that will assist the structural engineers in the design of the foundations and the relevant works.

The Job was carried out vide Work Order No : HYD/PE&SD/PUR/SOLAR/NTPC-MP / Soil / LOA / 001 dated 27.4.2016 under the guidance and supervision of the soil personnel of **M. K. Soil Testing Laboratory** and client's engineer.

**2.0 FIELD WORK:**

**2.1 Boring and other field test :**

Twenty two boreholes were drilled with hydraulic drilling method upto 5.0m depth below Existing ground level (EGL). Five trial pits were done upto maximum 1.50m depth below EGL. The work was in general carried out in accordance with IS: 1892 – 1979.

Forty disturbed samples are collected from different location for laboratory compaction test from 0.30m depth.

Fifty Electrical resistivity tests were done at specified location given by client.

The boreholes, trial pits and other field test located are shown in location plan in drawing part of report.

**Detail of Test location**

Test Location	Northing (m)	Easting (m)	RL of GL (m)	Termination depth below EGL (m)	Ground Water table below EGL (m)
BH-1	2663885	581276	395.389	5.00	Not met with
BH-2	2663929	581464	388.61	5.00	Not met with
BH-3	2663953	581689	384.654	5.00	Not met with
BH-4	2663929	582071	381.982	5.00	Not met with
BH-5	2664002	582359	376.138	5.00	Not met with
BH-6	2663929	582517	374.461	5.00	Not met with
BH-7	2664137	582647	380.276	5.00	Not met with
BH-8	2664137	582149	367.23	5.00	Not met with
BH-9	2664135	581473	388.486	5.00	Not met with
BH-10	2664282	581447	390.144	5.00	Not met with
BH-11	2664290	582095	387.389	5.00	Not met with
BH-12	2664326	582638	386.379	5.00	Not met with
BH-13	2664489	582559	363.184	5.00	Not met with
BH-14	2664490	582127	384.322	5.00	Not met with
BH-15	2664489	581835	387.322	5.00	Not met with
BH-16	2663999	581348	385.675	5.00	Not met with
BH-17	2664188	581766	370.93	5.00	Not met with
BH-18	2664422	582324	383.499	5.00	Not met with
BH-19	2664221	582453	368.87	5.00	Not met with
BH-20	2664161	582709	390.035	5.00	Not met with
BH-21	2664055	582734	389.052	5.00	Not met with
BH-22	2664321	581764	374.937	5.00	Not met with
TP-1	2664076	581428	378.048	1.50	Not met with
TP-2	2664480	581494	381.992	1.50	Not met with
TP-3	2664376	581866	367.516	1.30	Not met with
TP-4	2663895	582019	372.828	1.10	Not met with
TP-5	2664004	582610	383.908	1.20	Not met with

**Detail of Test location**

Test Location	Northing (m)	Easting (m)	RL of GL (m)
ERT-1	2663874	581258	394.721
ERT-2	2663874	581283	390.544
ERT-3	2663894	581258	396.461
ERT-4	2663894	581283	397.171
ERT-5	2663921	581453	389.018
ERT-6	2663921	581473	389.244
ERT-7	2663921	581673	385.462
ERT-8	2663921	581917	376.464
ERT-9	2663921	582060	382.123
ERT-10	2663921	582080	380.76
ERT-11	2663921	582210	377.614
ERT-12	2663921	582360	386.887
ERT-13	2663921	582505	374.972
ERT-14	2663921	582525	375.748
ERT-15	2663921	582690	392.314
ERT-16	2663999	581314	395.95
ERT-17	2663999	581573	381.655
ERT-18	2663999	582750	378.466
ERT-19	2664128	581333	389.718
ERT-20	2664128	581462	389.157
ERT-21	2664128	581483	391.796
ERT-22	2664128	581583	379.311
ERT-23	2664128	582138	369.353
ERT-24	2664128	582158	369.446
ERT-25	2664128	582258	367.611
ERT-26	2664128	582458	371.719
ERT-27	2664128	582637	386.312
ERT-28	2664128	582657	380.716
ERT-29	2664128	582777	387.892
ERT-30	2664198	581703	370.804

**Detail of Test location**

Test Location	Northing (m)	Easting (m)	RL of GL (m)
ERT-31	2664198	582378	367.238
ERT-32	2664198	582647	370.586
ERT-33	2664316	581392	386.344
ERT-34	2664316	581502	384.598
ERT-35	2664316	581990	387.406
ERT-36	2664316	582190	373.277
ERT-37	2664316	582550	368.054
ERT-38	2664316	582627	387.285
ERT-39	2664316	582647	390.017
ERT-40	2664316	582769	387.619
ERT-41	2664414	582665	371.221
ERT-42	2664480	581824	384.838
ERT-43	2664480	581844	388.488
ERT-44	2664480	581980	394.484
ERT-45	2664480	582116	384.385
ERT-46	2664480	582136	386.976
ERT-47	2664480	582281	384.208
ERT-48	2664480	582548	363.266
ERT-49	2664480	582568	362.73
ERT-50	2664533	581668	386.816

**2.2.1 Disturbed Samples**

Disturbed representative samples were collected, logged, labelled and placed in polythene bags. Core samples are collected wherever rock was encountered. As the rock encountered is highly fractured sufficient core samples were not collected during drilling work.

**2.2.2 Undisturbed Samples**

Undisturbed soil samples could not be collected in 100 mm diameter thin walled sampler (Shelby tube) due to rocky strata or hard soil. The single tube core barrel is used in soft and highly weathered rock.

**2.2.3 Standard Penetration Test:**

The standard penetration tests were performed in accordance with IS: 2131:1981 using the standard split spoon sampler & 63.5Kg hammer at the desired intervals. The results of standard penetration test results are shown in Table No.. 1 at the end of the report. The corrections for over burden pressure are applied to N-value.

**2.2.4 Ground Water Table:**

Ground Water table was not encountered in the boreholes upto 5.00m termination depth below EGL at the time of investigation (April/May - 2016)

**2.2.5 Drilling in Rocks:**

When rock was encountered a single tube core barrel and Nx size TC/Diamond bits are used for drilling and recovering rock cores. Recovered rock cores were numbered serially and preserved in wooden core boxes. Rock core recovery and Rock Quality Designation (RQD) were computed for every run length drilled. Detailed core logs of boreholes were prepared by geologist at site. Rock classification in terms of weathering grade, state of fractures and strength is carried out in the following manner. Tabulations given below explain it briefly.

**Relation between RQD and in-situ Rock Quality (IS : 13365 (part I) Annex B)**

<b>RQD Classification</b>	<b>RQD (%)</b>
Excellent	90 to 100
Good	75 to 90
Fair	50 to 75
Poor	25 to 50
Very Poor	00 to 25

**Classification of Rock as per Compressive Strength (IS : 13365 (part I) Annex B)**

<b>ROCK STRENGTH</b>	<b>COMPRESSIVE STRENGTH (MPa)</b>	<b>COMPRESSIVE STRENGTH (Kg/cm<sup>2</sup>)</b>
Extremely weak	< 2	< 20
Very Weak	2 to 10	20 to 100
Weak	10 to 25	101 to 250
Average	25 to 50	251 to 500
Strong	50 to 100	501 to 1000
Very Strong	100 to 250	1001 to 2500
Extremely Strong	> 250	> 2500

**Grades of Rock Mass**

<b>Terms (IS : 4464)</b>	<b>Description (IS : 4464)</b>	<b>Grade (IS : 4464)</b>	<b>Interpretati</b>
Fresh	No visible sign of rock material weathering, perhaps slight discoloration on major discontinuity surfaces.	I	CR > 90 %
Slightly Weathered	Discoloration indicates weathering of rock material and discontinuity surfaces. All the rock material may be discolored by weathering.	II	CR between 70% to 90 %
Moderately Weathered	Less than half of the rock material is decomposed or disintegrated to a soil. Fresh or discolored rock is present either as a continuous framework or as core stones.	III	CR between 50% to 70 %
Highly Weathered	More than half of the rock material is decomposed or disintegrated to a soil. Fresh or discolored rock is present either as a discontinuous framework or as core stones	IV	CR between 10% to 50 %
Completely Weathered	All rock material is decomposed and / or disintegrated to soil. The original mass structure is still largely intact.	V	CR between zero to 10 %
Residual Soil	All rock material is converted to soil. The mass structure and material fabric are destroyed. There is a large change in volume, but the soil has not been significantly transported.	VI	CR = Zero % But N > 50

‘**Interpretation**’ in above table has been done based on understanding of above table & experience and is **NOT** a part of original table and observation of entire of rock mass instead of individual rock pieces.

### **2.2.6 Electrical Resistivity Test :**

#### **Aim & Scope of Investigation:**

The main objectives of the Resistivity Survey and Investigation are as under.

- To collect the basic data on sub-surface geological formation.
- To know the resistance of the sub-surface layers.
- To determine the thickness of the different geological formation.
- To study the sub-surface resistivity vertically at various depths for designing of electrical earthing system.

Total 50 Nos. of Electrical Resistivity tests are conducted at pre marked locations in the plot area. In the geophysical resistivity survey Wenner configuration method is used. The main aim of the present survey is to know engineering properties of the formation and its resistivity at different depth.

In the Wenner four pin method, four electrodes are driven into the earth along a straight line at equal interval. Current 'I' is passed through the two outer electrodes and the voltage difference 'V' is observed between the two inner electrodes. The current 'I' flowing into the earth produces an electric proportional to its density and to the resistivity of the soil. The voltage 'V' measured between the inner electrodes is therefore, proportional to the field condition. Resistivity thus will be proportional to the ratio of the voltage to the current. **(Reference: IS-1892, Appendix-B)**

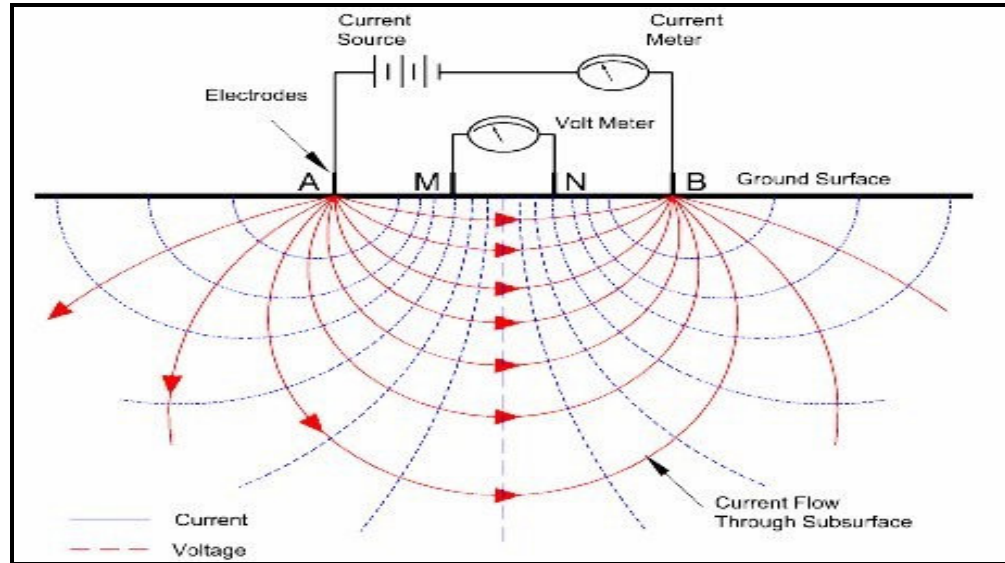
$$Pa = 2 \pi S \frac{V}{I} \text{ Ohm.m}$$

Where Pa = Apparent Resistivity of the formation / Soil (Ohm.m.)

S = Spacing between two electrodes (m.)

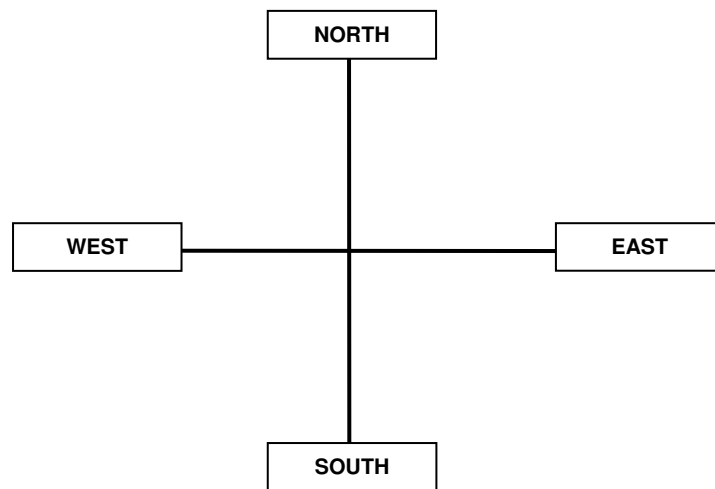
V = Voltage ( milli volt.)

I = Current (milli Ampere.), (V/I= Measured Resistance in Ohm.)



**Resistivity set up electrical circuit for resistivity survey**

At the selected point in the chosen direction i.e. North – South and East – West four electrodes are driven into the earth up to required depth along a straight line at equal intervals. The D.C. resistivity meter is placed in the steady and level base. The current and potential electrodes are connected to the instrument terminals. By passing current from the battery box, readings are taken.



The resistivity data of the sub-surface layers at different depth are calculated and tabulated in the table 4/1 to 4/50 of report.

Guidance for effect on corrosion of Resistivity value

Resistance classification	Soil resistivity, ohm.meter	Corrosion potential
Low	0-20	Severe
Medium	20-100	Moderate
High	100-300	Mild
Very High	Above 300	Unlikely

Guidelines for subsoil formation from resistivity value

Resistivity range, ohm. Meter	Type of soil
8-70	clay
4-300	Clay & sand mixtures
10-100	Shale, slates, sand stone etc.
200-3000	sand
40-10000	Moraine gravel
3000-30000	Ridge gravel
10000-50000	Solid granite

### **3.0 GEOLOGY OF AREA :**

#### **3.1 Introduction:**

Mandsaur district is located on northwest part of Madhya Pradesh state. It is one of the important tribal district of Malwa regions of Madhya Pradesh. The district is bounded by Neemuch district in the north, Ratlam district in the south, Banswara district of Rajasthan state in the west and Jhalawar district of Rajasthan state in the east. The district area extends between the parallels of latitude  $23^{\circ} 46'$  and  $24^{\circ} 45'$  North and between the meridians of longitude  $74^{\circ} 44'$  and  $75^{\circ} 54'$  East.

#### **3.2 Drainage :**

Mandsaur district falls under Ganga basin and Chambal river sub-basins. The river is broad, flat shallow valley with low gradient because the Chambal has reached the base level of erosion. Vertical erosion has reached and lateral erosion is taking place. Other tributaries of Chambal River are Retam, Shivna and Chhoti Kali Sindh.

### **3.3 Geomorphology:**

Physiographically the major parts of the district covered by Malwa Plateau, by gently sloping topography ranging the elevation between 445 m and 518 m above mean sea level. Topographic high plateau form surface water divides. Main surface water divide separates Chambal sub basin from Shiva micro-basin. Shivna is tributary of Chambal River is running ENE-WSW direction in southwestern parts of the area.

### **3.4 Soils :**

The soils in the district are generally of four types:

1. Black cotton soil
2. Red loamy soil
3. Laterite soil
4. Alluvial soil

Black cotton soil is derived from weathering and disintegration of basaltic lava flow. Major parts of the district are covered by black cotton soil. Red loamy soils consist of sandy loam to clayey loam and brick in colour. This soil is derived from Vindhyan sandstone and shales and occurring in valley portion on the plateau and adjacent to hill composed of Vindhyan sandstone. This type of soil covers a northern part of the district. Laterite soil dark brown to pink coloured lateritic soil is found as capping over hillocks of basaltic terrain. Alluvial soil is greyish yellow to brownish yellow in colour and occupy along the major rivers.

**3.5 Geology:**

Geologically major parts of the Mandsaur district is occupied by Deccan Trap basalts except narrow patch of alluvium and sedimentary rocks of Vindhyan super group in isolated patches, which are forming different type of aquifer in the area.

<b>LITHOLOGY</b>	<b>GROUP</b>
Basalt-black Trap	Deccan Trap
Suket Shale	Khorri group
Nimbahera Limestone	
Bari Shale	
Jiran Sandstone	Lasrawan Group
Binota Shale and Siltstone	
Palri shale	
Sawa Sandstone and Conglomerate	Sand group
Bhagwanpura Conglomerate	

Binota Sandstones or Arvalis are the base and are represented by low dipping, brown shales with ferruginous and clay concretions. Binota shales are succeeded by Jiran sandstones, Vindhyan and or the deccan traps.

**4.0 LABORATORY WORK :**

The results of the laboratory tests were performed on various soil/rock samples as per Indian standard are presented in the form of Table No.: 5/1 to 5/27 and drawing part at the end of report.

**5.0 SUB SOIL STRATIFICATION:**

Field and laboratory test data reveal the general stratification as under :

**Soil Stratification of boreholes**

<b>Borehole No</b>	<b>Depth (m)</b>	<b>Stratification</b>
BH-1	0.0-0.40	Reddish clayey gravels (GC)
	0.40-5.0	Grayish black weathered basalt rock obtain in form of rock pieces having high resistance to penetration
BH-2	0.0-0.50	Reddish clayey gravels (GC)
	0.50-5.0	Grayish black weathered basalt rock obtain in form of rock pieces having high resistance to penetration
BH-3	0.0-0.50	Reddish gravel soil mix layer
	0.50-5.0	Grayish black weathered basalt rock obtain in form of rock pieces having high resistance to penetration
BH-4	0.0-0.30	Reddish silty gravels (GM)
	0.30-5.0	Grayish black weathered basalt rock obtain in form of rock pieces having high resistance to penetration
BH-5	0.0-0.20	Reddish gravel soil mix layer
	0.20-5.0	Grayish black weathered basalt rock obtain in form of rock pieces having high resistance to penetration
BH-6	0.0-0.50	Reddish silty gravels (GM)
	0.50-5.0	Grayish black weathered basalt rock obtain in form of rock pieces having high resistance to penetration
BH-7	0.0-0.40	Reddish clayey gravels (GC)
	0.40-5.0	Grayish black weathered basalt rock obtain in form of rock pieces having high resistance to penetration
BH-8	0.0-0.30	Reddish silty gravels (GM)
	0.30-5.0	Grayish black weathered basalt rock obtain in form of rock pieces having high resistance to penetration

**Soil Stratification of boreholes**

<b>Borehole No</b>	<b>Depth (m)</b>	<b>Stratification</b>
BH-9	0.0-0.30	Reddish clayey gravels (GC)
	0.30-5.0	Grayish black weathered basalt rock obtain in form of rock pieces having high resistance to penetration
BH-10	0.0-0.30	Reddish silty gravels (GM)
	0.30-5.0	Grayish black weathered basalt rock obtain in form of rock pieces having high resistance to penetration
BH-11	0.0-1.50	Reddish clayey/silty gravels (GC/GM)
	1.50-5.0	Grayish black weathered basalt rock obtain in form of rock pieces having high resistance to penetration
BH-12	0.0-2.50	Blackish brown very stiff to hard silty clay having high plasticity (CH)
	2.50-5.0	Grayish black weathered basalt rock obtain in form of rock pieces having high resistance to penetration
BH-13	0.0-1.50	Blackish brown silty clay having high plasticity (CH) followed by dense gravelly clayey sand (SC)
	1.50-5.0	Grayish black weathered basalt rock obtain in form of rock pieces having high resistance to penetration
BH-14	0.0-1.50	Blackish brown silty clay having high plasticity (CH) followed by dense gravelly clayey sand (SC)
	1.50-5.0	Grayish black weathered basalt rock obtain in form of rock pieces having high resistance to penetration
BH-15	0.0-0.30	Reddish silty gravels (GM)
	0.30-5.0	Grayish black weathered basalt rock obtain in form of rock pieces having high resistance to penetration
BH-16	0.0-0.50	Reddish brown non plastic gravelly silty sand (SM)
	0.50-5.0	Grayish black weathered basalt rock obtain in form of rock pieces having high resistance to penetration

**Soil Stratification of boreholes**

<b>Borehole No</b>	<b>Depth (m)</b>	<b>Stratification</b>
BH-17	0.0-2.0	Blackish brown silty clay having high plasticity (CH)
	2.0-5.0	Grayish black weathered basalt rock obtain in form of rock pieces having high resistance to penetration
BH-18	0.0-2.0	Blackish brown silty clay having high plasticity (CH)
	2.0-5.0	Grayish black weathered basalt rock obtain in form of rock pieces having high resistance to penetration
BH-19	0.0-0.40	Blackish brown silty clay having high plasticity (CH)
	0.40-5.0	Grayish black weathered basalt rock obtain in form of rock pieces having high resistance to penetration
BH-20	0.0-0.30	Blackish brown silty clay having high plasticity (CH)
	0.30-5.0	Grayish black weathered basalt rock obtain in form of rock pieces having high resistance to penetration
BH-21	0.0-0.30	Reddish clayey gravels (GC)
	0.30-5.0	Grayish black weathered basalt rock obtain in form of rock pieces having high resistance to penetration
BH-22	0.0-1.50	Blackish brown silty clay having medium plasticity (CI)
	1.50-5.0	Grayish black weathered basalt rock obtain in form of rock pieces having high resistance to penetration
TP-1	0.0-1.30	Blackish brown silty clay having high plasticity (CH)
	1.30-1.50	Grayish black weathered rock
TP-2	0.0-0.20	Reddish brown clayey sand (SC)
	0.20-1.5	Grayish black weathered rock
TP-3	0.0-1.3	Grayish black weathered rock
TP-4	0.0-0.70	Blackish brown silty clay having high plasticity (CH)
	0.70-1.10	Grayish black weathered rock
TP-5	0.0-1.20	Grayish black weathered rock

**6.0 FOUNDATION ANALYSIS :**

The subsoil strata at this location consists of 0.30m granular soil at BH-4, 5, 8 to 10, BH-15, BH-21 location, 0.40m thick granular soil at BH-1 & BH-7 location, 0.50m thick granular soil at BH- 2, 3, 6, 16 location, 1.50m granular soil at BH-11 location. This layer is followed by disintegrated soft rock obtain in form of rock pieces upto 5.0m termination depth below EGL.

The subsoil strata at this location consists of 0.40m clayey soil at BH-19, 20 location, 1.50m thick clayey soil at BH-13 & BH-14 location, 2.0m to 2.5m thick clayey soil at BH- 12, 17, 18, 22 location. This layer is followed by disintegrated soft rock obtain in form of rock pieces upto 5.0m termination depth below EGL.

Considering subsoil strata open foundation is suggested for support the structure. Depth mention in table is for your guideline for design of lightly loaded and heavily loaded foundation. The foundation may be laid at variable depth as per structural stability requirement.

Alternatively load capacity of cast in situ bored piles estimated and reported. For estimation of pile capacity in soft weathered rock method as given in IS : 2911 (Part 1/Section 2 : 2010) Annex B. According design load given by client length of pile is suggested. According to top soil layer pile capacity is calculated for different zone.

Based on reference standard book suggested design parameters are as below :

Subsoil strata	Angle of friction resistance (degree)	Undrain Cohesion (t/m <sup>2</sup> )
Top soil (SM/GM/GC/SC)	33	-
Weathered rock layer	36	-
Clayey soil (very stiff to hard nature)	-	5.0

Typical calculation of Safe Bearing Capacity and pile capacity is as below :

**7.0 TYPICAL CALCULATION OF SAFE BEARING CAPACITY:**

**7.1 Bearing Pressure Based on C &  $\phi$  Values**

The disintegrated / weathered or very soft rock may be treated as soil (As per IRC:78-2000, Clause 706.3.1.1.2).

Now from literature we know that the c and  $\phi$  values of a rock specimen is in the range of C = 35 to 175 kg/sqcm and  $\phi$  is seldom less than 40 degree [Bowles, J. E., Foundation Analysis and Design, pp-278, 5<sup>th</sup> Edition].

When the rock is fractured so that good intact core is not recovered, it is the cohesion value that will be missed. The friction value will remain intact. Hence, considering the rock quality, parameters use for calculation of SBC, C = 0.00 kg/sqcm. & also for dense to very dense for reference book suggested angle of shearing resistance is 35 to 40. Hence is taken as  $\phi = 36^\circ$  (Ref. Pile foundation by Tomlinsen – Appendix : properties of materials)

**7.1.1 Assumption / Data: (Location: BH-1 to BH-11, BH-15, BH-16 and BH-19 to BH-21)**

- i. Type of foundation considered : Square foundation.
- ii. Total Permissible settlement : 50mm for footing  
(Ref.: IS: 1904-1986)
- iii. Depth of foundation below EGL : 2.00m
- iv. Size of foundation : 2.00m X 2.00m
- v. Water Table : Not met with

**7.1.2 Bearing Pressure Based on C &  $\phi$  Values :- (Shear Criterion)**

For computing bearing capacity at 2.00m depth below GL following parameters are adopted.

$$C_u = 0.0 \text{ Kg/cm}^2$$

$$\phi = 36^\circ \text{ (Considering general shear failure)}$$

The ultimate net bearing capacity for square foundation for general shear failure is given by equation

$$Q_{nd} = C N_c S_c d_c i_c + q (N_q - 1) s_q d_q i_q + 0.5 B S_D N_r S_r d_r i_r$$

Where,

$Q_{nd}$  = Net ultimate bearing capacity of foundation.

$C$  = Cohesion = 0.00 Kg/cm<sup>2</sup>

$DD$  = Dry density at foundation level = 0.0017 Kg/cm<sup>3</sup>

$D$  = Effective Depth of foundation = 200 cm

$B$  = Width of foundation = 200 cm

$q$  = Total surcharge at the base level of foundation.

$$= 0.0017 \times 200 = 0.34 \text{ Kg/cm}^2$$

$S_c, S_q, S_r$  are shape factor for square footing.

$$S_c = 1.30, S_q = 1.20, S_r = 0.8$$

$d_c, d_q, d_r$ , are depth factors,

(Assuming that overburden soil is not compacted properly)

$$d_c = 1.0, d_q = 1.0, d_r = 1.0$$

$i_c, i_q, i_r$  are inclination factors.

$$i_c = i_q = i_r = 1.0 \text{ (Since load is vertical)}$$

Adopting  $N_c, N_q, N_r$  factors as per IS: 6403 as below :

For  $\phi = 36^\circ$  and general shear failure

$$N_c = 50.59, N_q = 27.75, N_r = 56.31$$

$$\begin{aligned} Q_{nd} &= [0.00 \times 50.59 \times 1.3 \times 1.0 \times 1.0] + \\ &\quad [0.34 \times (27.75 - 1) \times 1.2 \times 1.0 \times 1.0] + \\ &\quad [0.5 \times 200 \times 0.0017 \times 56.31 \times 0.8 \times 1.0 \times 1.0] \\ &= 0.00 + 10.91 + 7.65 \\ &= 18.56 \text{ Kg/cm}^2 \end{aligned}$$

Where,

$Q_{nd}$  is net ultimate bearing capacity,

Adopting factor of safety as 3.0

$$\begin{aligned} q_s &= \frac{Q_{nd}}{FS} = \frac{18.56}{3.0} \\ &= 6.186 \text{ Kg/cm}^2 \\ &= 61.86 \text{ t/m}^2 \text{ say } 62 \text{ t/m}^2. \end{aligned}$$

## 7.2 Bearing Pressure Based on Settlement Criterion: (SPT Results)

$N$  = Average corrected  $N$ -value at 2.00m depth = 50

Using IS: 8009 - 1976 : (Part-1) for width = 2.00m.

Settlement for load intensity of  $10 \text{ t/m}^2 = 4.7 \text{ mm}$ .

Hence, for 50mm permissible settlement,

$$\begin{aligned} \text{Probable Load intensity foundation} &= \frac{50 \times 10}{4.7} \\ &= 106.4 \text{ t/m}^2. \end{aligned}$$

**7.3 Bearing Pressure Based Rock Mass rating (RMR)**

Bearing Capacity (Based on RMR)

(Location: BH-1 to BH-11, BH-15, BH-16 and BH-19 to BH-21 Depth : 1.0m to 2.0m)

(Location: BH-13, BH-14, BH-22 Depth : 1.50m to 3.0m)

(Location: BH-17, BH-18, Depth : 2.0m to 3.0m)

(Location: BH-12, Depth : 2.50m to 3.50m)

Sr. No.	Description	Condition	Rating as Per IS : 13365 (part I) Annex B
1.	Strength or intact rock material	Weak	1
2.	Rock Quality Designation	Very Poor	3
3.	Spacing of Discontinuities	Considering Very Close	5
4.	Condition of Discontinuity	Considering 5mm thick soft gauge	0
5.	Ground Water Condition	Considering Damp	10
6.	Orientation of discontinuity	Considering Fair	-7
RMR			12

RMR value obtained is 12 for which as per IS: 12070-1987 the safe bearing capacity is obtained as 39 t/m<sup>2</sup> without exceeding total settlement 12mm.

Considering the above three approaches & the soft rock at the founding level or dense sandy soil, suggested net allowable bearing capacity of 39 t/m<sup>2</sup>.

**8.0 PILE LOAD CARRING CAPACITY:**

**8.1 Sample Calculation of Pile Capacity for socket pile in weathered rock:**

Considering rock layer encountered during drilling work at different boreholes location total length of pile is suggested for different socket length of pile and shall be confirmed during pilling operation.

The shear strength of geo-material is obtained from its nature of rock layer.

As per IS: 2911(Part 1/Section 2: 2010) Annex B

$$Q_{allow} = \frac{C_{u1} N_c \pi d^2}{4 F_s} + \alpha C_{u2} \frac{\pi d L}{F_s}$$

Where  $N_c$  = bearing capacity factor = 9

$F_s$  = Factor of safety = 3

$d$  = diameter of pile = 0.35m

$C_{u1}$  = shear strength of rock below base of pile = 100 kN/m<sup>2</sup> = 10.19 t/m<sup>2</sup> (For very weak)

$C_{u2}$  = shear strength of rock = 100 kN/m<sup>2</sup> = 10.19 t/m<sup>2</sup> (For very weak)

$\alpha$  = 0.9

**8.1.1 Location: Zone A (BH- 1 to 10, 15, 16, 19 to 21)**

Sub soil Strata: 0.50m granular soil followed by weathered soft rock

**Data:**

- i. Type of Pile : Cast in situ Rock socket pile
- ii. Diameter of pile : 0.35 m
- iii. Socket length in weathered rock : 1.2 m
- iv. Total length of pile : 0.5+1.2 = 1.7 m

Compression capacity:

$$Q_{allow} = (10.19 \times 9 \times \pi / 4 \times 0.35^2) / 3 + (0.9 \times 10.19 \times \pi \times 0.35 \times 1.2) / 3$$
$$= 2.94 + 4.035 = 6.98 \text{ tonnes}$$

Uplift capacity (including self weight):

$$\text{Uplift Capacity with self-weight of pile} = 4.035 + 2.3 \times \pi / 4 \times 0.35^2 \times 1.7$$
$$= 4.411 \text{ tonnes}$$

Lateral Load carrying capacity:

For cohesion less soil, as per Pile Design & Construction, M.J Thomlinson (6.3.1: equ. 6.20)

lateral load capacity for short rigid free headed pile

$$H_u = 0.5 \times D \times L^3 \times K_p \times Y / (e + L)$$

$$e = 0.0 \text{ m}$$

$$K_p = (1 + \sin \Phi) / (1 - \sin \Phi)$$

where  $\Phi = 35$

$$K_p = 3.69$$

$$H_u = 0.5 \times 0.35 \times 1.7^3 \times 3.69 \times 1.85 / 1.7 = 3.453 \text{ tonnes}$$

$$\text{Allowable horizontal capacity} = H_u/2 = 3.453/2 = 1.726 \text{ tonnes}$$

### **8.1.2 Location: Zone B (BH- 11, 13, 14 and 22)**

Sub soil Strata: 1.50m granular soil followed by weathered soft rock

#### **Data:**

i. Type of Pile : Cast in situ Rock socket pile

ii. Diameter of pile : 0.35 m

iii. Socket length in weathered rock : 0.7 m

iv. Total length of pile : 1.5+0.7 = 2.2 m

Compression capacity:

$$\begin{aligned} Q_{\text{allow}} &= (10.19 \times 9 \times \pi/4 \times 0.35^2)/3 + (0.9 \times 10.19 \times \pi \times 0.35 \times 0.7)/3 \\ &= 2.94 + 2.354 = 5.3 \text{ tonnes} \end{aligned}$$

Uplift capacity (including self weight):

$$\text{Uplift Capacity with self-weight of pile} = 2.354 + 2.3 \times \pi /4 \times 0.35^2 \times 2.2$$

$$= 2.841 \text{ tonnes}$$

Lateral Load Carrying Capacity:

For cohesion less soil, as per Pile Design & Construction, M.J Thomlinson (6.3.1: equ. 6.20)

lateral load capacity for short rigid free headed pile

$$H_u = 0.5 \times D \times L^3 \times K_p \times Y / (e + L)$$

$$e = 0.0 \text{ m}$$

$$K_p = (1 + \sin \Phi) / (1 - \sin \Phi)$$

Where  $\Phi = 34$

$$K_p = 3.537$$

$$H_u = 0.5 \times 0.35 \times 2.2^3 \times 3.537 \times 1.85 / 2.2 = 5.543 \text{ tonnes}$$

$$\text{Allowable horizontal capacity} = H_u/2 = 5.543/2 = 2.771 \text{ tonns}$$

## **8.2 Sample Calculation for pile capacity of cast in situ Bored Pile (Zone C) BH-12, BH-17, BH-18 location**

**Data:**

Pile Stem dia : 0.35m

Length of pile : 2.30m

Ultimate capacity of Bored pile is given by equation as per IS : 2911 (part 1/sec 2) : 2010.

$$Q_u = A_p C_p N_c + \alpha C_a' A_s'$$

$A_p$  = C.S. area of pile stem at tip level

$$= \pi/4 (d)^2 = \pi /4 (0.35)^2 = 0.09621 \text{ m}^2.$$

$C_p$  = Cohesion at Pile tip = 5 t/m<sup>2</sup>

$N_c$  = Bearing capacity factor = 9

$$A_s' = \pi d l = \pi \times 0.35 \times (2.3) = 2.53 \text{ m}^2$$

$$C_a' = 5 \text{ t/m}^2$$

$$\alpha = 0.4$$

$$Q_u = 0.09621 \times 5 \times 9.0 + 0.4 \times 5 \times 2.53$$

$$= 4.33 + 5.06$$

$$= 9.39$$

$$q_a = \frac{Q_u}{\text{F.S.}} = \frac{9.39}{2}$$

$$= 4.69 \text{ tonnes}$$

$$Q_{\text{uplift}} = \frac{5.06}{2}$$

$$= 2.53 \text{ tonnes.}$$

$$Q_{\text{uplift with self-weight of pile}} = 2.53 + 2.3 \times \pi / 4 \times 0.35^2 \times 2.3 = 3.04 \text{ tonnes}$$

### **Lateral Load carrying capacity of Pile**

#### **For cohesive soil**

Ultimate Lateral resistance of short free head pile in cohesive soil

$H_u / (C_u D^2) = 13.0$  for  $L/D = 6.57$  &  $e/D = 0$  (Ref: Pile design & Construction, M.J Thomlinson fig 6.25)

$$H_u = 13 \times 0.35^2 \times 5.0 = 7.96 \text{ tons}$$

$$\text{Allowable horizontal capacity} = H_u / 2 = 7.96 / 2 = 3.98 \text{ tonnes}$$

**9.0 SUMMARY:**

**Summary of Allowable Bearing Capacity**

Borehole Location	Type & Size of Footing	Depth below EGL (m)	NET SAFE BEARING CAPACITY (T/M <sup>2</sup> )			Recommended Net Safe Bearing Capacity (t/m <sup>2</sup> ) For permissible settlement :		
			Shear Criterion C & φ Value	Settlement Criterion SPT Results For Permissible Settlement :		25mm	50mm	
				25mm	50mm			
BH-1 to BH-11, BH-15, BH-16 and BH-19 to BH-21	Square footing 1.00m x 1.00m	1.00	31	55	110	31	31	
		2.00	49	55	110	39	39	
	Square footing 2.00m x 2.00m	1.00	44	53	106	39	39	
		2.00	62	53	106	39	39	
	Square footing 3.00m x 3.00m	1.00	56	50	100	39	39	
		2.00	75	50	100	39	39	
	Rectangular footing 2.0m x 4.0m	1.00	41	53	106	39	39	
		2.00	59	53	106	39	39	
	BH-13, BH-14, BH-22	Square footing 1.00m x 1.00m	2.00	49	55	110	39	39
		Square footing 2.00m x 2.00m	2.00	62	53	106	39	39
Square footing 3.00m x 3.00m		2.00	75	50	100	39	39	
Rectangular footing 2.0m x 4.0m		2.00	59	53	106	39	39	

**Summary of Allowable Bearing Capacity**

Borehole Location	Type & Size of Footing	Depth below EGL (m)	NET SAFE BEARING CAPACITY (T/M <sup>2</sup> )			Recommended Net Safe Bearing Capacity (t/m <sup>2</sup> ) For permissible settlement :	
			Shear Criterion C & φ Value	Settlement Criterion SPT Results For Permissible Settlement :		25mm	50mm
				25mm	50mm		
BH-12, BH-17 & BH-18	Square footing 1.00m x 1.00m	2.50	58	55	110	39	39
	Square footing 2.00m x 2.00m	2.50	71	53	106	39	39
	Square footing 3.00m x 3.00m	2.50	84	50	100	39	39
	Rectangular footing 2.0m x 4.0m	2.50	68	53	106	39	39

Three approaches (as given in para 6) & the type of disintegrated soft rock or very dense sand at the founding level, reduce value of Safe bearing capacity is suggested.

Depth mention in table is for your guideline for design of lightly loaded and heavily loaded foundation. The foundation may be laid at variable depth as per structural stability requirement.

**Summary of Safe Load Carrying Capacity of cast in situ concrete socket Pile**

Bore Hole No	Dia of pile (m)	Socket Length (m)	Total pile length (m)	Horizontal load capacity (MT)	Allowable safe load Capacity (MT)	
					Compression	Uplift with self-weight of pile
(Zone A) BH-1 to 10, 15,16, 19 to 21	0.35	1.2	1.7	1.726	6.98	4.411
(Zone B) BH -11,13,14 and 22	0.35	0.7	2.2	2.771	5.3	2.841

Note : Above load carrying capacity is based on static formula which required to be verified by actual pile load test as per IS 2911 (part IV). Also, above capacity shall not exceed the structural capacity of pile.

As proposed structure is lightly loaded minimum socket length is considered as two times diameter of pile. Considering rock layer encountered during drilling work at different boreholes location total length of pile is suggested which shall be checked during piling operation and shall be modified if any difference in rock layer. For the hinged piles resting on rock proper seating has to be ensured.

**Summary of Safe Load Carrying Capacity of cast in situ Bored Pile**

Borehole NO	Diameter Of Pile stem (m)	Length of Pile below EGL (m)	Horizontal load capacity (tonnes)	Allowable Safe Load Capacity (tonnes)	
				Compression	Uplift with self-weight of pile
(Zone C) BH-12, 17, 18	0.35	2.3	3.98	4.69	3.04

Note : Above capacity is subjected to verification by pile load test as per IS: 2911 (Part –IV).

**10.0 CONCLUSIONS AND RECOMMENDATION:**

1. Soil Investigation work for proposed 1\*50MW Solar Power Plant at Mandsaur is in found to consists of clayey/silty gravels or silty/clayey sand or very stiff to hard silty clay followed by disintegrated soft basalt rock obtain in form of rock pieces upto 5.00m termination depth below EGL.
2. Ground water table is not encountered in the boreholes upto 5.00m termination depth below EGL at time of investigation. (May - 2016)
3. The net safe bearing capacity of different size of footing is recommended as vide Para 9 of summary with 25mm/50mm maximum permissible in natural condition of soil.
4. The load carrying capacity of cast in situ concrete socket pile in weathered rock of 0.35m diameter is estimated and reported vide para 9 of report. Also pile capacity of cast in situ concrete bored pile for location where soil encountered is calculated and reported vide para 9 of report. The load carrying capacity is based on static formula which required to be verified by actual pile load test as per IS 2911 (part IV).
5. The chemical analysis of soil sample shows non special precaution is required in concreting work as per IS: 456: 2000 (Table 4).
6. The clayey soil at BH-12 to BH-14, BH-17, BH-18 and BH-22 location is having moderate to high swelling potential hence it is not suitable to use for back/plinth filling purpose.
7. The electrical resistivity tests were done at different location, and results are given in table 9 of report.
8. The results of the laboratory tests are incorporated in the form of tables at the later part of the report.

**For, M. K. SOIL TESTING LABORATORY**

**PREPARED BY**

**CHECKED BY**

**APPROVED BY**

**Table No.: 1/1**

**Observed N-Values**

Bore Hole No.	Depth (m)	Nos. of blow to drive sampler for penetration of			N-Value for last 300 (mm)
		0-150 (mm)	150-300 (mm)	300-450 (mm)	
BH-1	1.00	50(4cm)	-	-	Refusal
	2.00	50(0cm)	-	-	Refusal
	3.00	50(0cm)	-	-	Refusal
	4.00	50(0cm)	-	-	Refusal
	5.00	50(0cm)	-	-	Refusal
BH-2	1.00	50(4cm)	-	-	Refusal
	2.00	50(0cm)	-	-	Refusal
	3.00	50(0cm)	-	-	Refusal
	4.00	50(0cm)	-	-	Refusal
	5.00	50(0cm)	-	-	Refusal
BH-3	1.00	50(2cm)	-	-	Refusal
	2.00	50(4cm)	-	-	Refusal
	3.00	50(0cm)	-	-	Refusal
	4.00	50(0cm)	-	-	Refusal
	5.00	50(0cm)	-	-	Refusal
BH-4	1.00	50(3cm)	-	-	Refusal
	2.00	50(0cm)	-	-	Refusal
	3.00	50(0cm)	-	-	Refusal
	4.00	50(0cm)	-	-	Refusal
	5.00	50(0cm)	-	-	Refusal

**Table No.: 1/2**

**Observed N-Values**

Bore Hole No.	Depth (m)	Nos. of blow to drive sampler for penetration of			N-Value for last 300 (mm)
		0-150 (mm)	150-300 (mm)	300-450 (mm)	
BH-5	1.00	50(0cm)	-	-	Refusal
	2.00	50(0cm)	-	-	Refusal
	3.00	50(0cm)	-	-	Refusal
	4.00	50(0cm)	-	-	Refusal
	5.00	50(0cm)	-	-	Refusal
BH-7	1.00	50(3cm)	-	-	Refusal
	2.00	50(0cm)	-	-	Refusal
	3.00	50(0cm)	-	-	Refusal
	4.00	50(0cm)	-	-	Refusal
	5.00	50(0cm)	-	-	Refusal
BH-8	1.00	50(4cm)	-	-	Refusal
	2.00	50(0cm)	-	-	Refusal
	3.00	50(0cm)	-	-	Refusal
	4.00	50(0cm)	-	-	Refusal
	5.00	50(0cm)	-	-	Refusal
BH-9	1.00	50(3cm)	-	-	Refusal
	2.00	50(6cm)	-	-	Refusal
	3.00	50(0cm)	-	-	Refusal
	4.00	50(0cm)	-	-	Refusal
	5.00	50(0cm)	-	-	Refusal
BH-10	1.00	50(3cm)	-	-	Refusal
	2.00	50(0cm)	-	-	Refusal
	3.00	50(0cm)	-	-	Refusal
	4.00	50(0cm)	-	-	Refusal
	5.00	50(0cm)	-	-	Refusal

**Table No.: 1/3**

**Observed N-Values**

Bore Hole No.	Depth (m)	Nos. of blow to drive sampler for penetration of			N-Value for last 300 (mm)
		0-150 (mm)	150-300 (mm)	300-450 (mm)	
BH-11	1.00	16	21	24	45
	2.00	50(7cm)	-	-	Refusal
	3.00	50(0cm)	-	-	Refusal
	4.00	50(0cm)	-	-	Refusal
	5.00	50(0cm)	-	-	Refusal
BH-12	1.00	8	11	14	25
	2.00	12	17	22	39
	3.00	50(6cm)	-	-	Refusal
	4.00	50(0cm)	-	-	Refusal
	5.00	50(0cm)	-	-	Refusal
BH-13	1.00	12	16	21	37
	2.00	50(4cm)	-	-	Refusal
	3.00	50(0cm)	-	-	Refusal
	4.00	50(0cm)	-	-	Refusal
	5.00	50(0cm)	-	-	Refusal
BH-14	1.00	12	20	24	44
	2.00	50(10cm)	-	-	Refusal
	3.00	50(0cm)	-	-	Refusal
	4.00	50(0cm)	-	-	Refusal
	5.00	50(0cm)	-	-	Refusal
BH-15	1.00	50(5cm)	-	-	Refusal
	2.00	50(0cm)	-	-	Refusal
	3.00	50(0cm)	-	-	Refusal
	4.00	50(0cm)	-	-	Refusal
	5.00	50(0cm)	-	-	Refusal

**Table No.: 1/4**

**Observed N-Values**

Bore Hole No.	Depth (m)	Nos. of blow to drive sampler for penetration of			N-Value for last 300 (mm)
		0-150 (mm)	150-300 (mm)	300-450 (mm)	
BH-16	1.00	50(0cm)	-	-	Refusal
	2.00	50(0cm)	-	-	Refusal
	3.00	50(0cm)	-	-	Refusal
	4.00	50(0cm)	-	-	Refusal
	5.00	50(0cm)	-	-	Refusal
BH-17	1.00	12	16	21	37
	2.00	50(8cm)	-	-	Refusal
	3.00	50(0cm)	-	-	Refusal
	4.00	50(0cm)	-	-	Refusal
	5.00	50(0cm)	-	-	Refusal
BH-18	1.00	9	13	16	29
	2.00	11	15	24	39
	3.00	50(4cm)	-	-	Refusal
	4.00	50(3cm)	-	-	Refusal
	5.00	50(0cm)	-	-	Refusal
BH-19	1.00	50(10cm)	-	-	Refusal
	2.00	50(3cm)	-	-	Refusal
	3.00	50(0cm)	-	-	Refusal
	4.00	50(0cm)	-	-	Refusal
	5.00	50(0cm)	-	-	Refusal
BH-19	1.00	50(4cm)	-	-	Refusal
	2.00	50(0cm)	-	-	Refusal
	3.00	50(0cm)	-	-	Refusal
	4.00	50(0cm)	-	-	Refusal
	5.00	50(0cm)	-	-	Refusal

**Table No.: 1/5**

**Observed N-Values**

Bore Hole No.	Depth (m)	Nos. of blow to drive sampler for penetration of			N-Value for last 300 (mm)
		0-150 (mm)	150-300 (mm)	300-450 (mm)	
BH-20	1.00	50(4cm)	-	-	Refusal
	2.00	50(0cm)	-	-	Refusal
	3.00	50(0cm)	-	-	Refusal
	4.00	50(0cm)	-	-	Refusal
	5.00	50(0cm)	-	-	Refusal
BH-21	1.00	50(4cm)	-	-	Refusal
	2.00	50(0cm)	-	-	Refusal
	3.00	50(0cm)	-	-	Refusal
	4.00	50(0cm)	-	-	Refusal
	5.00	50(0cm)	-	-	Refusal
BH-22	1.00	13	16	20	36
	2.00	50(4cm)	-	-	Refusal
	3.00	50(0cm)	-	-	Refusal
	4.00	50(0cm)	-	-	Refusal
	5.00	50(0cm)	-	-	Refusal

**Table No. 2**

**Chemical Analysis of Soil**

<b>BH. No</b>	<b>Depth (m)</b>	<b>pH</b>	<b>Chloride (%)</b>	<b>Sulphate (%)</b>	<b>TDS (%)</b>
BH-2	2.00	7.40	0.027	0.024	0.032
BH-5	2.00	7.20	0.025	0.029	0.038
BH-9	1.00	7.50	0.032	0.018	0.040
BH-13	2.00	7.40	0.028	0.012	0.042
BH-16	1.00	7.19	0.012	0.016	0.031
BH-19	3.00	7.25	0.021	0.026	0.036
BH-22	0.00	7.35	0.019	0.028	0.045

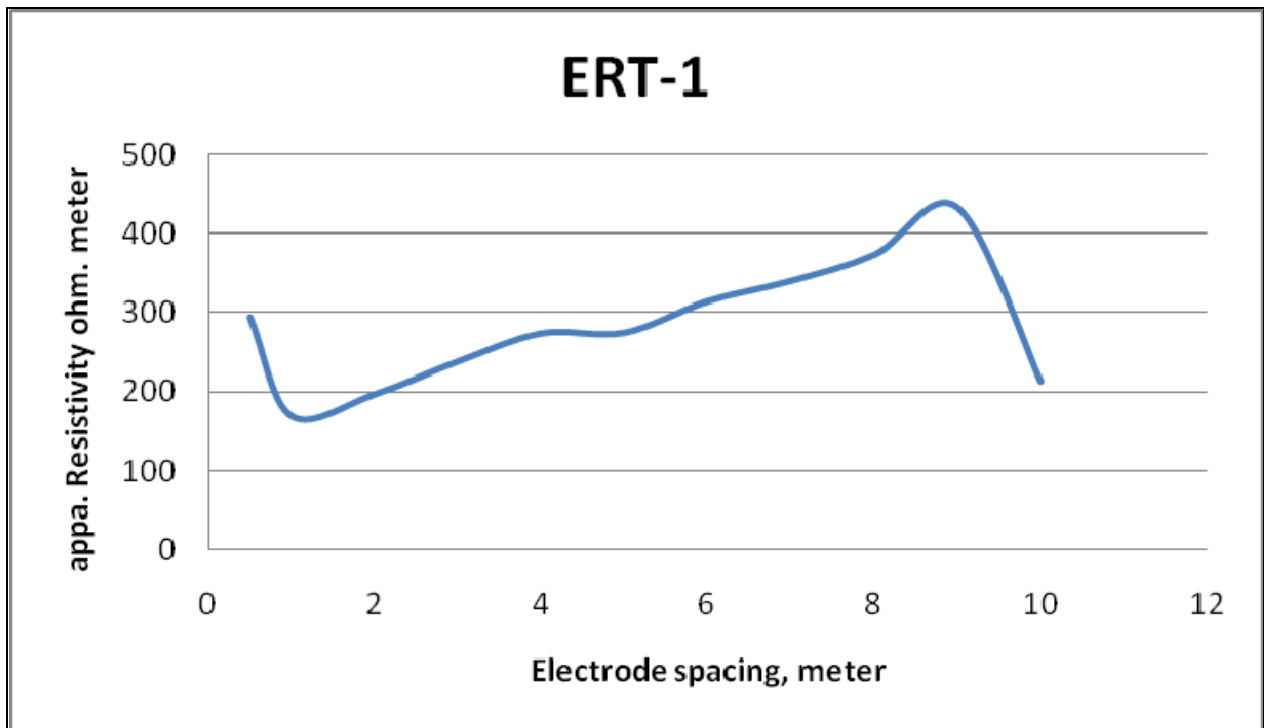
**Table No. 3**

**Properties of Rock Sample**

Borehole No.	Depth (m.)	Specific Gravity	Water absorption (%)
BH-1	4.0	2.75	0.61
	5.0	2.70	0.59
BH-2	4.00	2.72	0.69
BH-3	5.00	2.83	1.25
BH-4	4.00	2.81	1.10
BH-6	5.00	2.83	0.95
BH-7	4.00	2.82	0.69
BH-9	5.00	2.83	0.70
BH-10	4.00	2.85	0.82
BH-12	5.00	2.84	0.59
BH-14	4.00	2.82	0.60
BH-15	4.00	2.83	0.52
BH-17	4.00	2.75	0.65
BH-20	5.00	2.79	0.69
BH-22	4.00	2.82	0.78

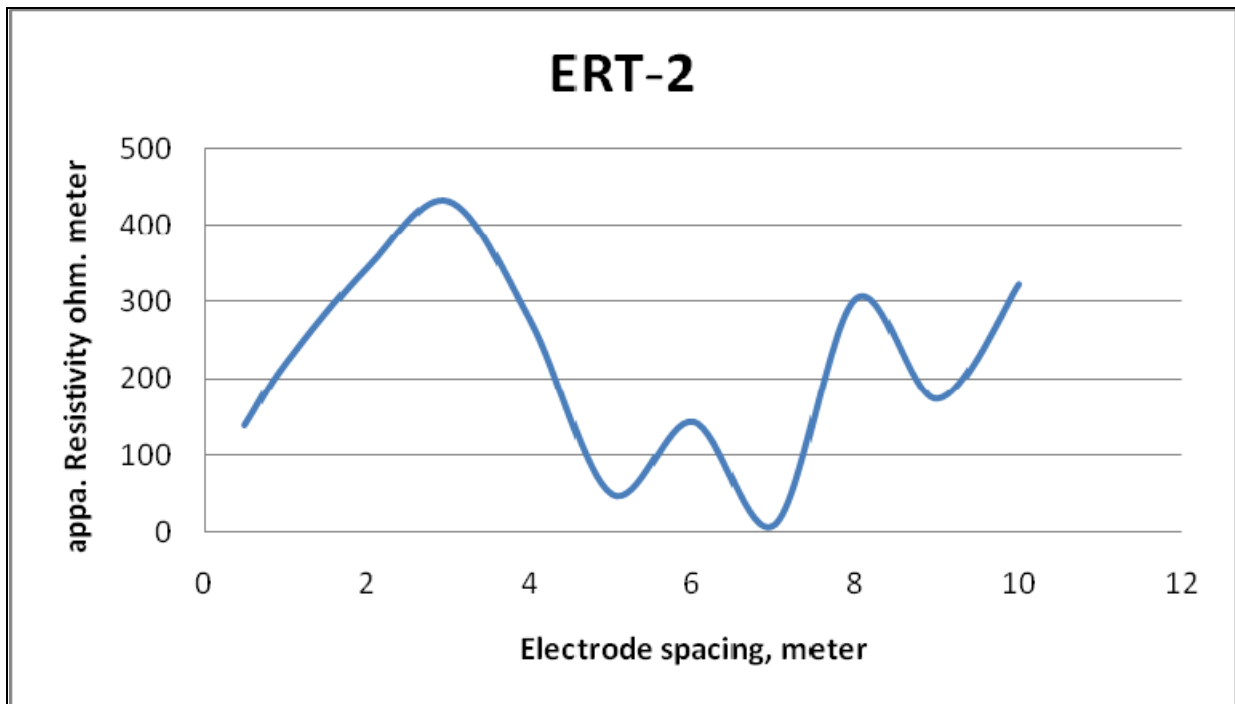
**Table No. 4/1 Electrical Resistivity Test**

APPARENT RESISTIVITY OF ALL DIRECTION.							
ERT - 1			LOCATION: P-4,E-581258; N:2663874				
VILLAGE: MANDSAUR			APPARENT RESISTIVITY (Ohm.m.)				
Sr.No	a (m.)	AB/2 (M)	MN/2 (M)	K=2.II.a	NORTH SOUTH	EAST WEST	AVERAGE RESISTIVITY. (Ohm.m.)
1	0.5	0.75	0.25	3.14	327.066	264.379	295.722
2	1	1.5	0.5	6.28	174.898	165.101	170.000
3	2	3.0	1.0	12.56	198.310	197.632	197.971
4	3	4.5	1.5	18.84	269.638	208.559	239.098
5	4	6.0	2.0	25.12	277.551	272.225	274.888
6	5	7.5	2.5	31.40	291.109	260.432	275.771
7	6	9.0	3.0	37.68	327.665	303.625	315.645
8	7	10.5	3.5	43.96	351.240	331.239	341.240
9	8	12.0	4.0	50.24	385.893	363.537	374.715
10	9	13.5	4.5	56.52	418.474	449.843	434.158
11	10	15.0	5.0	62.80	5.401	422.770	214.085



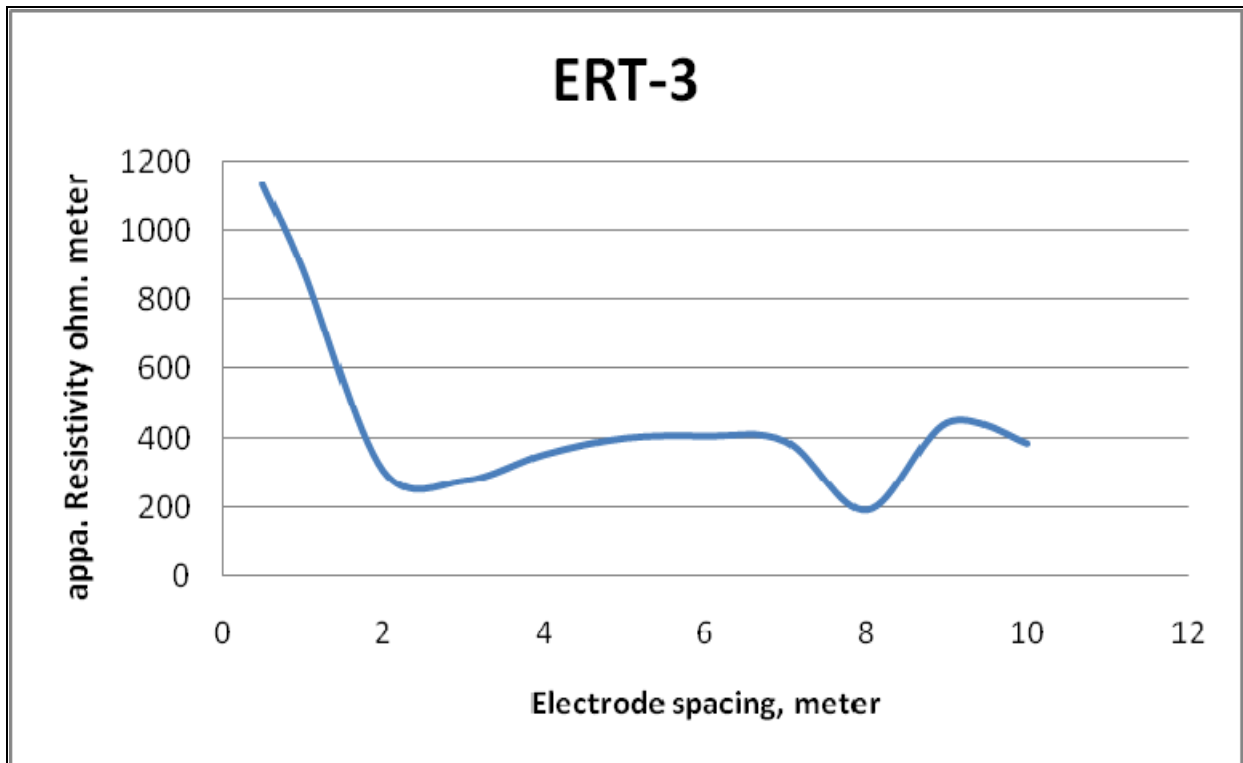
**Table No. 4/2 Electrical Resistivity Test**

APPARENT RESISTIVITY OF ALL DIRECTION.							
ERT - 2			LOCATION: P-4,E-581283; N:2663874				
VILLAGE: MANDSAUR			APPARENT RESISTIVITY (Ohm.m.)				
Sr.No	a (m.)	AB/2 (M)	MN/2 (M)	K=2.II.a	NORTH SOUTH	EAST WEST	AVERAGE RESISTIVITY. (Ohm.m.)
1	0.5	0.75	0.25	3.14	140.848	137.165	139.006
2	1	1.5	0.5	6.28	222.249	219.693	220.971
3	2	3.0	1.0	12.56	340.162	350.185	345.174
4	3	4.5	1.5	18.84	436.504	429.138	432.821
5	4	6.0	2.0	25.12	270.040	283.002	276.521
6	5	7.5	2.5	31.40	36.267	63.302	49.785
7	6	9.0	3.0	37.68	2.336	284.748	143.542
8	7	10.5	3.5	43.96	17.364	2.462	9.913
9	8	12.0	4.0	50.24	302.646	307.620	305.133
10	9	13.5	4.5	56.52	14.469	332.790	173.629
11	10	15.0	5.0	62.80	326.937	320.343	323.640



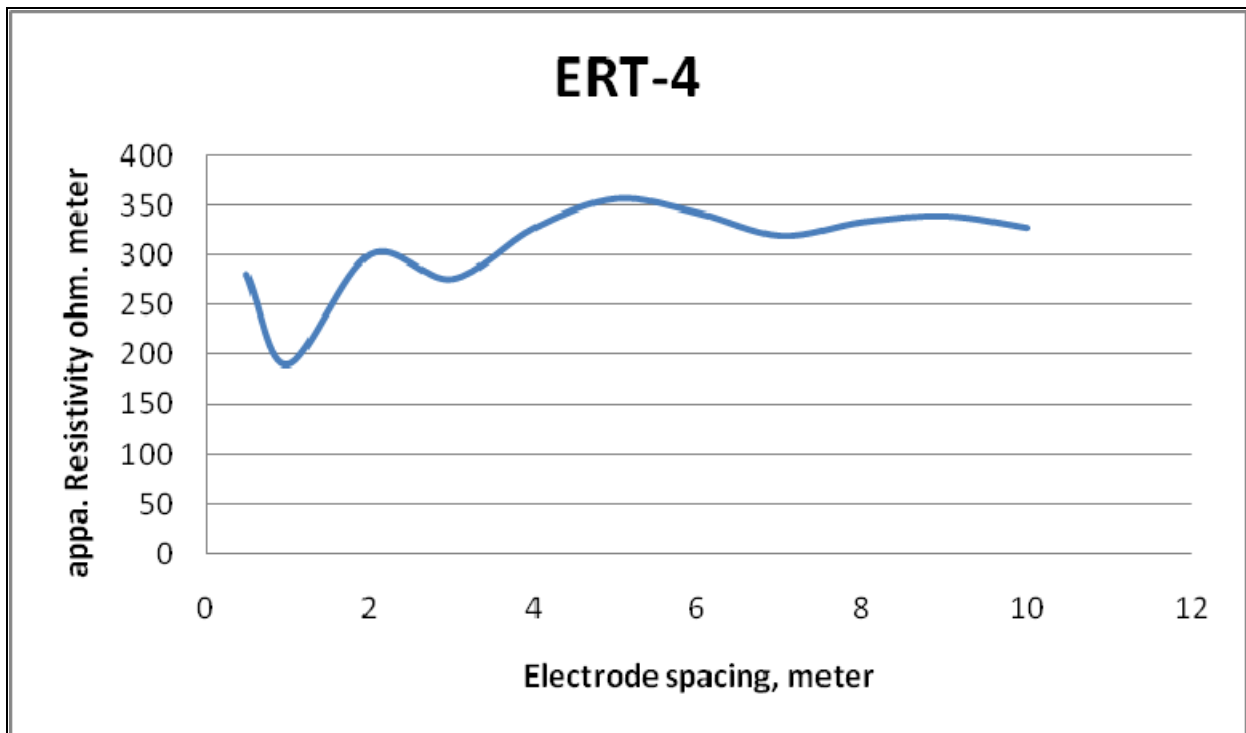
**Table No. 4/3 Electrical Resistivity Test**

APPARENT RESISTIVITY OF ALL DIRECTION.							
ERT - 3			LOCATION: P-4,E-581258; N:2663894				
VILLAGE: MANDSAUR			APPARENT RESISTIVITY (Ohm.m.)				
Sr.No	a (m.)	AB/2 (M)	MN/2 (M)	K=2.II.a	NORTH SOUTH	EAST WEST	AVERAGE RESISTIVITY. (Ohm.m.)
1	0.5	0.75	0.25	3.14	1136.564	1130.055	1133.309
2	1	1.5	0.5	6.28	879.815	892.551	886.183
3	2	3.0	1.0	12.56	309.956	299.719	304.837
4	3	4.5	1.5	18.84	270.166	280.019	275.092
5	4	6.0	2.0	25.12	373.836	329.022	351.429
6	5	7.5	2.5	31.40	397.869	398.435	398.152
7	6	9.0	3.0	37.68	410.147	398.014	404.080
8	7	10.5	3.5	43.96	381.529	394.893	388.211
9	8	12.0	4.0	50.24	1.507	379.965	190.736
10	9	13.5	4.5	56.52	496.246	389.197	442.721



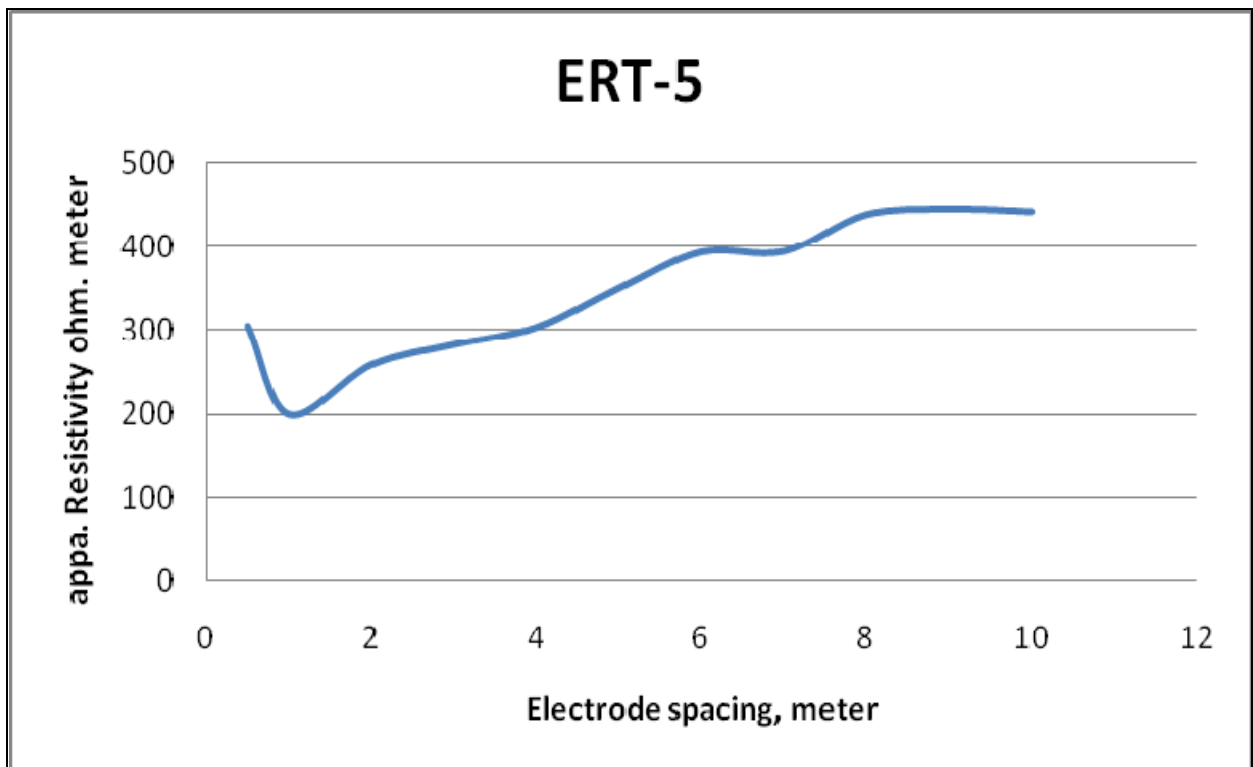
**Table No. 4/4 Electrical Resistivity Test**

APPARENT RESISTIVITY OF ALL DIRECTION.							
ERT - 4			LOCATION: P-4,E-581283; N:2663894				
VILLAGE: MANDSAUR			APPARENT RESISTIVITY (Ohm.m.)				
Sr.No	a (m.)	AB/2 (M)	MN/2 (M)	K=2.II.a	NORTH SOUTH	EAST WEST	AVERAGE RESISTIVITY. (Ohm.m.)
1	0.5	0.75	0.25	3.14	274.788	288.293	281.540
2	1	1.5	0.5	6.28	199.867	181.046	190.457
3	2	3.0	1.0	12.56	289.294	313.774	301.534
4	3	4.5	1.5	18.84	276.194	277.193	276.694
5	4	6.0	2.0	25.12	327.489	329.097	328.293
6	5	7.5	2.5	31.40	373.629	341.820	357.725
7	6	9.0	3.0	37.68	354.946	331.132	343.039
8	7	10.5	3.5	43.96	318.095	322.447	320.271
9	8	12.0	4.0	50.24	345.752	322.842	334.297
10	9	13.5	4.5	56.52	352.459	328.494	340.476
11	10	15.0	5.0	62.80	336.357	320.657	328.507



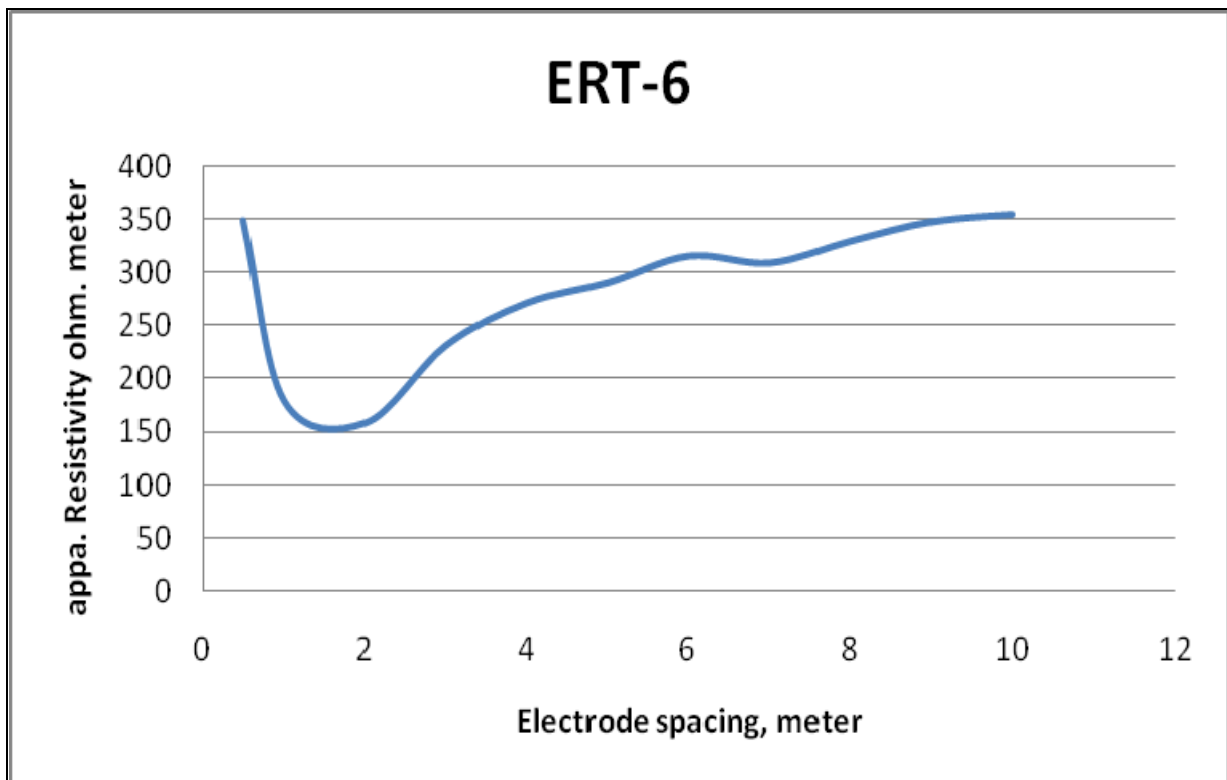
**Table No. 4/5 Electrical Resistivity Test**

APPARENT RESISTIVITY OF ALL DIRECTION.							
ERT - 5			LOCATION: P-4,E-581453; N:2663921				
VILLAGE: MANDSAUR			APPARENT RESISTIVITY (Ohm.m.)				
Sr.No	a (m.)	AB/2 (M)	MN/2 (M)	K=2.II.a	NORTH SOUTH	EAST WEST	AVERAGE RESISTIVITY. (Ohm.m.)
1	0.5	0.75	0.25	3.14	301.854	308.546	305.200
2	1	1.5	0.5	6.28	194.580	205.161	199.870
3	2	3.0	1.0	12.56	252.494	263.961	258.227
4	3	4.5	1.5	18.84	280.320	284.974	282.647
5	4	6.0	2.0	25.12	300.636	306.715	303.676
6	5	7.5	2.5	31.40	345.714	354.600	350.157
7	6	9.0	3.0	37.68	379.626	406.982	393.304
8	7	10.5	3.5	43.96	393.310	394.981	394.145
9	8	12.0	4.0	50.24	439.650	437.038	438.344
10	9	13.5	4.5	56.52	451.538	438.313	444.925
11	10	15.0	5.0	62.80	451.218	432.629	441.924



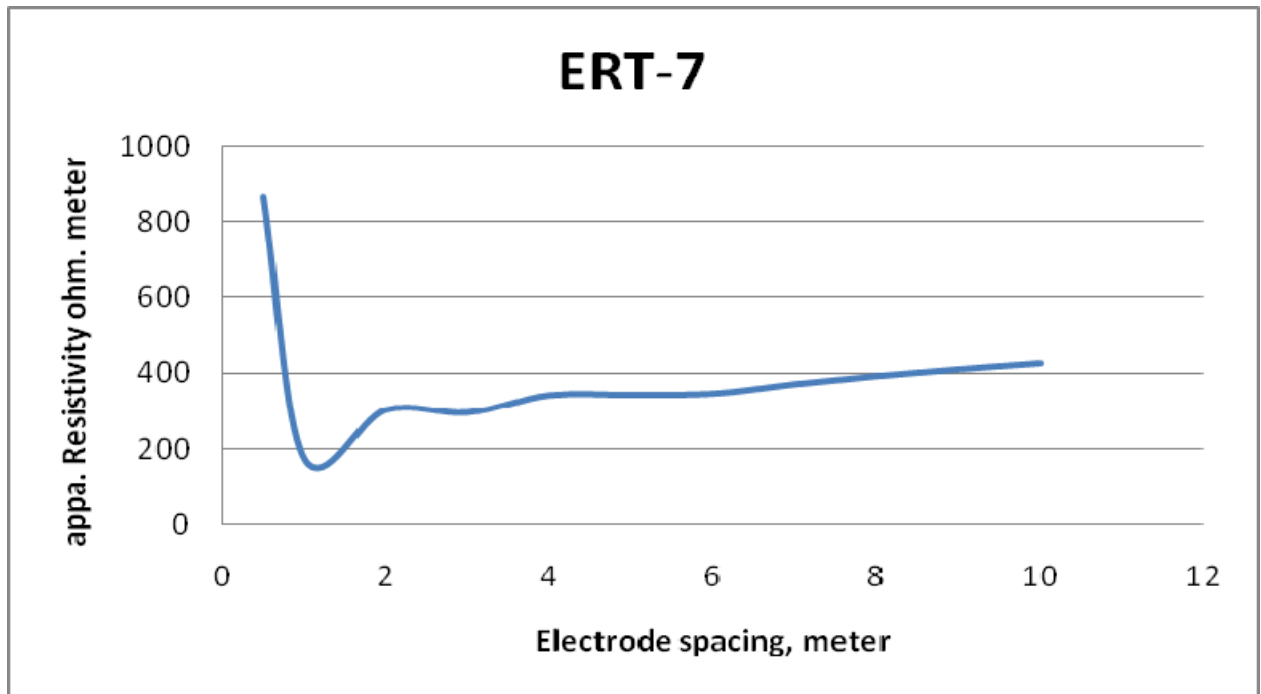
**Table No. 4/6 Electrical Resistivity Test**

APPARENT RESISTIVITY OF ALL DIRECTION.							
ERT - 6			LOCATION: P-4,E-581473; N:2663921				
VILLAGE: MANDSAUR			APPARENT RESISTIVITY (Ohm.m.)				
Sr.No	a (m.)	AB/2 (M)	MN/2 (M)	K=2.II.a	NORTH SOUTH	EAST WEST	AVERAGE RESISTIVITY. (Ohm.m.)
1	0.5	0.75	0.25	3.14	351.093	345.664	348.378
2	1	1.5	0.5	6.28	180.820	177.711	179.266
3	2	3.0	1.0	12.56	164.574	153.031	158.802
4	3	4.5	1.5	18.84	238.627	224.064	231.346
5	4	6.0	2.0	25.12	274.461	268.030	271.246
6	5	7.5	2.5	31.40	300.121	280.276	290.199
7	6	9.0	3.0	37.68	320.770	309.466	315.118
8	7	10.5	3.5	43.96	308.863	308.687	308.775
9	8	12.0	4.0	50.24	330.981	327.263	329.122
10	9	13.5	4.5	56.52	348.672	345.507	347.089
11	10	15.0	5.0	62.80	362.356	345.337	353.847



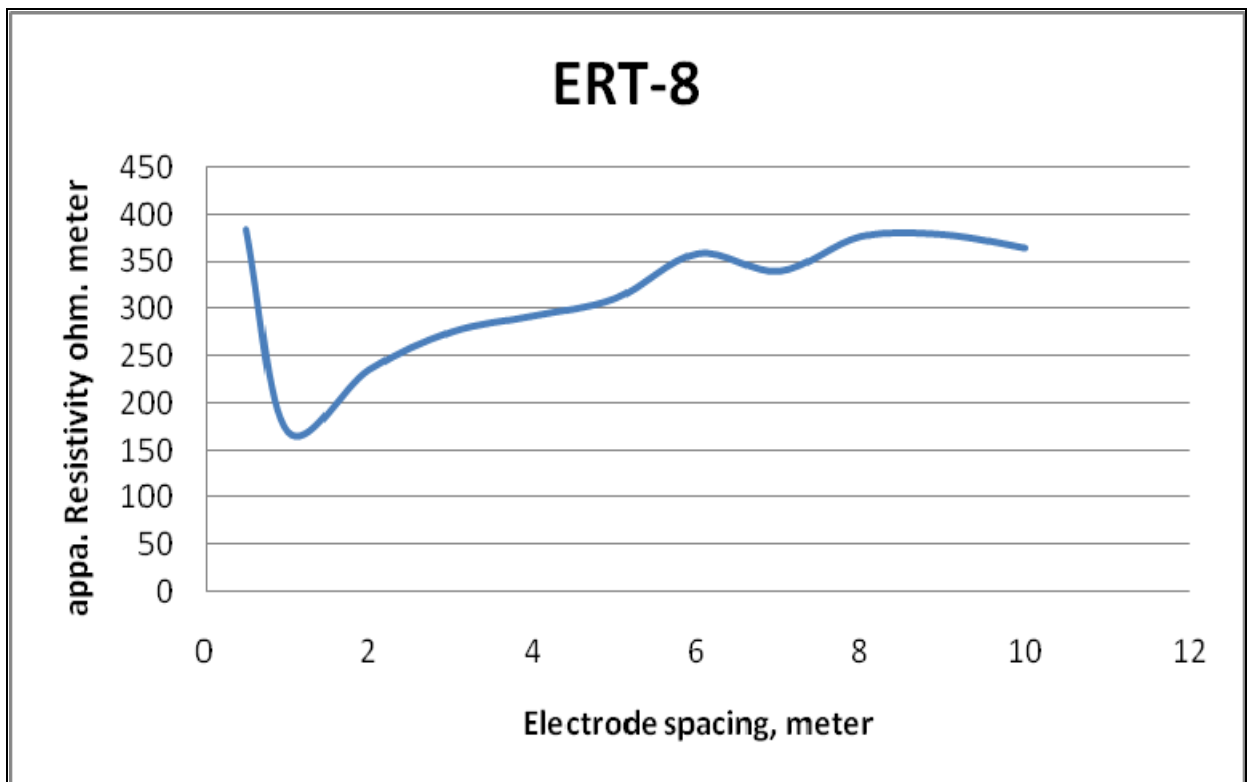
**Table No. 4/7 Electrical Resistivity Test**

APPARENT RESISTIVITY OF ALL DIRECTION.							
ERT - 7			LOCATION: P-4,E-581673; N:2663921				
VILLAGE: MANDSAUR			APPARENT RESISTIVITY (Ohm.m.)				
Sr.No	a (m.)	AB/2 (M)	MN/2 (M)	K=2.II.a	NORTH SOUTH	EAST WEST	AVERAGE RESISTIVITY. (Ohm.m.)
1	0.5	0.75	0.25	3.14	865.707	869.183	867.445
2	1	1.5	0.5	6.28	176.003	176.525	176.264
3	2	3.0	1.0	12.56	300.084	308.486	304.285
4	3	4.5	1.5	18.84	295.072	299.386	297.229
5	4	6.0	2.0	25.12	341.205	345.676	343.441
6	5	7.5	2.5	31.40	343.076	345.777	344.427
7	6	9.0	3.0	37.68	345.488	350.047	347.768
8	7	10.5	3.5	43.96	370.583	374.231	372.407
9	8	12.0	4.0	50.24	395.891	391.269	393.580
10	9	13.5	4.5	56.52	412.653	410.109	411.381
11	10	15.0	5.0	62.80	428.861	425.784	427.323



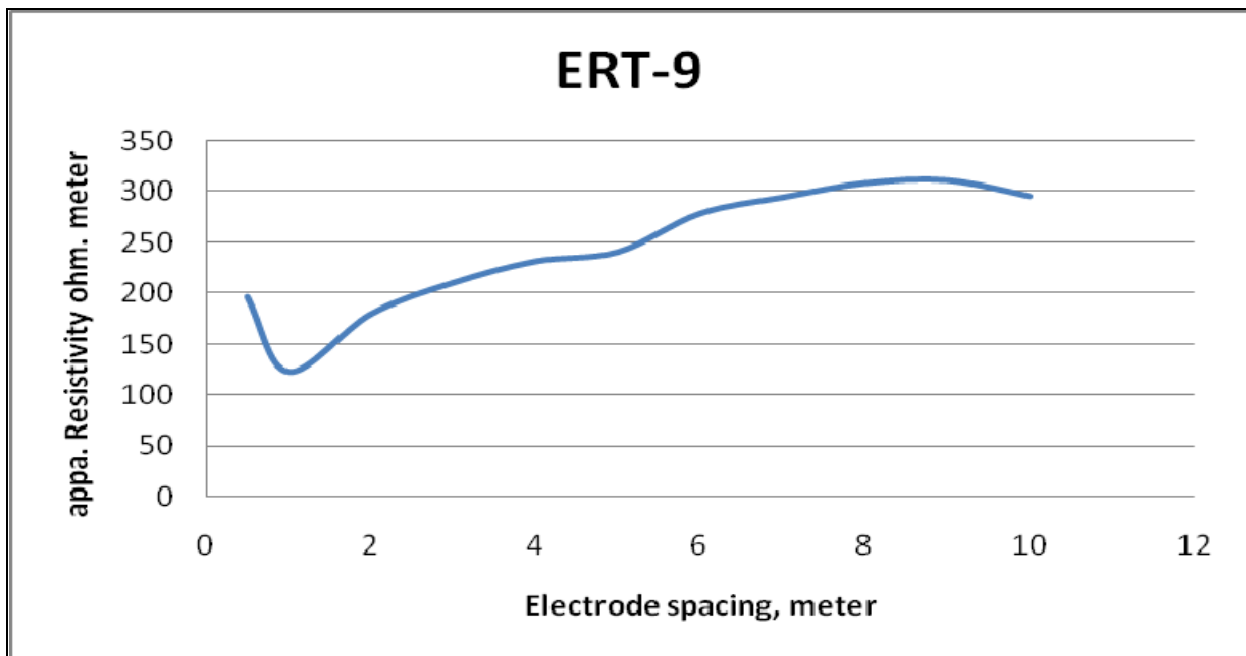
**Table No. 4/8 Electrical Resistivity Test**

APPARENT RESISTIVITY OF ALL DIRECTION.							
ERT - 8			LOCATION: P-4,E-581917; N:2663921				
VILLAGE: MANDSAUR			APPARENT RESISTIVITY (Ohm.m.)				
Sr.No	a (m.)	AB/2 (M)	MN/2 (M)	K=2.II.a	NORTH SOUTH	EAST WEST	AVERAGE RESISTIVITY. (Ohm.m.)
1	0.5	0.75	0.25	3.14	382.493	385.944	384.218
2	1	1.5	0.5	6.28	169.058	170.213	169.635
3	2	3.0	1.0	12.56	228.617	242.169	235.393
4	3	4.5	1.5	18.84	279.058	271.918	275.488
5	4	6.0	2.0	25.12	293.402	291.643	292.522
6	5	7.5	2.5	31.40	311.676	310.232	310.954
7	6	9.0	3.0	37.68	343.227	373.823	358.525
8	7	10.5	3.5	43.96	342.360	337.657	340.009
9	8	12.0	4.0	50.24	377.956	375.845	376.900
10	9	13.5	4.5	56.52	384.223	373.541	378.882
11	10	15.0	5.0	62.80	365.684	363.612	364.648



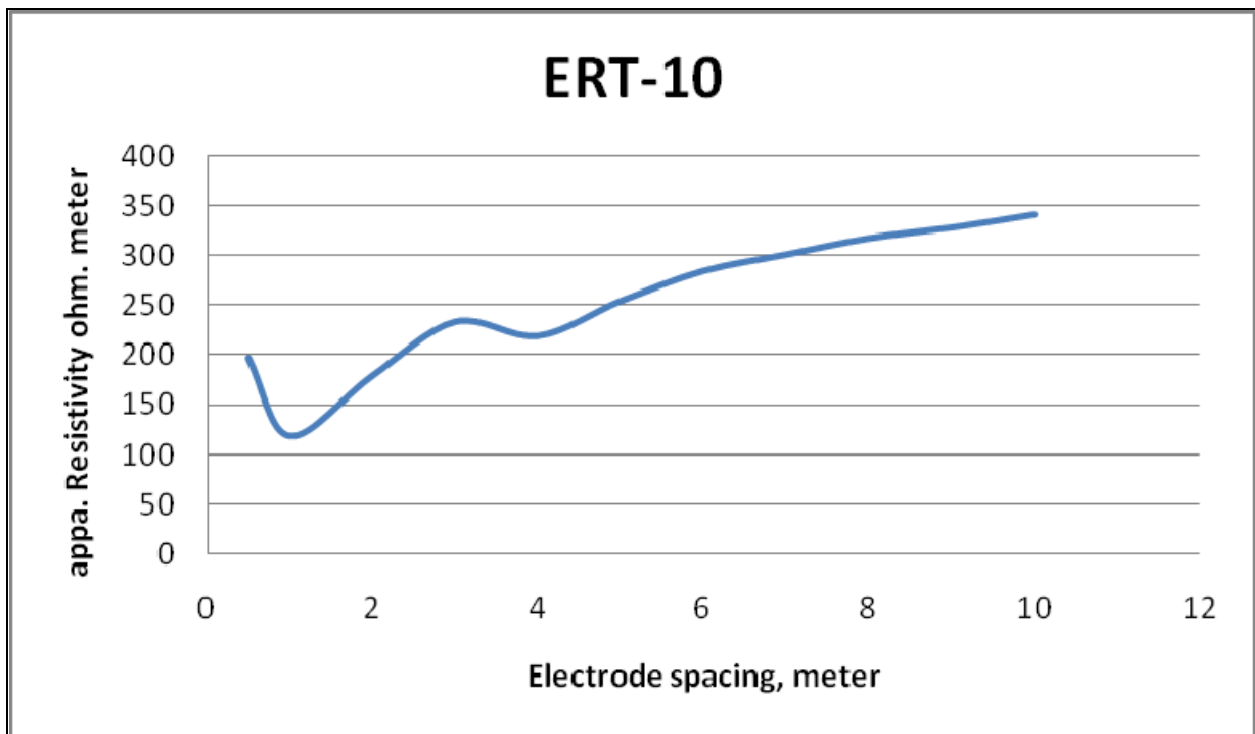
**Table No. 4/9 Electrical Resistivity Test**

APPARENT RESISTIVITY OF ALL DIRECTION.							
ERT - 9			LOCATION: P-4,E-582060; N:2663921				
VILLAGE: MANDSAUR			APPARENT RESISTIVITY (Ohm.m.)				
Sr.No	a (m.)	AB/2 (M)	MN/2 (M)	K=2.II.a	NORTH SOUTH	EAST WEST	AVERAGE RESISTIVITY. (Ohm.m.)
1	0.5	0.75	0.25	3.14	196.529	197.588	197.059
2	1	1.5	0.5	6.28	124.105	122.479	123.292
3	2	3.0	1.0	12.56	179.646	180.738	180.192
4	3	4.5	1.5	18.84	206.863	214.795	210.829
5	4	6.0	2.0	25.12	220.554	243.564	232.059
6	5	7.5	2.5	31.40	238.671	243.978	241.325
7	6	9.0	3.0	37.68	279.962	278.191	279.077
8	7	10.5	3.5	43.96	300.071	290.136	295.103
9	8	12.0	4.0	50.24	315.909	302.043	308.976
10	9	13.5	4.5	56.52	319.395	304.191	311.793
11	10	15.0	5.0	62.80	332.903	259.427	296.165



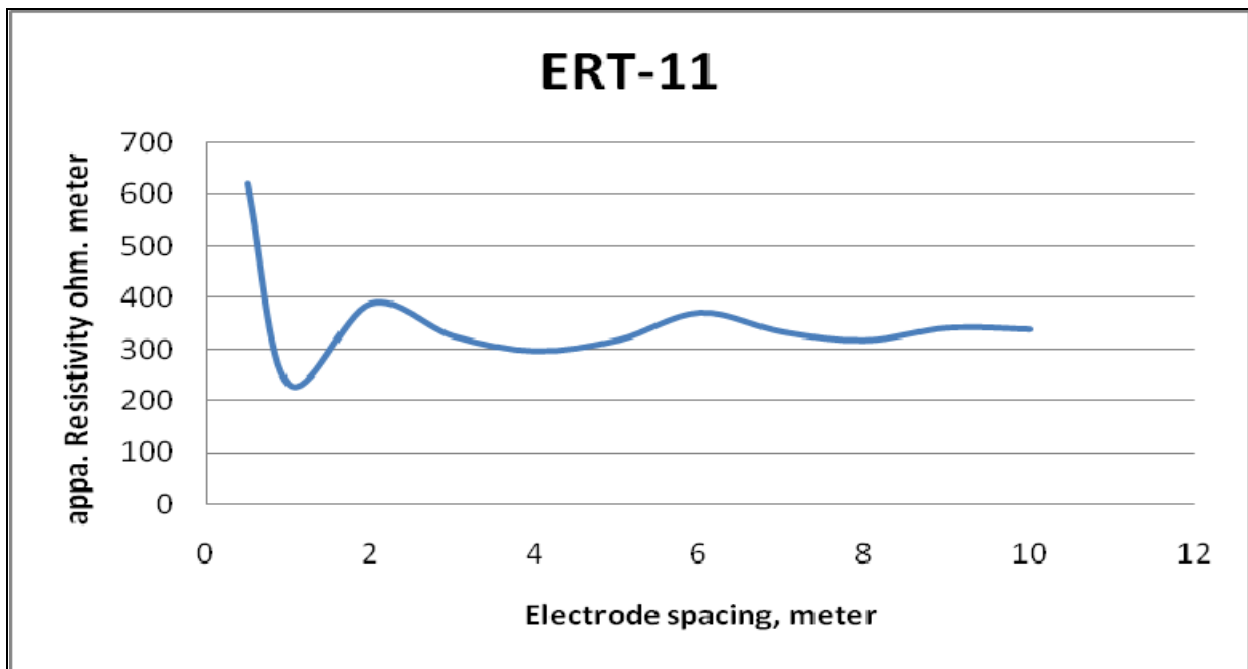
**Table No. 4/10 Electrical Resistivity Test**

APPARENT RESISTIVITY OF ALL DIRECTION.							
ERT - 10			LOCATION: P-4,E-582080; N:2663921				
VILLAGE: MANDSAUR			APPARENT RESISTIVITY (Ohm.m.)				
Sr.No	a (m.)	AB/2 (M)	MN/2 (M)	K=2.II.a	NORTH SOUTH	EAST WEST	AVERAGE RESISTIVITY. (Ohm.m.)
1	0.5	0.75	0.25	3.14	198.131	198.147	198.139
2	1	1.5	0.5	6.28	124.363	114.710	119.537
3	2	3.0	1.0	12.56	185.762	174.622	180.192
4	3	4.5	1.5	18.84	225.326	243.093	234.209
5	4	6.0	2.0	25.12	217.514	222.563	220.039
6	5	7.5	2.5	31.40	245.831	264.576	255.204
7	6	9.0	3.0	37.68	283.881	286.481	285.181
8	7	10.5	3.5	43.96	303.456	300.115	301.785
9	8	12.0	4.0	50.24	321.687	314.502	318.095
10	9	13.5	4.5	56.52	329.286	328.099	328.692
11	10	15.0	5.0	62.80	342.260	341.004	341.632



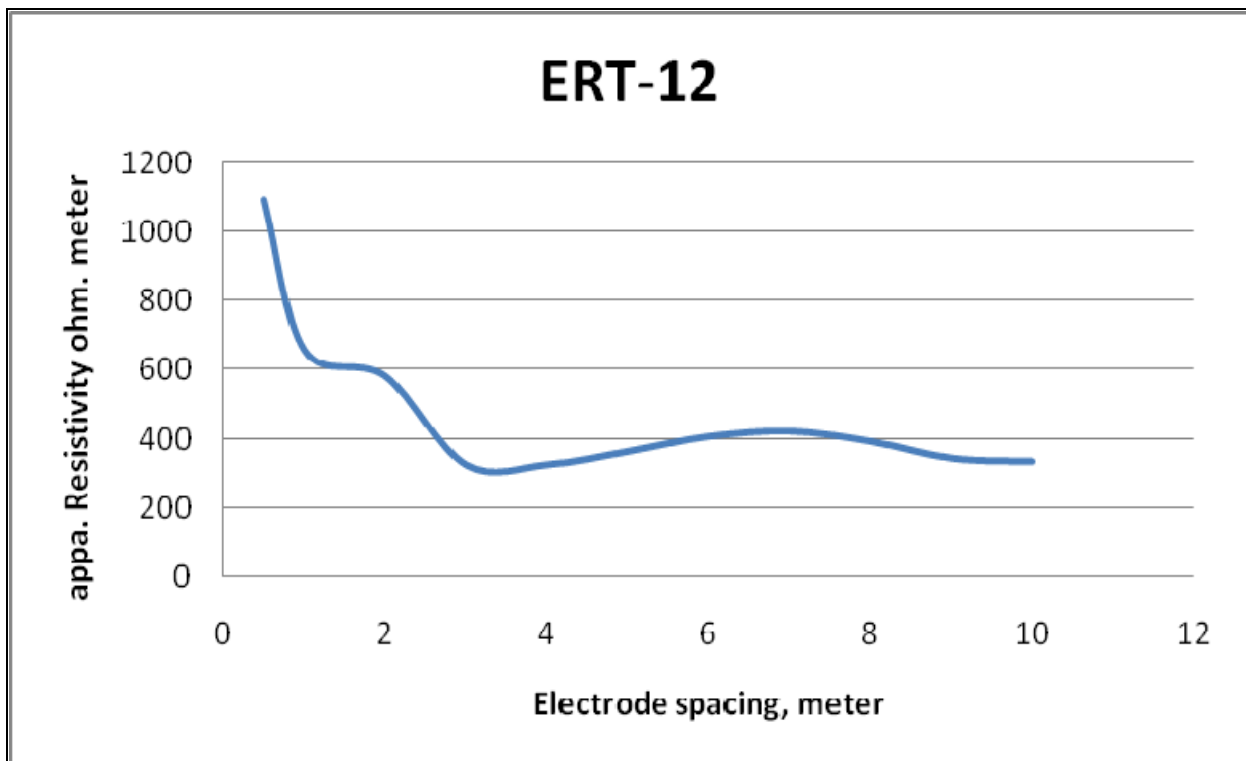
**Table No. 4/11 Electrical Resistivity Test**

APPARENT RESISTIVITY OF ALL DIRECTION.							
ERT - 11			LOCATION: P-4,E-582210; N:2663921				
VILLAGE: MANDSAUR			APPARENT RESISTIVITY (Ohm.m.)				
Sr.No	a (m.)	AB/2 (M)	MN/2 (M)	K=2.II.a	NORTH SOUTH	EAST WEST	AVERAGE RESISTIVITY. (Ohm.m.)
1	0.5	0.75	0.25	3.14	623.482	620.652	622.067
2	1	1.5	0.5	6.28	233.679	231.682	232.680
3	2	3.0	1.0	12.56	391.897	387.175	389.536
4	3	4.5	1.5	18.84	318.886	333.600	326.243
5	4	6.0	2.0	25.12	296.491	297.170	296.830
6	5	7.5	2.5	31.40	319.369	317.454	318.412
7	6	9.0	3.0	37.68	373.823	370.055	371.939
8	7	10.5	3.5	43.96	337.613	330.579	334.096
9	8	12.0	4.0	50.24	317.014	318.120	317.567
10	9	13.5	4.5	56.52	344.829	339.798	342.313
11	10	15.0	5.0	62.80	342.260	336.608	339.434



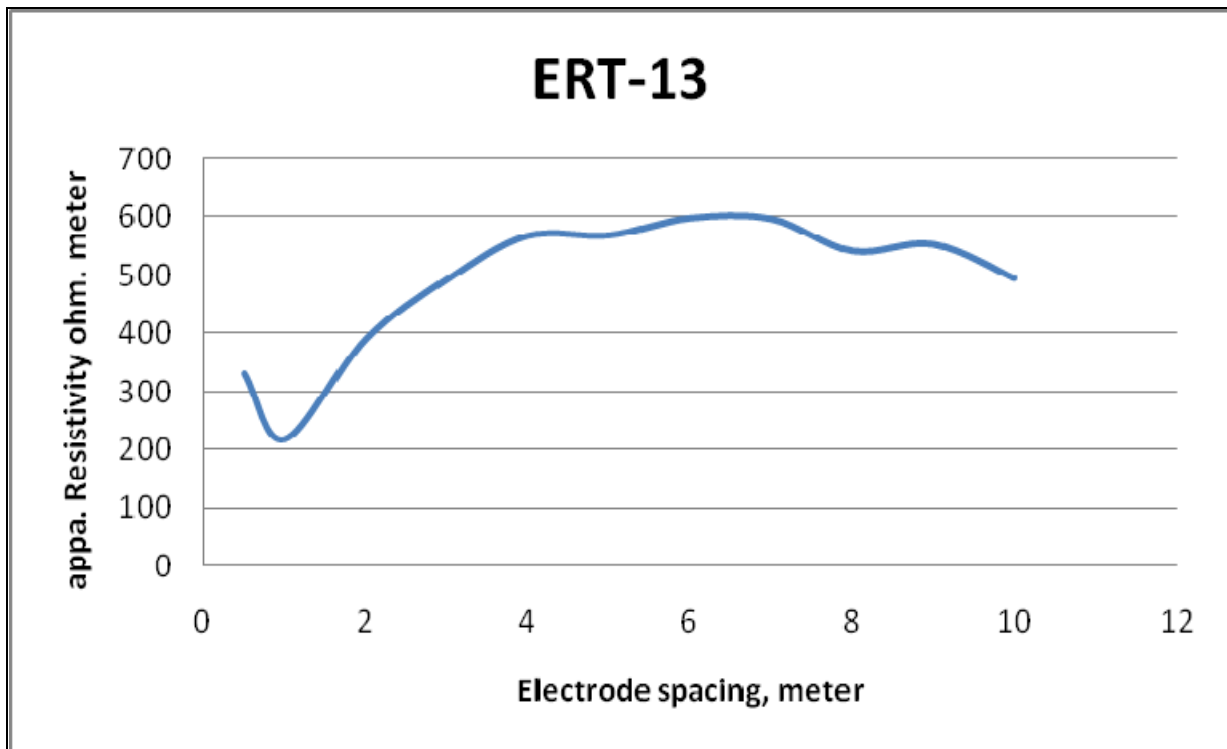
**Table No. 4/12 Electrical Resistivity Test**

APPARENT RESISTIVITY OF ALL DIRECTION.							
ERT - 12			LOCATION: P-4,E-582360; N:2663921				
VILLAGE: MANDSAUR			APPARENT RESISTIVITY (Ohm.m.)				
Sr.No	a (m.)	AB/2 (M)	MN/2 (M)	K=2.II.a	NORTH SOUTH	EAST WEST	AVERAGE RESISTIVITY. (Ohm.m.)
1	0.5	0.75	0.25	3.14	1092.139	1094.686	1093.412
2	1	1.5	0.5	6.28	659.431	658.157	658.794
3	2	3.0	1.0	12.56	575.575	589.391	582.483
4	3	4.5	1.5	18.84	316.682	335.842	326.262
5	4	6.0	2.0	25.12	323.043	330.579	326.811
6	5	7.5	2.5	31.40	362.984	366.909	364.947
7	6	9.0	3.0	37.68	407.321	408.112	407.716
8	7	10.5	3.5	43.96	422.368	423.379	422.873
9	8	12.0	4.0	50.24	392.525	394.937	393.731
10	9	13.5	4.5	56.52	350.594	339.911	345.252
11	10	15.0	5.0	62.80	339.057	332.966	336.011



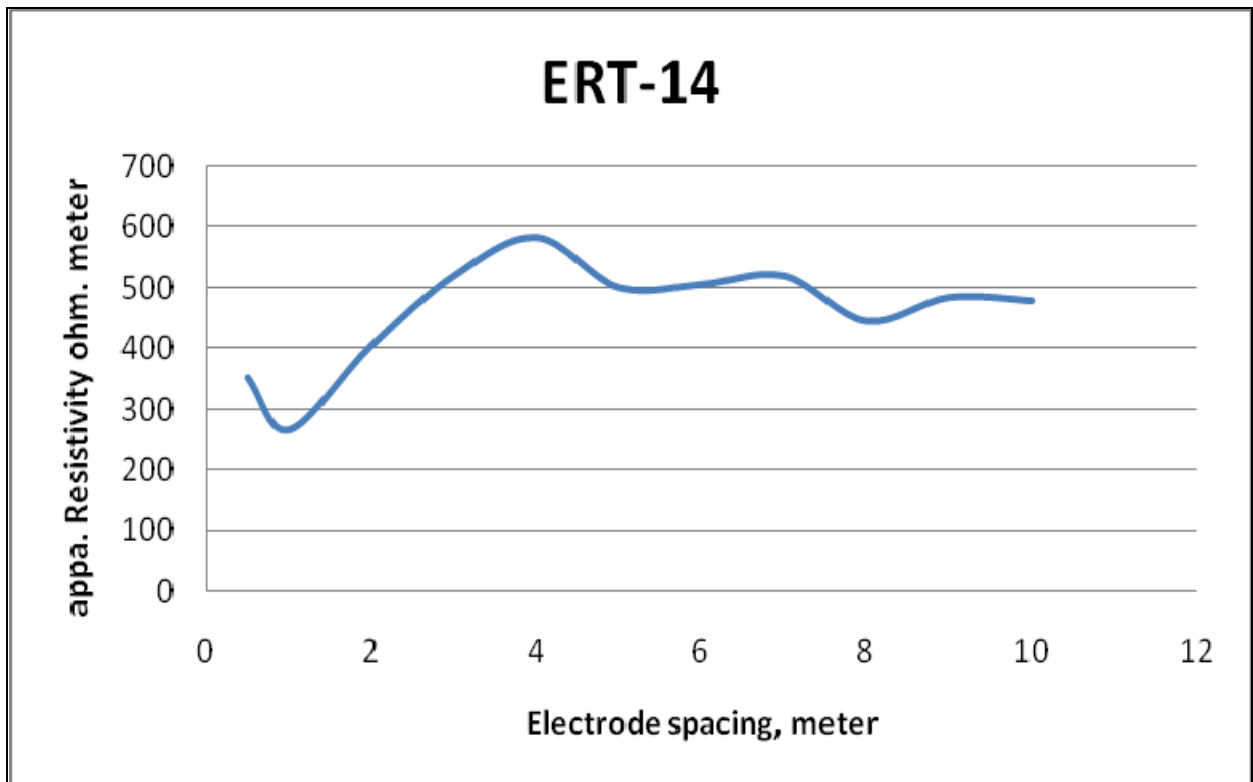
**Table No. 4/13 Electrical Resistivity Test**

APPARENT RESISTIVITY OF ALL DIRECTION.							
ERT - 13			LOCATION: P-4,E-582505; N:2663921				
VILLAGE: MANDSAUR			APPARENT RESISTIVITY (Ohm.m.)				
Sr.No	a (m.)	AB/2 (M)	MN/2 (M)	K=2.II.a	NORTH SOUTH	EAST WEST	AVERAGE RESISTIVITY. (Ohm.m.)
1	0.5	0.75	0.25	3.14	331.524	331.867	331.695
2	1	1.5	0.5	6.28	218.054	220.447	219.251
3	2	3.0	1.0	12.56	388.054	392.914	390.484
4	3	4.5	1.5	18.84	489.878	495.549	492.713
5	4	6.0	2.0	25.12	566.908	567.285	567.097
6	5	7.5	2.5	31.40	573.615	562.719	568.167
7	6	9.0	3.0	37.68	597.718	597.454	597.586
8	7	10.5	3.5	43.96	593.592	598.296	595.944
9	8	12.0	4.0	50.24	546.661	535.910	541.286
10	9	13.5	4.5	56.52	552.144	553.218	552.681
11	10	15.0	5.0	62.80	480.420	508.868	494.644



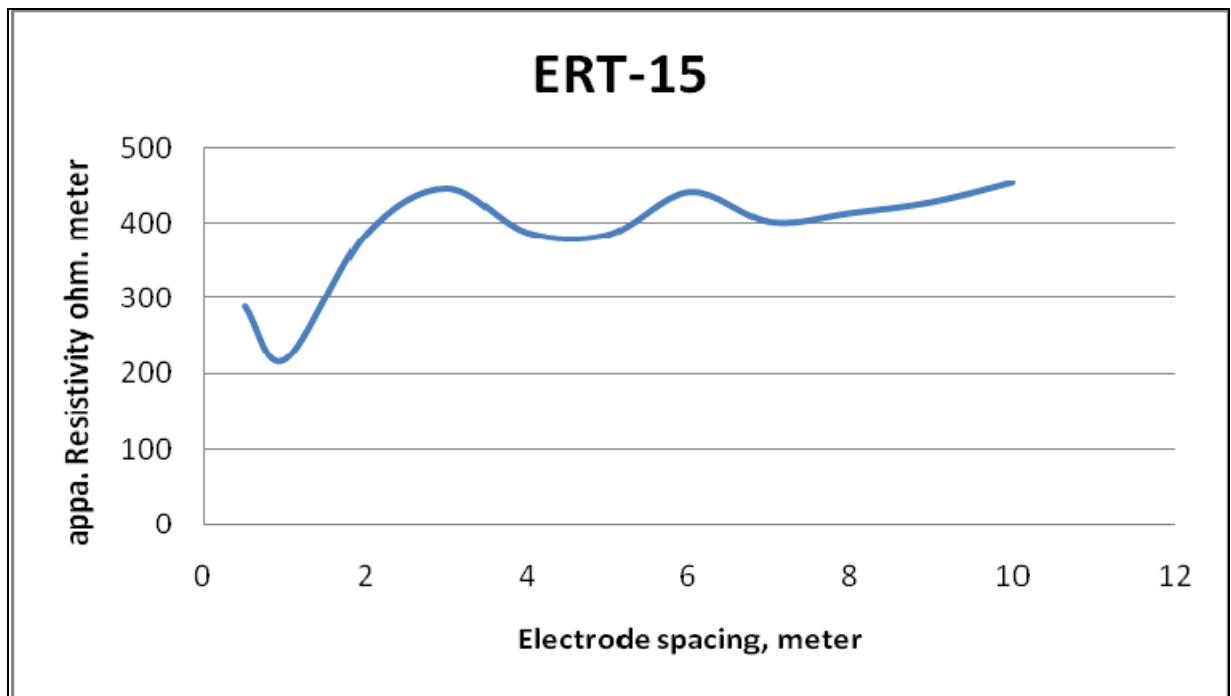
**Table No. 4/14 Electrical Resistivity Test**

APPARENT RESISTIVITY OF ALL DIRECTION.							
ERT - 14			LOCATION: P-4,E-582525; N:2663921				
VILLAGE: MANDSAUR			APPARENT RESISTIVITY (Ohm.m.)				
Sr.No	a (m.)	AB/2 (M)	MN/2 (M)	K=2.II.a	NORTH SOUTH	EAST WEST	AVERAGE RESISTIVITY. (Ohm.m.)
1	0.5	0.75	0.25	3.14	350.119	353.595	351.857
2	1	1.5	0.5	6.28	262.881	269.475	266.178
3	2	3.0	1.0	12.56	396.934	412.106	404.520
4	3	4.5	1.5	18.84	538.636	499.317	518.976
5	4	6.0	2.0	25.12	603.533	560.201	581.867
6	5	7.5	2.5	31.40	528.274	471.502	499.888
7	6	9.0	3.0	37.68	527.256	482.681	504.969
8	7	10.5	3.5	43.96	519.651	517.849	518.750
9	8	12.0	4.0	50.24	447.287	442.765	445.026
10	9	13.5	4.5	56.52	486.355	480.477	483.416
11	10	15.0	5.0	62.80	490.594	465.976	478.285



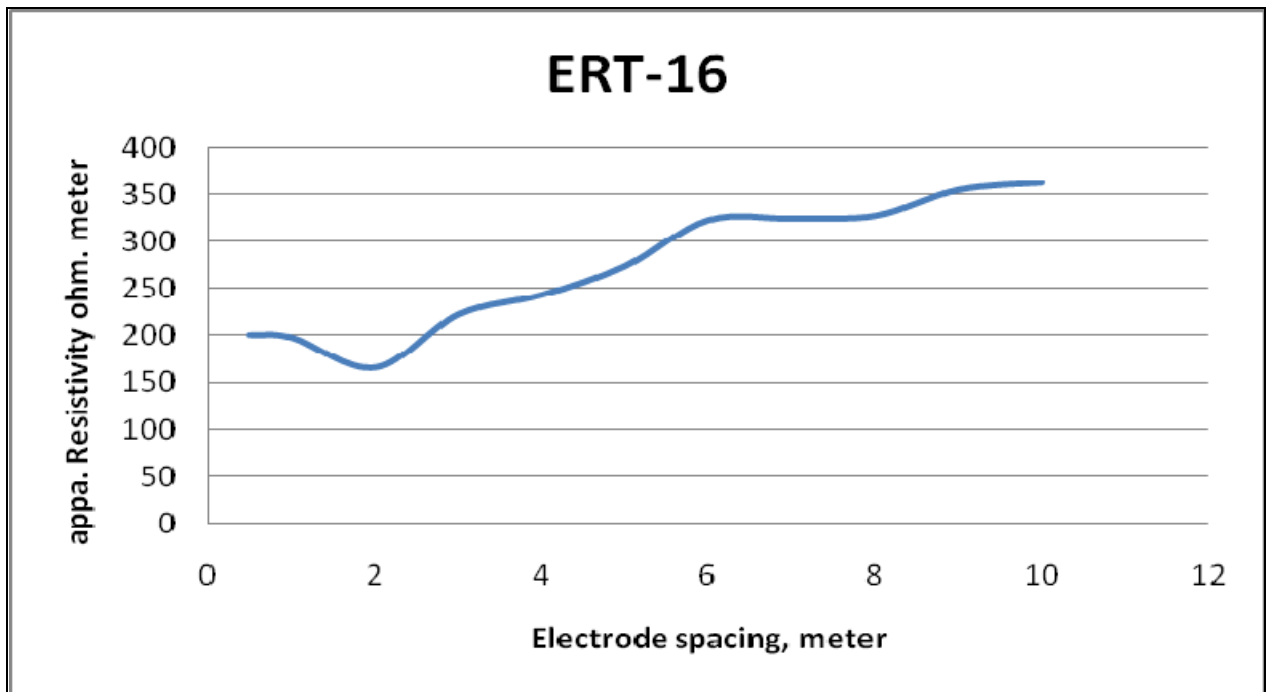
**Table No. 4/15 Electrical Resistivity Test**

APPARENT RESISTIVITY OF ALL DIRECTION.							
ERT - 15			LOCATION: P-4,E-582690; N:2663921				
VILLAGE: MANDSAUR			APPARENT RESISTIVITY (Ohm.m.)				
Sr.No	a (m.)	AB/2 (M)	MN/2 (M)	K=2.II.a	NORTH SOUTH	EAST WEST	AVERAGE RESISTIVITY. (Ohm.m.)
1	0.5	0.75	0.25	3.14	288.255	288.607	288.431
2	1	1.5	0.5	6.28	215.285	220.434	217.859
3	2	3.0	1.0	12.56	384.499	385.605	385.052
4	3	4.5	1.5	18.84	435.675	454.101	444.888
5	4	6.0	2.0	25.12	398.403	374.790	386.597
6	5	7.5	2.5	31.40	373.409	395.075	384.242
7	6	9.0	3.0	37.68	443.154	437.465	440.310
8	7	10.5	3.5	43.96	420.258	382.452	401.355
9	8	12.0	4.0	50.24	415.033	411.114	413.073
10	9	13.5	4.5	56.52	441.986	412.709	427.348
11	10	15.0	5.0	62.80	477.406	428.296	452.851



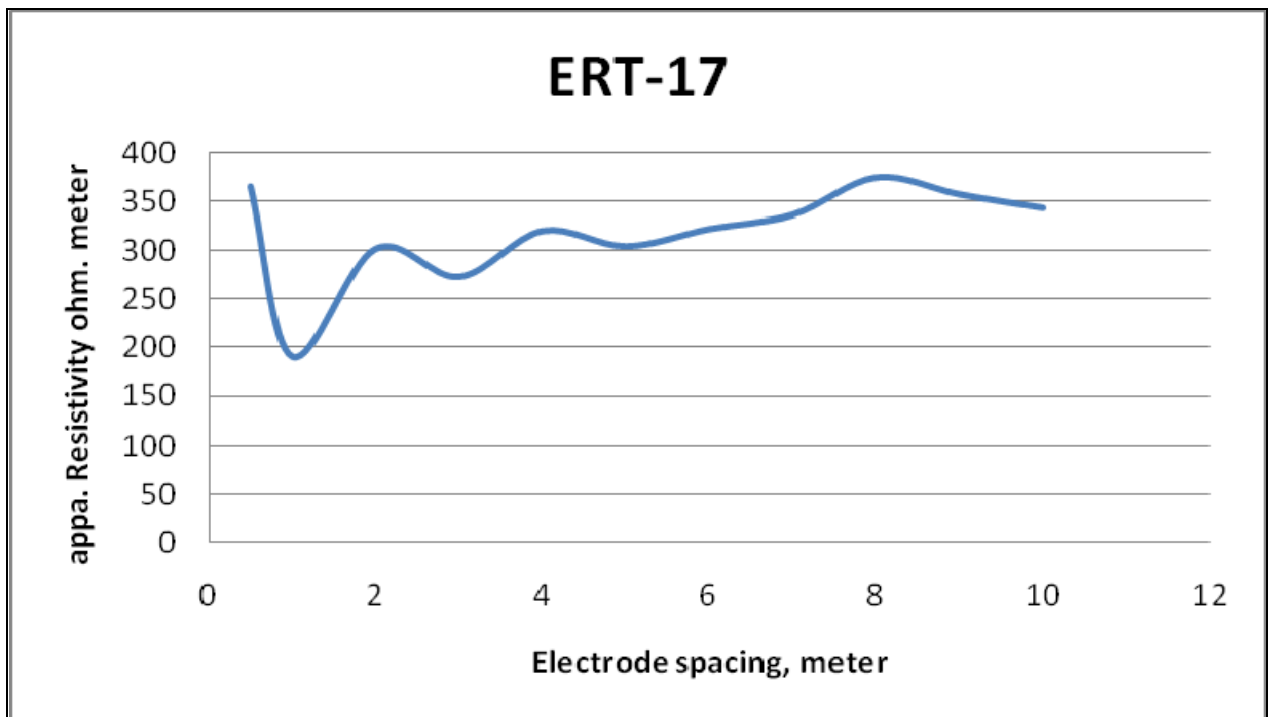
**Table No. 4/16 Electrical Resistivity Test**

APPARENT RESISTIVITY OF ALL DIRECTION.							
ERT - 16			LOCATION: P-4,E-581314; N:2663999				
VILLAGE: MANDSAUR			APPARENT RESISTIVITY (Ohm.m.)				
Sr.No	a (m.)	AB/2 (M)	MN/2 (M)	K=2.II.a	NORTH SOUTH	EAST WEST	AVERAGE RESISTIVITY. (Ohm.m.)
1	0.5	0.75	0.25	3.14	200.338	201.277	200.808
2	1	1.5	0.5	6.28	197.826	197.707	197.767
3	2	3.0	1.0	12.56	165.578	166.043	165.811
4	3	4.5	1.5	18.84	222.538	222.689	222.613
5	4	6.0	2.0	25.12	243.413	243.915	243.664
6	5	7.5	2.5	31.40	275.692	273.117	274.405
7	6	9.0	3.0	37.68	324.802	322.578	323.690
8	7	10.5	3.5	43.96	326.227	324.513	325.370
9	8	12.0	4.0	50.24	329.072	327.565	328.318
10	9	13.5	4.5	56.52	356.641	354.946	355.793
11	10	15.0	5.0	62.80	364.868	362.230	363.549



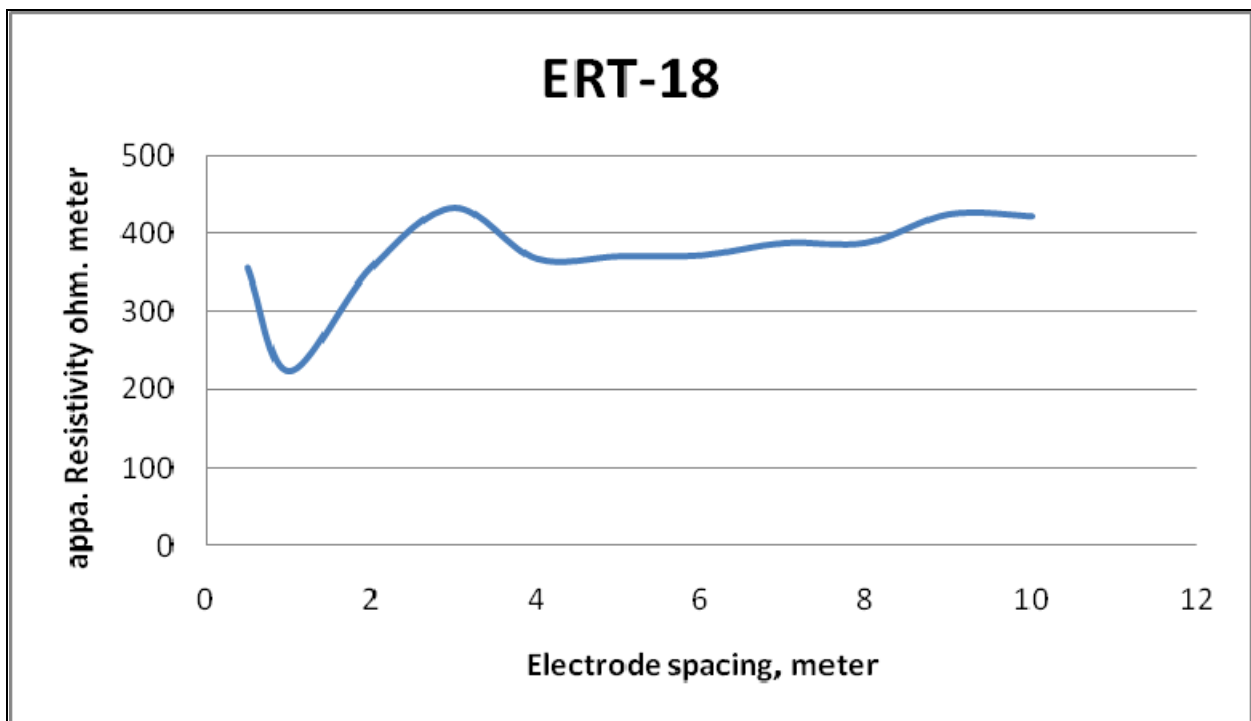
**Table No. 4/17 Electrical Resistivity Test**

APPARENT RESISTIVITY OF ALL DIRECTION.							
ERT - 17			LOCATION: P-4,E-581573; N:2663999				
VILLAGE: MANDSAUR			APPARENT RESISTIVITY (Ohm.m.)				
Sr.No	a (m.)	AB/2 (M)	MN/2 (M)	K=2.II.a	NORTH SOUTH	EAST WEST	AVERAGE RESISTIVITY. (Ohm.m.)
1	0.5	0.75	0.25	3.14	365.998	363.935	364.967
2	1	1.5	0.5	6.28	193.939	187.226	190.582
3	2	3.0	1.0	12.56	311.614	292.246	301.930
4	3	4.5	1.5	18.84	276.590	269.619	273.105
5	4	6.0	2.0	25.12	323.822	316.537	320.180
6	5	7.5	2.5	31.40	304.266	304.894	304.580
7	6	9.0	3.0	37.68	323.671	320.770	322.221
8	7	10.5	3.5	43.96	338.536	334.228	336.382
9	8	12.0	4.0	50.24	375.845	372.329	374.087
10	9	13.5	4.5	56.52	360.598	353.250	356.924
11	10	15.0	5.0	62.80	345.463	341.067	343.265



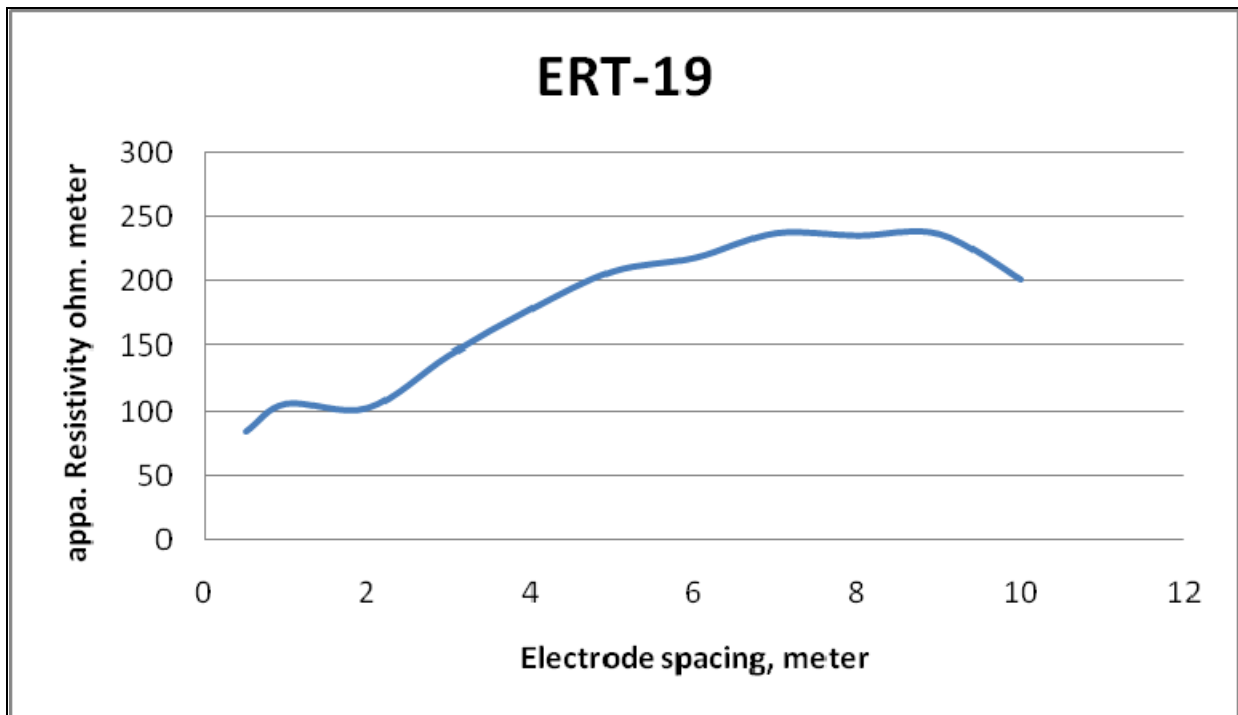
**Table No. 4/18 Electrical Resistivity Test**

APPARENT RESISTIVITY OF ALL DIRECTION.							
ERT - 18			LOCATION: P-4,E-582750; N:2663999				
VILLAGE: MANDSAUR			APPARENT RESISTIVITY (Ohm.m.)				
Sr.No	a (m.)	AB/2 (M)	MN/2 (M)	K=2.II.a	NORTH SOUTH	EAST WEST	AVERAGE RESISTIVITY. (Ohm.m.)
1	0.5	0.75	0.25	3.14	355.636	355.765	355.701
2	1	1.5	0.5	6.28	222.444	223.003	222.723
3	2	3.0	1.0	12.56	349.306	362.733	356.019
4	3	4.5	1.5	18.84	429.740	437.145	433.442
5	4	6.0	2.0	25.12	367.003	367.531	367.267
6	5	7.5	2.5	31.40	370.834	369.923	370.379
7	6	9.0	3.0	37.68	373.786	369.641	371.713
8	7	10.5	3.5	43.96	387.244	388.167	387.705
9	8	12.0	4.0	50.24	390.365	385.843	388.104
10	9	13.5	4.5	56.52	426.048	424.465	425.256
11	10	15.0	5.0	62.80	426.475	418.750	422.613



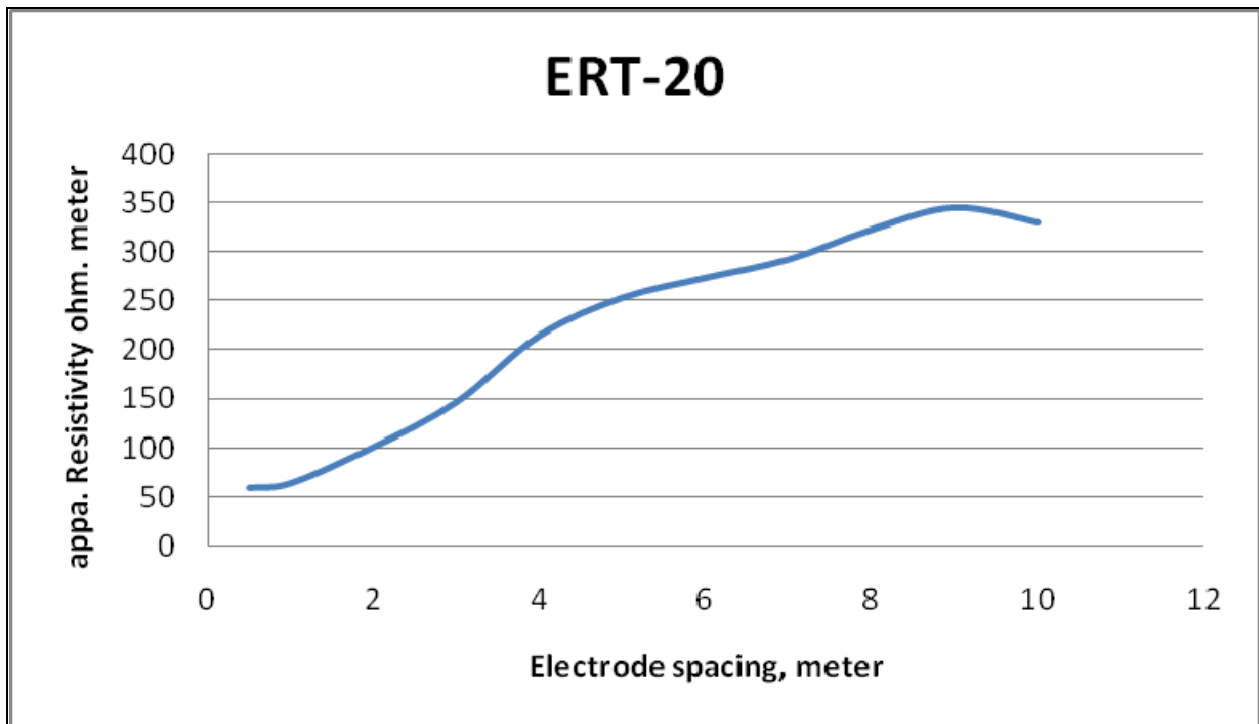
**Table No. 4/19 Electrical Resistivity Test**

APPARENT RESISTIVITY OF ALL DIRECTION.							
ERT - 19			LOCATION: P-4,E-581333; N:2664128				
VILLAGE: MANDSAUR			APPARENT RESISTIVITY (Ohm.m.)				
Sr.No	a (m.)	AB/2 (M)	MN/2 (M)	K=2.II.a	NORTH SOUTH	EAST WEST	AVERAGE RESISTIVITY. (Ohm.m.)
1	0.5	0.75	0.25	3.14	82.456	85.100	83.778
2	1	1.5	0.5	6.28	105.510	105.586	105.548
3	2	3.0	1.0	12.56	101.836	102.615	102.226
4	3	4.5	1.5	18.84	143.052	143.410	143.231
5	4	6.0	2.0	25.12	178.427	178.704	178.566
6	5	7.5	2.5	31.40	207.554	208.182	207.868
7	6	9.0	3.0	37.68	218.921	218.167	218.544
8	7	10.5	3.5	43.96	238.703	236.944	237.824
9	8	12.0	4.0	50.24	235.123	236.630	235.877
10	9	13.5	4.5	56.52	237.949	236.310	237.130
11	10	15.0	5.0	62.80	201.023	202.279	201.651



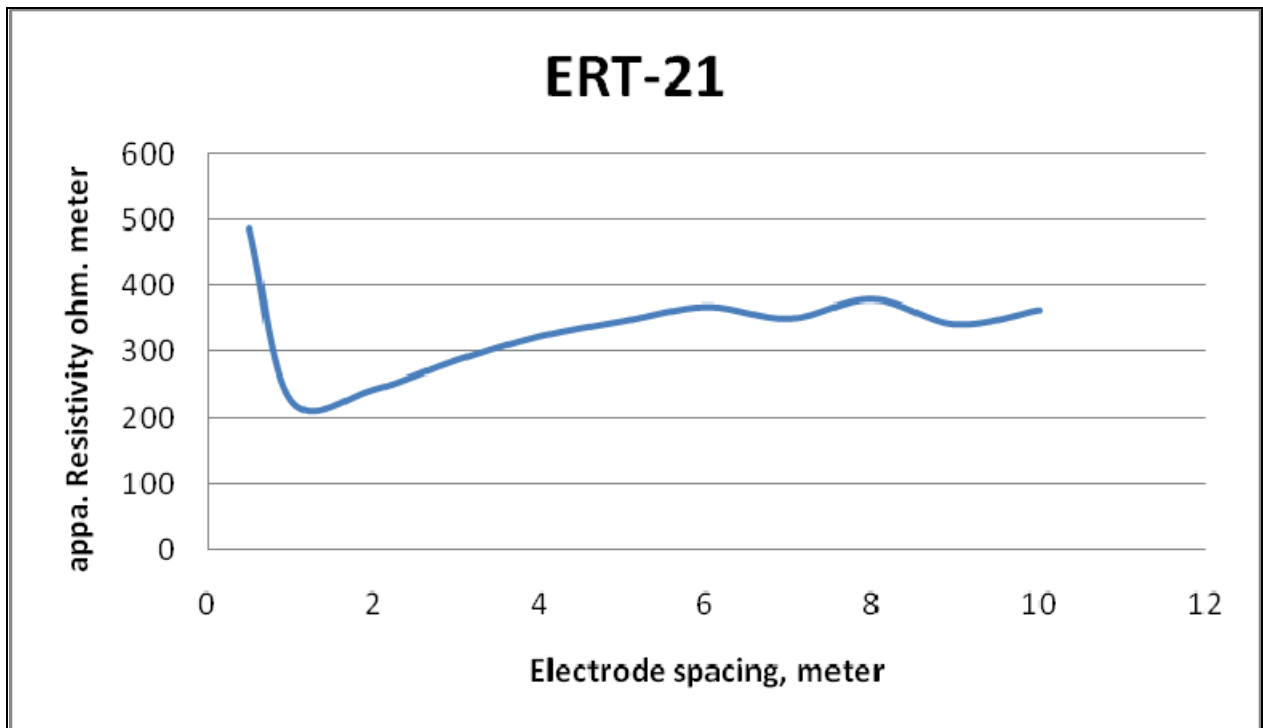
**Table No. 4/20 Electrical Resistivity Test**

APPARENT RESISTIVITY OF ALL DIRECTION.							
ERT - 20			LOCATION: P-4,E-581462; N:2664128				
VILLAGE: MANDSAUR			APPARENT RESISTIVITY (Ohm.m.)				
Sr.No	a (m.)	AB/2 (M)	MN/2 (M)	K=2.II.a	NORTH SOUTH	EAST WEST	AVERAGE RESISTIVITY. (Ohm.m.)
1	0.5	0.75	0.25	3.14	59.154	61.233	60.194
2	1	1.5	0.5	6.28	62.800	67.026	64.913
3	2	3.0	1.0	12.56	101.271	102.766	102.019
4	3	4.5	1.5	18.84	146.255	148.893	147.574
5	4	6.0	2.0	25.12	208.496	223.141	215.818
6	5	7.5	2.5	31.40	266.335	241.811	254.073
7	6	9.0	3.0	37.68	277.664	271.334	274.499
8	7	10.5	3.5	43.96	314.842	272.156	293.499
9	8	12.0	4.0	50.24	341.130	306.765	323.948
10	9	13.5	4.5	56.52	363.424	328.551	345.987
11	10	15.0	5.0	62.80	325.304	336.357	330.830



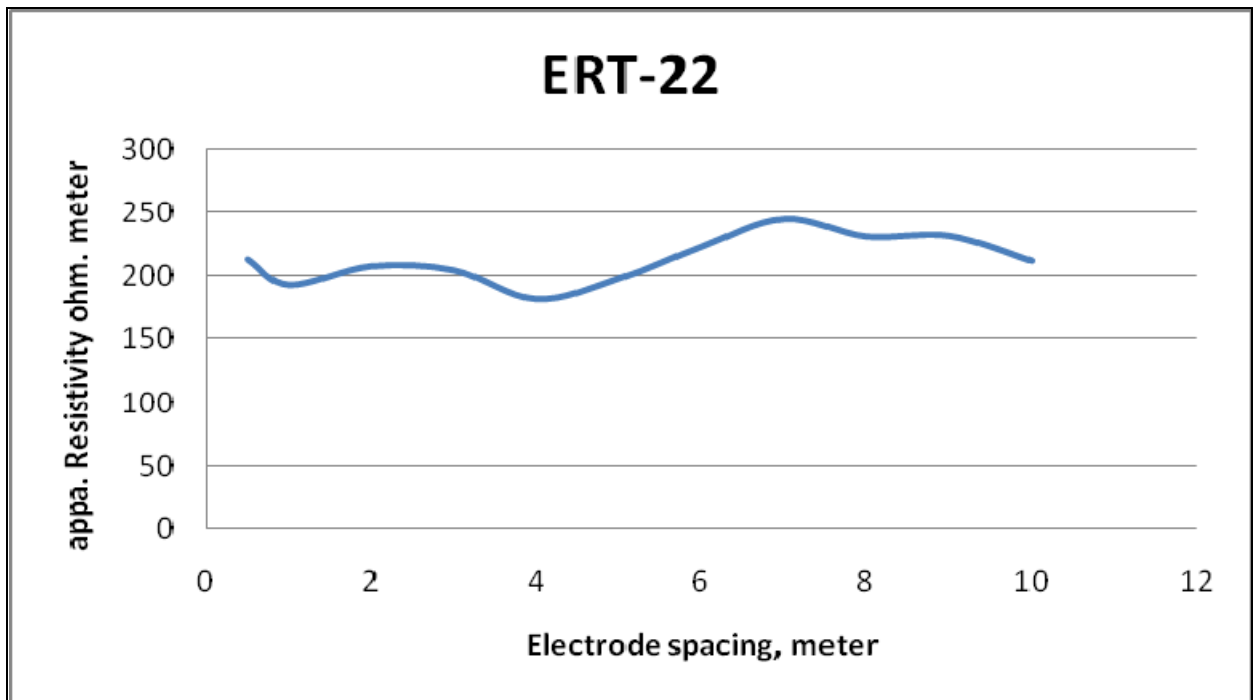
**Table No. 4/21 Electrical Resistivity Test**

APPARENT RESISTIVITY OF ALL DIRECTION.							
ERT - 21			LOCATION: P-4,E-581483; N:2664128				
VILLAGE: MANDSAUR			APPARENT RESISTIVITY (Ohm.m.)				
Sr.No	a (m.)	AB/2 (M)	MN/2 (M)	K=2.II.a	NORTH SOUTH	EAST WEST	AVERAGE RESISTIVITY. (Ohm.m.)
1	0.5	0.75	0.25	3.14	485.962	488.458	487.210
2	1	1.5	0.5	6.28	230.602	224.906	227.754
3	2	3.0	1.0	12.56	229.421	259.804	244.612
4	3	4.5	1.5	18.84	279.322	297.860	288.591
5	4	6.0	2.0	25.12	318.597	331.082	324.839
6	5	7.5	2.5	31.40	344.803	351.083	347.943
7	6	9.0	3.0	37.68	354.267	384.411	369.339
8	7	10.5	3.5	43.96	346.800	356.472	351.636
9	8	12.0	4.0	50.24	377.101	384.386	380.744
10	9	13.5	4.5	56.52	340.759	344.942	342.850
11	10	15.0	5.0	62.80	365.370	363.800	364.585



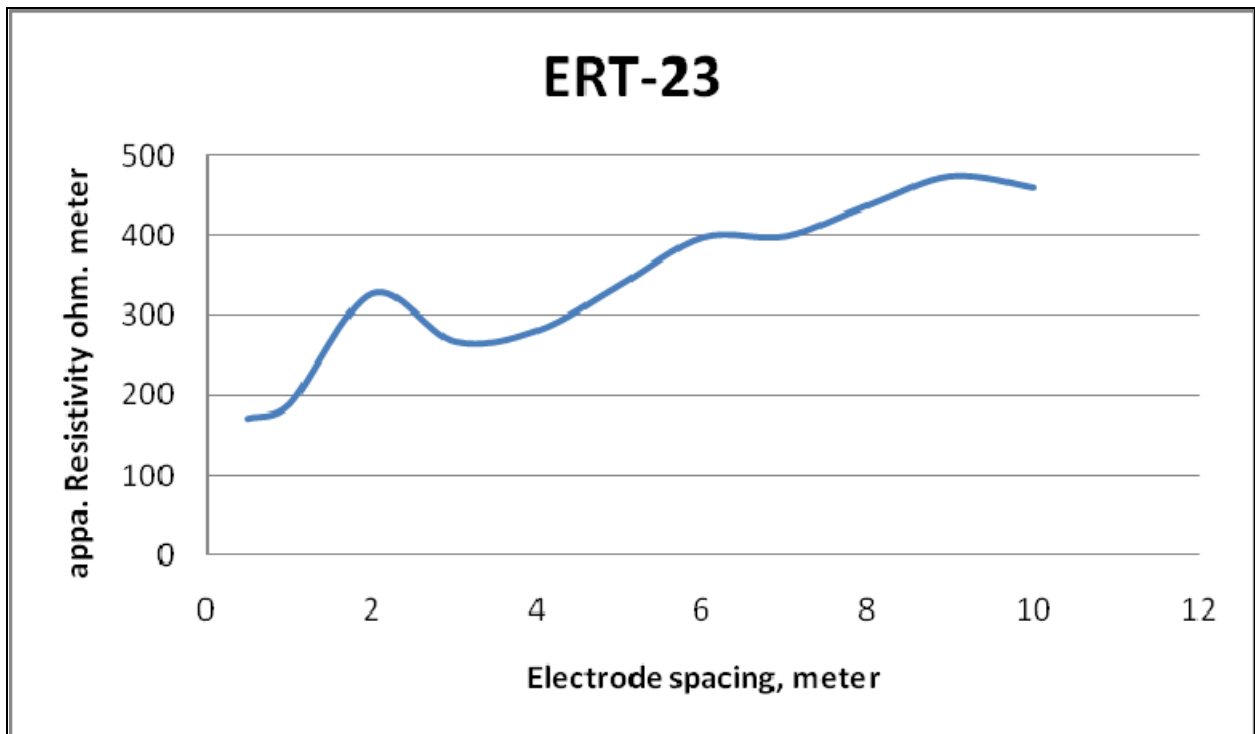
**Table No. 4/22 Electrical Resistivity Test**

APPARENT RESISTIVITY OF ALL DIRECTION.							
ERT - 22			LOCATION: P-4,E-581583; N:2664128				
VILLAGE: MANDSAUR			APPARENT RESISTIVITY (Ohm.m.)				
Sr.No	a (m.)	AB/2 (M)	MN/2 (M)	K=2.II.a	NORTH SOUTH	EAST WEST	AVERAGE RESISTIVITY. (Ohm.m.)
1	0.5	0.75	0.25	3.14	212.917	212.832	212.875
2	1	1.5	0.5	6.28	190.786	195.044	192.915
3	2	3.0	1.0	12.56	207.340	207.617	207.479
4	3	4.5	1.5	18.84	199.836	208.954	204.395
5	4	6.0	2.0	25.12	182.572	181.392	181.982
6	5	7.5	2.5	31.40	197.694	198.134	197.914
7	6	9.0	3.0	37.68	223.066	222.350	222.708
8	7	10.5	3.5	43.96	246.967	241.780	244.374
9	8	12.0	4.0	50.24	255.219	206.185	230.702
10	9	13.5	4.5	56.52	248.745	213.646	231.195
11	10	15.0	5.0	62.80	217.665	206.047	211.856



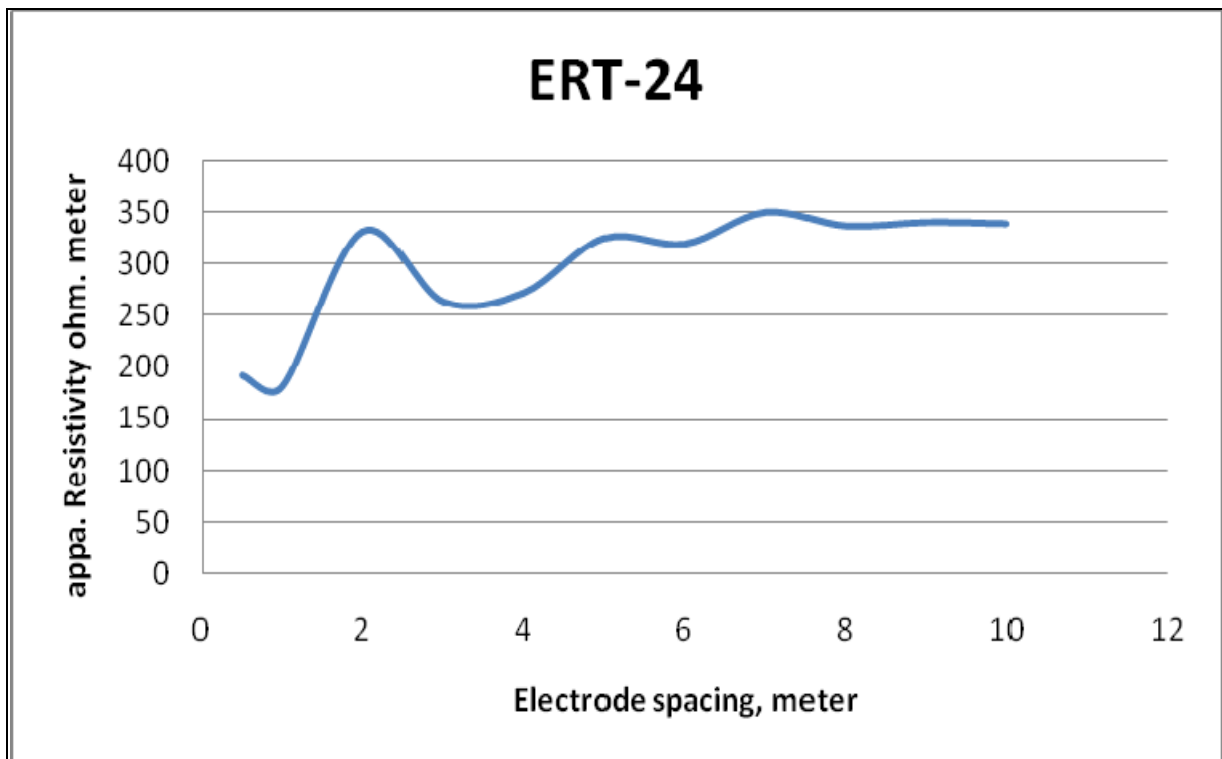
**Table No. 4/23 Electrical Resistivity Test**

APPARENT RESISTIVITY OF ALL DIRECTION.							
ERT - 23			LOCATION: P-4,E-582138; N:2664128				
VILLAGE: MANDSAUR			APPARENT RESISTIVITY (Ohm.m.)				
Sr.No	a (m.)	AB/2 (M)	MN/2 (M)	K=2.II.a	NORTH SOUTH	EAST WEST	AVERAGE RESISTIVITY. (Ohm.m.)
1	0.5	0.75	0.25	3.14	170.389	170.763	170.576
2	1	1.5	0.5	6.28	189.041	187.326	188.183
3	2	3.0	1.0	12.56	328.482	325.291	326.887
4	3	4.5	1.5	18.84	270.655	262.027	266.341
5	4	6.0	2.0	25.12	281.419	279.485	280.452
6	5	7.5	2.5	31.40	339.214	336.043	337.629
7	6	9.0	3.0	37.68	401.405	392.626	397.015
8	7	10.5	3.5	43.96	404.696	392.167	398.431
9	8	12.0	4.0	50.24	441.157	433.119	437.138
10	9	13.5	4.5	56.52	480.590	467.194	473.892
11	10	15.0	5.0	62.80	460.136	458.566	459.351



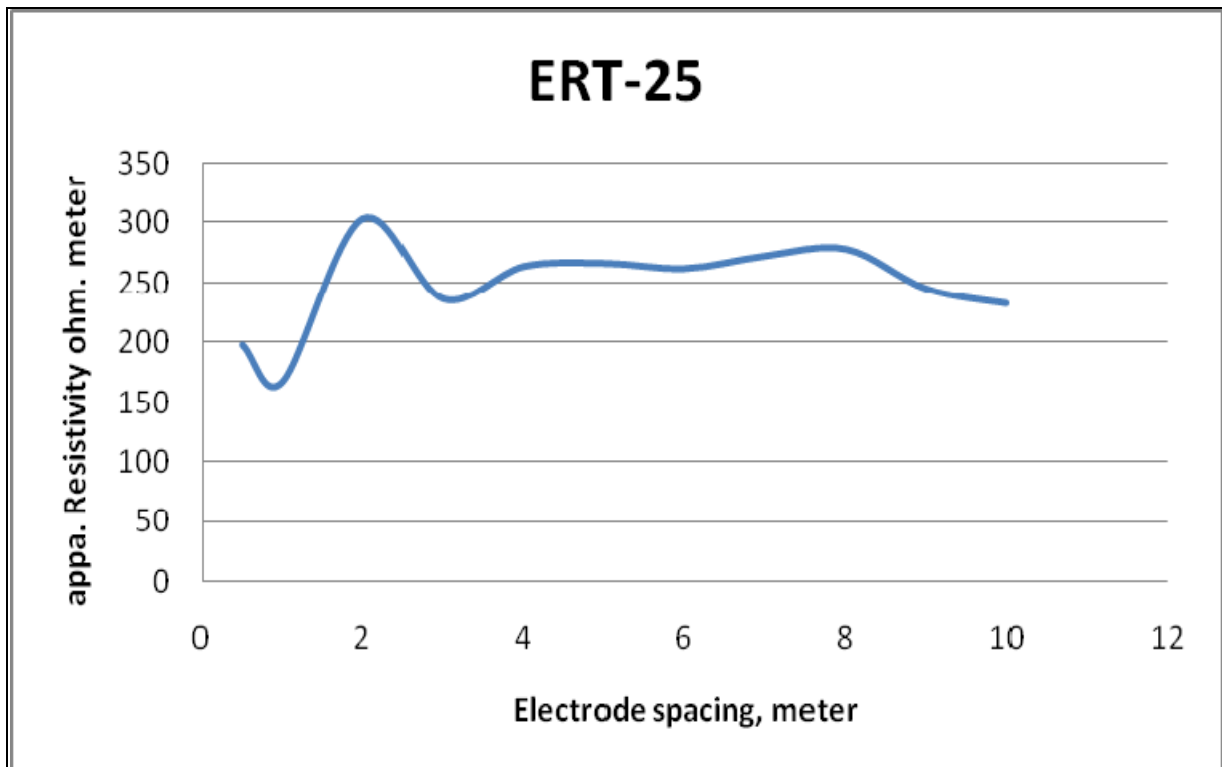
**Table No. 4/24 Electrical Resistivity Test**

APPARENT RESISTIVITY OF ALL DIRECTION.							
ERT - 24			LOCATION: P-4,E-582158; N:2664128				
VILLAGE: MANDSAUR			APPARENT RESISTIVITY (Ohm.m.)				
Sr.No	a (m.)	AB/2 (M)	MN/2 (M)	K=2.II.a	NORTH SOUTH	EAST WEST	AVERAGE RESISTIVITY. (Ohm.m.)
1	0.5	0.75	0.25	3.14	193.119	191.204	192.162
2	1	1.5	0.5	6.28	177.743	185.775	181.759
3	2	3.0	1.0	12.56	324.337	337.776	331.056
4	3	4.5	1.5	18.84	246.220	280.584	263.402
5	4	6.0	2.0	25.12	271.949	272.200	272.075
6	5	7.5	2.5	31.40	326.026	323.451	324.739
7	6	9.0	3.0	37.68	302.420	336.332	319.376
8	7	10.5	3.5	43.96	347.416	351.372	349.394
9	8	12.0	4.0	50.24	326.711	346.254	336.482
10	9	13.5	4.5	56.52	329.342	350.537	339.940
11	10	15.0	5.0	62.80	332.903	344.332	338.618



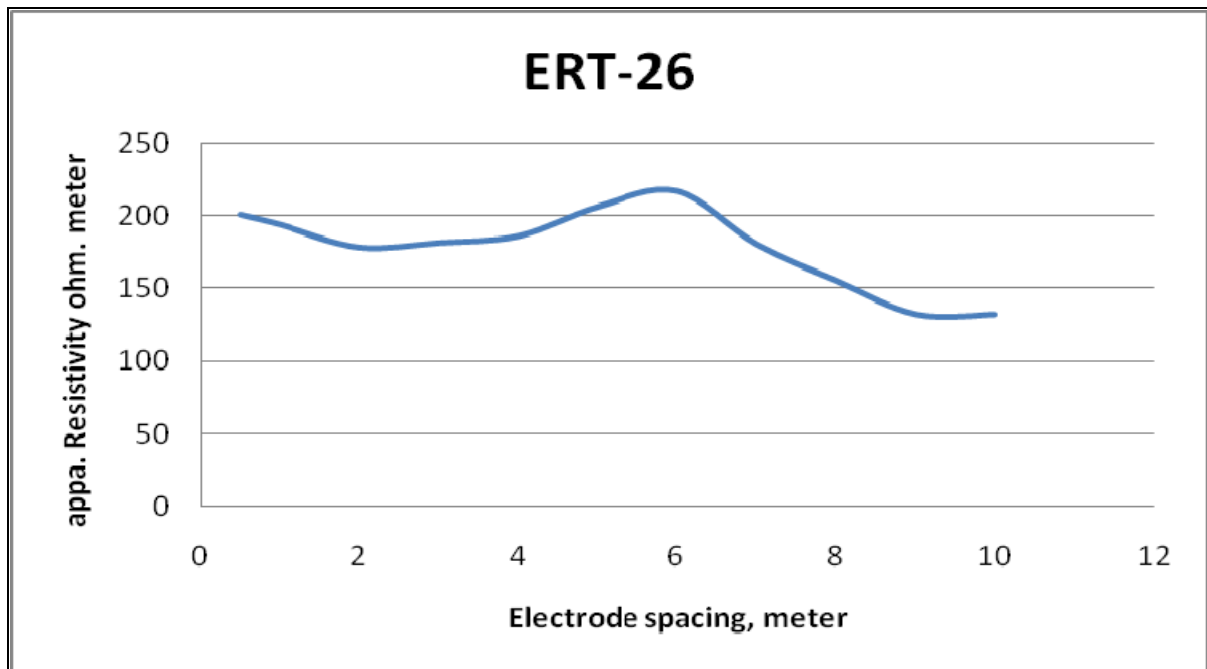
**Table No. 4/25 Electrical Resistivity Test**

APPARENT RESISTIVITY OF ALL DIRECTION.							
ERT - 25			LOCATION: P-4,E-582258; N:2664128				
VILLAGE: MANDSAUR			APPARENT RESISTIVITY (Ohm.m.)				
Sr.No	a (m.)	AB/2 (M)	MN/2 (M)	K=2.II.a	NORTH SOUTH	EAST WEST	AVERAGE RESISTIVITY. (Ohm.m.)
1	0.5	0.75	0.25	3.14	199.761	197.588	198.674
2	1	1.5	0.5	6.28	155.637	179.501	167.569
3	2	3.0	1.0	12.56	306.288	301.226	303.757
4	3	4.5	1.5	18.84	226.777	246.842	236.809
5	4	6.0	2.0	25.12	266.523	262.002	264.262
6	5	7.5	2.5	31.40	267.151	266.837	266.994
7	6	9.0	3.0	37.68	260.783	264.438	262.611
8	7	10.5	3.5	43.96	272.596	273.431	273.014
9	8	12.0	4.0	50.24	281.897	275.416	278.656
10	9	13.5	4.5	56.52	243.488	247.558	245.523
11	10	15.0	5.0	62.80	239.833	226.771	233.302



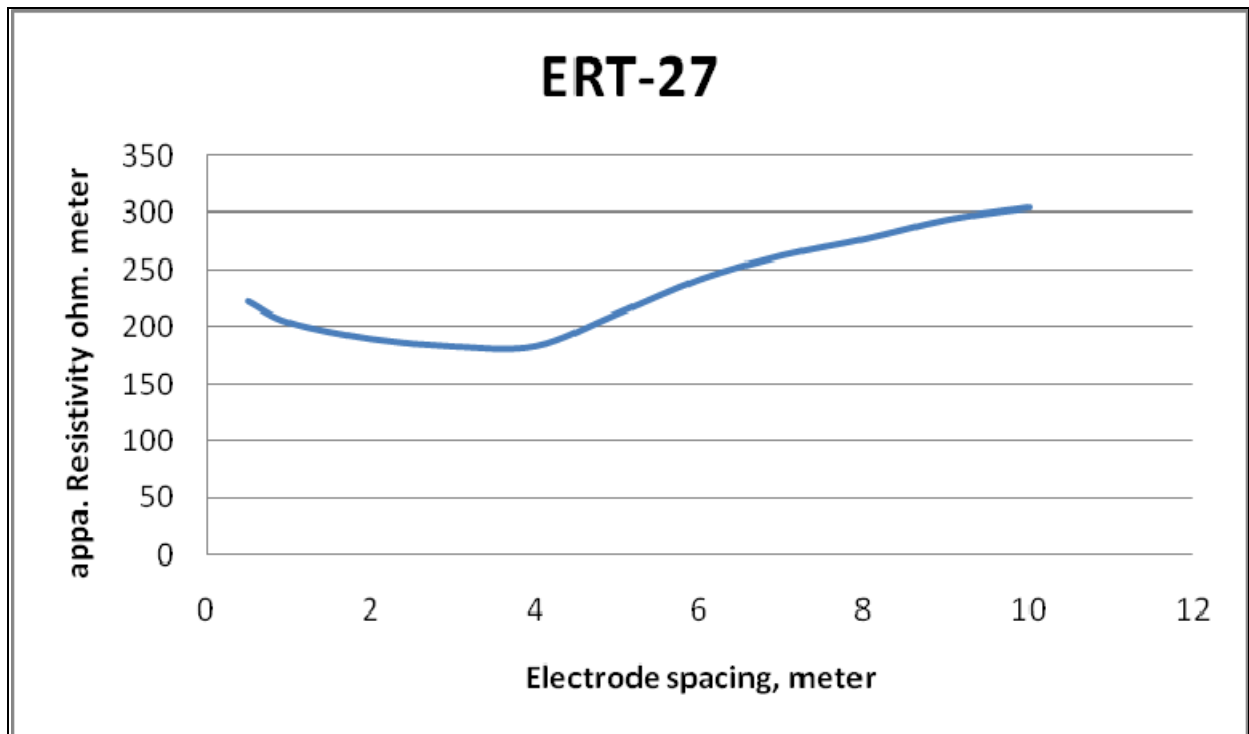
**Table No. 4/26 Electrical Resistivity Test**

APPARENT RESISTIVITY OF ALL DIRECTION.							
ERT - 26			LOCATION: P-4,E-582458; N:2664128				
VILLAGE: MANDSAUR			APPARENT RESISTIVITY (Ohm.m.)				
Sr.No	a (m.)	AB/2 (M)	MN/2 (M)	K=2.l.a	NORTH SOUTH	EAST WEST	AVERAGE RESISTIVITY. (Ohm.m.)
1	0.5	0.75	0.25	3.14	200.420	201.079	200.750
2	1	1.5	0.5	6.28	197.946	189.537	193.741
3	2	3.0	1.0	12.56	177.573	178.603	178.088
4	3	4.5	1.5	18.84	181.015	181.580	181.297
5	4	6.0	2.0	25.12	188.475	183.401	185.938
6	5	7.5	2.5	31.40	211.008	201.274	206.141
7	6	9.0	3.0	37.68	214.814	218.958	216.886
8	7	10.5	3.5	43.96	173.818	186.830	180.324
9	8	12.0	4.0	50.24	154.789	155.895	155.342
10	9	13.5	4.5	56.52	129.939	134.574	132.257
11	10	15.0	5.0	62.80	131.943	132.508	132.225



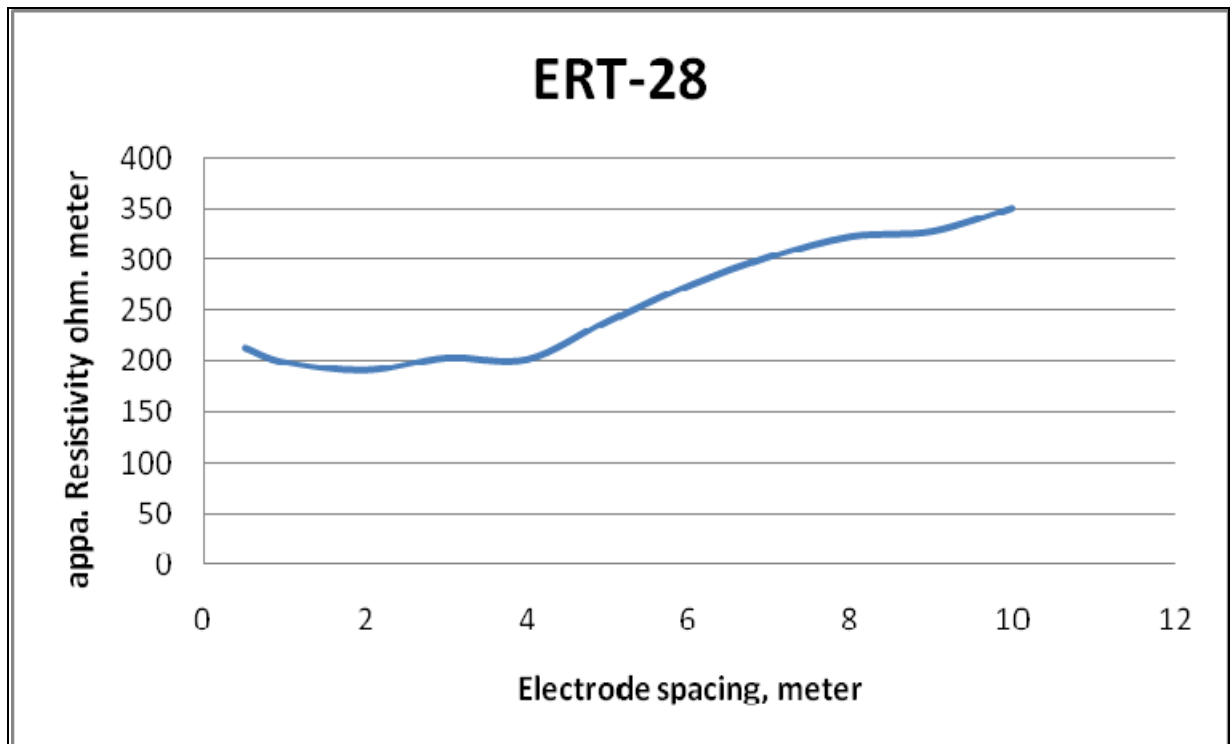
**Table No. 4/27 Electrical Resistivity Test**

APPARENT RESISTIVITY OF ALL DIRECTION.							
ERT - 27			LOCATION: P-4,E-582637; N:2664128				
VILLAGE: MANDSAUR			APPARENT RESISTIVITY (Ohm.m.)				
Sr.No	a (m.)	AB/2 (M)	MN/2 (M)	K=2.II.a	NORTH SOUTH	EAST WEST	AVERAGE RESISTIVITY. (Ohm.m.)
1	0.5	0.75	0.25	3.14	222.588	222.887	222.737
2	1	1.5	0.5	6.28	201.017	207.887	204.452
3	2	3.0	1.0	12.56	190.008	189.945	189.976
4	3	4.5	1.5	18.84	184.387	182.428	183.407
5	4	6.0	2.0	25.12	184.029	183.401	183.715
6	5	7.5	2.5	31.40	212.515	211.950	212.233
7	6	9.0	3.0	37.68	242.282	241.642	241.962
8	7	10.5	3.5	43.96	262.925	262.133	262.529
9	8	12.0	4.0	50.24	277.325	276.471	276.898
10	9	13.5	4.5	56.52	294.469	292.943	293.706
11	10	15.0	5.0	62.80	301.440	306.464	303.952



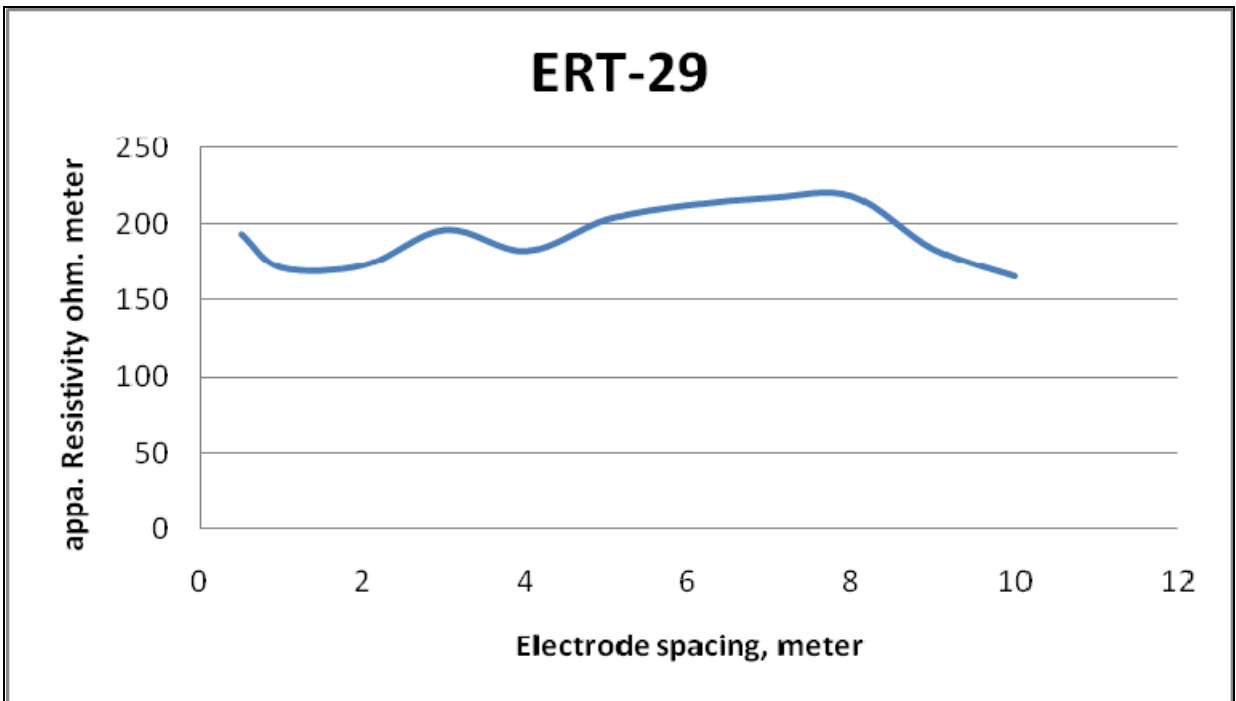
**Table No. 4/28 Electrical Resistivity Test**

APPARENT RESISTIVITY OF ALL DIRECTION.							
ERT – 28			LOCATION: P-4,E-582657; N:2664128				
VILLAGE: MANDSAUR			APPARENT RESISTIVITY (Ohm.m.)				
Sr.No	a (m.)	AB/2 (M)	MN/2 (M)	K=2.II.a	NORTH SOUTH	EAST WEST	AVERAGE RESISTIVITY. (Ohm.m.)
1	0.5	0.75	0.25	3.14	211.959	215.128	213.544
2	1	1.5	0.5	6.28	196.445	202.850	199.647
3	2	3.0	1.0	12.56	190.698	192.181	191.440
4	3	4.5	1.5	18.84	205.036	203.171	204.103
5	4	6.0	2.0	25.12	201.613	204.251	202.932
6	5	7.5	2.5	31.40	241.246	239.048	240.147
7	6	9.0	3.0	37.68	275.780	274.386	275.083
8	7	10.5	3.5	43.96	306.225	299.456	302.840
9	8	12.0	4.0	50.24	322.742	322.541	322.641
10	9	13.5	4.5	56.52	326.742	328.494	327.618
11	10	15.0	5.0	62.80	348.980	352.308	350.644



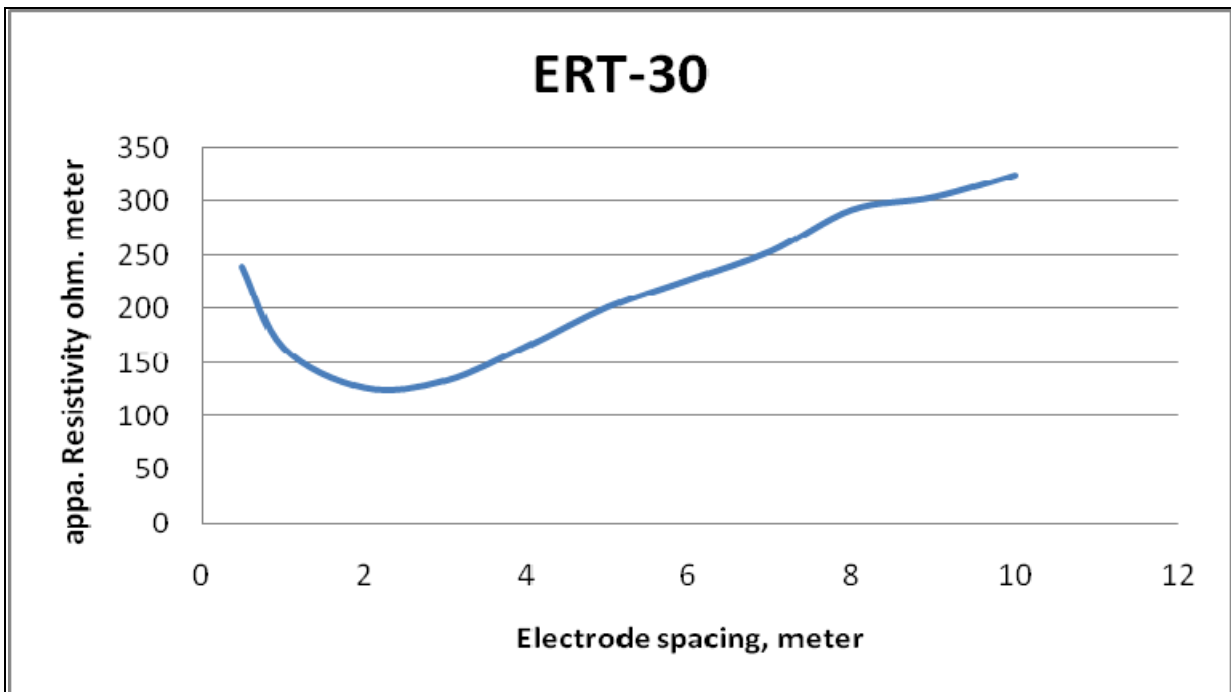
**Table No. 4/29 Electrical Resistivity Test**

APPARENT RESISTIVITY OF ALL DIRECTION.							
ERT - 29			LOCATION: P-4,E-582777; N:2664128				
VILLAGE: MANDSAUR			APPARENT RESISTIVITY (Ohm.m.)				
Sr.No	a (m.)	AB/2 (M)	MN/2 (M)	K=2.II.a	NORTH SOUTH	EAST WEST	AVERAGE RESISTIVITY. (Ohm.m.)
1	0.5	0.75	0.25	3.14	194.623	193.518	194.071
2	1	1.5	0.5	6.28	174.647	168.938	171.793
3	2	3.0	1.0	12.56	176.970	169.786	173.378
4	3	4.5	1.5	18.84	198.310	195.371	196.840
5	4	6.0	2.0	25.12	184.029	182.120	183.075
6	5	7.5	2.5	31.40	204.131	203.503	203.817
7	6	9.0	3.0	37.68	214.399	211.422	212.911
8	7	10.5	3.5	43.96	216.327	218.965	217.646
9	8	12.0	4.0	50.24	217.087	220.101	218.594
10	9	13.5	4.5	56.52	184.255	184.255	184.255
11	10	15.0	5.0	62.80	168.367	163.908	166.137



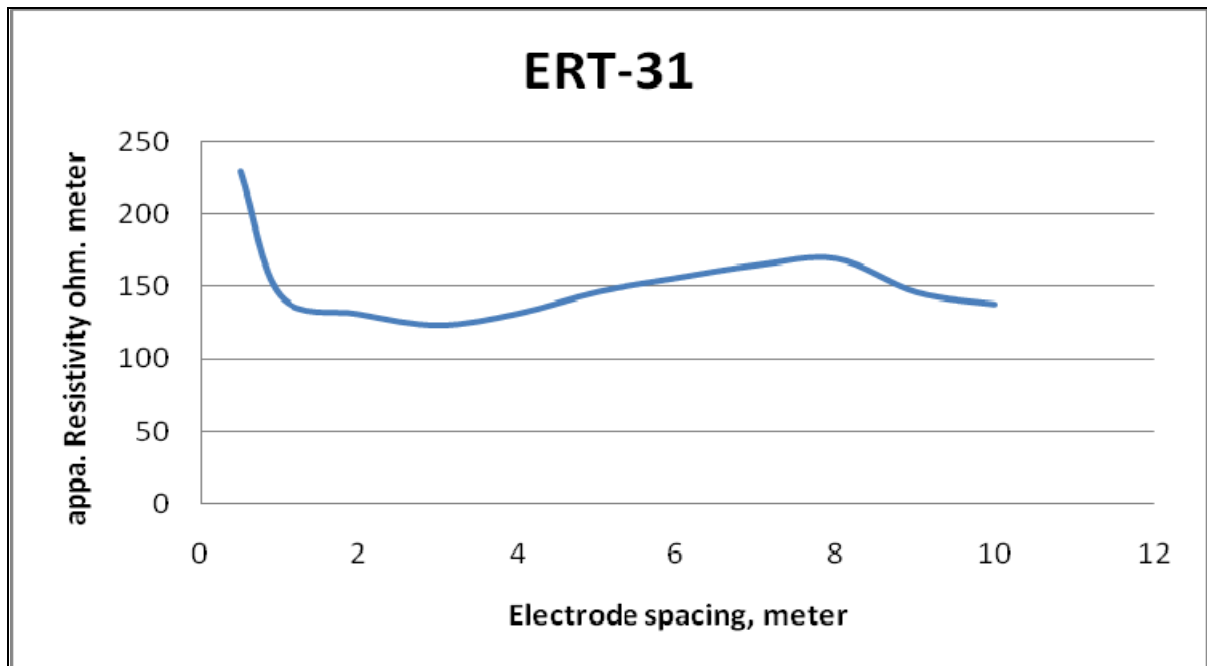
**Table No. 4/30 Electrical Resistivity Test**

APPARENT RESISTIVITY OF ALL DIRECTION.							
ERT - 30			LOCATION: P-4,E-581703; N:2664198				
VILLAGE: MANDSAUR			APPARENT RESISTIVITY (Ohm.m.)				
Sr.No	a (m.)	AB/2 (M)	MN/2 (M)	K=2.II.a	NORTH SOUTH	EAST WEST	AVERAGE RESISTIVITY. (Ohm.m.)
1	0.5	0.75	0.25	3.14	236.944	241.237	239.091
2	1	1.5	0.5	6.28	160.027	166.740	163.384
3	2	3.0	1.0	12.56	118.956	133.149	126.052
4	3	4.5	1.5	18.84	129.977	135.422	132.700
5	4	6.0	2.0	25.12	162.275	168.003	165.139
6	5	7.5	2.5	31.40	198.731	204.194	201.462
7	6	9.0	3.0	37.68	223.367	231.280	227.323
8	7	10.5	3.5	43.96	253.561	254.089	253.825
9	8	12.0	4.0	50.24	308.373	276.822	292.598
10	9	13.5	4.5	56.52	308.938	299.669	304.304
11	10	15.0	5.0	62.80	330.830	319.401	325.116



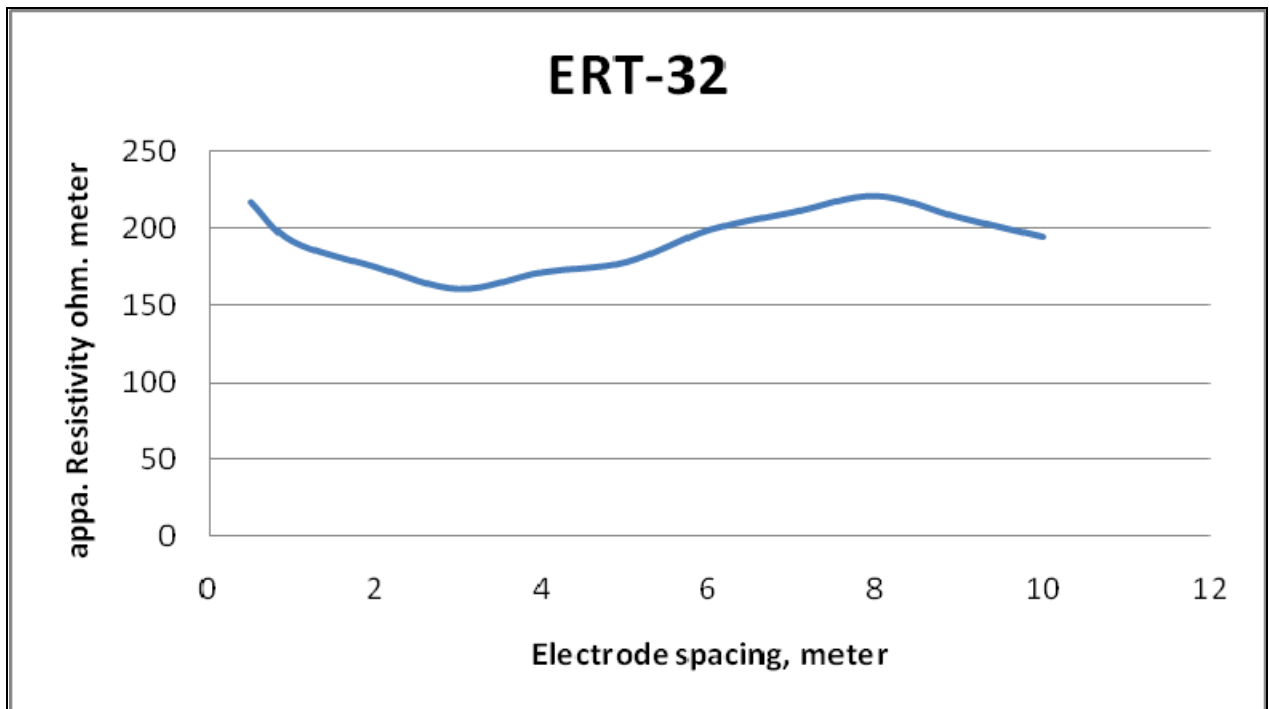
**Table No. 4/31 Electrical Resistivity Test**

APPARENT RESISTIVITY OF ALL DIRECTION.							
ERT - 31			LOCATION: P-4,E-582378; N:2664198				
VILLAGE: MANDSAUR			APPARENT RESISTIVITY (Ohm.m.)				
Sr.No	a (m.)	AB/2 (M)	MN/2 (M)	K=2.II.a	NORTH SOUTH	EAST WEST	AVERAGE RESISTIVITY. (Ohm.m.)
1	0.5	0.75	0.25	3.14	232.002	227.838	229.920
2	1	1.5	0.5	6.28	143.259	143.881	143.570
3	2	3.0	1.0	12.56	127.999	133.262	130.630
4	3	4.5	1.5	18.84	122.479	122.950	122.714
5	4	6.0	2.0	25.12	130.649	131.528	131.089
6	5	7.5	2.5	31.40	146.983	145.413	146.198
7	6	9.0	3.0	37.68	155.279	156.372	155.826
8	7	10.5	3.5	43.96	167.488	161.817	164.652
9	8	12.0	4.0	50.24	167.299	171.318	169.309
10	9	13.5	4.5	56.52	147.517	144.126	145.822
11	10	15.0	5.0	62.80	138.223	136.967	137.595



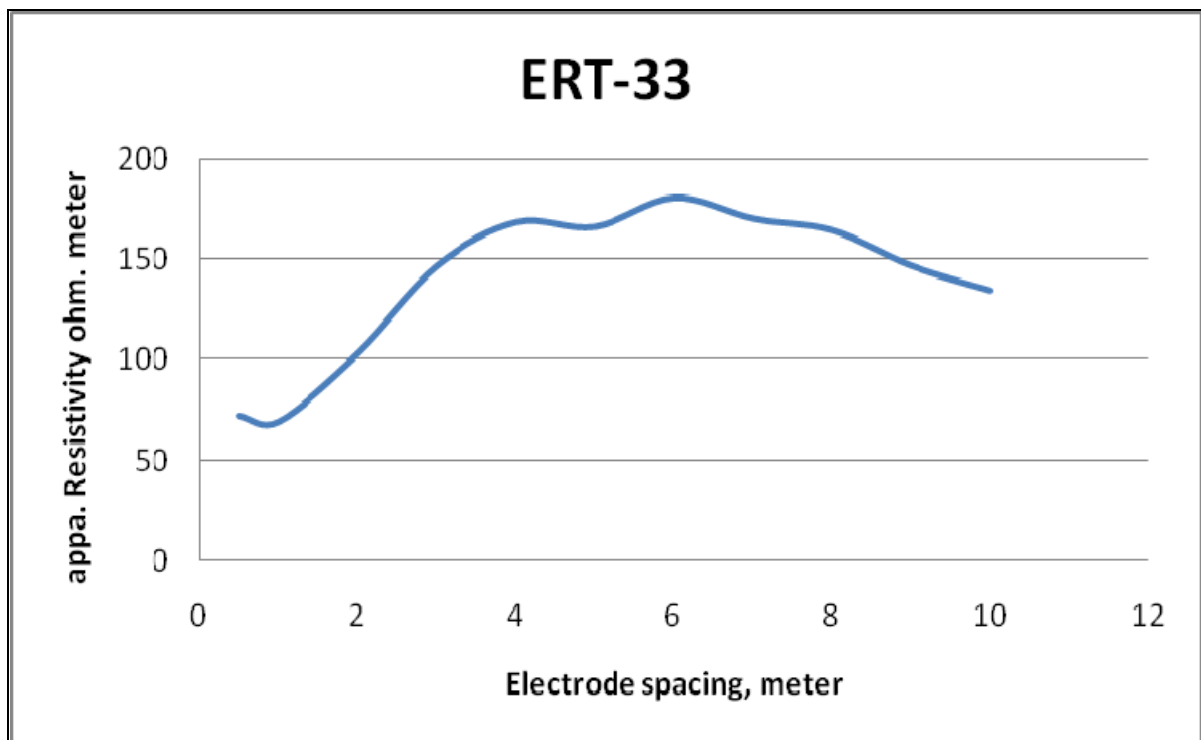
**Table No. 4/32 Electrical Resistivity Test**

APPARENT RESISTIVITY OF ALL DIRECTION.							
ERT - 32			LOCATION: P-4,E-582647; N:2664198				
VILLAGE: MANDSAUR			APPARENT RESISTIVITY (Ohm.m.)				
Sr.No	a (m.)	AB/2 (M)	MN/2 (M)	K=2.II.a	NORTH SOUTH	EAST WEST	AVERAGE RESISTIVITY. (Ohm.m.)
1	0.5	0.75	0.25	3.14	219.451	215.344	217.398
2	1	1.5	0.5	6.28	194.843	189.530	192.187
3	2	3.0	1.0	12.56	180.625	170.577	175.601
4	3	4.5	1.5	18.84	161.892	161.082	161.487
5	4	6.0	2.0	25.12	173.077	171.344	172.210
6	5	7.5	2.5	31.40	179.011	178.446	178.729
7	6	9.0	3.0	37.68	200.043	198.988	199.516
8	7	10.5	3.5	43.96	211.448	210.173	210.810
9	8	12.0	4.0	50.24	222.061	220.554	221.307
10	9	13.5	4.5	56.52	208.559	206.298	207.428
11	10	15.0	5.0	62.80	194.806	195.308	195.057



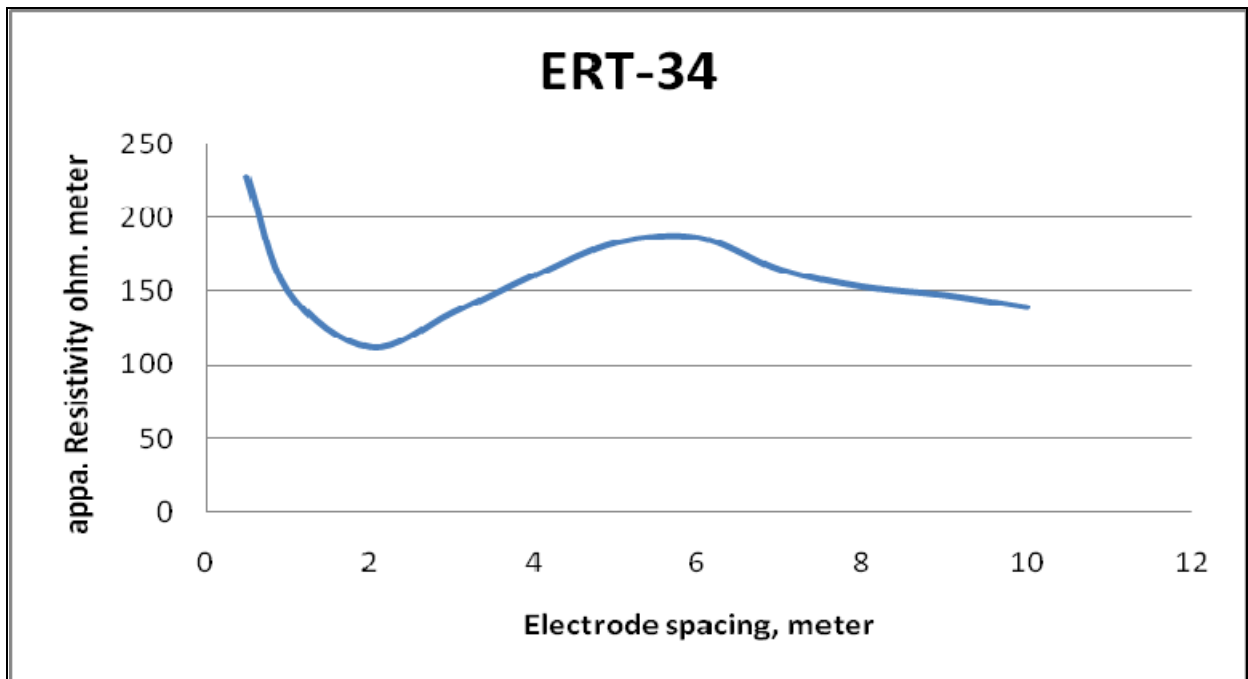
**Table No. 4/33 Electrical Resistivity Test**

APPARENT RESISTIVITY OF ALL DIRECTION.							
ERT - 33			LOCATION: P-4,E-581392; N:2664316				
VILLAGE: MANDSAUR			APPARENT RESISTIVITY (Ohm.m.)				
Sr.No	a (m.)	AB/2 (M)	MN/2 (M)	K=2.II.a	NORTH SOUTH	EAST WEST	AVERAGE RESISTIVITY. (Ohm.m.)
1	0.5	0.75	0.25	3.14	70.656	74.361	72.509
2	1	1.5	0.5	6.28	69.212	69.727	69.469
3	2	3.0	1.0	12.56	98.973	107.777	103.375
4	3	4.5	1.5	18.84	150.908	142.826	146.867
5	4	6.0	2.0	25.12	163.305	173.830	168.568
6	5	7.5	2.5	31.40	165.823	166.734	166.279
7	6	9.0	3.0	37.68	180.186	181.316	180.751
8	7	10.5	3.5	43.96	172.323	168.411	170.367
9	8	12.0	4.0	50.24	165.440	163.782	164.611
10	9	13.5	4.5	56.52	146.387	147.461	146.924
11	10	15.0	5.0	62.80	136.904	132.382	134.643



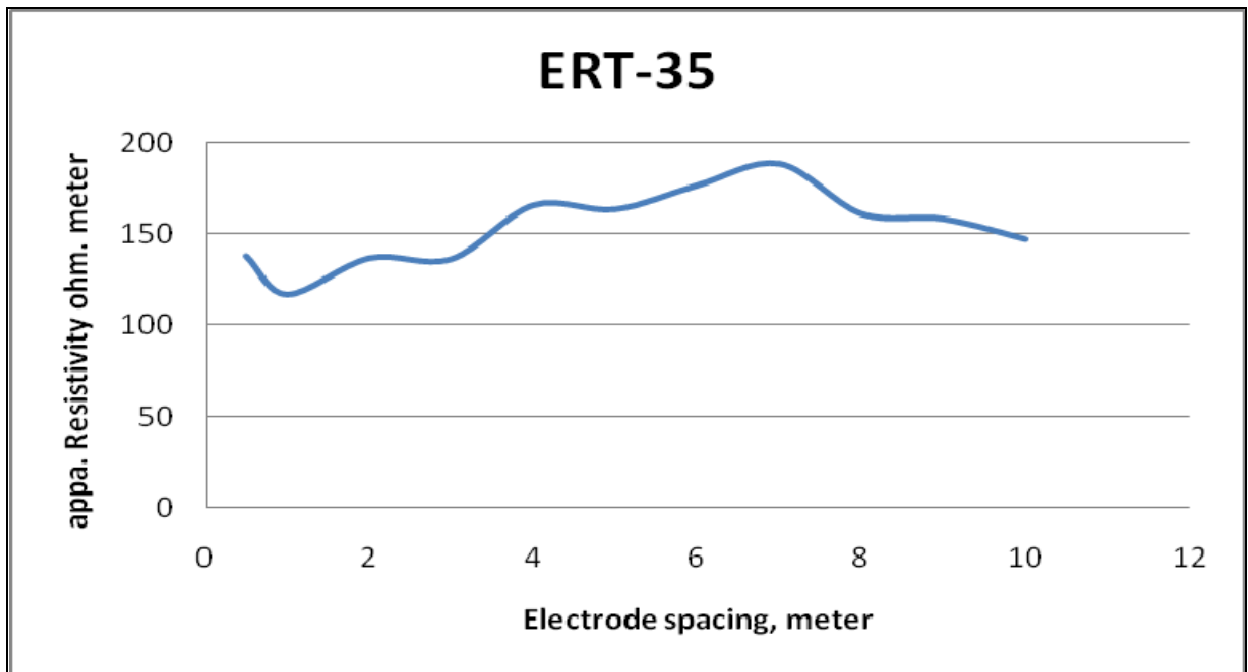
**Table No. 4/34 Electrical Resistivity Test**

APPARENT RESISTIVITY OF ALL DIRECTION.							
ERT – 34			LOCATION: P-4,E-581502; N:2664316				
VILLAGE: MANDSAUR			APPARENT RESISTIVITY (Ohm.m.)				
Sr.No	a (m.)	AB/2 (M)	MN/2 (M)	K=2.II.a	NORTH SOUTH	EAST WEST	AVERAGE RESISTIVITY. (Ohm.m.)
1	0.5	0.75	0.25	3.14	226.896	229.509	228.203
2	1	1.5	0.5	6.28	147.586	153.113	150.349
3	2	3.0	1.0	12.56	111.809	112.035	111.922
4	3	4.5	1.5	18.84	135.422	135.064	135.243
5	4	6.0	2.0	25.12	161.270	160.542	160.906
6	5	7.5	2.5	31.40	184.663	181.743	183.203
7	6	9.0	3.0	37.68	185.386	187.872	186.629
8	7	10.5	3.5	43.96	144.584	184.896	164.740
9	8	12.0	4.0	50.24	151.222	155.242	153.232
10	9	13.5	4.5	56.52	147.461	147.517	147.489
11	10	15.0	5.0	62.80	143.184	135.020	139.102



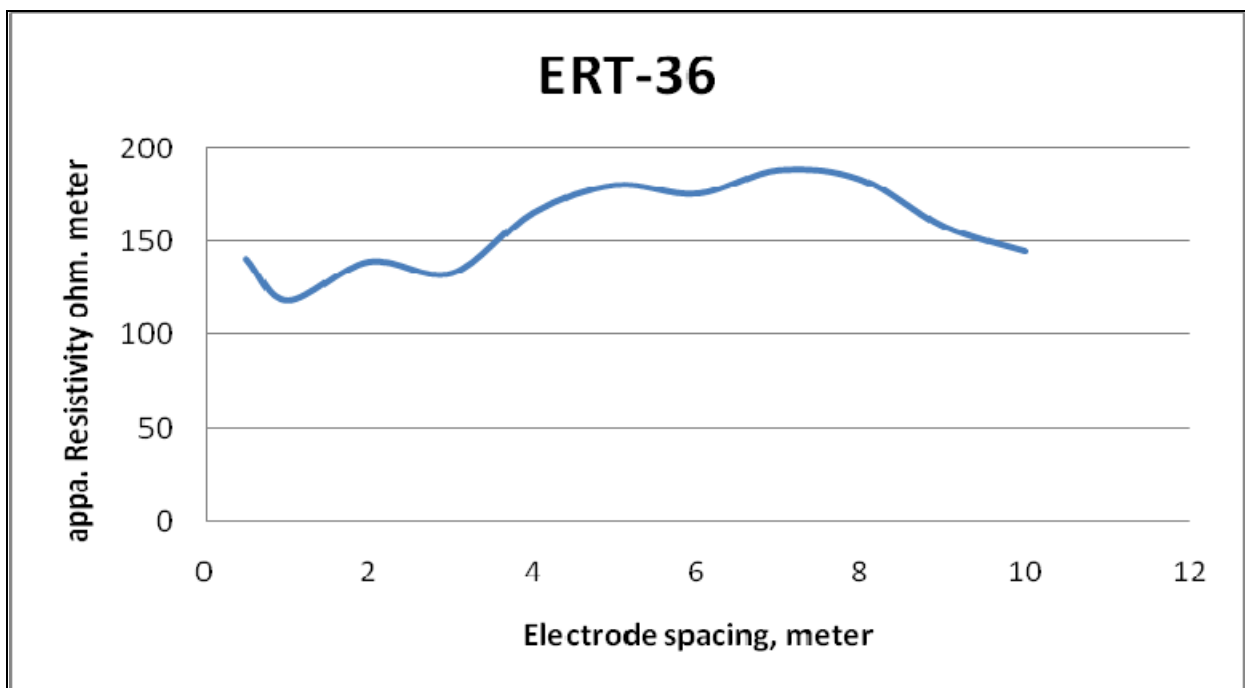
**Table No. 4/35 Electrical Resistivity Test**

APPARENT RESISTIVITY OF ALL DIRECTION.							
ERT – 35			LOCATION: P-4,E-581990; N:2664316				
VILLAGE: MANDSAUR			APPARENT RESISTIVITY (Ohm.m.)				
Sr.No	a (m.)	AB/2 (M)	MN/2 (M)	K=2.II.a	NORTH SOUTH	EAST WEST	AVERAGE RESISTIVITY. (Ohm.m.)
1	0.5	0.75	0.25	3.14	136.782	139.049	137.915
2	1	1.5	0.5	6.28	116.764	116.814	116.789
3	2	3.0	1.0	12.56	132.910	140.584	136.747
4	3	4.5	1.5	18.84	134.913	137.551	136.232
5	4	6.0	2.0	25.12	165.792	165.365	165.578
6	5	7.5	2.5	31.40	163.877	162.683	163.280
7	6	9.0	3.0	37.68	176.305	176.719	176.512
8	7	10.5	3.5	43.96	188.237	188.588	188.413
9	8	12.0	4.0	50.24	159.914	161.823	160.868
10	9	13.5	4.5	56.52	157.295	158.934	158.115
11	10	15.0	5.0	62.80	144.503	149.527	147.015



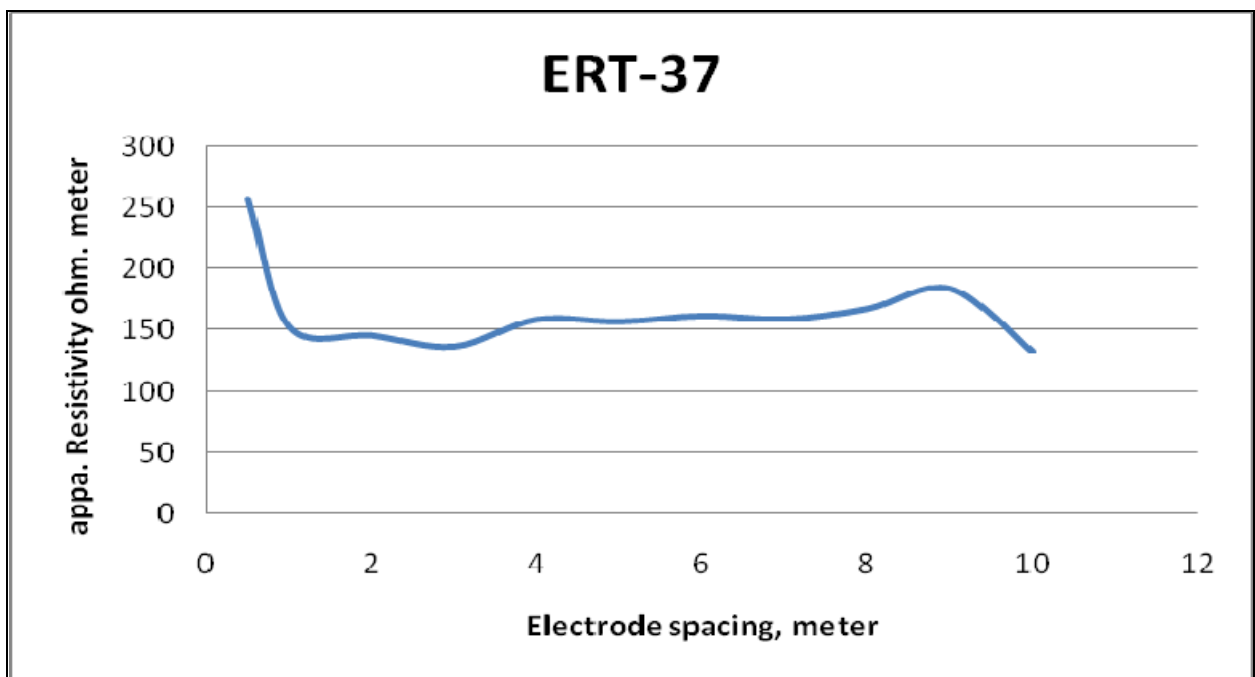
**Table No. 4/36 Electrical Resistivity Test**

APPARENT RESISTIVITY OF ALL DIRECTION.							
ERT - 36			LOCATION: P-4,E-582190; N:2664316				
VILLAGE: MANDSAUR			APPARENT RESISTIVITY (Ohm.m.)				
Sr.No	a (m.)	AB/2 (M)	MN/2 (M)	K=2.II.a	NORTH SOUTH	EAST WEST	AVERAGE RESISTIVITY. (Ohm.m.)
1	0.5	0.75	0.25	3.14	143.815	137.532	140.674
2	1	1.5	0.5	6.28	118.234	118.705	118.469
3	2	3.0	1.0	12.56	140.433	137.946	139.190
4	3	4.5	1.5	18.84	132.219	133.783	133.001
5	4	6.0	2.0	25.12	165.842	165.340	165.591
6	5	7.5	2.5	31.40	182.151	178.666	180.409
7	6	9.0	3.0	37.68	176.418	175.212	175.815
8	7	10.5	3.5	43.96	188.193	189.072	188.632
9	8	12.0	4.0	50.24	180.914	185.938	183.426
10	9	13.5	4.5	56.52	158.934	157.691	158.313
11	10	15.0	5.0	62.80	146.387	143.372	144.880



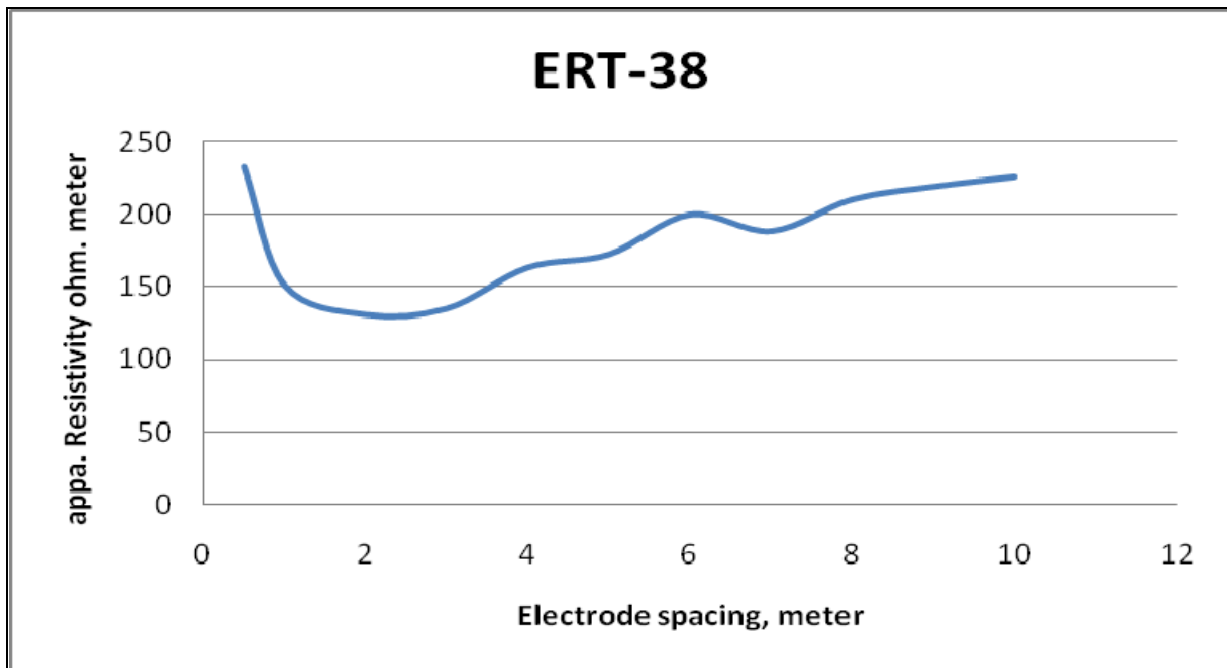
**Table No. 4/37 Electrical Resistivity Test**

APPARENT RESISTIVITY OF ALL DIRECTION.							
ERT - 37			LOCATION: P-4,E-582550; N:2664316				
VILLAGE: MANDSAUR			APPARENT RESISTIVITY (Ohm.m.)				
Sr.No	a (m.)	AB/2 (M)	MN/2 (M)	K=2.II.a	NORTH SOUTH	EAST WEST	AVERAGE RESISTIVITY. (Ohm.m.)
1	0.5	0.75	0.25	3.14	255.913	259.311	257.612
2	1	1.5	0.5	6.28	155.801	149.521	152.661
3	2	3.0	1.0	12.56	145.194	145.709	145.451
4	3	4.5	1.5	18.84	124.363	148.987	136.675
5	4	6.0	2.0	25.12	157.804	159.261	158.532
6	5	7.5	2.5	31.40	147.643	165.823	156.733
7	6	9.0	3.0	37.68	158.294	165.076	161.685
8	7	10.5	3.5	43.96	167.927	149.904	158.915
9	8	12.0	4.0	50.24	164.787	169.861	167.324
10	9	13.5	4.5	56.52	158.934	208.728	183.831
11	10	15.0	5.0	62.80	133.199	131.943	132.571



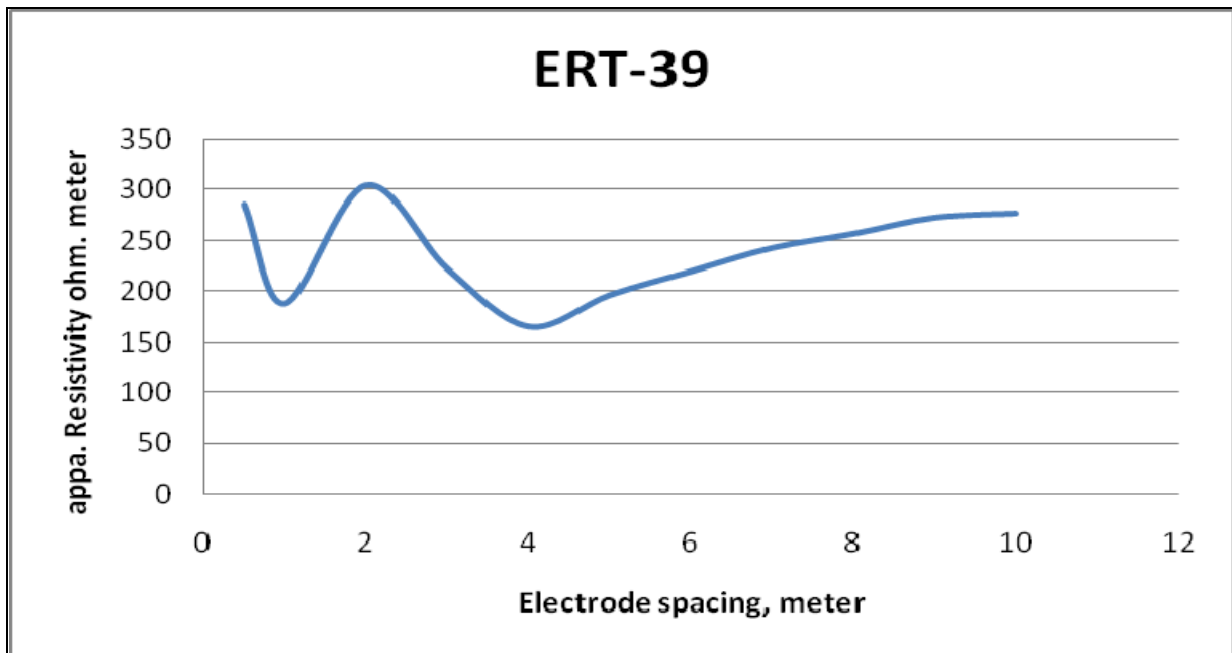
**Table No. 4/38 Electrical Resistivity Test**

APPARENT RESISTIVITY OF ALL DIRECTION.							
ERT - 38			LOCATION: P-4,E-582627; N:2664316				
VILLAGE: MANDSAUR			APPARENT RESISTIVITY (Ohm.m.)				
Sr.No	a (m.)	AB/2 (M)	MN/2 (M)	K=2.II.a	NORTH SOUTH	EAST WEST	AVERAGE RESISTIVITY. (Ohm.m.)
1	0.5	0.75	0.25	3.14	231.829	234.282	233.056
2	1	1.5	0.5	6.28	149.954	152.830	151.392
3	2	3.0	1.0	12.56	126.931	135.158	131.045
4	3	4.5	1.5	18.84	122.950	147.442	135.196
5	4	6.0	2.0	25.12	163.808	163.305	163.556
6	5	7.5	2.5	31.40	172.731	172.574	172.653
7	6	9.0	3.0	37.68	200.420	199.742	200.081
8	7	10.5	3.5	43.96	187.621	189.468	188.544
9	8	12.0	4.0	50.24	210.003	211.108	210.556
10	9	13.5	4.5	56.52	224.950	213.702	219.326
11	10	15.0	5.0	62.80	226.834	225.389	226.111



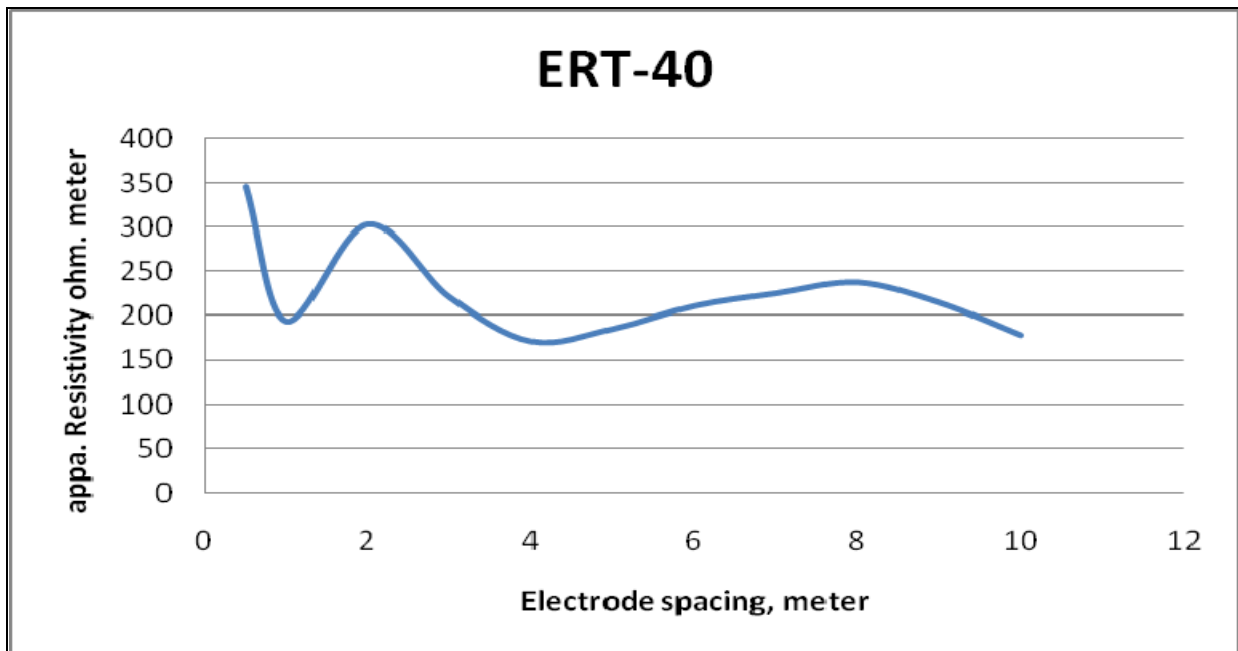
**Table No. 4/39 Electrical Resistivity Test**

APPARENT RESISTIVITY OF ALL DIRECTION.							
ERT - 39			LOCATION: P-4, E-582647; N:2664316				
VILLAGE: MANDSAUR			APPARENT RESISTIVITY (Ohm.m.)				
Sr. No.	a (m.)	AB/2 (M)	MN/2 (M)	K=2.II.a	NORTH SOUTH	EAST WEST	AVERAGE RESISTIVITY. (Ohm.m.)
1	0.5	0.75	0.25	3.14	288.827	281.975	285.401
2	1	1.5	0.5	6.28	190.215	185.298	187.756
3	2	3.0	1.0	12.56	300.523	307.795	304.159
4	3	4.5	1.5	18.84	222.425	221.973	222.199
5	4	6.0	2.0	25.12	166.043	164.184	165.114
6	5	7.5	2.5	31.40	197.380	195.496	196.438
7	6	9.0	3.0	37.68	219.599	219.976	219.787
8	7	10.5	3.5	43.96	243.099	242.220	242.659
9	8	12.0	4.0	50.24	256.626	256.777	256.701
10	9	13.5	4.5	56.52	271.748	273.331	272.539
11	10	15.0	5.0	62.80	278.204	275.252	276.728



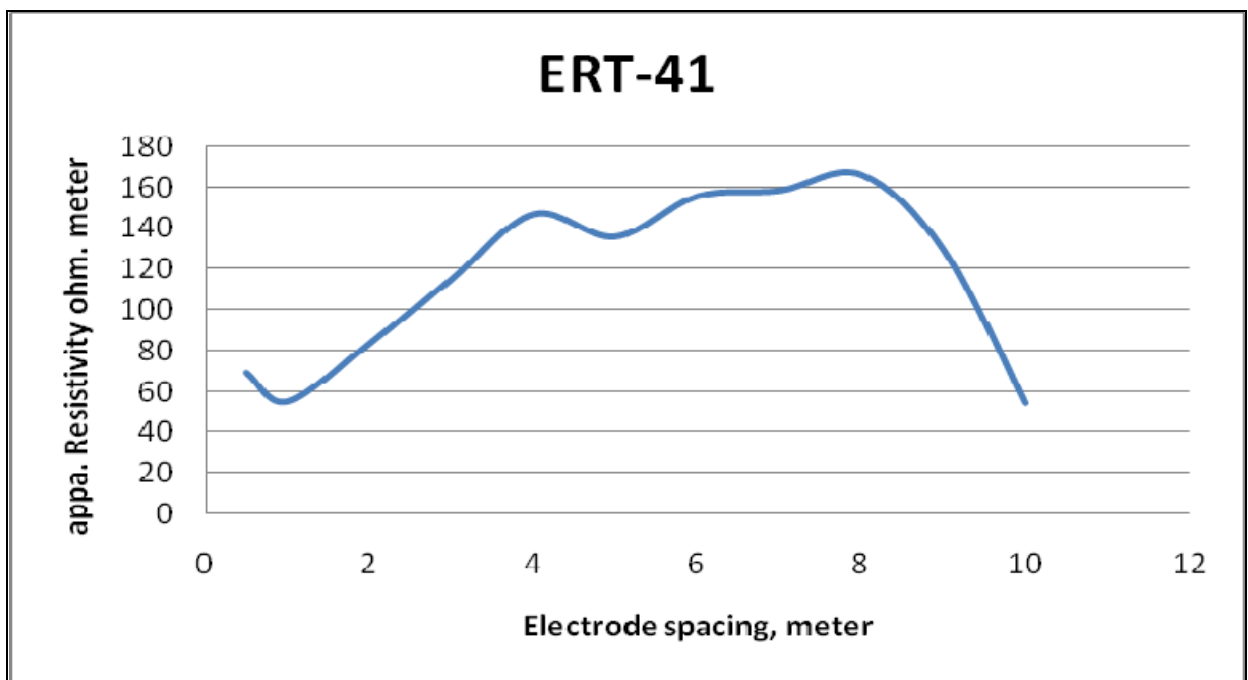
**Table No. 4/40 Electrical Resistivity Test**

APPARENT RESISTIVITY OF ALL DIRECTION.							
ERT – 40			LOCATION: P-4,E-582769; N:2664316				
VILLAGE: MANDSAUR			APPARENT RESISTIVITY (Ohm.m.)				
Sr. No.	a (m.)	AB/2 (M)	MN/2 (M)	K=2.II.a	NORTH SOUTH	EAST WEST	AVERAGE RESISTIVITY. (Ohm.m.)
1	0.5	0.75	0.25	3.14	347.950	345.343	346.647
2	1	1.5	0.5	6.28	197.833	190.227	194.030
3	2	3.0	1.0	12.56	308.348	299.255	303.801
4	3	4.5	1.5	18.84	220.447	222.124	221.285
5	4	6.0	2.0	25.12	171.067	171.570	171.318
6	5	7.5	2.5	31.40	185.888	185.323	185.605
7	6	9.0	3.0	37.68	211.385	211.008	211.196
8	7	10.5	3.5	43.96	225.119	225.866	225.493
9	8	12.0	4.0	50.24	240.750	235.123	237.937
10	9	13.5	4.5	56.52	215.511	214.267	214.889
11	10	15.0	5.0	62.80	177.724	178.980	178.352



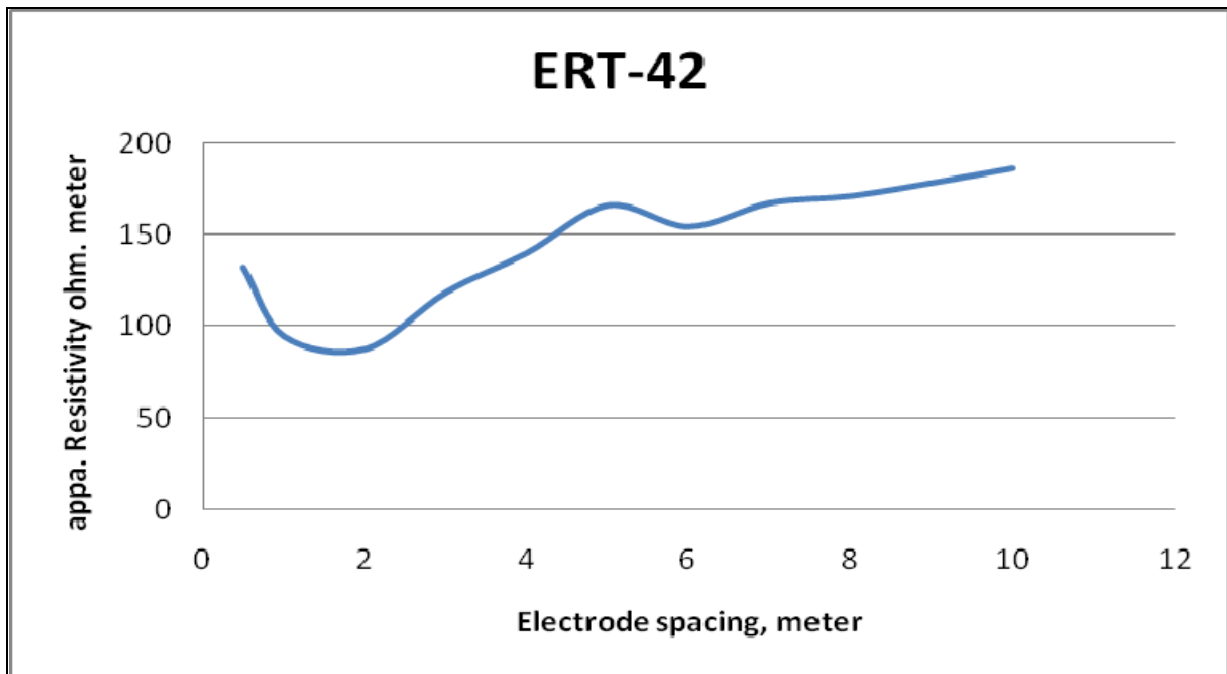
**Table No. 4/41 Electrical Resistivity Test**

APPARENT RESISTIVITY OF ALL DIRECTION.							
ERT – 41			LOCATION: P-4,E-582665; N:2664414				
VILLAGE: MANDSAUR			APPARENT RESISTIVITY (Ohm.m.)				
Sr. No.	a (m.)	AB/2 (M)	MN/2 (M)	K=2.II.a	NORTH SOUTH	EAST WEST	AVERAGE RESISTIVITY. (Ohm.m.)
1	0.5	0.75	0.25	3.14	70.907	67.516	69.212
2	1	1.5	0.5	6.28	50.818	59.666	55.242
3	2	3.0	1.0	12.56	77.885	89.050	83.467
4	3	4.5	1.5	18.84	113.266	116.827	115.046
5	4	6.0	2.0	25.12	148.736	144.892	146.814
6	5	7.5	2.5	31.40	134.423	137.563	135.993
7	6	9.0	3.0	37.68	154.601	156.749	155.675
8	7	10.5	3.5	43.96	158.300	158.608	158.454
9	8	12.0	4.0	50.24	165.842	166.294	166.068
10	9	13.5	4.5	56.52	147.009	112.079	129.544
11	10	15.0	5.0	62.80	57.776	51.370	54.573



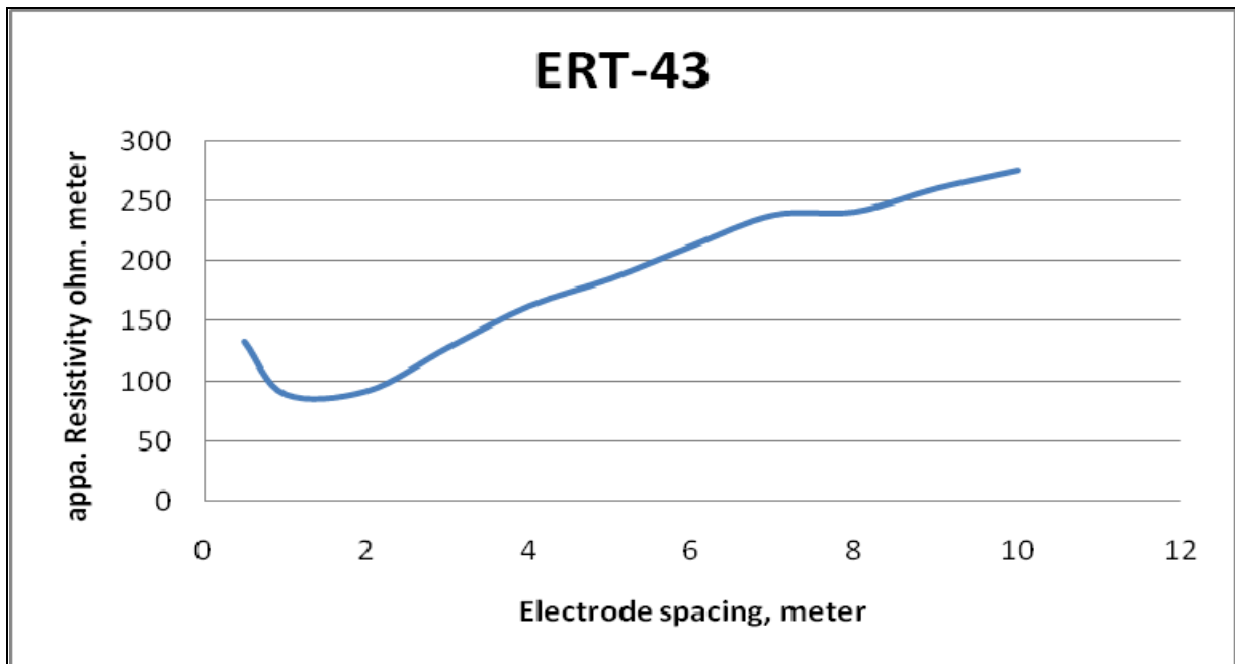
**Table No. 4/42 Electrical Resistivity Test**

APPARENT RESISTIVITY OF ALL DIRECTION.							
ERT – 42			LOCATION: P-4,E-581824; N:2664480				
VILLAGE: MANDSAUR			APPARENT RESISTIVITY (Ohm.m.)				
Sr. No.	a (m.)	AB/2 (M)	MN/2 (M)	K=2.II.a	NORTH SOUTH	EAST WEST	AVERAGE RESISTIVITY. (Ohm.m.)
1	0.5	0.75	0.25	3.14	130.169	134.653	132.411
2	1	1.5	0.5	6.28	89.886	99.237	94.561
3	2	3.0	1.0	12.56	75.674	99.551	87.612
4	3	4.5	1.5	18.84	110.836	126.473	118.654
5	4	6.0	2.0	25.12	140.999	139.441	140.220
6	5	7.5	2.5	31.40	166.420	166.075	166.247
7	6	9.0	3.0	37.68	155.242	153.847	154.545
8	7	10.5	3.5	43.96	167.488	167.619	167.554
9	8	12.0	4.0	50.24	181.567	161.069	171.318
10	9	13.5	4.5	56.52	186.968	170.125	178.547
11	10	15.0	5.0	62.80	189.405	183.753	186.579



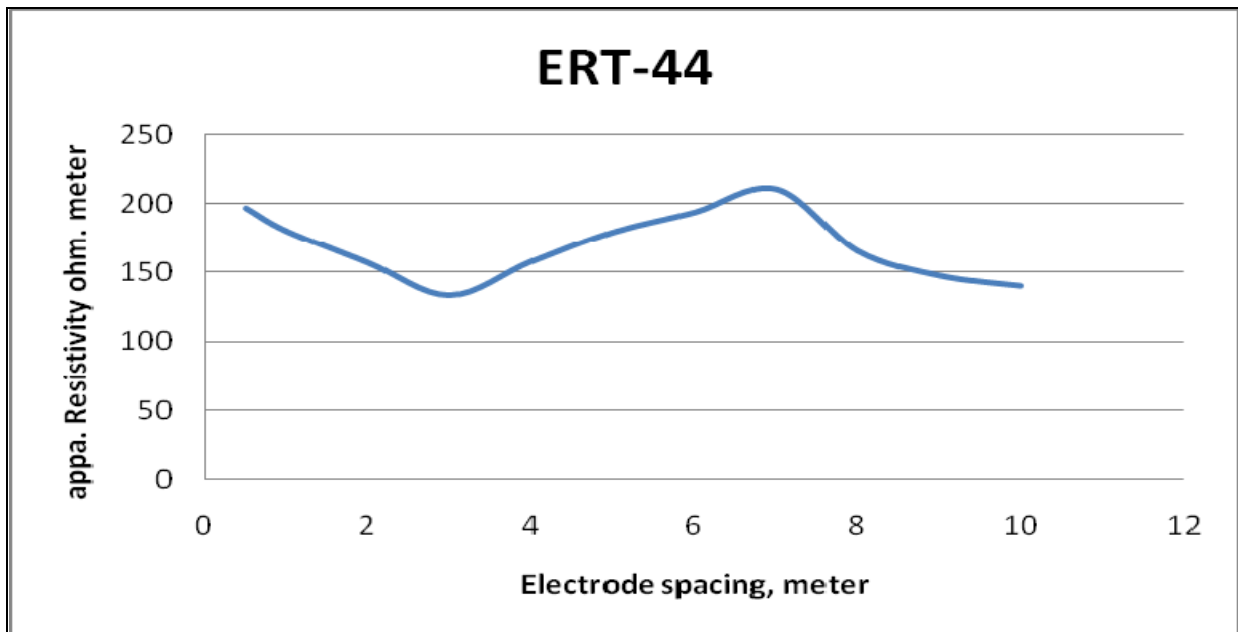
**Table No. 4/43 Electrical Resistivity Test**

APPARENT RESISTIVITY OF ALL DIRECTION.							
ERT – 43			LOCATION: P-4,E-581844; N:2664480				
VILLAGE: MANDSAUR			APPARENT RESISTIVITY (Ohm.m.)				
Sr. No.	a (m.)	AB/2 (M)	MN/2 (M)	K=2.II.a	NORTH SOUTH	EAST WEST	AVERAGE RESISTIVITY. (Ohm.m.)
1	0.5	0.75	0.25	3.14	133.296	133.459	133.378
2	1	1.5	0.5	6.28	89.327	88.711	89.019
3	2	3.0	1.0	12.56	91.701	91.814	91.757
4	3	4.5	1.5	18.84	128.150	128.338	128.244
5	4	6.0	2.0	25.12	162.024	163.782	162.903
6	5	7.5	2.5	31.40	186.076	185.040	185.558
7	6	9.0	3.0	37.68	214.814	211.121	212.967
8	7	10.5	3.5	43.96	237.516	239.582	238.549
9	8	12.0	4.0	50.24	241.805	240.650	241.227
10	9	13.5	4.5	56.52	260.162	261.179	260.670
11	10	15.0	5.0	62.80	276.508	275.252	275.880



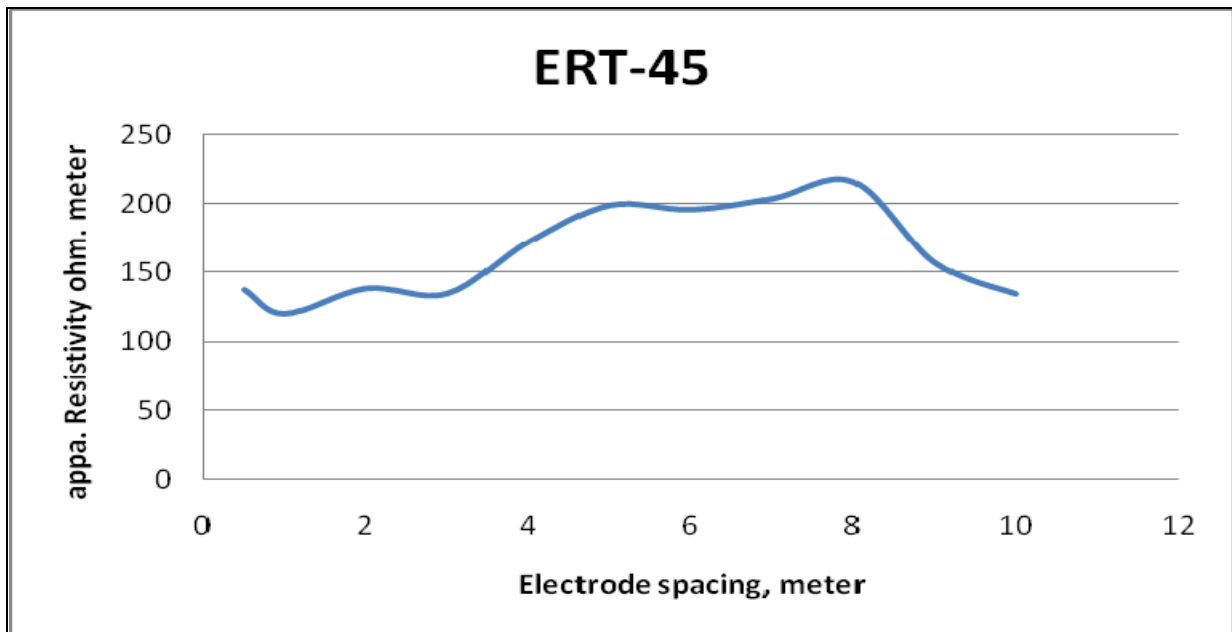
**Table No. 4/44 Electrical Resistivity Test**

APPARENT RESISTIVITY OF ALL DIRECTION.							
ERT – 44			LOCATION: P-4,E-581980; N:2664480				
VILLAGE: MANDSAUR			APPARENT RESISTIVITY (Ohm.m.)				
Sr. No.	a (m.)	AB/2 (M)	MN/2 (M)	K=2.II.a	NORTH SOUTH	EAST WEST	AVERAGE RESISTIVITY. (Ohm.m.)
1	0.5	0.75	0.25	3.14	196.253	198.143	197.198
2	1	1.5	0.5	6.28	180.299	180.927	180.613
3	2	3.0	1.0	12.56	157.100	157.754	157.427
4	3	4.5	1.5	18.84	133.406	133.802	133.604
5	4	6.0	2.0	25.12	157.779	158.507	158.143
6	5	7.5	2.5	31.40	179.231	180.110	179.671
7	6	9.0	3.0	37.68	194.806	193.600	194.203
8	7	10.5	3.5	43.96	211.448	210.568	211.008
9	8	12.0	4.0	50.24	165.239	166.294	165.767
10	9	13.5	4.5	56.52	147.122	148.648	147.885
11	10	15.0	5.0	62.80	141.928	138.788	140.358



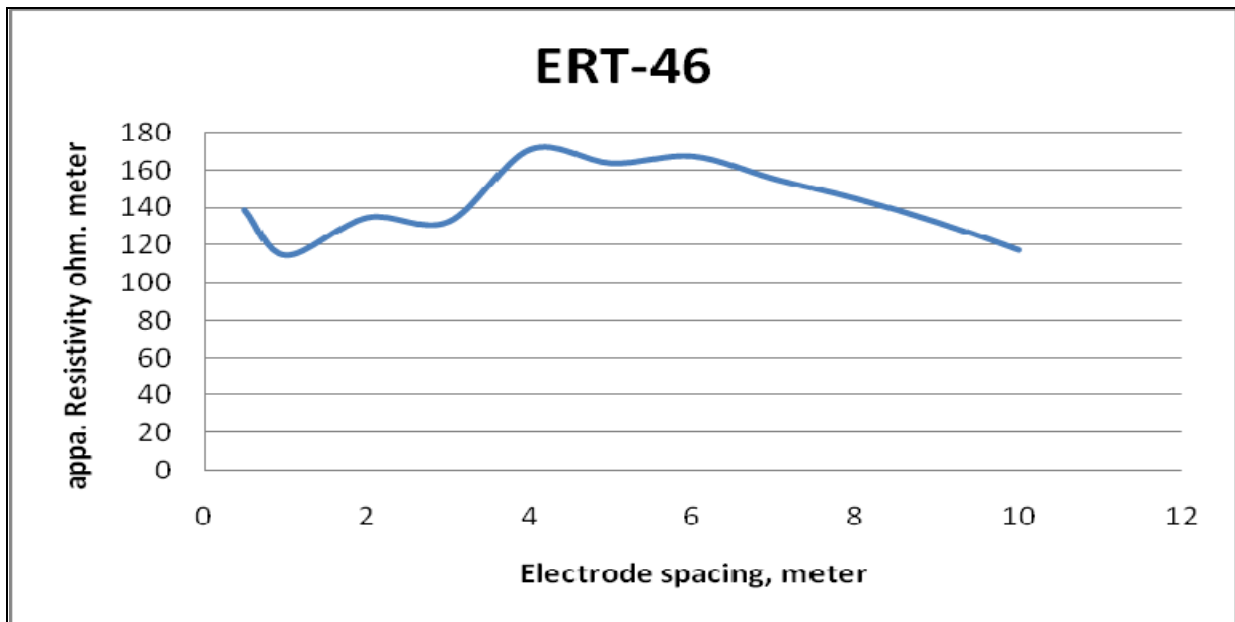
**Table No. 4/45 Electrical Resistivity Test**

APPARENT RESISTIVITY OF ALL DIRECTION.							
ERT – 45			LOCATION: P-4,E-581816; N:2664480				
VILLAGE: MANDSAUR			APPARENT RESISTIVITY (Ohm.m.)				
Sr. No.	a (m.)	AB/2 (M)	MN/2 (M)	K=2.II.a	NORTH SOUTH	EAST WEST	AVERAGE RESISTIVITY. (Ohm.m.)
1	0.5	0.75	0.25	3.14	141.024	134.423	137.724
2	1	1.5	0.5	6.28	124.419	116.293	120.356
3	2	3.0	1.0	12.56	139.441	137.921	138.681
4	3	4.5	1.5	18.84	132.181	137.720	134.951
5	4	6.0	2.0	25.12	170.062	175.363	172.713
6	5	7.5	2.5	31.40	197.851	200.991	199.421
7	6	9.0	3.0	37.68	196.614	196.011	196.313
8	7	10.5	3.5	43.96	210.217	198.304	204.260
9	8	12.0	4.0	50.24	222.061	210.455	216.258
10	9	13.5	4.5	56.52	170.238	144.691	157.465
11	10	15.0	5.0	62.80	137.092	132.257	134.675



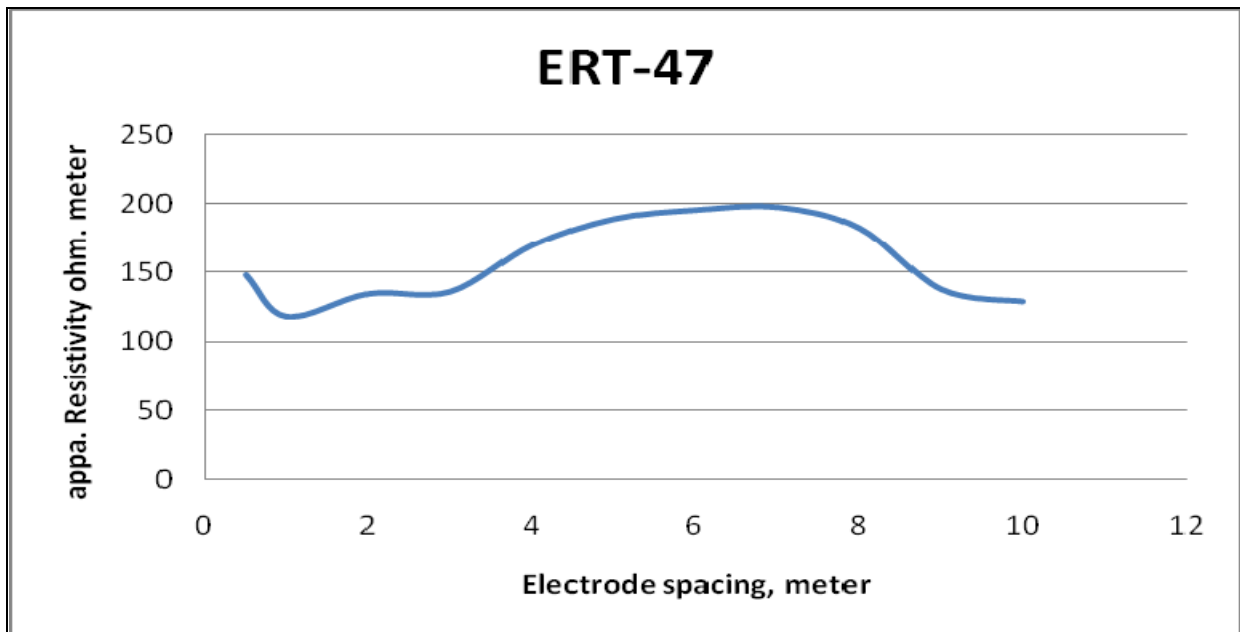
**Table No. 4/46 Electrical Resistivity Test**

APPARENT RESISTIVITY OF ALL DIRECTION.							
ERT – 46			LOCATION: P-4,E-582136; N:2664480				
VILLAGE: MANDSAUR			APPARENT RESISTIVITY (Ohm.m.)				
Sr. No.	a (m.)	AB/2 (M)	MN/2 (M)	K=2.II.a	NORTH SOUTH	EAST WEST	AVERAGE RESISTIVITY. (Ohm.m.)
1	0.5	0.75	0.25	3.14	137.042	140.301	138.672
2	1	1.5	0.5	6.28	114.327	114.987	114.657
3	2	3.0	1.0	12.56	133.777	135.434	134.606
4	3	4.5	1.5	18.84	130.090	134.913	132.502
5	4	6.0	2.0	25.12	170.037	171.117	170.577
6	5	7.5	2.5	31.40	163.154	163.594	163.374
7	6	9.0	3.0	37.68	166.357	167.676	167.017
8	7	10.5	3.5	43.96	155.838	154.344	155.091
9	8	12.0	4.0	50.24	147.002	142.179	144.591
10	9	13.5	4.5	56.52	134.178	130.053	132.116
11	10	15.0	5.0	62.80	120.953	113.856	117.405



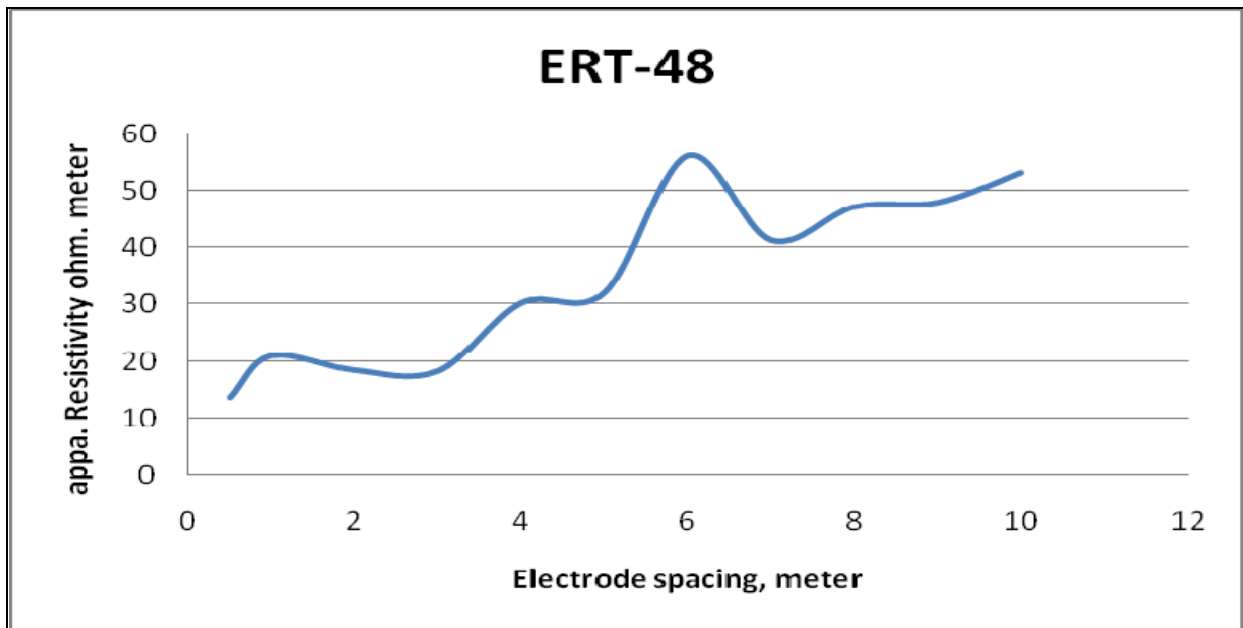
**Table No. 4/47 Electrical Resistivity Test**

APPARENT RESISTIVITY OF ALL DIRECTION.							
ERT – 47			LOCATION: P-4,E-582281; N:2664480				
VILLAGE: MANDSAUR			APPARENT RESISTIVITY (Ohm.m.)				
Sr. No.	a (m.)	AB/2 (M)	MN/2 (M)	K=2.II.a	NORTH SOUTH	EAST WEST	AVERAGE RESISTIVITY. (Ohm.m.)
1	0.5	0.75	0.25	3.14	146.789	149.747	148.268
2	1	1.5	0.5	6.28	122.466	114.390	118.428
3	2	3.0	1.0	12.56	134.543	134.769	134.656
4	3	4.5	1.5	18.84	137.306	135.328	136.317
5	4	6.0	2.0	25.12	171.117	168.329	169.723
6	5	7.5	2.5	31.40	188.808	188.745	188.777
7	6	9.0	3.0	37.68	195.522	194.881	195.201
8	7	10.5	3.5	43.96	196.106	198.304	197.205
9	8	12.0	4.0	50.24	181.869	182.371	182.120
10	9	13.5	4.5	56.52	136.778	139.096	137.937
11	10	15.0	5.0	62.80	131.943	126.416	129.180



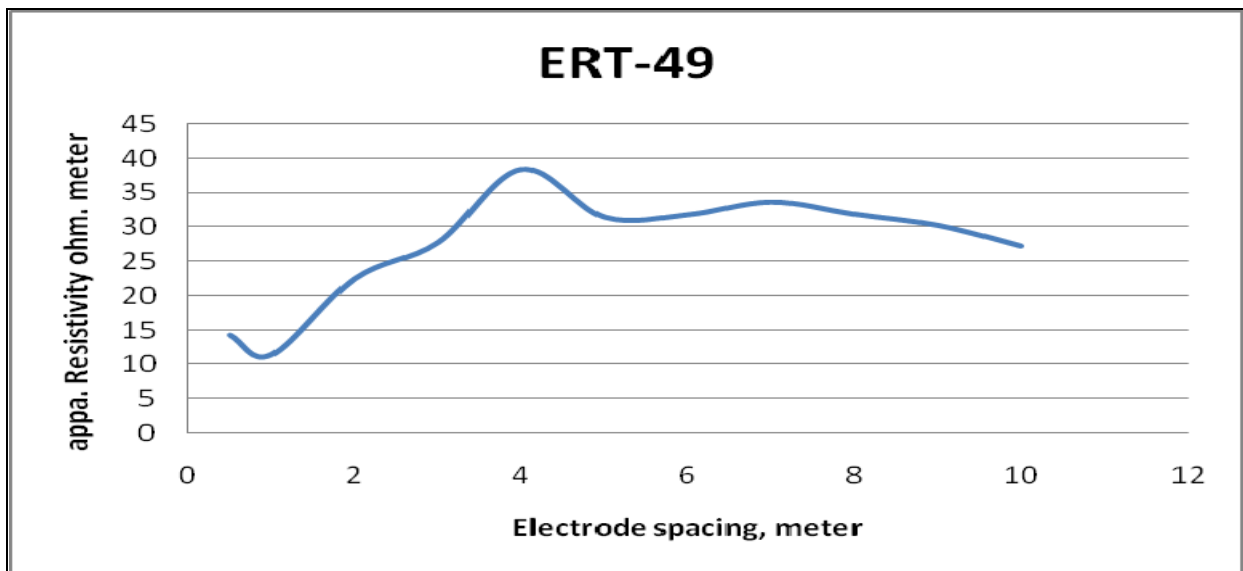
**Table No. 4/48 Electrical Resistivity Test**

APPARENT RESISTIVITY OF ALL DIRECTION.							
ERT – 48			LOCATION: P-4,E-582548; N:2664480				
VILLAGE: MANDSAUR			APPARENT RESISTIVITY (Ohm.m.)				
Sr. No.	a (m.)	AB/2 (M)	MN/2 (M)	K=2.II.a	NORTH SOUTH	EAST WEST	AVERAGE RESISTIVITY. (Ohm.m.)
1	0.5	0.75	0.25	3.14	13.738	13.763	13.750
2	1	1.5	0.5	6.28	21.038	21.069	21.054
3	2	3.0	1.0	12.56	18.388	18.626	18.507
4	3	4.5	1.5	18.84	18.614	18.143	18.378
5	4	6.0	2.0	25.12	29.918	30.646	30.282
6	5	7.5	2.5	31.40	32.154	32.154	32.154
7	6	9.0	3.0	37.68	38.509	73.664	56.087
8	7	10.5	3.5	43.96	41.059	41.586	41.322
9	8	12.0	4.0	50.24	46.874	47.427	47.150
10	9	13.5	4.5	56.52	48.099	47.759	47.929
11	10	15.0	5.0	62.80	53.317	52.940	53.129



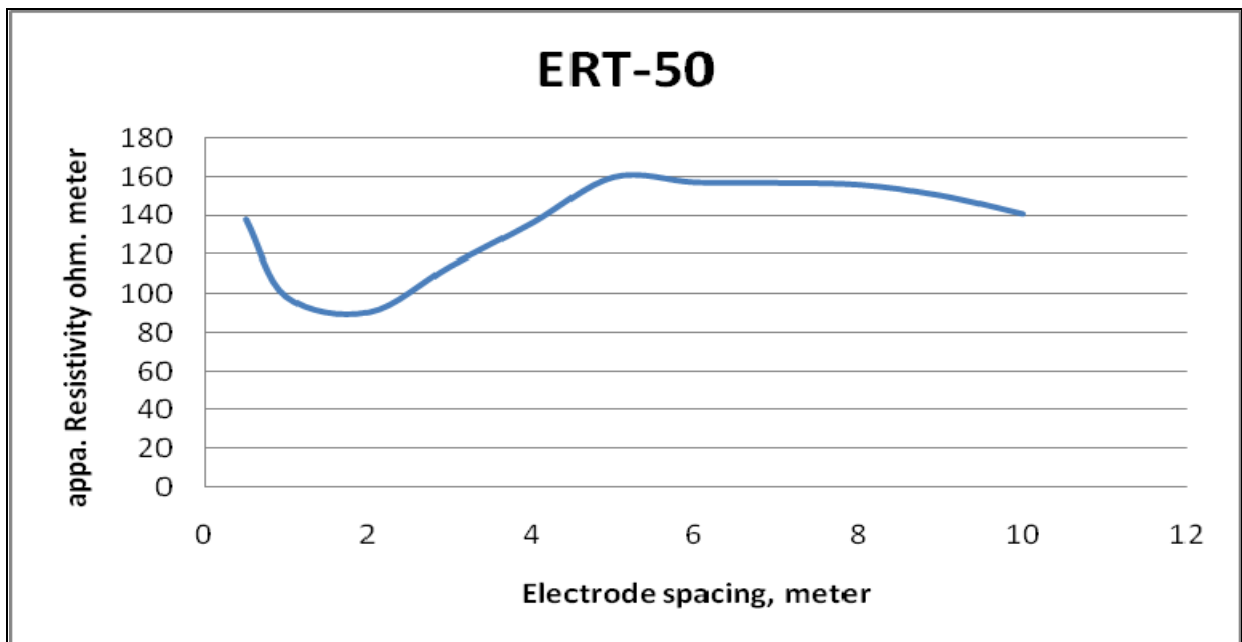
**Table No. 4/49 Electrical Resistivity Test**

APPARENT RESISTIVITY OF ALL DIRECTION.							
ERT – 49			LOCATION: P-4,E-582568; N:2664480				
VILLAGE: MANDSAUR			APPARENT RESISTIVITY (Ohm.m.)				
Sr. No.	a (m.)	AB/2 (M)	MN/2 (M)	K=2.II.a	NORTH SOUTH	EAST WEST	AVERAGE RESISTIVITY. (Ohm.m.)
1	0.5	0.75	0.25	3.14	14.256	14.171	14.213
2	1	1.5	0.5	6.28	11.266	11.386	11.326
3	2	3.0	1.0	12.56	22.432	22.545	22.489
4	3	4.5	1.5	18.84	27.695	27.808	27.751
5	4	6.0	2.0	25.12	29.843	47.025	38.434
6	5	7.5	2.5	31.40	31.431	31.463	31.447
7	6	9.0	3.0	37.68	31.840	31.802	31.821
8	7	10.5	3.5	43.96	33.717	33.629	33.673
9	8	12.0	4.0	50.24	32.154	31.651	31.902
10	9	13.5	4.5	56.52	30.295	30.238	30.266
11	10	15.0	5.0	62.80	27.569	26.941	27.255



**Table No. 4/50 Electrical Resistivity Test**

APPARENT RESISTIVITY OF ALL DIRECTION.							
ERT – 50			LOCATION: P-4,E-582568; N:2664533				
VILLAGE: MANDSAUR			APPARENT RESISTIVITY (Ohm.m.)				
Sr. No.	a (m.)	AB/2 (M)	MN/2 (M)	K=2.II.a	NORTH SOUTH	EAST WEST	AVERAGE RESISTIVITY. (Ohm.m.)
1	0.5	0.75	0.25	3.14	137.541	138.217	137.879
2	1	1.5	0.5	6.28	98.483	98.659	98.571
3	2	3.0	1.0	12.56	90.809	90.558	90.683
4	3	4.5	1.5	18.84	115.301	113.285	114.293
5	4	6.0	2.0	25.12	136.176	135.899	136.037
6	5	7.5	2.5	31.40	143.184	176.154	159.669
7	6	9.0	3.0	37.68	157.126	156.786	156.956
8	7	10.5	3.5	43.96	158.871	154.431	156.651
9	8	12.0	4.0	50.24	156.045	155.342	155.694
10	9	13.5	4.5	56.52	151.587	148.648	150.117
11	10	15.0	5.0	62.80	141.928	139.416	140.672



**JOB NO. : MK/29/05-16 M.K. SOIL TESTING LABORATORY. AHMEDABAD – 380054**

**Table No: 5/1 SOIL CHARACTERISTICS FOR BOREHOLE NO.: – BH – 1**

Project: Topographical Survey & Soil Investigation for 1\*50MWp Solar PV Project, NTPC, Mandsour. Dist : Mandsour. State : Madhya Pradesh.

W.T. below G.L. (m) : Not met With  
Termination depth (m) : 5.00

Name of Customer: Bharat Heavy Electricals Limited., Hyderabad.

DEPTH (m)	SAMPLE TYPE	SPT – N Value	SPECIFIC GRAVITY (IS: 2720(P:3-1/2))	INSITU BULK UNIT WT (gm/cm <sup>3</sup> )	INSITU DRY UNIT WEIGHT (gm/cm <sup>3</sup> ) (IS: 2720(P:29))	INSITU WATER CONTENT (%) (IS: 2720(P:2))	SIEVE ANALYSIS 2720(P:4)			ATTERBERGS LIMITS (IS: 2720(P:5))			I.S. CLASSIFICATION (IS: 1498)	TYPE OF SHEAR TEST (IS: 2720(P/11/13))	COHESION C, kg/cm <sup>2</sup>	ANGLE OF INT. FRICTION, $\phi$ (°)	COMPRESSION INDEX, C <sub>c</sub> (IS: 2720(P:15))	SHRINKAGE LIMIT (%) (IS: 2720(P:6))	FREE SWELL (%) (IS: 2720(P:40))	SWELLING PRESSURE (kg/cm <sup>2</sup> ) (IS: 2720(P:41))	UNCONFINED COMPRESSIVE STRENGTH (kg/cm <sup>2</sup> ) (IS: 2720(P:10))			
							GRAVEL (%)	% SAND			SILT & CLAY (%)	LIQUID LIMIT (%)										PLASTIC LIMIT (%)	PLASTICITY INDEX, IP (%)	
								COARSE	MED.	FINE														
0.00	DS	-	-	-	-	-	45	12	8	10	25	35	17	18	GC	-	-	-	-	11.6	25	-	-	
1.00	SPT	Ref.	-	-	-	-	43	10	15	11	21	-	NP	-	GM (WR)	-	-	-	-	-	-	-	-	
2.00	SPT	Ref.	-	-	-	-	----- Weathered basalt in form of rock pieces -----																	
3.00	SPT	Ref.	-	-	-	-	----- Weathered basalt in form of rock pieces -----																	
4.00	SPT	Ref.	-	-	-	-	----- Weathered basalt in form of rock pieces -----																	
5.00	SPT	Ref.	-	-	-	-	----- Weathered basalt in form of rock pieces -----																	

**JOB NO. : MK/29/05-16 M.K. SOIL TESTING LABORATORY. AHMEDABAD – 380054**

**Table No: 5/2 SOIL CHARACTERISTICS FOR BOREHOLE NO.: – BH – 2**

Project: Topographical Survey & Soil Investigation for 1\*50MWp Solar PV Project, NTPC, Mandsour. Dist : Mandsour. State : Madhya Pradesh.

W.T. below G.L. (m) : Not met With  
Termination depth (m) : 5.00

Name of Customer: Bharat Heavy Electricals Limited., Hyderabad.

DEPTH (m)	SAMPLE TYPE	SPT – N Value	SPECIFIC GRAVITY (IS: 2720(P:3-1/2))	INSITU BULK UNIT WT (gm/cm <sup>3</sup> )	INSITU DRY UNIT WEIGHT (gm/cm <sup>3</sup> ) (IS: 2720(P:29))	INSITU WATER CONTENT (%) (IS: 2720(P:2))	SIEVE ANALYSIS 2720(P:4)			ATTERBERGS LIMITS (IS: 2720(P:5))			I.S. CLASSIFICATION (IS: 1498)	TYPE OF SHEAR TEST (IS: 2720(P/11/13))	COHESION C <sub>v</sub> kg/cm <sup>2</sup>	ANGLE OF INT. FRICTION, φ (°)	COMPRESSION INDEX, C <sub>c</sub> (IS: 2720(P:15))	SHRINKAGE LIMIT (%) (IS: 2720(P:6))	FREE SWELL (%) (IS: 2720(P:40))	SWELLING PRESSURE (kg/cm <sup>2</sup> ) (IS: 2720(P:41))	UNCONFINED COMPRESSIVE STRENGTH (kg/cm <sup>2</sup> ) (IS: 2720(P:10))			
							GRAVEL (%)	% SAND			SILT & CLAY (%)	LIQUID LIMIT (%)										PLASTIC LIMIT (%)	PLASTICITY INDEX, IP (%)	
								COARSE	MED.	FINE														
0.00	DS	-	-	-	-	-	39	14	10	5	32	32	16	16	GC	-	-	-	-	12.1	20	-	-	
1.00	SPT	Ref.	-	-	-	-	----- Weathered basalt in form of rock pieces -----																	
2.00	SPT	Ref.	-	-	-	-	----- Weathered basalt in form of rock pieces -----																	
3.00	SPT	Ref.	-	-	-	-	----- Weathered basalt in form of rock pieces -----																	
4.00	SPT	Ref.	-	-	-	-	----- Weathered basalt in form of rock pieces -----																	
5.00	SPT	Ref.	-	-	-	-	----- Weathered basalt in form of rock pieces -----																	

**JOB NO. : MK/29/05-16 M.K. SOIL TESTING LABORATORY. AHMEDABAD – 380054**

**Table No: 5/3 SOIL CHARACTERISTICS FOR BOREHOLE NO.: – BH – 3**

Project: Topographical Survey & Soil Investigation for 1\*50MWp Solar PV Project, NTPC, Mandsour. Dist : Mandsour. State : Madhya Pradesh.

W.T. below G.L. (m) : Not met With  
Termination depth (m) : 5.00

Name of Customer: Bharat Heavy Electricals Limited., Hyderabad.

DEPTH (m)	SAMPLE TYPE	SPT – N Value	SPECIFIC GRAVITY (IS: 2720(P:3-1/2))	INSITU BULK UNIT WT (gm/cm <sup>3</sup> )	INSITU DRY UNIT WEIGHT (gm/cm <sup>3</sup> ) (IS: 2720(P:29))	INSITU WATER CONTENT (%) (IS: 2720(P:2))	SIEVE ANALYSIS 2720(P:4)			ATTERBERGS LIMITS (IS: 2720(P:5))			I.S. CLASSIFICATION (IS: 1498)	TYPE OF SHEAR TEST (IS: 2720(P/11/13))	COHESION C, kg/cm <sup>2</sup>	ANGLE OF INT. FRICTION, $\phi$ (°)	COMPRESSION INDEX, Cc (IS: 2720(P:15))	SHRINKAGE LIMIT (%) (IS: 2720(P:6))	FREE SWELL (%) (IS: 2720(P:40))	SWELLING PRESSURE (kg/cm <sup>2</sup> ) (IS: 2720(P:41))	UNCONFINED COMPRESSIVE STRENGTH (kg/cm <sup>2</sup> ) (IS: 2720(P:10))	
							GRAVEL (%)	% SAND		SILT & CLAY (%)	LIQUID LIMIT (%)	PLASTIC LIMIT (%)										PLASTICITY INDEX, IP (%)
								COARSE	MED.													
0.00	DS	-	-	-	-	-	----- Soil, boulder, cobbles mix layer -----															
1.00	SPT	Ref.	-	-	-	-	----- Weathered basalt in form of rock pieces -----															
2.00	SPT	Ref.	-	-	-	-	----- Weathered basalt in form of rock pieces -----															
3.00	SPT	Ref.	-	-	-	-	----- Weathered basalt in form of rock pieces -----															
4.00	SPT	Ref.	-	-	-	-	----- Weathered basalt in form of rock pieces -----															
5.00	SPT	Ref.	-	-	-	-	----- Weathered basalt in form of rock pieces -----															

**JOB NO. : MK/29/05-16 M.K. SOIL TESTING LABORATORY. AHMEDABAD – 380054**

**Table No: 5/4 SOIL CHARACTERISTICS FOR BOREHOLE NO.: – BH – 4**

Project: Topographical Survey & Soil Investigation for 1\*50MWp Solar PV Project, NTPC, Mandsour. Dist : Mandsour. State : Madhya Pradesh.

W.T. below G.L. (m) : Not met With  
Termination depth (m) : 5.00

Name of Customer: Bharat Heavy Electricals Limited., Hyderabad.

DEPTH (m)	SAMPLE TYPE	SPT – N Value	SPECIFIC GRAVITY (IS: 2720(P:3-1/2))	INSITU BULK UNIT WT (gm/cm <sup>3</sup> )	INSITU DRY UNIT WEIGHT (gm/cm <sup>3</sup> ) (IS: 2720(P:29))	INSITU WATER CONTENT (%) (IS: 2720(P:2))	SIEVE ANALYSIS 2720(P:4)			ATTERBERGS LIMITS (IS: 2720(P:5))			I.S. CLASSIFICATION (IS: 1498)	TYPE OF SHEAR TEST (IS: 2720(P/11/13))	COHESION C <sub>v</sub> kg/cm <sup>2</sup>	ANGLE OF INT. FRICTION, φ (°)	COMPRESSION INDEX, C <sub>c</sub> (IS: 2720(P:15))	SHRINKAGE LIMIT (%) (IS: 2720(P:6))	FREE SWELL (%) (IS: 2720(P:40))	SWELLING PRESSURE (kg/cm <sup>2</sup> ) (IS: 2720(P:41))	UNCONFINED COMPRESSIVE STRENGTH (kg/cm <sup>2</sup> ) (IS: 2720(P:10))		
							GRAVEL (%)	% SAND			SILT & CLAY (%)	LIQUID LIMIT (%)										PLASTIC LIMIT (%)	PLASTICITY INDEX, IP (%)
								COARSE	MED.	FINE													
0.00	DS	-	-	-	-	-	48	12	10	11	19	-	NP	-	-	-	-	-	-	-	-		
1.00	SPT	Ref.	-	-	-	-	----- Weathered basalt in form of rock pieces -----					-	-	-	-	-	-	-	-	-			
2.00	SPT	Ref.	-	-	-	-	----- Weathered basalt in form of rock pieces -----					-	-	-	-	-	-	-	-	-	-		
3.00	SPT	Ref.	-	-	-	-	----- Weathered basalt in form of rock pieces -----					-	-	-	-	-	-	-	-	-	-		
4.00	SPT	Ref.	-	-	-	-	----- Weathered basalt in form of rock pieces -----					-	-	-	-	-	-	-	-	-	-		
5.00	SPT	Ref.	-	-	-	-	----- Weathered basalt in form of rock pieces -----					-	-	-	-	-	-	-	-	-	-		

**JOB NO. : MK/29/05-16 M.K. SOIL TESTING LABORATORY. AHMEDABAD – 380054**

**Table No: 5/5 SOIL CHARACTERISTICS FOR BOREHOLE NO.: – BH – 5**

Project: Topographical Survey & Soil Investigation for 1\*50MWp Solar PV Project, NTPC, Mandsour. Dist : Mandsour. State : Madhya Pradesh.

W.T. below G.L. (m) : Not met With  
Termination depth (m) : 5.00

Name of Customer: Bharat Heavy Electricals Limited., Hyderabad.

DEPTH (m)	SAMPLE TYPE	SPT – N Value	SPECIFIC GRAVITY (IS: 2720(P:3-1/2))	INSITU BULK UNIT WT (gm/cm <sup>3</sup> )	INSITU DRY UNIT WEIGHT (gm/cm <sup>3</sup> ) (IS: 2720(P:29))	INSITU WATER CONTENT (%) (IS: 2720(P:2))	SIEVE ANALYSIS 2720(P:4)			ATTERBERGS LIMITS (IS: 2720(P:5))			I.S. CLASSIFICATION (IS: 1498)	TYPE OF SHEAR TEST (IS: 2720(P/11/13))	COHESION C, kg/cm <sup>2</sup>	ANGLE OF INT. FRICTION, $\phi$ (°)	COMPRESSION INDEX, Cc (IS: 2720(P:15))	SHRINKAGE LIMIT (%) (IS: 2720(P:6))	FREE SWELL (%) (IS: 2720(P:40))	SWELLING PRESSURE (kg/cm <sup>2</sup> ) (IS: 2720(P:41))	UNCONFINED COMPRESSIVE STRENGTH (kg/cm <sup>2</sup> ) (IS: 2720(P:10))	
							GRAVEL (%)	% SAND		SILT & CLAY (%)	LIQUID LIMIT (%)	PLASTIC LIMIT (%)										PLASTICITY INDEX, IP (%)
								COARSE	MED.													
0.00	DS	-	-	-	-	-	----- Soil, boulder, cobbles mix layer -----															
1.00	SPT	Ref.	-	-	-	-	----- Weathered basalt in form of rock pieces -----															
2.00	SPT	Ref.	-	-	-	-	----- Weathered basalt in form of rock pieces -----															
3.00	SPT	Ref.	-	-	-	-	----- Weathered basalt in form of rock pieces -----															
4.00	SPT	Ref.	-	-	-	-	----- Weathered basalt in form of rock pieces -----															
5.00	SPT	Ref.	-	-	-	-	----- Weathered basalt in form of rock pieces -----															

**JOB NO. : MK/29/05-16 M.K. SOIL TESTING LABORATORY. AHMEDABAD – 380054**

**Table No: 5/6 SOIL CHARACTERISTICS FOR BOREHOLE NO.: – BH – 6**

Project: Topographical Survey & Soil Investigation for 1\*50MWp Solar PV Project, NTPC, Mandsour. Dist : Mandsour. State : Madhya Pradesh.

W.T. below G.L. (m) : Not met With  
Termination depth (m) : 5.00

Name of Customer: Bharat Heavy Electricals Limited., Hyderabad.

DEPTH (m)	SAMPLE TYPE	SPT – N Value	SPECIFIC GRAVITY (IS: 2720(P:3-1/2))	INSITU BULK UNIT WT (gm/cm <sup>3</sup> )	INSITU DRY UNIT WEIGHT (gm/cm <sup>3</sup> ) (IS: 2720(P:29))	INSITU WATER CONTENT (%) (IS: 2720(P:2))	SIEVE ANALYSIS 2720(P:4)			ATTERBERGS LIMITS (IS: 2720(P:5))			I.S. CLASSIFICATION (IS: 1498)	TYPE OF SHEAR TEST (IS: 2720(P/11/13))	COHESION C <sub>v</sub> kg/cm <sup>2</sup>	ANGLE OF INT. FRICTION, φ (°)	COMPRESSION INDEX, C <sub>c</sub> (IS: 2720(P:15))	SHRINKAGE LIMIT (%) (IS: 2720(P:6))	FREE SWELL (%) (IS: 2720(P:40))	SWELLING PRESSURE (kg/cm <sup>2</sup> ) (IS: 2720(P:41))	UNCONFINED COMPRESSIVE STRENGTH (kg/cm <sup>2</sup> ) (IS: 2720(P:10))		
							GRAVEL (%)	% SAND			SILT & CLAY (%)	LIQUID LIMIT (%)										PLASTIC LIMIT (%)	PLASTICITY INDEX, IP (%)
								COARSE	MED.	FINE													
0.00	DS	-	-	-	-	-	37	10	15	6	32	-	NP	-	GM	-	-	-	-	-	-	-	
1.00	SPT	Ref.	-	-	-	-	----- Weathered basalt in form of rock pieces -----					-	-	-	-	-	-	-	-	-			
2.00	SPT	Ref.	-	-	-	-	----- Weathered basalt in form of rock pieces -----					-	-	-	-	-	-	-	-	-	-		
3.00	SPT	Ref.	-	-	-	-	----- Weathered basalt in form of rock pieces -----					-	-	-	-	-	-	-	-	-	-		
4.00	SPT	Ref.	-	-	-	-	----- Weathered basalt in form of rock pieces -----					-	-	-	-	-	-	-	-	-	-		
5.00	SPT	Ref.	-	-	-	-	----- Weathered basalt in form of rock pieces -----					-	-	-	-	-	-	-	-	-	-		

**JOB NO. : MK/29/05-16 M.K. SOIL TESTING LABORATORY. AHMEDABAD – 380054**

**Table No: 5/7 SOIL CHARACTERISTICS FOR BOREHOLE NO.: – BH – 7**

Project: Topographical Survey & Soil Investigation for 1\*50MWp Solar PV Project, NTPC, Mandsour. Dist : Mandsour. State : Madhya Pradesh.

W.T. below G.L. (m) : Not met With  
Termination depth (m) : 5.00

Name of Customer: Bharat Heavy Electricals Limited., Hyderabad.

DEPTH (m)	SAMPLE TYPE	SPT – N Value	SPECIFIC GRAVITY (IS: 2720(P:3-1/2))	INSITU BULK UNIT WT (gm/cm <sup>3</sup> )	INSITU DRY UNIT WEIGHT (gm/cm <sup>3</sup> ) (IS: 2720(P:29))	INSITU WATER CONTENT (%) (IS: 2720(P:2))	SIEVE ANALYSIS 2720(P:4)			ATTERBERGS LIMITS (IS: 2720(P:5))			I.S. CLASSIFICATION (IS: 1498)	TYPE OF SHEAR TEST (IS: 2720(P/11/13))	COHESION C <sub>v</sub> kg/cm <sup>2</sup>	ANGLE OF INT. FRICTION, φ (°)	COMPRESSION INDEX, C <sub>c</sub> (IS: 2720(P:15))	SHRINKAGE LIMIT (%) (IS: 2720(P:6))	FREE SWELL (%) (IS: 2720(P:40))	SWELLING PRESSURE (kg/cm <sup>2</sup> ) (IS: 2720(P:41))	UNCONFINED COMPRESSIVE STRENGTH (kg/cm <sup>2</sup> ) (IS: 2720(P:10))			
							GRAVEL (%)	% SAND			SILT & CLAY (%)	LIQUID LIMIT (%)										PLASTIC LIMIT (%)	PLASTICITY INDEX, IP (%)	
								COARSE	MED.	FINE														
0.00	DS	-	-	-	-	-	41	8	12	11	28	36	18	18	GC	-	-	-	-	11.0	25	-	-	
1.00	SPT	Ref.	-	-	-	-	----- Weathered basalt in form of rock pieces -----																	
2.00	SPT	Ref.	-	-	-	-	----- Weathered basalt in form of rock pieces -----																	
3.00	SPT	Ref.	-	-	-	-	----- Weathered basalt in form of rock pieces -----																	
4.00	SPT	Ref.	-	-	-	-	----- Weathered basalt in form of rock pieces -----																	
5.00	SPT	Ref.	-	-	-	-	----- Weathered basalt in form of rock pieces -----																	

**JOB NO. : MK/29/05-16 M.K. SOIL TESTING LABORATORY. AHMEDABAD – 380054**

**Table No: 5/8 SOIL CHARACTERISTICS FOR BOREHOLE NO.: – BH – 8**

Project: Topographical Survey & Soil Investigation for 1\*50MWp Solar PV Project, NTPC, Mandsour. Dist : Mandsour. State : Madhya Pradesh.

W.T. below G.L. (m) : Not met With  
Termination depth (m) : 5.00

Name of Customer: Bharat Heavy Electricals Limited., Hyderabad.

DEPTH (m)	SAMPLE TYPE	SPT – N Value	SPECIFIC GRAVITY (IS: 2720(P:3-1/2))	INSITU BULK UNIT WT (gm/cm <sup>3</sup> )	INSITU DRY UNIT WEIGHT (gm/cm <sup>3</sup> ) (IS: 2720(P:29))	INSITU WATER CONTENT (%) (IS: 2720(P:2))	SIEVE ANALYSIS 2720(P:4)			ATTERBERGS LIMITS (IS: 2720(P:5))			I.S. CLASSIFICATION (IS: 1498)	TYPE OF SHEAR TEST (IS: 2720(P/11/13))	COHESION C <sub>v</sub> kg/cm <sup>2</sup>	ANGLE OF INT. FRICTION, φ (°)	COMPRESSION INDEX, C <sub>c</sub> (IS: 2720(P:15))	SHRINKAGE LIMIT (%) (IS: 2720(P:6))	FREE SWELL (%) (IS: 2720(P:40))	SWELLING PRESSURE (kg/cm <sup>2</sup> ) (IS: 2720(P:41))	UNCONFINED COMPRESSIVE STRENGTH (kg/cm <sup>2</sup> ) (IS: 2720(P:10))		
							GRAVEL (%)	% SAND			SILT & CLAY (%)	LIQUID LIMIT (%)										PLASTIC LIMIT (%)	PLASTICITY INDEX, IP (%)
								COARSE	MED.	FINE													
0.00	DS	-	-	-	-	-	55	15	10	8	12	-	NP	-	GM	-	-	-	-	-	-	-	
1.00	SPT	Ref.	-	-	-	-	----- Weathered basalt in form of rock pieces -----					-	-	-	-	-	-	-	-	-			
2.00	SPT	Ref.	-	-	-	-	----- Weathered basalt in form of rock pieces -----					-	-	-	-	-	-	-	-	-			
3.00	SPT	Ref.	-	-	-	-	----- Weathered basalt in form of rock pieces -----					-	-	-	-	-	-	-	-	-			
4.00	SPT	Ref.	-	-	-	-	----- Weathered basalt in form of rock pieces -----					-	-	-	-	-	-	-	-	-			
5.00	SPT	Ref.	-	-	-	-	----- Weathered basalt in form of rock pieces -----					-	-	-	-	-	-	-	-	-			

**JOB NO. : MK/29/05-16 M.K. SOIL TESTING LABORATORY. AHMEDABAD – 380054**

**Table No: 5/9 SOIL CHARACTERISTICS FOR BOREHOLE NO.: – BH – 9**

Project: Topographical Survey & Soil Investigation for 1\*50MWp Solar PV Project, NTPC, Mandsour. Dist : Mandsour. State : Madhya Pradesh.

W.T. below G.L. (m) : Not met With  
Termination depth (m) : 5.00

Name of Customer: Bharat Heavy Electricals Limited., Hyderabad.

DEPTH (m)	SAMPLE TYPE	SPT – N Value	SPECIFIC GRAVITY (IS: 2720(P:3-1/2))	INSITU BULK UNIT WT (gm/cm <sup>3</sup> )	INSITU DRY UNIT WEIGHT (gm/cm <sup>3</sup> ) (IS: 2720(P:29))	INSITU WATER CONTENT (%) (IS: 2720(P:2))	SIEVE ANALYSIS 2720(P:4)			ATTERBERGS LIMITS (IS: 2720(P:5))			I.S. CLASSIFICATION (IS: 1498)	TYPE OF SHEAR TEST (IS: 2720(P/11/13))	COHESION C, kg/cm <sup>2</sup>	ANGLE OF INT. FRICTION, $\phi$ (°)	COMPRESSION INDEX, C <sub>c</sub> (IS: 2720(P:15))	SHRINKAGE LIMIT (%) (IS: 2720(P:6))	FREE SWELL (%) (IS: 2720(P:40))	SWELLING PRESSURE (kg/cm <sup>2</sup> ) (IS: 2720(P:41))	UNCONFINED COMPRESSIVE STRENGTH (kg/cm <sup>2</sup> ) (IS: 2720(P:10))			
							GRAVEL (%)	% SAND			SILT & CLAY (%)	LIQUID LIMIT (%)										PLASTIC LIMIT (%)	PLASTICITY INDEX, IP (%)	
								COARSE	MED.	FINE														
0.00	DS	-	-	-	-	-	42	5	13	10	30	29	15	14	GC	-	-	-	-	11.2	20	-	-	
1.00	SPT	Ref.	-	-	-	-	----- Weathered basalt in form of rock pieces -----																	
2.00	SPT	Ref.	-	-	-	-	----- Weathered basalt in form of rock pieces -----																	
3.00	SPT	Ref.	-	-	-	-	----- Weathered basalt in form of rock pieces -----																	
4.00	SPT	Ref.	-	-	-	-	----- Weathered basalt in form of rock pieces -----																	
5.00	SPT	Ref.	-	-	-	-	----- Weathered basalt in form of rock pieces -----																	

**JOB NO. : MK/29/05-16 M.K. SOIL TESTING LABORATORY. AHMEDABAD – 380054**

**Table No: 5/10 SOIL CHARACTERISTICS FOR BOREHOLE NO.: – BH – 10**

Project: Topographical Survey & Soil Investigation for 1\*50MWp Solar PV Project, NTPC, Mandsour. Dist : Mandsour. State : Madhya Pradesh.

W.T. below G.L. (m) : Not met With  
Termination depth (m) : 5.00

Name of Customer: Bharat Heavy Electricals Limited., Hyderabad.

DEPTH (m)	SAMPLE TYPE	SPT – N Value	SPECIFIC GRAVITY (IS: 2720(P:3-1/2))	INSITU BULK UNIT WT (gm/cm <sup>3</sup> )	INSITU DRY UNIT WEIGHT (gm/cm <sup>3</sup> ) (IS: 2720(P:29))	INSITU WATER CONTENT (%) (IS: 2720(P:2))	SIEVE ANALYSIS 2720(P:4)				ATTERBERGS LIMITS (IS: 2720(P:5))			I.S. CLASSIFICATION (IS: 1498)	TYPE OF SHEAR TEST (IS: 2720(P/11/13))	COHESION C, kg/cm <sup>2</sup>	ANGLE OF INT. FRICTION, φ (°)	COMPRESSION INDEX, Cc (IS: 2720(P:15))	SHRINKAGE LIMIT (%) (IS: 2720(P:6))	FREE SWELL (%) (IS: 2720(P:40))	SWELLING PRESSURE (kg/cm <sup>2</sup> ) (IS: 2720(P:41))	UNCONFINED COMPRESSIVE STRENGTH (kg/cm <sup>2</sup> ) (IS: 2720(P:10))	
							GRAVEL (%)	% SAND			SILT & CLAY (%)	LIQUID LIMIT (%)	PLASTIC LIMIT (%)										PLASTICITY INDEX, IP (%)
								COARSE	MED.	FINE													
0.00	DS	-	-	-	-	-	51	11	13	8	17	-	NP	-	GM	-	-	-	-	-	-	-	-
1.00	SPT	Ref.	-	-	-	-	----- Weathered basalt in form of rock pieces -----																
2.00	SPT	Ref.	-	-	-	-	----- Weathered basalt in form of rock pieces -----																
3.00	SPT	Ref.	-	-	-	-	----- Weathered basalt in form of rock pieces -----																
4.00	SPT	Ref.	-	-	-	-	----- Weathered basalt in form of rock pieces -----																
5.00	SPT	Ref.	-	-	-	-	----- Weathered basalt in form of rock pieces -----																

**JOB NO. : MK/29/05-16 M.K. SOIL TESTING LABORATORY. AHMEDABAD – 380054**

**Table No: 5/11 SOIL CHARACTERISTICS FOR BOREHOLE NO.: – BH – 11**

Project: Topographical Survey & Soil Investigation for 1\*50MWp Solar PV Project, NTPC, Mandsour. Dist : Mandsour. State : Madhya Pradesh.

W.T. below G.L. (m) : Not met With  
Termination depth (m) : 5.00

Name of Customer: Bharat Heavy Electricals Limited., Hyderabad.

DEPTH (m)	SAMPLE TYPE	SPT – N Value	SPECIFIC GRAVITY (IS: 2720(P:3-1/2))	INSITU BULK UNIT WT (gm/cm <sup>3</sup> )	INSITU DRY UNIT WEIGHT (gm/cm <sup>3</sup> ) (IS: 2720(P:29))	INSITU WATER CONTENT (%) (IS: 2720(P:2))	SIEVE ANALYSIS 2720(P:4)				ATTERBERGS LIMITS (IS: 2720(P:5))			I.S. CLASSIFICATION (IS: 1498)	TYPE OF SHEAR TEST (IS: 2720(P/11/13))	COHESION C, kg/cm <sup>2</sup>	ANGLE OF INT. FRICTION, φ (°)	COMPRESSION INDEX, Cc (IS: 2720(P:15))	SHRINKAGE LIMIT (%) (IS: 2720(P:6))	FREE SWELL (%) (IS: 2720(P:40))	SWELLING PRESSURE (kg/cm <sup>2</sup> ) (IS: 2720(P:41))	UNCONFINED COMPRESSIVE STRENGTH (kg/cm <sup>2</sup> ) (IS: 2720(P:10))	
							GRAVEL (%)	% SAND			SILT & CLAY (%)	LIQUID LIMIT (%)	PLASTIC LIMIT (%)										PLASTICITY INDEX, IP (%)
								COARSE	MED.	FINE													
0.00	DS	-	-	-	-	-	40	9	10	16	25	-	NP	-	GM	-	-	-	-	-	-	-	-
1.00	SPT	45	-	-	-	-	39	13	10	6	32	39	17	22	GC	-	-	-	-	11.0	25	-	-
2.00	SPT	Ref.	-	-	-	-	----- Weathered basalt in form of rock pieces -----																
3.00	SPT	Ref.	-	-	-	-	----- Weathered basalt in form of rock pieces -----																
4.00	SPT	Ref.	-	-	-	-	----- Weathered basalt in form of rock pieces -----																
5.00	SPT	Ref.	-	-	-	-	----- Weathered basalt in form of rock pieces -----																

**JOB NO. : MK/29/05-16 M.K. SOIL TESTING LABORATORY. AHMEDABAD – 380054**

**Table No: 5/12 SOIL CHARACTERISTICS FOR BOREHOLE NO.: – BH – 12**

Project: Topographical Survey & Soil Investigation for 1\*50MWp Solar PV Project, NTPC, Mandsour. Dist : Mandsour. State : Madhya Pradesh.

W.T. below G.L. (m) : Not met With  
Termination depth (m) : 5.00

Name of Customer: Bharat Heavy Electricals Limited., Hyderabad.

DEPTH (m)	SAMPLE TYPE	SPT – N Value	SPECIFIC GRAVITY (IS: 2720(P:3-1/2))	INSITU BULK UNIT WT (gm/cm <sup>3</sup> )	INSITU DRY UNIT WEIGHT (gm/cm <sup>3</sup> ) (IS: 2720(P:29))	INSITU WATER CONTENT (%) (IS: 2720(P:2))	SIEVE ANALYSIS 2720(P:4)				ATTERBERGS LIMITS (IS: 2720(P:5))			I.S. CLASSIFICATION (IS: 1498)	TYPE OF SHEAR TEST (IS: 2720(P/1/13))	COHESION C, kg/cm <sup>2</sup>	ANGLE OF INT. FRICTION, φ (°)	COMPRESSION INDEX, Cc (IS: 2720(P:15))	SHRINKAGE LIMIT (%) (IS: 2720(P:6))	FREE SWELL (%) (IS: 2720(P:40))	SWELLING PRESSURE (kg/cm <sup>2</sup> ) (IS: 2720(P:41))	UNCONFINED COMPRESSIVE STRENGTH (kg/cm <sup>2</sup> ) (IS: 2720(P:10))	
							GRAVEL (%)	% SAND			SILT & CLAY (%)	LIQUID LIMIT (%)	PLASTIC LIMIT (%)										PLASTICITY INDEX, IP (%)
								COARSE	MED.	FINE													
0.00	DS	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
1.00	SPT	25	-	-	-	-	0	0	4	18	78	53	28	25	CH	-	-	-	-	8.9	50	-	-
2.00	SPT	39	-	-	-	-	1	3	6	21	69	56	27	29	CH	-	-	-	-	8.8	55	-	-
3.00	SPT	Ref.	-	-	-	-	----- Weathered basalt in form of rock pieces -----																
4.00	SPT	Ref.	-	-	-	-	----- Weathered basalt in form of rock pieces -----																
5.00	SPT	Ref.	-	-	-	-	----- Weathered basalt in form of rock pieces -----																

**JOB NO. : MK/29/05-16 M.K. SOIL TESTING LABORATORY. AHMEDABAD – 380054**

**Table No: 5/13 SOIL CHARACTERISTICS FOR BOREHOLE NO.: – BH – 13**

Project: Topographical Survey & Soil Investigation for 1\*50MWp Solar PV Project, NTPC, Mandsour. Dist : Mandsour. State : Madhya Pradesh.

W.T. below G.L. (m) : Not met With  
Termination depth (m) : 5.00

Name of Customer: Bharat Heavy Electricals Limited., Hyderabad.

DEPTH (m)	SAMPLE TYPE	SPT – N Value	SPECIFIC GRAVITY (IS: 2720(P:3-1/2))	INSITU BULK UNIT WT (gm/cm <sup>3</sup> )	INSITU DRY UNIT WEIGHT (gm/cm <sup>3</sup> ) (IS: 2720(P:29))	INSITU WATER CONTENT (%) (IS: 2720(P:2))	SIEVE ANALYSIS 2720(P:4)			ATTERBERGS LIMITS (IS: 2720(P:5))			I.S. CLASSIFICATION (IS: 1498)	TYPE OF SHEAR TEST (IS: 2720(P/11/13))	COHESION C <sub>v</sub> kg/cm <sup>2</sup>	ANGLE OF INT. FRICTION, φ (°)	COMPRESSION INDEX, C <sub>c</sub> (IS: 2720(P:15))	SHRINKAGE LIMIT (%) (IS: 2720(P:6))	FREE SWELL (%) (IS: 2720(P:40))	SWELLING PRESSURE (kg/cm <sup>2</sup> ) (IS: 2720(P:41))	UNCONFINED COMPRESSIVE STRENGTH (kg/cm <sup>2</sup> ) (IS: 2720(P:10))		
							GRAVEL (%)	% SAND			SILT & CLAY (%)	LIQUID LIMIT (%)										PLASTIC LIMIT (%)	PLASTICITY INDEX, IP (%)
								COARSE	MED.	FINE													
0.00	DS	-	-	-	-	-	3	18	15	5	69	66	30	36	CH	-	-	-	-	8.4	65	-	-
1.00	SPT	37	-	-	-	-	10	11	18	22	39	32	16	16	SC	-	-	-	-	10.8	25	-	-
2.00	SPT	Ref.	-	-	-	-	----- Weathered basalt in form of rock pieces -----																
3.00	SPT	Ref.	-	-	-	-	----- Weathered basalt in form of rock pieces -----																
4.00	SPT	Ref.	-	-	-	-	----- Weathered basalt in form of rock pieces -----																
5.00	SPT	Ref.	-	-	-	-	----- Weathered basalt in form of rock pieces -----																

**JOB NO. : MK/29/05-16 M.K. SOIL TESTING LABORATORY. AHMEDABAD – 380054**

**Table No: 5/14 SOIL CHARACTERISTICS FOR BOREHOLE NO.: – BH – 14**

Project: Topographical Survey & Soil Investigation for 1\*50MWp Solar PV Project, NTPC, Mandsour. Dist : Mandsour. State : Madhya Pradesh.

W.T. below G.L. (m) : Not met With  
Termination depth (m) : 5.00

Name of Customer: Bharat Heavy Electricals Limited., Hyderabad.

DEPTH (m)	SAMPLE TYPE	SPT – N Value	SPECIFIC GRAVITY (IS: 2720(P:3-1/2))	INSITU BULK UNIT WT (gm/cm <sup>3</sup> )	INSITU DRY UNIT WEIGHT (gm/cm <sup>3</sup> ) (IS: 2720(P:29))	INSITU WATER CONTENT (%) (IS: 2720(P:2))	SIEVE ANALYSIS 2720(P:4)			ATTERBERGS LIMITS (IS: 2720(P:5))			I.S. CLASSIFICATION (IS: 1498)	TYPE OF SHEAR TEST (IS: 2720(P/11/13))	COHESION C <sub>v</sub> kg/cm <sup>2</sup>	ANGLE OF INT. FRICTION, φ (°)	COMPRESSION INDEX, C <sub>c</sub> (IS: 2720(P:15))	SHRINKAGE LIMIT (%) (IS: 2720(P:6))	FREE SWELL (%) (IS: 2720(P:40))	SWELLING PRESSURE (kg/cm <sup>2</sup> ) (IS: 2720(P:41))	UNCONFINED COMPRESSIVE STRENGTH (kg/cm <sup>2</sup> ) (IS: 2720(P:10))		
							GRAVEL (%)	% SAND			SILT & CLAY (%)	LIQUID LIMIT (%)										PLASTIC LIMIT (%)	PLASTICITY INDEX, IP (%)
								COARSE	MED.	FINE													
0.00	DS	-	-	-	-	-	3	8	7	5	77	64	30	34	CH	-	-	-	-	8.6	58	-	-
1.00	SPT	44	-	-	-	-	6	20	12	20	42	52	28	24	SC	-	-	-	-	9.5	40	-	-
2.00	SPT	Ref.	-	-	-	-	----- Weathered basalt in form of rock pieces -----																
3.00	SPT	Ref.	-	-	-	-	----- Weathered basalt in form of rock pieces -----																
4.00	SPT	Ref.	-	-	-	-	----- Weathered basalt in form of rock pieces -----																
5.00	SPT	Ref.	-	-	-	-	----- Weathered basalt in form of rock pieces -----																

**JOB NO. : MK/29/05-16 M.K. SOIL TESTING LABORATORY. AHMEDABAD – 380054**

**Table No: 5/15 SOIL CHARACTERISTICS FOR BOREHOLE NO.: – BH – 15**

Project: Topographical Survey & Soil Investigation for 1\*50MWp Solar PV Project, NTPC, Mandsour. Dist : Mandsour. State : Madhya Pradesh.

W.T. below G.L. (m) : Not met With  
Termination depth (m) : 5.00

Name of Customer: Bharat Heavy Electricals Limited., Hyderabad.

DEPTH (m)	SAMPLE TYPE	SPT – N Value	SPECIFIC GRAVITY (IS: 2720(P:3-1/2))	INSITU BULK UNIT WT (gm/cm <sup>3</sup> )	INSITU DRY UNIT WEIGHT (gm/cm <sup>3</sup> ) (IS: 2720(P:29))	INSITU WATER CONTENT (%) (IS: 2720(P:2))	SIEVE ANALYSIS 2720(P:4)			ATTERBERGS LIMITS (IS: 2720(P:5))			I.S. CLASSIFICATION (IS: 1498)	TYPE OF SHEAR TEST (IS: 2720(P/11/13))	COHESION C <sub>v</sub> kg/cm <sup>2</sup>	ANGLE OF INT. FRICTION, φ (°)	COMPRESSION INDEX, C <sub>c</sub> (IS: 2720(P:15))	SHRINKAGE LIMIT (%) (IS: 2720(P:6))	FREE SWELL (%) (IS: 2720(P:40))	SWELLING PRESSURE (kg/cm <sup>2</sup> ) (IS: 2720(P:41))	UNCONFINED COMPRESSIVE STRENGTH (kg/cm <sup>2</sup> ) (IS: 2720(P:10))		
							GRAVEL (%)	% SAND			SILT & CLAY (%)	LIQUID LIMIT (%)										PLASTIC LIMIT (%)	PLASTICITY INDEX, IP (%)
								COARSE	MED.	FINE													
0.00	DS	-	-	-	-	-	47	9	15	11	18	-	NP	-	GM	-	-	-	-	-	-	-	
1.00	SPT	Ref.	-	-	-	-	----- Weathered basalt in form of rock pieces -----																
2.00	SPT	Ref.	-	-	-	-	----- Weathered basalt in form of rock pieces -----																
3.00	SPT	Ref.	-	-	-	-	----- Weathered basalt in form of rock pieces -----																
4.00	SPT	Ref.	-	-	-	-	----- Weathered basalt in form of rock pieces -----																
5.00	SPT	Ref.	-	-	-	-	----- Weathered basalt in form of rock pieces -----																

**JOB NO. : MK/29/05-16 M.K. SOIL TESTING LABORATORY. AHMEDABAD – 380054**

**Table No: 5/16 SOIL CHARACTERISTICS FOR BOREHOLE NO.: – BH – 16**

Project: Topographical Survey & Soil Investigation for 1\*50MWp Solar PV Project, NTPC, Mandsour. Dist : Mandsour. State : Madhya Pradesh.

W.T. below G.L. (m) : Not met With  
Termination depth (m) : 5.00

Name of Customer: Bharat Heavy Electricals Limited., Hyderabad.

DEPTH (m)	SAMPLE TYPE	SPT – N Value	SPECIFIC GRAVITY (IS: 2720(P:3-1/2))	INSITU BULK UNIT WT (gm/cm <sup>3</sup> )	INSITU DRY UNIT WEIGHT (gm/cm <sup>3</sup> ) (IS: 2720(P:29))	INSITU WATER CONTENT (%) (IS: 2720(P:2))	SIEVE ANALYSIS 2720(P:4)				ATTERBERGS LIMITS (IS: 2720(P:5))			I.S. CLASSIFICATION (IS: 1498)	TYPE OF SHEAR TEST (IS: 2720(P/1/13))	COHESION C, kg/cm <sup>2</sup>	ANGLE OF INT. FRICTION, φ ( ° )	COMPRESSION INDEX, C <sub>c</sub> (IS: 2720(P:15))	SHRINKAGE LIMIT(%) (IS: 2720(P:6))	FREE SWELL (%) (IS: 2720(P:40))	SWELLING PRESSURE (kg/cm <sup>2</sup> ) (IS: 2720(P:41))	UNCONFINED COMPRESSIVE STRENGTH (kg/cm <sup>2</sup> ) (IS: 2720(P:10))	
							GRAVEL (%)	% SAND			SILT & CLAY (%)	LIQUID LIMIT (%)	PLASTIC LIMIT (%)										PLASTICITY INDEX, IP (%)
								COARSE	MED.	FINE													
0.00	DS	-	-	-	-	-	30	12	20	16	22	-	NP	-	SM	-	-	-	-	-	-	-	
1.00	SPT	Ref.	-	-	-	-	----- Weathered basalt in form of rock pieces -----																
2.00	SPT	Ref.	-	-	-	-	----- Weathered basalt in form of rock pieces -----																
3.00	SPT	Ref.	-	-	-	-	----- Weathered basalt in form of rock pieces -----																
4.00	SPT	Ref.	-	-	-	-	----- Weathered basalt in form of rock pieces -----																
5.00	SPT	Ref.	-	-	-	-	----- Weathered basalt in form of rock pieces -----																

**JOB NO. : MK/29/05-16 M.K. SOIL TESTING LABORATORY. AHMEDABAD – 380054**

**Table No: 5/17 SOIL CHARACTERISTICS FOR BOREHOLE NO.: – BH – 17**

Project: Topographical Survey & Soil Investigation for 1\*50MWp Solar PV Project, NTPC, Mandsour. Dist : Mandsour. State : Madhya Pradesh.

W.T. below G.L. (m) : Not met With  
Termination depth (m) : 5.00

Name of Customer: Bharat Heavy Electricals Limited., Hyderabad.

DEPTH (m)	SAMPLE TYPE	SPT – N Value	SPECIFIC GRAVITY (IS: 2720(P:3-1/2))	INSITU BULK UNIT WT (gm/cm <sup>3</sup> )	INSITU DRY UNIT WEIGHT (gm/cm <sup>3</sup> ) (IS: 2720(P:29))	INSITU WATER CONTENT (%) (IS: 2720(P:2))	SIEVE ANALYSIS 2720(P:4)				ATTERBERGS LIMITS (IS: 2720(P:5))			I.S. CLASSIFICATION (IS: 1498)	TYPE OF SHEAR TEST (IS: 2720(P/1/1/3))	COHESION C, kg/cm <sup>2</sup>	ANGLE OF INT. FRICTION, φ ( ° )	COMPRESSION INDEX, Cc (IS: 2720(P:15))	SHRINKAGE LIMIT(%) (IS: 2720(P:6))	FREE SWELL (%) (IS: 2720(P:40))	SWELLING PRESSURE (kg/cm <sup>2</sup> ) (IS: 2720(P:41))	UNCONFINED COMPRESSIVE STRENGTH (kg/cm <sup>2</sup> ) (IS: 2720(P:10))	
							GRAVEL (%)	% SAND			SILT & CLAY (%)	LIQUID LIMIT (%)	PLASTIC LIMIT (%)										PLASTICITY INDEX, IP (%)
								COARSE	MED.	FINE													
0.00	DS	-	-	-	-	-	8	10	10	6	66	54	24	30	CH	-	-	-	-	9.0	48	-	-
1.00	SPT	37	-	-	-	-	15	6	7	4	68	60	31	29	CH	-	-	-	-	8.8	55	-	-
3.00	SPT	Ref.	-	-	-	-	----- Weathered basalt in form of rock pieces -----																
4.00	SPT	Ref.	-	-	-	-	----- Weathered basalt in form of rock pieces -----																
5.00	SPT	Ref.	-	-	-	-	----- Weathered basalt in form of rock pieces -----																

**JOB NO. : MK/29/05-16 M.K. SOIL TESTING LABORATORY. AHMEDABAD – 380054**
**Table No: 5/18 SOIL CHARACTERISTICS FOR BOREHOLE NO.: – BH – 18**

Project: Topographical Survey &amp; Soil Investigation for 1\*50MWp Solar PV Project, NTPC, Mandsour. Dist : Mandsour. State : Madhya Pradesh.

 W.T. below G.L. (m) : Not met With  
 Termination depth (m) : 5.00

Name of Customer: Bharat Heavy Electricals Limited., Hyderabad.

DEPTH (m)	SAMPLE TYPE	SPT – N Value	SPECIFIC GRAVITY (IS: 2720(P:3-1/2))	INSITU BULK UNIT WT (gm/cm <sup>3</sup> )	INSITU DRY UNIT WEIGHT (gm/cm <sup>3</sup> ) (IS: 2720(P:29))	INSITU WATER CONTENT (%) (IS: 2720(P:2))	SIEVE ANALYSIS 2720(P:4)				ATTERBERGS LIMITS (IS: 2720(P:5))			I.S. CLASSIFICATION (IS: 1498)	TYPE OF SHEAR TEST (IS: 2720(P/11/13))	COHESION C, kg/cm <sup>2</sup>	ANGLE OF INT. FRICTION, $\phi$ (°)	COMPRESSION INDEX, C <sub>c</sub> (IS: 2720(P:15))	SHRINKAGE LIMIT(%) (IS: 2720(P:6))	FREE SWELL (%) (IS: 2720(P:40))	SWELLING PRESSURE (kg/cm <sup>2</sup> ) (IS: 2720(P:41))	UNCONFINED COMPRESSIVE STRENGTH (kg/cm <sup>2</sup> ) (IS: 2720(P:10))	
							GRAVEL (%)	% SAND			SILT & CLAY (%)	LIQUID LIMIT (%)	PLASTIC LIMIT (%)										PLASTICITY INDEX, IP (%)
								COARSE	MED.	FINE													
0.00	DS	-	-	-	-	-	6	3	5	3	83	63	25	38	CH	-	-	-	-	8.6	60	-	-
1.00	SPT	29	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2.00	SPT	39	-	-	-	-	8	5	4	20	63	58	26	32	CH	-	-	-	-	8.9	50	-	-
3.00	SPT	Ref.	-	-	-	-	----- Weathered basalt in form of rock pieces -----																
4.00	SPT	Ref.	-	-	-	-	----- Weathered basalt in form of rock pieces -----																
5.00	SPT	Ref.	-	-	-	-	----- Weathered basalt in form of rock pieces -----																

**JOB NO. : MK/29/05-16 M.K. SOIL TESTING LABORATORY. AHMEDABAD – 380054**

**Table No: 5/19 SOIL CHARACTERISTICS FOR BOREHOLE NO.: – BH – 19**

Project: Topographical Survey & Soil Investigation for 1\*50MWp Solar PV Project, NTPC, Mandsour. Dist : Mandsour. State : Madhya Pradesh.

W.T. below G.L. (m) : Not met With  
Termination depth (m) : 5.00

Name of Customer: Bharat Heavy Electricals Limited., Hyderabad.

DEPTH (m)	SAMPLE TYPE	SPT – N Value	SPECIFIC GRAVITY (IS: 2720(P:3-1/2))	INSITU BULK UNIT WT (gm/cm <sup>3</sup> )	INSITU DRY UNIT WEIGHT (gm/cm <sup>3</sup> ) (IS: 2720(P:29))	INSITU WATER CONTENT (%) (IS: 2720(P:2))	SIEVE ANALYSIS 2720(P:4)				ATTERBERGS LIMITS (IS: 2720(P:5))			I.S. CLASSIFICATION (IS: 1498)	TYPE OF SHEAR TEST (IS: 2720(P/11/13))	COHESION C, kg/cm <sup>2</sup>	ANGLE OF INT. FRICTION, φ ( ° )	COMPRESSION INDEX, C <sub>c</sub> (IS: 2720(P:15))	SHRINKAGE LIMIT(%) (IS: 2720(P:6))	FREE SWELL (%) (IS: 2720(P:40))	SWELLING PRESSURE (kg/cm <sup>2</sup> ) (IS: 2720(P:41))	UNCONFINED COMPRESSIVE STRENGTH (kg/cm <sup>2</sup> ) (IS: 2720(P:10))	
							GRAVEL (%)	% SAND			SILT & CLAY (%)	LIQUID LIMIT (%)	PLASTIC LIMIT (%)										PLASTICITY INDEX, IP (%)
								COARSE	MED.	FINE													
0.00	DS	-	-	-	-	-	2	6	8	11	73	52	25	27	CH	-	-	-	-	9.0	45	-	-
1.00	SPT	Ref.	-	-	-	-	----- Weathered basalt in form of rock pieces -----																
2.00	SPT	Ref.	-	-	-	-	----- Weathered basalt in form of rock pieces -----																
3.00	SPT	Ref.	-	-	-	-	----- Weathered basalt in form of rock pieces -----																
4.00	SPT	Ref.	-	-	-	-	----- Weathered basalt in form of rock pieces -----																
5.00	SPT	Ref.	-	-	-	-	----- Weathered basalt in form of rock pieces -----																

**JOB NO. : MK/29/05-16 M.K. SOIL TESTING LABORATORY. AHMEDABAD – 380054**

**Table No: 5/20 SOIL CHARACTERISTICS FOR BOREHOLE NO.: – BH – 20**

Project: Topographical Survey & Soil Investigation for 1\*50MWp Solar PV Project, NTPC, Mandsour. Dist : Mandsour. State : Madhya Pradesh.

W.T. below G.L. (m) : Not met With  
Termination depth (m) : 5.00

Name of Customer: Bharat Heavy Electricals Limited., Hyderabad.

DEPTH (m)	SAMPLE TYPE	SPT – N Value	SPECIFIC GRAVITY (IS: 2720(P:3-1/2))	INSITU BULK UNIT WT (gm/cm <sup>3</sup> )	INSITU DRY UNIT WEIGHT (gm/cm <sup>3</sup> ) (IS: 2720(P:29))	INSITU WATER CONTENT (%) (IS: 2720(P:2))	SIEVE ANALYSIS 2720(P:4)				ATTERBERGS LIMITS (IS: 2720(P:5))			I.S. CLASSIFICATION (IS: 1498)	TYPE OF SHEAR TEST (IS: 2720(P/11/13))	COHESION C, kg/cm <sup>2</sup>	ANGLE OF INT. FRICTION, $\phi$ (°)	COMPRESSION INDEX, C <sub>c</sub> (IS: 2720(P:15))	SHRINKAGE LIMIT(%) (IS: 2720(P:6))	FREE SWELL (%) (IS: 2720(P:40))	SWELLING PRESSURE (kg/cm <sup>2</sup> ) (IS: 2720(P:41))	UNCONFINED COMPRESSIVE STRENGTH (kg/cm <sup>2</sup> ) (IS: 2720(P:10))		
							GRAVEL (%)	% SAND			SILT & CLAY (%)	LIQUID LIMIT (%)	PLASTIC LIMIT (%)										PLASTICITY INDEX, IP (%)	
								COARSE	MED.	FINE														
0.00	DS	-	-	-	-	-	8	10	10	12	60	54	26	28	CH	-	-	-	-	8.8	55	-	-	
1.00	SPT	Ref.	-	-	-	-	----- Weathered basalt in form of rock pieces -----																	
2.00	SPT	Ref.	-	-	-	-	----- Weathered basalt in form of rock pieces -----																	
3.00	SPT	Ref.	-	-	-	-	----- Weathered basalt in form of rock pieces -----																	
4.00	SPT	Ref.	-	-	-	-	----- Weathered basalt in form of rock pieces -----																	
5.00	SPT	Ref.	-	-	-	-	----- Weathered basalt in form of rock pieces -----																	

**JOB NO. : MK/29/05-16 M.K. SOIL TESTING LABORATORY. AHMEDABAD – 380054**

**Table No: 5/21 SOIL CHARACTERISTICS FOR BOREHOLE NO.: – BH – 21**

Project: Topographical Survey & Soil Investigation for 1\*50MWp Solar PV Project, NTPC, Mandsour. Dist : Mandsour. State : Madhya Pradesh.

W.T. below G.L. (m) : Not met With  
Termination depth (m) : 5.00

Name of Customer: Bharat Heavy Electricals Limited., Hyderabad.

DEPTH (m)	SAMPLE TYPE	SPT – N Value	SPECIFIC GRAVITY (IS: 2720(P:3-1/2))	INSITU BULK UNIT WT (gm/cm <sup>3</sup> )	INSITU DRY UNIT WEIGHT (gm/cm <sup>3</sup> ) (IS: 2720(P:29))	INSITU WATER CONTENT (%) (IS: 2720(P:2))	SIEVE ANALYSIS 2720(P:4)				ATTERBERGS LIMITS (IS: 2720(P:5))			I.S. CLASSIFICATION (IS: 1498)	TYPE OF SHEAR TEST (IS: 2720(P/11/13))	COHESION C, kg/cm <sup>2</sup>	ANGLE OF INT. FRICTION, φ ( ° )	COMPRESSION INDEX, Cc (IS: 2720(P:15))	SHRINKAGE LIMIT(%) (IS: 2720(P:6))	FREE SWELL (%) (IS: 2720(P:40))	SWELLING PRESSURE (kg/cm <sup>2</sup> ) (IS: 2720(P:41))	UNCONFINED COMPRESSIVE STRENGTH (kg/cm <sup>2</sup> ) (IS: 2720(P:10))	
							GRAVEL (%)	% SAND			SILT & CLAY (%)	LIQUID LIMIT (%)	PLASTIC LIMIT (%)										PLASTICITY INDEX, IP (%)
								COARSE	MED.	FINE													
0.00	DS	-	-	-	-	-	37	8	13	12	30	42	25	17	GC	-	-	-	-	10.8	35	-	-
1.00	SPT	Ref.	-	-	-	-	----- Weathered basalt in form of rock pieces -----																
2.00	SPT	Ref.	-	-	-	-	----- Weathered basalt in form of rock pieces -----																
3.00	SPT	Ref.	-	-	-	-	----- Weathered basalt in form of rock pieces -----																
4.00	SPT	Ref.	-	-	-	-	----- Weathered basalt in form of rock pieces -----																
5.00	SPT	Ref.	-	-	-	-	----- Weathered basalt in form of rock pieces -----																

**JOB NO. : MK/29/05-16 M.K. SOIL TESTING LABORATORY. AHMEDABAD – 380054**

**Table No: 5/21 SOIL CHARACTERISTICS FOR BOREHOLE NO.: – BH – 21**

Project: Topographical Survey & Soil Investigation for 1\*50MWp Solar PV Project, NTPC, Mandsour. Dist : Mandsour. State : Madhya Pradesh.

W.T. below G.L. (m) : Not met With  
Termination depth (m) : 5.00

Name of Customer: Bharat Heavy Electricals Limited., Hyderabad.

DEPTH (m)	SAMPLE TYPE	SPT – N Value	SPECIFIC GRAVITY (IS: 2720(P:3-1/2))	INSITU BULK UNIT WT (gm/cm <sup>3</sup> )	INSITU DRY UNIT WEIGHT (gm/cm <sup>3</sup> ) (IS: 2720(P:29))	INSITU WATER CONTENT (%) (IS: 2720(P:2))	SIEVE ANALYSIS 2720(P:4)				ATTERBERGS LIMITS (IS: 2720(P:5))			I.S. CLASSIFICATION (IS: 1498)	TYPE OF SHEAR TEST (IS: 2720(P/11/13))	COHESION C, kg/cm <sup>2</sup>	ANGLE OF INT. FRICTION, φ ( ° )	COMPRESSION INDEX, Cc (IS: 2720(P:15))	SHRINKAGE LIMIT(%) (IS: 2720(P:6))	FREE SWELL (%) (IS: 2720(P:40))	SWELLING PRESSURE (kg/cm <sup>2</sup> ) (IS: 2720(P:41))	UNCONFINED COMPRESSIVE STRENGTH (kg/cm <sup>2</sup> ) (IS: 2720(P:10))	
							GRAVEL (%)	% SAND			SILT & CLAY (%)	LIQUID LIMIT (%)	PLASTIC LIMIT (%)										PLASTICITY INDEX, IP (%)
								COARSE	MED.	FINE													
0.00	DS	-	-	-	-	-	37	8	13	12	30	42	25	17	GC	-	-	-	-	10.4	35	-	-
1.00	SPT	Ref.	-	-	-	-	----- Weathered basalt in form of rock pieces -----																
2.00	SPT	Ref.	-	-	-	-	----- Weathered basalt in form of rock pieces -----																
3.00	SPT	Ref.	-	-	-	-	----- Weathered basalt in form of rock pieces -----																
4.00	SPT	Ref.	-	-	-	-	----- Weathered basalt in form of rock pieces -----																
5.00	SPT	Ref.	-	-	-	-	----- Weathered basalt in form of rock pieces -----																

**JOB NO. : MK/29/05-16 M.K. SOIL TESTING LABORATORY. AHMEDABAD – 380054**

**Table No: 5/22 SOIL CHARACTERISTICS FOR BOREHOLE NO.: – BH – 22**

Project: Topographical Survey & Soil Investigation for 1\*50MWp Solar PV Project, NTPC, Mandsour. Dist : Mandsour. State : Madhya Pradesh.

W.T. below G.L. (m) : Not met With  
Termination depth (m) : 5.00

Name of Customer: Bharat Heavy Electricals Limited., Hyderabad.

DEPTH (m)	SAMPLE TYPE	SPT – N Value	SPECIFIC GRAVITY (IS: 2720(P:3-1/2))	INSITU BULK UNIT WT (gm/cm <sup>3</sup> )	INSITU DRY UNIT WEIGHT (gm/cm <sup>3</sup> ) (IS: 2720(P:29))	INSITU WATER CONTENT (%) (IS: 2720(P:2))	SIEVE ANALYSIS 2720(P:4)				ATTERBERGS LIMITS (IS: 2720(P:5))			I.S. CLASSIFICATION (IS: 1498)	TYPE OF SHEAR TEST (IS: 2720(P/11/13))	COHESION C, kg/cm <sup>2</sup>	ANGLE OF INT. FRICTION, φ ( ° )	COMPRESSION INDEX, Cc (IS: 2720(P:15))	SHRINKAGE LIMIT(%) (IS: 2720(P:6))	FREE SWELL (%) (IS: 2720(P:40))	SWELLING PRESSURE (kg/cm <sup>2</sup> ) (IS: 2720(P:41))	UNCONFINED COMPRESSIVE STRENGTH (kg/cm <sup>2</sup> ) (IS: 2720(P:10))	
							GRAVEL (%)	% SAND			SILT & CLAY (%)	LIQUID LIMIT (%)	PLASTIC LIMIT (%)										PLASTICITY INDEX, IP (%)
								COARSE	MED.	FINE													
0.00	DS	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
1.00	SPT	36	-	-	-	-	15	7	9	9	60	48	24	24	CI	-	-	-	-	9.4	40	-	-
2.00	SPT	Ref.	-	-	-	-	----- Weathered basalt in form of rock pieces -----																
3.00	SPT	Ref.	-	-	-	-	----- Weathered basalt in form of rock pieces -----																
4.00	SPT	Ref.	-	-	-	-	----- Weathered basalt in form of rock pieces -----																
5.00	SPT	Ref.	-	-	-	-	----- Weathered basalt in form of rock pieces -----																

**JOB NO. : MK/29/05-16 M.K. SOIL TESTING LABORATORY. AHMEDABAD – 380054**

**Table No: 5/23 SOIL CHARACTERISTICS FOR TRIALPIT NO.: – TP – 1**

Project: Topographical Survey & Soil Investigation for 1\*50MWp Solar PV Project, NTPC, Mandsour. Dist : Mandsour. State : Madhya Pradesh.

W.T. below G.L. (m) : Not met With  
Termination depth (m) : 1.50

Name of Customer: Bharat Heavy Electricals Limited., Hyderabad.

DEPTH (m)	SAMPLE TYPE	SPT – N Value	SPECIFIC GRAVITY (IS: 2720(P:3-1/2))	INSITU BULK UNIT WT (gm/cm <sup>3</sup> )	INSITU DRY UNIT WEIGHT (gm/cm <sup>3</sup> ) (IS: 2720(P:29))	INSITU WATER CONTENT (%) (IS: 2720(P:2))	SIEVE ANALYSIS 2720(P:4)				ATTERBERGS LIMITS (IS: 2720(P:5))			I.S. CLASSIFICATION (IS: 1498)	TYPE OF SHEAR TEST (IS: 2720(P/11/13))	COHESION C, kg/cm <sup>2</sup>	ANGLE OF INT. FRICTION, $\phi$ (°)	COMPRESSION INDEX, C <sub>c</sub> (IS: 2720(P:15))	SHRINKAGE LIMIT(%) (IS: 2720(P:6))	FREE SWELL (%) (IS: 2720(P:40))	SWELLING PRESSURE (kg/cm <sup>2</sup> ) (IS: 2720(P:41))	UNCONFINED COMPRESSIVE STRENGTH (kg/cm <sup>2</sup> ) (IS: 2720(P:10))	
							GRAVEL (%)	% SAND			SILT & CLAY (%)	LIQUID LIMIT (%)	PLASTIC LIMIT (%)										PLASTICITY INDEX, IP (%)
								COARSE	MED.	FINE													
0.00	DS	-	-	-	-	-	2	4	8	28	58	52	25	27	CH	-	-	-	-	9.3	45	-	-
1.00	DS	-	-	-	-	-	4	6	9	27	54	51	26	25	CH	-	-	-	-	9.6	45	-	-
1.50	DS	-	-	-	-	-	----- Weathered rock -----																

**JOB NO. : MK/29/05-16 M.K. SOIL TESTING LABORATORY. AHMEDABAD – 380054**

**Table No: 5/24 SOIL CHARACTERISTICS FOR TRIALPIT NO.: – TP – 2**

Project: Topographical Survey & Soil Investigation for 1\*50MWp Solar PV Project, NTPC, Mandsour. Dist : Mandsour. State : Madhya Pradesh.

W.T. below G.L. (m) : Not met With  
Termination depth (m) : 1.50

Name of Customer: Bharat Heavy Electricals Limited., Hyderabad.

DEPTH (m)	SAMPLE TYPE	SPT – N Value	SPECIFIC GRAVITY (IS: 2720(P:3-1/2))	INSITU BULK UNIT WT (gm/cm <sup>3</sup> )	INSITU DRY UNIT WEIGHT (gm/cm <sup>3</sup> ) (IS: 2720(P:29))	INSITU WATER CONTENT (%) (IS: 2720(P:2))	SIEVE ANALYSIS 2720(P:4)				ATTERBERGS LIMITS (IS: 2720(P:5))			I.S. CLASSIFICATION (IS: 1498)	TYPE OF SHEAR TEST (IS: 2720(P/11/13))	COHESION C, kg/cm <sup>2</sup>	ANGLE OF INT. FRICTION, $\phi$ (°)	COMPRESSION INDEX, C <sub>c</sub> (IS: 2720(P:15))	SHRINKAGE LIMIT(%) (IS: 2720(P:6))	FREE SWELL (%) (IS: 2720(P:40))	SWELLING PRESSURE (kg/cm <sup>2</sup> ) (IS: 2720(P:41))	UNCONFINED COMPRESSIVE STRENGTH (kg/cm <sup>2</sup> ) (IS: 2720(P:10))		
							GRAVEL (%)	% SAND			SILT & CLAY (%)	LIQUID LIMIT (%)	PLASTIC LIMIT (%)										PLASTICITY INDEX, IP (%)	
								COARSE	MED.	FINE														
0.00	DS	-	-	-	-	-	4	8	15	37	36	40	20	20	SC	-	-	-	-	-	30	-	-	
1.00	DS	-	-	-	-	-	----- Weathered rock -----																	
1.50	DS	-	-	-	-	-	----- Weathered rock -----																	

**JOB NO. : MK/29/05-16 M.K. SOIL TESTING LABORATORY. AHMEDABAD – 380054**

**Table No: 5/25 SOIL CHARACTERISTICS FOR TRIALPIT NO.: – TP – 3**

Project: Topographical Survey & Soil Investigation for 1\*50MWp Solar PV Project, NTPC, Mandsour. Dist : Mandsour. State : Madhya Pradesh.

W.T. below G.L. (m) : Not met With  
Termination depth (m) : 1.30

Name of Customer: Bharat Heavy Electricals Limited., Hyderabad.

DEPTH (m)	SAMPLE TYPE	SPT – N Value	SPECIFIC GRAVITY (IS: 2720(P:3-1/2))	INSITU BULK UNIT WT (gm/cm <sup>3</sup> )	INSITU DRY UNIT WEIGHT (gm/cm <sup>3</sup> ) (IS: 2720(P:29))	INSITU WATER CONTENT (%) (IS: 2720(P:2))	SIEVE ANALYSIS 2720(P:4)			SILT & CLAY (%)	ATTERBERGS LIMITS (IS: 2720(P:5))			I.S. CLASSIFICATION (IS: 1498)	TYPE OF SHEAR TEST (IS: 2720(P/11/13))	COHESION C, kg/cm <sup>2</sup>	ANGLE OF INT. FRICTION, φ ( ° )	COMPRESSION INDEX, Cc (IS: 2720(P:15))	SHRINKAGE LIMIT(%) (IS: 2720(P:6))	FREE SWELL (%) (IS: 2720(P:40))	SWELLING PRESSURE (kg/cm <sup>2</sup> ) (IS: 2720(P:41))	UNCONFINED COMPRESSIVE STRENGTH (kg/cm <sup>2</sup> ) (IS: 2720(P:10))	
							GRAVEL (%)	% SAND			LIQUID LIMIT (%)	PLASTIC LIMIT (%)	PLASTICITY INDEX, IP (%)										
								COARSE	MED.														FINE
0.00	DS	-	-	-	-	-	----- Weathered rock -----																
1.30	DS	-	-	-	-	-	----- Weathered rock -----																

**JOB NO. : MK/29/05-16 M.K. SOIL TESTING LABORATORY. AHMEDABAD – 380054**

**Table No: 5/26 SOIL CHARACTERISTICS FOR TRIALPIT NO.: – TP – 4**

Project: Topographical Survey & Soil Investigation for 1\*50MWp Solar PV Project, NTPC, Mandsour. Dist : Mandsour. State : Madhya Pradesh.

W.T. below G.L. (m) : Not met With  
Termination depth (m) : 1.10

Name of Customer: Bharat Heavy Electricals Limited., Hyderabad.

DEPTH (m)	SAMPLE TYPE	SPT – N Value	SPECIFIC GRAVITY (IS: 2720(P:3-1/2))	INSITU BULK UNIT WT (gm/cm <sup>3</sup> )	INSITU DRY UNIT WEIGHT (gm/cm <sup>3</sup> ) (IS: 2720(P:29))	INSITU WATER CONTENT (%) (IS: 2720(P:2))	SIEVE ANALYSIS 2720(P:4)				ATTERBERGS LIMITS (IS: 2720(P:5))			I.S. CLASSIFICATION (IS: 1498)	TYPE OF SHEAR TEST (IS: 2720(P/11/13))	COHESION C, kg/cm <sup>2</sup>	ANGLE OF INT. FRICTION, φ ( ° )	COMPRESSION INDEX, Cc (IS: 2720(P:15))	SHRINKAGE LIMIT(%) (IS: 2720(P:6))	FREE SWELL (%) (IS: 2720(P:40))	SWELLING PRESSURE (kg/cm <sup>2</sup> ) (IS: 2720(P:41))	UNCONFINED COMPRESSIVE STRENGTH (kg/cm <sup>2</sup> ) (IS: 2720(P:10))	
							GRAVEL (%)	% SAND			SILT & CLAY (%)	LIQUID LIMIT (%)	PLASTIC LIMIT (%)										PLASTICITY INDEX, IP (%)
								COARSE	MED.	FINE													
0.00	DS	-	-	-	-	-	4	8	15	5	68	54	26	28	CH	-	-	-	-	9.1	50	-	-
1.10	DS	-	-	-	-	-	----- Weathered rock -----																

**JOB NO. : MK/29/05-16 M.K. SOIL TESTING LABORATORY. AHMEDABAD – 380054**

**Table No: 5/27 SOIL CHARACTERISTICS FOR TRIALPIT NO.: – TP – 5**

Project: Topographical Survey & Soil Investigation for 1\*50MWp Solar PV Project, NTPC, Mandsour. Dist : Mandsour. State : Madhya Pradesh.

W.T. below G.L. (m) : Not met With  
Termination depth (m) : 1.20

Name of Customer: Bharat Heavy Electricals Limited., Hyderabad.

DEPTH (m)	SAMPLE TYPE	SPT – N Value	SPECIFIC GRAVITY (IS: 2720(P:3-1/2))	INSITU BULK UNIT WT (gm/cm <sup>3</sup> )	INSITU DRY UNIT WEIGHT (gm/cm <sup>3</sup> ) (IS: 2720(P:29))	INSITU WATER CONTENT (%) (IS: 2720(P:2))	SIEVE ANALYSIS 2720(P:4)				ATTERBERGS LIMITS (IS: 2720(P:5))			I.S. CLASSIFICATION (IS: 1498)	TYPE OF SHEAR TEST (IS: 2720(P/11/13))	COHESION C, kg/cm <sup>2</sup>	ANGLE OF INT. FRICTION, φ ( ° )	COMPRESSION INDEX, Cc (IS: 2720(P:15))	SHRINKAGE LIMIT(%) (IS: 2720(P:6))	FREE SWELL (%) (IS: 2720(P:40))	SWELLING PRESSURE (kg/cm <sup>2</sup> ) (IS: 2720(P:41))	UNCONFINED COMPRESSIVE STRENGTH (kg/cm <sup>2</sup> ) (IS: 2720(P:10))	
							GRAVEL (%)	% SAND			SILT & CLAY (%)	LIQUID LIMIT (%)	PLASTIC LIMIT (%)										PLASTICITY INDEX, IP (%)
								COARSE	MED.	FINE													
0.00	DS	-	-	-	-	-	----- Weathered rock -----																
1.00	DS	-	-	-	-	-	----- Weathered rock -----																
1.20	DS	-	-	-	-	-	----- Weathered rock -----																

**Table No. 6 California Bearing Ratio Test**

Project: Topographical Survey & Soil Investigation for 1\*50MWp Solar PV Project, NTPC, Mandour. Dist : Mandour. State : Madhya Pradesh.

Client : Bharat Heavy Electricals Limited., Hyderabad.

CBR SAMPLE NO.	SAMPLE TYPE	DEPTH (MTR.)	SIEVE ANALYSIS 2720(P:4)					ATTEBERG'S LIMITS (IS: 2720(P:5))			I.S. CLASSIFICATION (IS: 1498)	MODIFIED PROCTOR TEST RESULTS		CBR TEST RESULTS (%)	
			GRAVEL (%)	% SAND			SILT & CLAY (%)	LIQUID LIMIT (%)	PLASTIC LIMIT (%)	PLASTICITY INDEX, (%)		MAXIMUM DRY DENSITY (g/cc)	OPTIMUM MOISTURE CONTENT (%)	SOAKED CBR	UNSOAKED CBR
				COARSE	MED.	FINE									
1	DS	0.30	30	11	19	20	20	48	23	25	SC	1.92	13.0	16.9	21.4
2	DS	0.30	40	11	10	10	29	55	30	25	GC	1.98	14.0	17.8	25.0
3	DS	0.30	17	6	20	6	51	54	26	28	CH	1.87	16.2	10.0	14.8
4	DS	0.30	40	15	10	10	25	40	20	20	GC	2.0	13.5	18.5	25.4
5	DS	0.30	45	11	7	14	23	-	-	NP	GM	2.15	8.7	21.2	28.4
6	DS	0.30	39	5	9	5	42	53	24	29	GC	1.96	12.8	17.7	22.6
7	DS	0.30	42	13	12	9	24	-	-	NP	GM	2.12	8.5	21.0	28.1
8	DS	0.30	35	6	10	10	39	56	30	26	GC	1.99	12.6	17.4	22.1
9	DS	0.30	40	3	10	8	39	52	25	27	GC	1.98	12.8	17.7	23.2
10	DS	0.30	44	16	9	10	21	50	25	25	GC	1.98	12.6	18.0	24.1
11	DS	0.30	29	18	10	13	30	56	26	30	SC	1.95	13.8	16.6	20.9
12	DS	0.30	39	6	17	10	28	56	25	31	SC	1.96	13.6	16.8	21.1
13	DS	0.30	15	6	10	9	60	55	24	31	CH	1.82	17.5	7.0	8.8
14	DS	0.30	44	10	6	17	23	56	26	30	GC	2.0	12.0	17.3	21.4
15	DS	0.30	40	7	8	18	27	47	21	26	GC	2.08	12.4	17.6	21.5
16	DS	0.30	52	7	8	5	28	36	15	21	GC	2.14	11.9	19.8	23.9
17	DS	0.30	45	6	13	6	30	49	21	28	GC	2.08	12.6	18.9	22.7
18	DS	0.30	35	14	10	18	23	60	30	30	SC	1.95	13.9	14.7	18.4
19	DS	0.30	52	8	6	9	25	55	24	31	GC	1.98	12.2	17.4	23.9

**Table No. 6 California Bearing Ratio Test**  
**Page – 2**

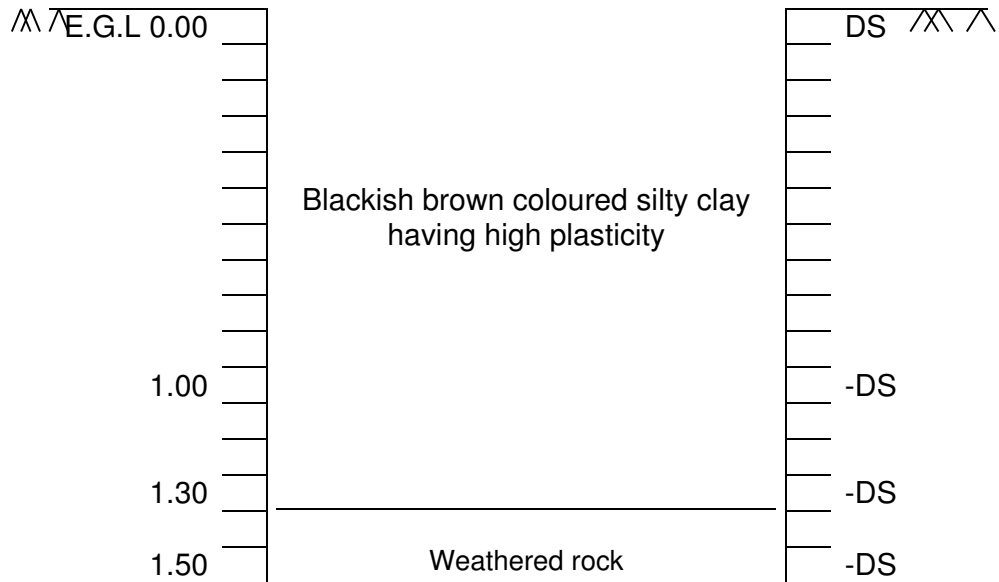
CBR SAMPLE NO.	SAMPLE TYPE	DEPTH (MTR.)	SIEVE ANALYSIS 2720(P:4)					ATTERBERGS LIMITS (IS: 2720(P:5))			I.S. CLASSIFICATION (IS: 1498)	MODIFIED PROCTOR TEST RESULTS		CBR TEST RESULTS (%)	
			GRAVEL (%)	% SAND			SILT & CLAY (%)	LIQUID LIMIT (%)	PLASTIC LIMIT (%)	PLASTICITY INDEX, (%)		MAXIMUM DRY DENSITY (g/Cc)	OPTIMUM MOISTURE CONTENT (%)	SOAKED CBR	UNSOAKED CBR
				COARSE	MED.	FINE									
20	DS	0.30	40	18	10	9	23	53	24	29	GC	1.94	12.0	16.9	23.4
21	DS	0.30	40	15	8	10	27	59	26	33	GC	1.92	12.4	17.1	23.9
22	DS	0.30	35	16	7	22	20	46	23	23	SC	1.90	13.5	15.0	17.2
23	DS	0.30	53	8	15	6	18	39	17	22	GC	2.10	11.9	18.2	22.3
24	DS	0.30	32	6	10	5	47	36	16	20	GC	1.98	11.5	17.8	21.9
25	DS	0.30	49	6	12	6	27	34	15	19	GC	2.1	11.0	18.2	23.1
26	DS	0.30	42	9	10	19	20	53	24	29	GC	2.0	12.2	16.0	21.2
27	DS	0.30	12	20	9	19	40	55	26	29	SC	1.92	13.8	13.5	17.4
28	DS	0.30	45	16	10	9	20	54	24	30	GC	1.97	12.0	16.8	22.0
29	DS	0.30	15	12	10	11	52	62	31	31	CH	1.83	17.9	6.8	9.0
30	DS	0.30	26	11	12	14	37	56	27	29	SC	1.90	15.8	14.2	17.8
31	DS	0.30	15	5	10	10	60	55	24	31	CH	1.85	17.8	7.1	9.4
32	DS	0.30	53	10	14	4	19	40	20	20	GC	1.92	11.5	17.1	23.4
33	DS	0.30	31	5	15	3	46	69	30	39	GC	1.95	13.0	14.7	20.2
34	DS	0.30	12	11	10	7	60	54	31	23	CH	1.87	17.6	7.4	9.9
35	DS	0.30	8	2	9	7	74	58	26	32	CH	1.82	18.0	7.0	9.6
36	DS	0.30	33	6	19	7	35	52	26	26	GC	2.0	10.9	19.4	25.8
37	DS	0.30	40	8	18	8	26	30	15	15	GC	2.12	10.4	19.8	26.2
38	DS	0.30	0	0	3	4	93	71	28	43	CH	1.75	16.0	5.8	7.3
39	DS	0.30	40	10	10	5	35	-	-	NP	GM	2.15	8.9	21.0	28.0
40	DS	0.30	46	6	11	5	32	49	21	28	GC	2.0	12.2	17.8	22.0

**Record of Trial Pit**

Project: Topographical Survey & Soil Investigation for 1\*50MWp Solar PV Project, NTPC, Mandsour. Dist : Mandsour. State : Madhya Pradesh.

Client : Bharat Heavy Electricals Limited., Hyderabad.

Trial Pit No	: 1	Depth of Excavation	: 1.50
Base Size Width	: 1.50x1.50x 1.50	Date of Test	: 12.5.2016
Site Location	: Mandsour	Co-ordinate	: E : 581428, N : 2664076

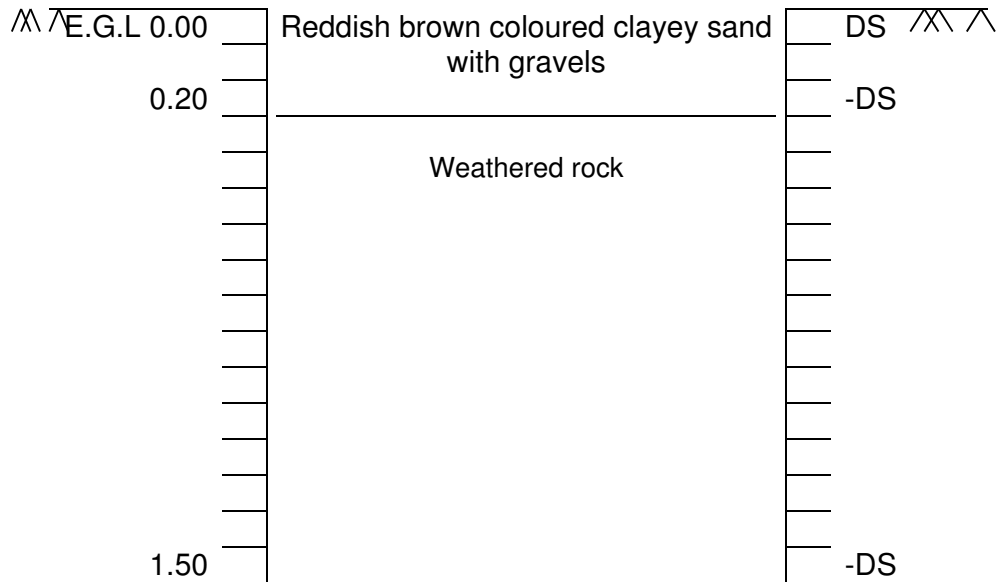


**Record of Trial Pit**

Project: Topographical Survey & Soil Investigation for 1\*50MWp Solar PV Project, NTPC, Mandsour. Dist : Mandsour. State : Madhya Pradesh.

Client : Bharat Heavy Electricals Limited., Hyderabad.

Trial Pit No	: 2	Depth of Excavation	: 1.50
Base Size Width	: 1.50x1.50x 1.50	Date of Test	: 12.5.2016
Site Location	: Mandsour	Co-ordinate	: E : 581494, N : 2664480

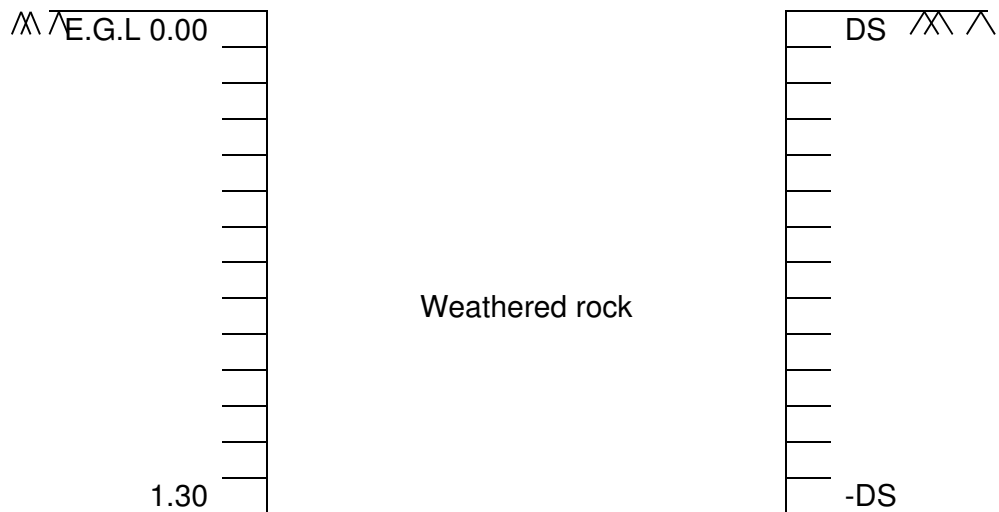


**Record of Trial Pit**

Project: Topographical Survey & Soil Investigation for 1\*50MWp Solar PV Project, NTPC, Mandsour. Dist : Mandsour. State : Madhya Pradesh.

Client : Bharat Heavy Electricals Limited., Hyderabad.

Trial Pit No	: 3	Depth of Excavation	: 1.50
Base Size Width	: 1.50x1.50x 1.30	Date of Test	: 12.5.2016
Site Location	: Mandsour	Co-ordinate	: E : 581866, N : 2664376

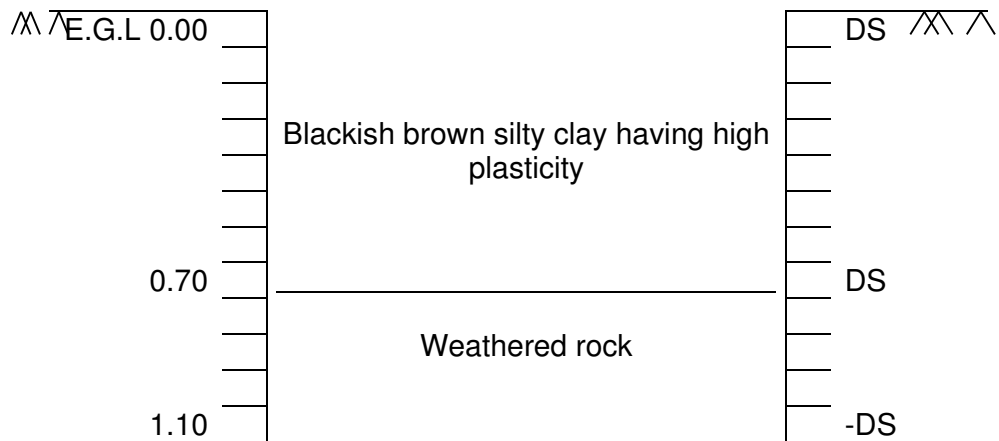


**Record of Trial Pit**

Project: Topographical Survey & Soil Investigation for 1\*50MWp Solar PV Project, NTPC, Mandsour. Dist : Mandsour. State : Madhya Pradesh.

Client : Bharat Heavy Electricals Limited., Hyderabad.

Trial Pit No	: 4	Depth of Excavation	: 1.50
Base Size Width	: 1.50x1.50x 1.10	Date of Test	: 12.5.2016
Site Location	: Mandsour	Co-ordinate	: E : 582019, N : 2663895

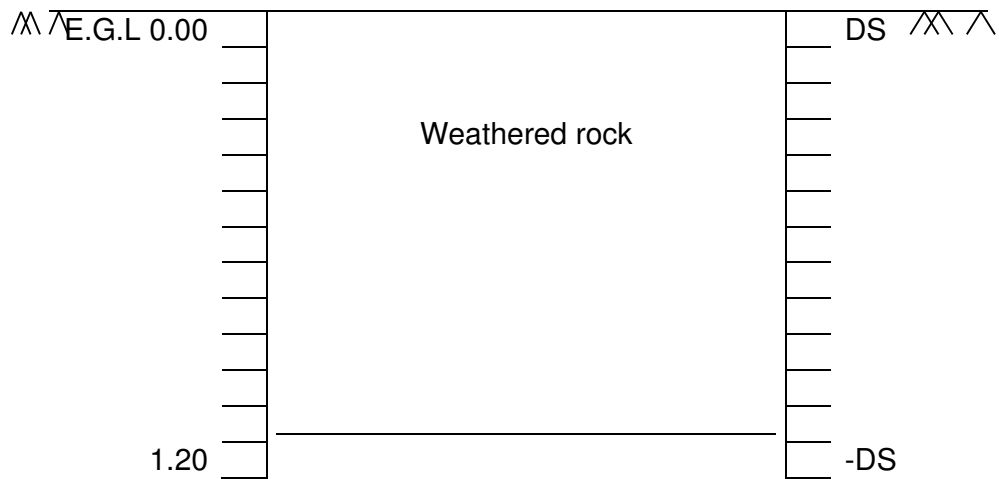


**Record of Trial Pit**

Project: Topographical Survey & Soil Investigation for 1\*50MWp Solar PV Project, NTPC, Mandsour. Dist : Mandsour. State : Madhya Pradesh.

Client : Bharat Heavy Electricals Limited., Hyderabad.

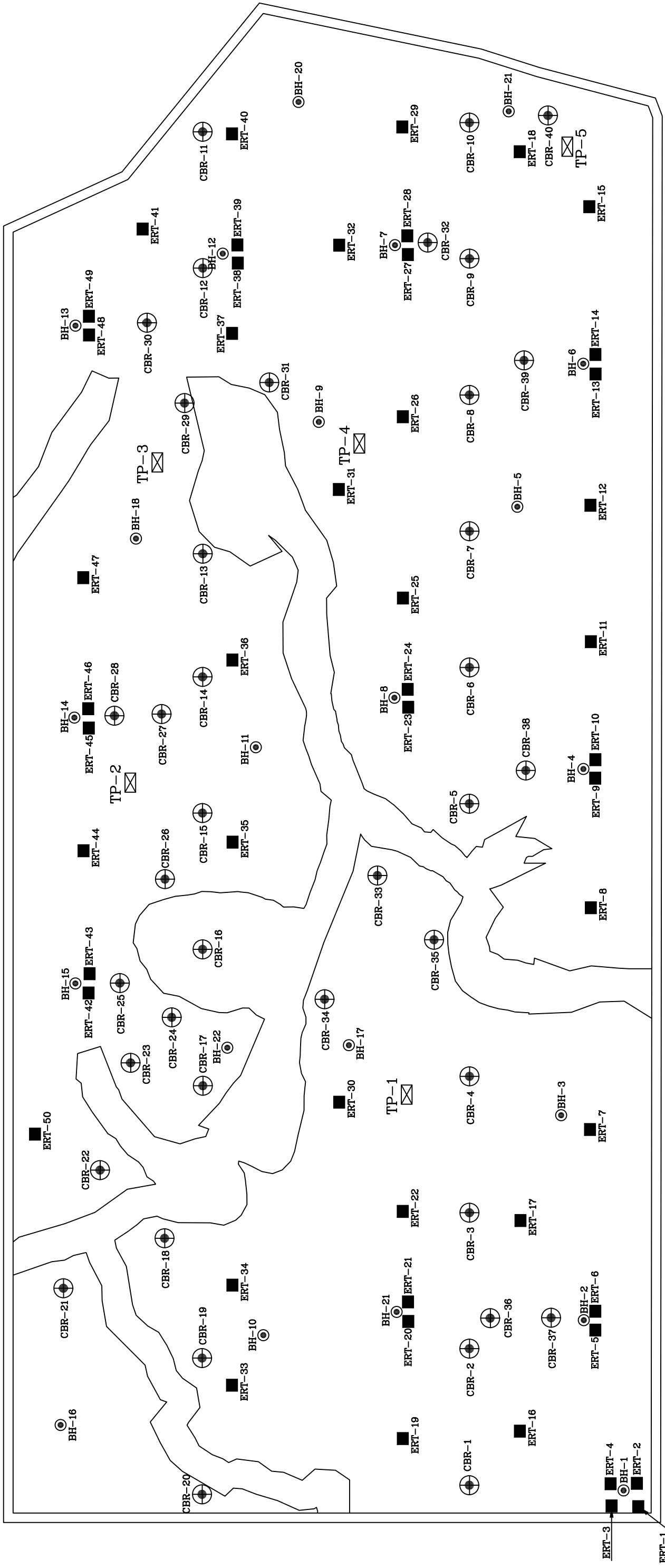
Trial Pit No	: 5	Depth of Excavation	: 1.50
Base Size Width	: 1.50x1.50x 1.20	Date of Test	: 12.5.2016
Site Location	: Mandsour	Co-ordinate	: E : 582610, N : 2664004



**ABBREVIATIONS**

DS	Disturbed Soil Sample
CS	Core sample
SBC	Safe Bearing Capacity
SPT	Standard penetration test
NP	Non Plastic
LL	Liquid Limit
PL	Plastic Limits
PI	Plasticity Index
RMR	Rock Mass Rating
CR	Core Recovery
RQD	Rock Quality Designation
SM	Silty Sand
SC	Clayey sand
GM	Silty Gravels
GC	Clayey Gravels
CWR	Completely weathered rock
Mix	Sand, soil with gravel, mix layer
BH	Borehole
Ref.	Refusal

# LOCATION PLAN



CLIENT:-

**BHARAT HEAVY ELECTRICALS LIMITED.**

HYDERABAD

PROJECT:- SOIL INVESTIGATION WORK FOR 1\*50MWP SOLAR PV PROJECT, NTPC,

MANDSOUR DIST : MANDSOUR STATE : MADHYA PRADESH.

DRAWN BY:-



**M. K. Soil Testing Laboratory**

BHARTI HOUSE  
GROUND FLOOR, OPP. GRAND BHAGWATI HOTEL  
NR. AVALON HOTEL AND JAHNVI BUNGALOWS  
OFF. C. HIGHWAY, BODAKDEV  
PHONE NO.: +91-79-2662 0940, 2662 60860, 9624097903  
EMAIL: info@mksoil.com

JOB NO.:-

**MK-29-05-16**

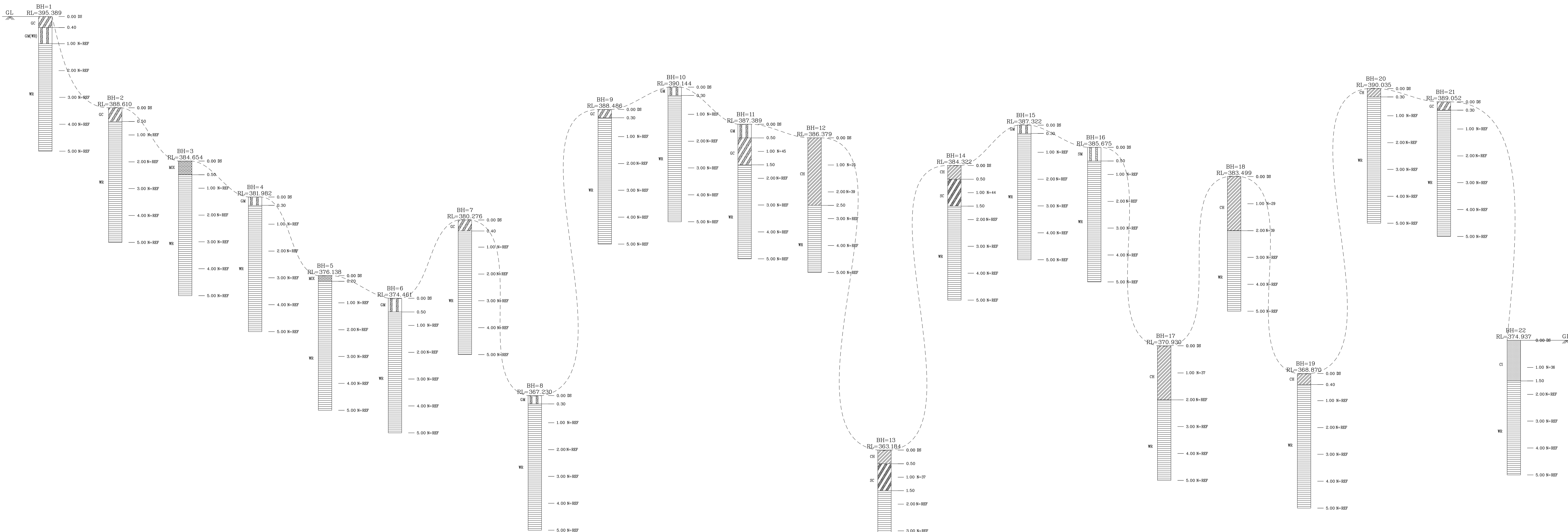
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**1**

SCALE:-

**NOT TO SCALE**

### CROSS SECTIONAL DETAILS OF BOREHOLES



**LEGEND**

	= CLAYEY GRAVELS
	= WEATHERED ROCK
	= SILTY GRAVELS
	= SAND WITH GRAVEL MIX LAYER
	= SILTY CLAY HAVING HIGH PLASTICITY
	= CLAYEY SAND
	= SILTY SAND
	= SILTY CLAY HAVING MEDIUM PLASTICITY
	= DISTURBED SAMPLE
	= S.P.T. VALUE
	= CURVE RECOVERY
	= STANDARD PENETRATION TEST
	= GROUND LEVEL
	= ROCK QUALITY DESIGNATION

**CLIENT:** BHARAT HEAVY ELECTRICALS LIMITED.  
HYDERABAD

**PROJECT:** SOIL INVESTIGATION WORK FOR POWER SUPPLY PROJECT, WPC, MARAPAKOTA, DIST. MADHUR, STATE. MADHRA PRADESH.

**DRAWN BY:** M. K. Soil Testing Laboratory

**DATE:** 20/05/16




**SCALE:** NOT TO SCALE

**PROJECT=** SOIL INVESTIGATION WORK FOR 1\*50MWP SOLAR PV PROJECT, NTPC, MANDSOUR. DIST : MANDSOUR. STATE : MADHYA PRADESH.

**CLIENT=** BHARAT HEAVY ELECTRICALS LIMITED., HYDERABAD

METHOD OF BORING	HYDRAULIC
DIA. OF BORE	100 mm
BORE HOLE NO.	BH=1

G.W.T. BELOW EXISTING G.L. (m)	NOT MET WITH
TERMINATION DEPTH (m)	5.00
JOB NO.	MK-29-05-16



DEPTH (m)	TYPE OF SAMPLE	SPT - NO. OF BLOWS			SPT: N-VALUE	SOIL CLASSIFICATION	LEGEND	VISUAL DESCRIPTION	DEPTH IN (m)	LAYER THICKNESS (m)
		0-15cm	15-30cm	30-45cm						
0.00	DS	-	-	-	-	GC		REDDISH BROWN COLOUR CLAYEY GRAVELS	0.40	0.40
1.00	SPT	50 (0 cm)	-	-	REF	GM (WR)		BLACKISH BROWN COLOUR WEATHERED ROCK		0.60
2.00	SPT	50 (0 cm)	-	-	REF	WR		GREYISH BLACK COLOUR WEATHERED BASALT IN FORM OF ROCK PEICES	1.00	4.00
3.00	SPT	50 (0 cm)	-	-	REF					
4.00	SPT	50 (0 cm)	-	-	REF					
5.00	SPT	50 (0 cm)	-	-	REF					

**PROJECT=** SOIL INVESTIGATION WORK FOR 1\*50MWP SOLAR PV PROJECT, NTPC, MANDSOUR. DIST : MANDSOUR. STATE : MADHYA PRADESH.

**CLIENT=** BHARAT HEAVY ELECTRICALS LIMITED., HYDERABAD

METHOD OF BORING	HYDRAULIC
DIA. OF BORE	100 mm
BORE HOLE NO.	BH=2

G.W.T. BELOW EXISTING G.L. (m)	NOT MET WITH
TERMINATION DEPTH (m)	5.00
JOB NO.	MK-29-05-16



DEPTH (m)	TYPE OF SAMPLE	SPT - NO. OF BLOWS			SPT: N-VALUE	SOIL CLASSIFICATION	LEGEND	VISUAL DESCRIPTION	DEPTH IN (m)	LAYER THICKNESS (m)
		0-15cm	15-30cm	30-45cm						
0.00	DS	-	-	-	-	GC		REDDISH BROWN COLOUR CLAYEY GRAVELS	0.50	0.50
1.00	SPT	50 (0 cm)	-	-	REF	WR		GREYISH BLACK COLOUR WEATHERED BASALT IN FORM OF ROCK PEICES		
2.00	SPT	50 (0 cm)	-	-	REF					
3.00	SPT	50 (0 cm)	-	-	REF					
4.00	SPT	50 (0 cm)	-	-	REF					
5.00	SPT	50 (0 cm)	-	-	REF					
									5.00	

**PROJECT=** SOIL INVESTIGATION WORK FOR 1\*50MWP SOLAR PV PROJECT, NTPC, MANDSOUR. DIST : MANDSOUR. STATE : MADHYA PRADESH.

**CLIENT=** BHARAT HEAVY ELECTRICALS LIMITED., HYDERABAD

METHOD OF BORING	HYDRAULIC
DIA. OF BORE	100 mm
BORE HOLE NO.	BH=3

G.W.T. BELOW EXISTING G.L. (m)	NOT MET WITH
TERMINATION DEPTH (m)	5.00
JOB NO.	MK-29-05-16

DEPTH (m)	TYPE OF SAMPLE	SPT - NO. OF BLOWS			SPT: N-VALUE	SOIL CLASSIFICATION	LEGEND	VISUAL DESCRIPTION	DEPTH IN (m)	LAYER THICKNESS (m)
		0-15cm	15-30cm	30-45cm						
0.00	DS	-	-	-	-	MIX		REDDISH BROWN COLOUR SOIL, BOULDER, COBBLES MIX SOIL	0.50	0.50
1.00	SPT	50 (0 cm)	-	-	REF	WR		GREYISH BLACK COLOUR WEATHERED BASALT IN FORM OF ROCK PEICES		4.50
2.00	SPT	50 (0 cm)	-	-	REF					
3.00	SPT	50 (0 cm)	-	-	REF					
4.00	SPT	50 (0 cm)	-	-	REF					
5.00	SPT	50 (0 cm)	-	-	REF					
										5.00

**PROJECT=** SOIL INVESTIGATION WORK FOR 1\*50MWP SOLAR PV PROJECT, NTPC, MANDSOUR. DIST : MANDSOUR. STATE : MADHYA PRADESH.

**CLIENT=** BHARAT HEAVY ELECTRICALS LIMITED., HYDERABAD

METHOD OF BORING	HYDRAULIC
DIA. OF BORE	100 mm
BORE HOLE NO.	BH=4

G.W.T. BELOW EXISTING G.L. (m)	NOT MET WITH
TERMINATION DEPTH (m)	5.00
JOB NO.	MK-29-05-16



DEPTH (m)	TYPE OF SAMPLE	SPT - NO. OF BLOWS			SPT: N-VALUE	SOIL CLASSIFICATION	LEGEND	VISUAL DESCRIPTION	DEPTH IN (m)	LAYER THICKNESS (m)
		0-15cm	15-30cm	30-45cm						
0.00	DS	-	-	-	-	GM		REDDISH BROWN COLOUR SILTY GRAVELS	0.30	0.30
1.00	SPT	50 (0 cm)	-	-	REF	WR		GREYISH BLACK COLOUR WEATHERED BASALT IN FORM OF ROCK PEICES		
2.00	SPT	50 (0 cm)	-	-	REF					
3.00	SPT	50 (0 cm)	-	-	REF					
4.00	SPT	50 (0 cm)	-	-	REF					
5.00	SPT	50 (0 cm)	-	-	REF					

**PROJECT=** SOIL INVESTIGATION WORK FOR 1\*50MWP SOLAR PV PROJECT, NTPC, MANDSOUR. DIST : MANDSOUR. STATE : MADHYA PRADESH.

**CLIENT=** BHARAT HEAVY ELECTRICALS LIMITED., HYDERABAD

METHOD OF BORING	HYDRAULIC
DIA. OF BORE	100 mm
BORE HOLE NO.	BH=5

G.W.T. BELOW EXISTING G.L. (m)	NOT MET WITH
TERMINATION DEPTH (m)	5.00
JOB NO.	MK-29-05-16

DEPTH (m)	TYPE OF SAMPLE	SPT - NO. OF BLOWS			SPT: N-VALUE	SOIL CLASSIFICATION	LEGEND	VISUAL DESCRIPTION	DEPTH IN (m)	LAYER THICKNESS (m)
		0-15cm	15-30cm	30-45cm						
0.00	DS	-	-	-	-	MIX		REDDISH BROWN COLOUR SOIL, BOULDER, COBBLES MIX SOIL	0.20	0.20
1.00	SPT	50 (0 cm)	-	-	REF	WR		GREYISH BLACK COLOUR WEATHERED BASALT IN FORM OF ROCK PEICES		4.80
2.00	SPT	50 (0 cm)	-	-	REF					
3.00	SPT	50 (0 cm)	-	-	REF					
4.00	SPT	50 (0 cm)	-	-	REF					
5.00	SPT	50 (0 cm)	-	-	REF					
5.00										

**PROJECT=** SOIL INVESTIGATION WORK FOR 1\*50MWP SOLAR PV PROJECT, NTPC, MANDSOUR. DIST : MANDSOUR. STATE : MADHYA PRADESH.

**CLIENT=** BHARAT HEAVY ELECTRICALS LIMITED., HYDERABAD

METHOD OF BORING	HYDRAULIC
DIA. OF BORE	150 mm
BORE HOLE NO.	BH=6

G.W.T. BELOW EXISTING G.L. (m)	NOT MET WITH
TERMINATION DEPTH (m)	5.00
JOB NO.	MK-29-05-16


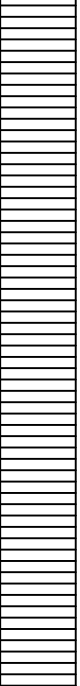
DEPTH (m)	TYPE OF SAMPLE	SPT - NO. OF BLOWS			SPT: N-VALUE	SOIL CLASSIFICATION	LEGEND	VISUAL DESCRIPTION	DEPTH IN (m)	LAYER THICKNESS (m)
		0-15cm	15-30cm	30-45cm						
0.00	DS	-	-	-	-	GM		REDDISH BROWN COLOUR SILTY GRAVELS	0.50	0.50
1.00	SPT	50 (0 cm)	-	-	REF	WR		GREYISH BLACK COLOUR WEATHERED BASALT IN FORM OR ROCK PIECES		4.50
2.00	SPT	50 (0 cm)	-	-	REF					
3.00	SPT	50 (0 cm)	-	-	REF					
4.00	SPT	50 (0 cm)	-	-	REF					
5.00	SPT	50 (0 cm)	-	-	REF					
5.00										

**PROJECT=** SOIL INVESTIGATION WORK FOR 1\*50MWP SOLAR PV PROJECT, NTPC, MANDSOUR. DIST : MANDSOUR. STATE : MADHYA PRADESH.

**CLIENT=** BHARAT HEAVY ELECTRICALS LIMITED., HYDERABAD

METHOD OF BORING	HYDRAULIC
DIA. OF BORE	100 mm
BORE HOLE NO.	BH=7

G.W.T. BELOW EXISTING G.L. (m)	NOT MET WITH
TERMINATION DEPTH (m)	5.00
JOB NO.	MK-29-05-16

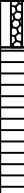
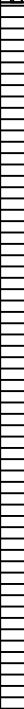
DEPTH (m)	TYPE OF SAMPLE	SPT - NO. OF BLOWS			SPT: N-VALUE	SOIL CLASSIFICATION	LEGEND	VISUAL DESCRIPTION	DEPTH IN (m)	LAYER THICKNESS (m)
		0-15cm	15-30cm	30-45cm						
0.00	DS	-	-	-	-	GC		REDDISH BROWN COLOUR CLAYEY GRAVELS	0.40	0.40
1.00	SPT	50 (0 cm)	-	-	REF	WR		GREYISH BLACK COLOUR WEATHERED BASALT IN FORM OR ROCK PIECES		
2.00	SPT	50 (0 cm)	-	-	REF					
3.00	SPT	50 (0 cm)	-	-	REF					
4.00	SPT	50 (0 cm)	-	-	REF					
5.00	SPT	50 (0 cm)	-	-	REF					
5.00										4.60

**PROJECT=** SOIL INVESTIGATION WORK FOR 1\*50MWP SOLAR PV PROJECT, NTPC, MANDSOUR. DIST : MANDSOUR. STATE : MADHYA PRADESH.

**CLIENT=** BHARAT HEAVY ELECTRICALS LIMITED., HYDERABAD

METHOD OF BORING	HYDRAULIC
DIA. OF BORE	100 mm
BORE HOLE NO.	BH=8

G.W.T. BELOW EXISTING G.L. (m)	NOT MET WITH
TERMINATION DEPTH (m)	5.00
JOB NO.	MK-29-05-16

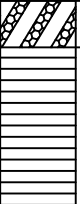

DEPTH (m)	TYPE OF SAMPLE	SPT - NO. OF BLOWS			SPT: N-VALUE	SOIL CLASSIFICATION	LEGEND	VISUAL DESCRIPTION	DEPTH IN (m)	LAYER THICKNESS (m)
		0-15cm	15-30cm	30-45cm						
0.00	DS	-	-	-	-	GM		REDDISH BROWN COLOUR SILTY GRAVELS	0.30	0.30
1.00	SPT	50 (4 cm)	-	-	REF	WR		GREYISH BLACK COLOUR WEATHERED BASALT IN FORM OF ROCK PEICES		
2.00	SPT	50 (0 cm)	-	-	REF					
3.00	SPT	50 (0 cm)	-	-	REF					
4.00	SPT	50 (0 cm)	-	-	REF					
5.00	SPT	50 (0 cm)	-	-	REF					
									5.00	

**PROJECT=** SOIL INVESTIGATION WORK FOR 1\*50MWP SOLAR PV PROJECT, NTPC, MANDSOUR. DIST : MANDSOUR. STATE : MADHYA PRADESH.

**CLIENT=** BHARAT HEAVY ELECTRICALS LIMITED., HYDERABAD

METHOD OF BORING	HYDRAULIC
DIA. OF BORE	100 mm
BORE HOLE NO.	BH=9

G.W.T. BELOW EXISTING G.L. (m)	NOT MET WITH
TERMINATION DEPTH (m)	5.00
JOB NO.	MK-29-05-16



DEPTH (m)	TYPE OF SAMPLE	SPT - NO. OF BLOWS			SPT: N-VALUE	SOIL CLASSIFICATION	LEGEND	VISUAL DESCRIPTION	DEPTH IN (m)	LAYER THICKNESS (m)
		0-15cm	15-30cm	30-45cm						
0.00	DS	-	-	-	-	GC		REDDISH BROWN COLOUR CLAYEY GRAVELS	0.30	0.30
1.00	SPT	50 (3 cm)	-	-	REF	WR		GREYISH BLACK COLOUR WEATHERED BASALT IN FORM OR ROCK PIECES		4.70
2.00	SPT	50 (6 cm)	-	-	REF					
3.00	SPT	50 (0 cm)	-	-	REF					
4.00	SPT	50 (0 cm)	-	-	REF					
5.00	SPT	50 (0 cm)	-	-	REF					
										5.00

**PROJECT=** SOIL INVESTIGATION WORK FOR 1\*50MWP SOLAR PV PROJECT, NTPC, MANDSOUR. DIST : MANDSOUR. STATE : MADHYA PRADESH.

**CLIENT=** BHARAT HEAVY ELECTRICALS LIMITED., HYDERABAD

METHOD OF BORING	HYDRAULIC
DIA. OF BORE	100 mm
BORE HOLE NO.	BH=10

G.W.T. BELOW EXISTING G.L. (m)	NOT MET WITH
TERMINATION DEPTH (m)	5.00
JOB NO.	MK-29-05-16



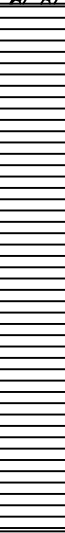
DEPTH (m)	TYPE OF SAMPLE	SPT - NO. OF BLOWS			SPT: N-VALUE	SOIL CLASSIFICATION	LEGEND	VISUAL DESCRIPTION	DEPTH IN (m)	LAYER THICKNESS (m)
		0-15cm	15-30cm	30-45cm						
0.00	DS	-	-	-	-	GM		REDDISH BROWN COLOUR SILTY GRAVELS	0.30	0.30
1.00	SPT	50 (3 cm)	-	-	REF	WR		GREYISH BLACK COLOUR WEATHERED BASALT IN FORM OF ROCK PEICES		
2.00	SPT	50 (0 cm)	-	-	REF					
3.00	SPT	50 (0 cm)	-	-	REF					
4.00	SPT	50 (0 cm)	-	-	REF					
5.00	SPT	50 (0 cm)	-	-	REF					
5.00										

**PROJECT=** SOIL INVESTIGATION WORK FOR 1\*50MWP SOLAR PV PROJECT, NTPC, MANDSOUR. DIST : MANDSOUR. STATE : MADHYA PRADESH.

**CLIENT=** BHARAT HEAVY ELECTRICALS LIMITED., HYDERABAD

METHOD OF BORING	HYDRAULIC
DIA. OF BORE	150 mm
BORE HOLE NO.	BH=11

G.W.T. BELOW EXISTING G.L. (m)	NOT MET WITH
TERMINATION DEPTH (m)	5.00
JOB NO.	MK-29-05-16

DEPTH (m)	TYPE OF SAMPLE	SPT - NO. OF BLOWS			SPT: N-VALUE	SOIL CLASSIFICATION	LEGEND	VISUAL DESCRIPTION	DEPTH IN (m)	LAYER THICKNESS (m)
		0-15cm	15-30cm	30-45cm						
0.00	DS	-	-	-	-	GM		REDDISH BROWN COLOUR SILTY GRAVELS	0.50	0.50
1.00	SPT	16	21	24	45	GC		REDDISH BROWN COLOUR CLAYEY GRAVELS		1.00
2.00	SPT	50 (7 cm)	-	-	REF	WR		GREYISH BLACK COLOUR WEATHERED BASALT IN FORM OR ROCK PIECES	1.50	3.50
3.00	SPT	50 (0 cm)	-	-	REF					
4.00	SPT	50 (0 cm)	-	-	REF					
5.00	SPT	50 (0 cm)	-	-	REF					
5.00										

**PROJECT=** SOIL INVESTIGATION WORK FOR 1\*50MWP SOLAR PV PROJECT, NTPC, MANDSOUR. DIST : MANDSOUR. STATE : MADHYA PRADESH.

**CLIENT=** BHARAT HEAVY ELECTRICALS LIMITED., HYDERABAD

METHOD OF BORING	HYDRAULIC
DIA. OF BORE	150 mm
BORE HOLE NO.	BH=12

G.W.T. BELOW EXISTING G.L. (m)	NOT MET WITH
TERMINATION DEPTH (m)	5.00
JOB NO.	MK-29-05-16




DEPTH (m)	TYPE OF SAMPLE	SPT - NO. OF BLOWS			SPT: N-VALUE	SOIL CLASSIFICATION	LEGEND	VISUAL DESCRIPTION	DEPTH IN (m)	LAYER THICKNESS (m)
		0-15cm	15-30cm	30-45cm						
0.00	DS	-	-	-	-	CH	REDDISH BROWN COLOUR SILTY CLAY HAVING HIGH PLASTICITY	2.50	2.50	
1.00	SPT	8	11	14	25					
2.00	SPT	12	17	22	39					
3.00	SPT	50 (6 cm)	-	-	REF	WR	GREYISH BLACK COLOUR WEATHERED BASALT IN FORM OR ROCK PIECES	2.50	2.50	
4.00	SPT	50 (0 cm)	-	-	REF					
5.00	SPT	50 (0 cm)	-	-	REF					

**PROJECT=** SOIL INVESTIGATION WORK FOR 1\*50MWP SOLAR PV PROJECT, NTPC, MANDSOUR. DIST : MANDSOUR. STATE : MADHYA PRADESH.

**CLIENT=** BHARAT HEAVY ELECTRICALS LIMITED., HYDERABAD

METHOD OF BORING	HYDRAULIC
DIA. OF BORE	150 mm
BORE HOLE NO.	BH=13

G.W.T. BELOW EXISTING G.L. (m)	NOT MET WITH
TERMINATION DEPTH (m)	5.00
JOB NO.	MK-29-05-16




DEPTH (m)	TYPE OF SAMPLE	SPT - NO. OF BLOWS			SPT: N-VALUE	SOIL CLASSIFICATION	LEGEND	VISUAL DESCRIPTION	DEPTH IN (m)	LAYER THICKNESS (m)
		0-15cm	15-30cm	30-45cm						
0.00	DS	-	-	-	-	CH		REDDISH BROWN COLOUR SILTY CLAY HAVING HIGH PLASTICITY	0.50	0.50
1.00	SPT	12	16	21	37	SC		REDDISH BROWN COLOUR CLAYEY SAND		1.00
2.00	SPT	50 (4 cm)	-	-	REF	WR		GREYISH BLACK COLOUR WEATHERED BASALT IN FORM OR ROCK PIECES	1.50	3.50
3.00	SPT	50 (0 cm)	-	-	REF					
4.00	SPT	50 (0 cm)	-	-	REF					
5.00	SPT	50 (0 cm)	-	-	REF					
5.00										

**PROJECT=** SOIL INVESTIGATION WORK FOR 1\*50MWP SOLAR PV PROJECT, NTPC, MANDSOUR. DIST : MANDSOUR. STATE : MADHYA PRADESH.

**CLIENT=** BHARAT HEAVY ELECTRICALS LIMITED., HYDERABAD

METHOD OF BORING	HYDRAULIC
DIA. OF BORE	150 mm
BORE HOLE NO.	BH=14

G.W.T. BELOW EXISTING G.L. (m)	NOT MET WITH
TERMINATION DEPTH (m)	5.00
JOB NO.	MK-29-05-16

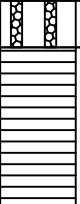

DEPTH (m)	TYPE OF SAMPLE	SPT - NO. OF BLOWS			SPT: N-VALUE	SOIL CLASSIFICATION	LEGEND	VISUAL DESCRIPTION	DEPTH IN (m)	LAYER THICKNESS (m)
		0-15cm	15-30cm	30-45cm						
0.00	DS	-	-	-	-	CH		REDDISH BROWN COLOUR SILTY CLAY HAVING HIGH PLASTICITY	0.50	0.50
1.00	SPT	12	20	24	44	SC		REDDISH BROWN COLOUR CLAYEY SAND		1.00
2.00	SPT	50 (10cm)	-	-	REF	WR		GREYISH BLACK COLOUR WEATHERED BASALT IN FORM OR ROCK PIECES	1.50	3.50
3.00	SPT	50 (0 cm)	-	-	REF					
4.00	SPT	50 (0 cm)	-	-	REF					
5.00	SPT	50 (0 cm)	-	-	REF					
5.00										

**PROJECT=** SOIL INVESTIGATION WORK FOR 1\*50MWP SOLAR PV PROJECT, NTPC, MANDSOUR. DIST : MANDSOUR. STATE : MADHYA PRADESH.

**CLIENT=** BHARAT HEAVY ELECTRICALS LIMITED., HYDERABAD

METHOD OF BORING	HYDRAULIC
DIA. OF BORE	100 mm
BORE HOLE NO.	BH=15

G.W.T. BELOW EXISTING G.L. (m)	NOT MET WITH
TERMINATION DEPTH (m)	5.00
JOB NO.	MK-29-05-16


DEPTH (m)	TYPE OF SAMPLE	SPT - NO. OF BLOWS			SPT: N-VALUE	SOIL CLASSIFICATION	LEGEND	VISUAL DESCRIPTION	DEPTH IN (m)	LAYER THICKNESS (m)
		0-15cm	15-30cm	30-45cm						
0.00	DS	-	-	-	-	GM		REDDISH BROWN COLOUR SILTY GRAVELS	0.30	0.30
1.00	SPT	50 (5 cm)	-	-	REF	WR		GREYISH BLACK COLOUR WEATHERED BASALT IN FORM OF ROCK PEICES		
2.00	SPT	50 (0 cm)	-	-	REF					
3.00	SPT	50 (0 cm)	-	-	REF					
4.00	SPT	50 (0 cm)	-	-	REF					
5.00	SPT	50 (0 cm)	-	-	REF					
									5.00	

**PROJECT=** SOIL INVESTIGATION WORK FOR 1\*50MWP SOLAR PV PROJECT, NTPC, MANDSOUR. DIST : MANDSOUR. STATE : MADHYA PRADESH.

**CLIENT=** BHARAT HEAVY ELECTRICALS LIMITED., HYDERABAD

METHOD OF BORING	HYDRAULIC
DIA. OF BORE	150 mm
BORE HOLE NO.	BH=16

G.W.T. BELOW EXISTING G.L. (m)	NOT MET WITH
TERMINATION DEPTH (m)	5.00
JOB NO.	MK-29-05-16



DEPTH (m)	TYPE OF SAMPLE	SPT - NO. OF BLOWS			SPT: N-VALUE	SOIL CLASSIFICATION	LEGEND	VISUAL DESCRIPTION	DEPTH IN (m)	LAYER THICKNESS (m)
		0-15cm	15-30cm	30-45cm						
0.00	DS	-	-	-	-	SM		REDDISH BROWN COLOUR SILTY SAND	0.50	0.50
1.00	SPT	50 (0 cm)	-	-	REF					
2.00	SPT	50 (0 cm)	-	-	REF					
3.00	SPT	50 (0 cm)	-	-	REF					
4.00	SPT	50 (0 cm)	-	-	REF					
5.00	SPT	50 (0 cm)	-	-	REF					

**PROJECT=** SOIL INVESTIGATION WORK FOR 1\*50MWP SOLAR PV PROJECT, NTPC, MANDSOUR. DIST : MANDSOUR. STATE : MADHYA PRADESH.

**CLIENT=** BHARAT HEAVY ELECTRICALS LIMITED., HYDERABAD

METHOD OF BORING	HYDRAULIC
DIA. OF BORE	150 mm
BORE HOLE NO.	BH=17

G.W.T. BELOW EXISTING G.L. (m)	NOT MET WITH
TERMINATION DEPTH (m)	5.00
JOB NO.	MK-29-05-16



DEPTH (m)	TYPE OF SAMPLE	SPT - NO. OF BLOWS			SPT: N-VALUE	SOIL CLASSIFICATION	LEGEND	VISUAL DESCRIPTION	DEPTH IN (m)	LAYER THICKNESS (m)
		0-15cm	15-30cm	30-45cm						
0.00	DS	-	-	-	-	CH		REDDISH BROWN COLOUR SILTY CLAY HAVING HIGH PLASTICITY	2.00	2.00
1.00	SPT	12	16	21	37					
2.00	SPT	50 (8 cm)	-	-	REF	WR		GREYISH BLACK COLOUR WEATHERED BASALT IN FORM OR ROCK PIECES	2.00	3.00
3.00	SPT	50 (0 cm)	-	-	REF					
4.00	SPT	50 (0 cm)	-	-	REF					
5.00	SPT	50 (0 cm)	-	-	REF					

**PROJECT=** SOIL INVESTIGATION WORK FOR 1\*50MWP SOLAR PV PROJECT, NTPC, MANDSOUR. DIST : MANDSOUR. STATE : MADHYA PRADESH.

**CLIENT=** BHARAT HEAVY ELECTRICALS LIMITED., HYDERABAD

METHOD OF BORING	HYDRAULIC
DIA. OF BORE	150 mm
BORE HOLE NO.	BH=18

G.W.T. BELOW EXISTING G.L. (m)	NOT MET WITH
TERMINATION DEPTH (m)	5.00
JOB NO.	MK-29-05-16

DEPTH (m)	TYPE OF SAMPLE	SPT - NO. OF BLOWS			SPT: N-VALUE	SOIL CLASSIFICATION	LEGEND	VISUAL DESCRIPTION	DEPTH IN (m)	LAYER THICKNESS (m)
		0-15cm	15-30cm	30-45cm						
0.00	DS	-	-	-	-	CH		REDDISH BROWN COLOUR SILTY CLAY HAVING HIGH PLASTICITY	2.00	
1.00	SPT	9	13	16	29					
2.00	SPT	11	15	24	39					
3.00	SPT	50 (4 cm)	-	-	REF	WR		GREYISH BLACK COLOUR WEATHERED BASALT IN FORM OR ROCK PIECES	3.00	
4.00	SPT	50 (3 cm)	-	-	REF					
5.00	SPT	50 (0 cm)	-	-	REF					

**PROJECT=** SOIL INVESTIGATION WORK FOR 1\*50MWP SOLAR PV PROJECT, NTPC, MANDSOUR. DIST : MANDSOUR. STATE : MADHYA PRADESH.

**CLIENT=** BHARAT HEAVY ELECTRICALS LIMITED., HYDERABAD

METHOD OF BORING	HYDRAULIC
DIA. OF BORE	150 mm
BORE HOLE NO.	BH=19

G.W.T. BELOW EXISTING G.L. (m)	NOT MET WITH
TERMINATION DEPTH (m)	5.00
JOB NO.	MK-29-05-16



DEPTH (m)	TYPE OF SAMPLE	SPT - NO. OF BLOWS			SPT: N-VALUE	SOIL CLASSIFICATION	LEGEND	VISUAL DESCRIPTION	DEPTH IN (m)	LAYER THICKNESS (m)
		0-15cm	15-30cm	30-45cm						
0.00	DS	-	-	-	-	CH	REDDISH BROWN COLOUR SILTY CLAY HAVING HIGH PLASTICITY	0.40	0.40	
1.00	SPT	50 (4 cm)	-	-	REF	WR	GREYISH BLACK COLOUR WEATHERED BASALT IN FORM OR ROCK PIECES		4.60	
2.00	SPT	50 (0 cm)	-	-	REF					
3.00	SPT	50 (0 cm)	-	-	REF					
4.00	SPT	50 (0 cm)	-	-	REF					
5.00	SPT	50 (0 cm)	-	-	REF					

**PROJECT=** SOIL INVESTIGATION WORK FOR 1\*50MWP SOLAR PV PROJECT, NTPC, MANDSOUR. DIST : MANDSOUR. STATE : MADHYA PRADESH.

**CLIENT=** BHARAT HEAVY ELECTRICALS LIMITED., HYDERABAD

METHOD OF BORING	HYDRAULIC
DIA. OF BORE	150 mm
BORE HOLE NO.	BH=20

G.W.T. BELOW EXISTING G.L. (m)	NOT MET WITH
TERMINATION DEPTH (m)	5.00
JOB NO.	MK-29-05-16

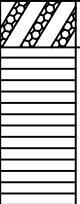

DEPTH (m)	TYPE OF SAMPLE	SPT - NO. OF BLOWS			SPT: N-VALUE	SOIL CLASSIFICATION	LEGEND	VISUAL DESCRIPTION	DEPTH IN (m)	LAYER THICKNESS (m)
		0-15cm	15-30cm	30-45cm						
0.00	DS	-	-	-	-	CH		REDDISH BROWN COLOUR SILTY CLAY HAVING HIGH PLASTICITY	0.30	0.30
1.00	SPT	50 (4 cm)	-	-	REF	WR		GREYISH BLACK COLOUR WEATHERED BASALT IN FORM OR ROCK PIECES		
2.00	SPT	50 (0 cm)	-	-	REF					
3.00	SPT	50 (0 cm)	-	-	REF					
4.00	SPT	50 (0 cm)	-	-	REF					
5.00	SPT	50 (0 cm)	-	-	REF					
5.00										

**PROJECT=** SOIL INVESTIGATION WORK FOR 1\*50MWP SOLAR PV PROJECT, NTPC, MANDSOUR. DIST : MANDSOUR. STATE : MADHYA PRADESH.

**CLIENT=** BHARAT HEAVY ELECTRICALS LIMITED., HYDERABAD

METHOD OF BORING	HYDRAULIC
DIA. OF BORE	100 mm
BORE HOLE NO.	BH=21

G.W.T. BELOW EXISTING G.L. (m)	NOT MET WITH
TERMINATION DEPTH (m)	5.00
JOB NO.	MK-29-05-16



DEPTH (m)	TYPE OF SAMPLE	SPT - NO. OF BLOWS			SPT: N-VALUE	SOIL CLASSIFICATION	LEGEND	VISUAL DESCRIPTION	DEPTH IN (m)	LAYER THICKNESS (m)
		0-15cm	15-30cm	30-45cm						
0.00	DS	-	-	-	-	GC		REDDISH BROWN COLOUR CLAYEY GRAVELS	0.30	0.30
1.00	SPT	50 (4 cm)	-	-	REF	WR		GREYISH BLACK COLOUR WEATHERED BASALT IN FORM OR ROCK PIECES		
2.00	SPT	50 (0 cm)	-	-	REF					
3.00	SPT	50 (0 cm)	-	-	REF					
4.00	SPT	50 (0 cm)	-	-	REF					
5.00	SPT	50 (0 cm)	-	-	REF					
5.00										4.70

**PROJECT=** SOIL INVESTIGATION WORK FOR 1\*50MWP SOLAR PV PROJECT, NTPC, MANDSOUR. DIST : MANDSOUR. STATE : MADHYA PRADESH.

**CLIENT=** BHARAT HEAVY ELECTRICALS LIMITED., HYDERABAD

METHOD OF BORING	HYDRAULIC
DIA. OF BORE	150 mm
BORE HOLE NO.	BH=22

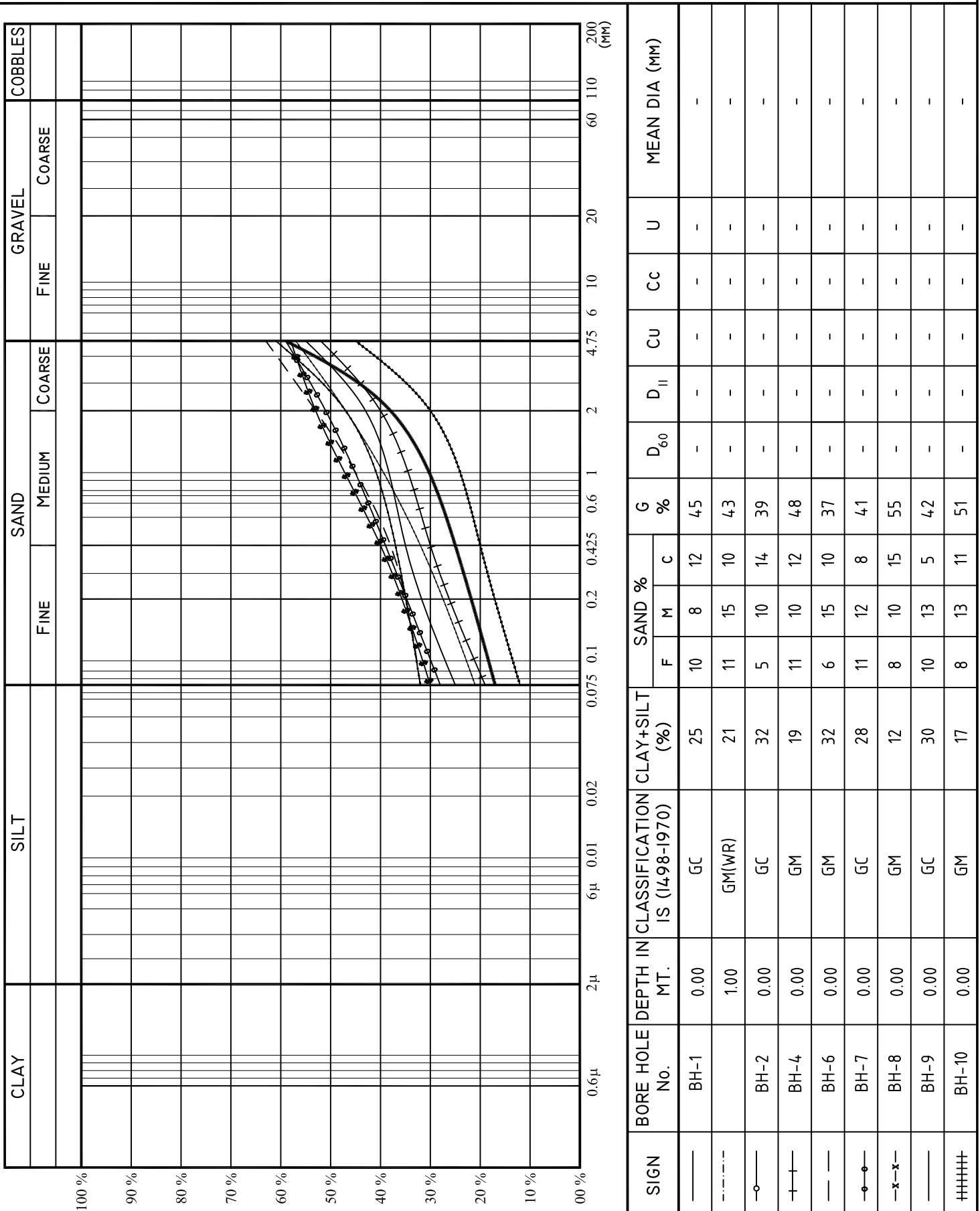
G.W.T. BELOW EXISTING G.L. (m)	NOT MET WITH
TERMINATION DEPTH (m)	5.00
JOB NO.	MK-29-05-16

DEPTH (m)	TYPE OF SAMPLE	SPT - NO. OF BLOWS			SPT: N-VALUE	SOIL CLASSIFICATION	LEGEND	VISUAL DESCRIPTION	DEPTH IN (m)	LAYER THICKNESS (m)
		0-15cm	15-30cm	30-45cm						
0.00	DS	-	-	-	-					
1.00	SPT	13	16	20	36	CI		REDDISH BROWN COLOUR SILTY CLAY HAVING MEDIUM PLASTICITY	1.50	1.50
2.00	SPT	50 (4 cm)	-	-	REF	WR		GREYISH BLACK COLOUR WEATHERED BASALT IN FORM OR ROCK PIECES	5.00	3.50
3.00	SPT	50 (0 cm)	-	-	REF					
4.00	SPT	50 (0 cm)	-	-	REF					
5.00	SPT	50 (0 cm)	-	-	REF					

# M.K. SOIL TESTING LABORATORY

SECTION:-

## GRAIN SIZE DISTRIBUTION



PROJECT:- SOIL INVESTIGATION WORK FOR 1\*50MWP SOLAR PV PROJECT, NTPC, MANDSOUR.  
 DIST : MANDSOUR. STATE : MADHYA PRADESH.

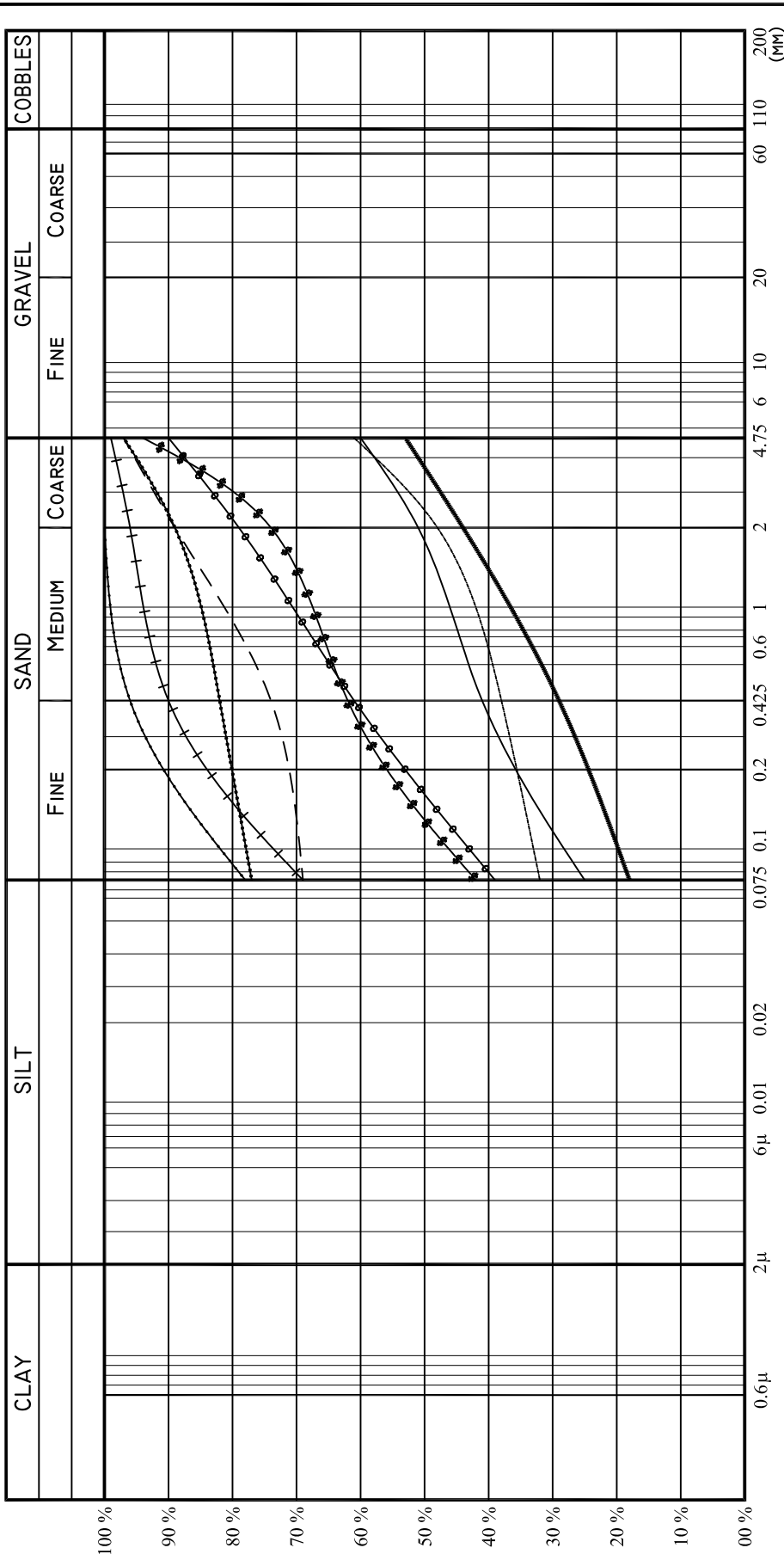
JOB NO.:- MK-29-05-16

PAGE NO.:- 25

# M.K. SOIL TESTING LABORATORY

SECTION:-

## GRAIN SIZE DISTRIBUTION



SIGN	BORE HOLE No.	DEPTH MT.	CLASSIFICATION IS (I498-1970)	CLAY+SILT (%)	SAND %			G %	D <sub>60</sub>	D <sub>10</sub>	C <sub>u</sub>	C <sub>c</sub>	U	MEAN DIA (MM)
					F	M	C							
—	BH-11	0.00	GM	25	16	10	9	40	-	-	-	-	-	-
---		1.00	GC	32	6	10	13	39	-	-	-	-	-	-
○	BH-12	1.00	CH	78	18	4	-	-	-	-	-	-	-	-
++		2.00	CH	69	21	6	3	1	-	-	-	-	-	-
—	BH-13	0.00	CH	69	5	15	18	3	-	-	-	-	-	-
○		1.00	SC	39	22	18	11	10	-	-	-	-	-	-
-x-x-	BH-14	0.00	CH	77	5	7	8	3	-	-	-	-	-	-
—		1.00	SC	42	20	12	20	6	-	-	-	-	-	-
+++++	BH-15	0.00	GM	18	11	15	9	47	-	-	-	-	-	-

PROJECT:- SOIL INVESTIGATION WORK FOR 1\*50MWP SOLAR PV PROJECT, NTPC, MANDSOUR.  
 DIST : MANDSOUR. STATE : MADHYA PRADESH.

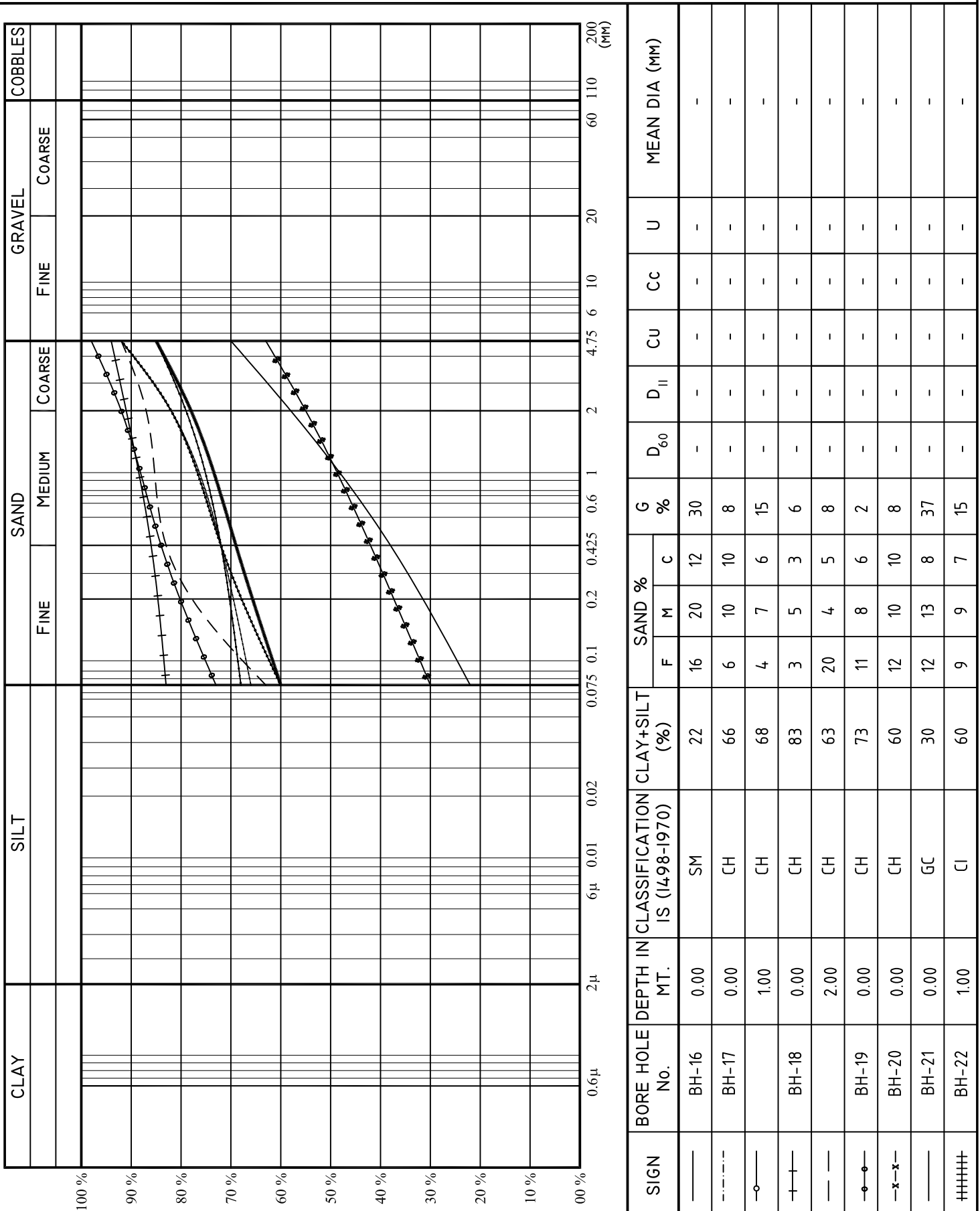
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PAGE NO.:- 26

# M.K. SOIL TESTING LABORATORY

SECTION:-

## GRAIN SIZE DISTRIBUTION



PROJECT:- SOIL INVESTIGATION WORK FOR 1\*50MWP SOLAR PV PROJECT, NTPC, MANDSOUR.  
DIST : MANDSOUR. STATE : MADHYA PRADESH.

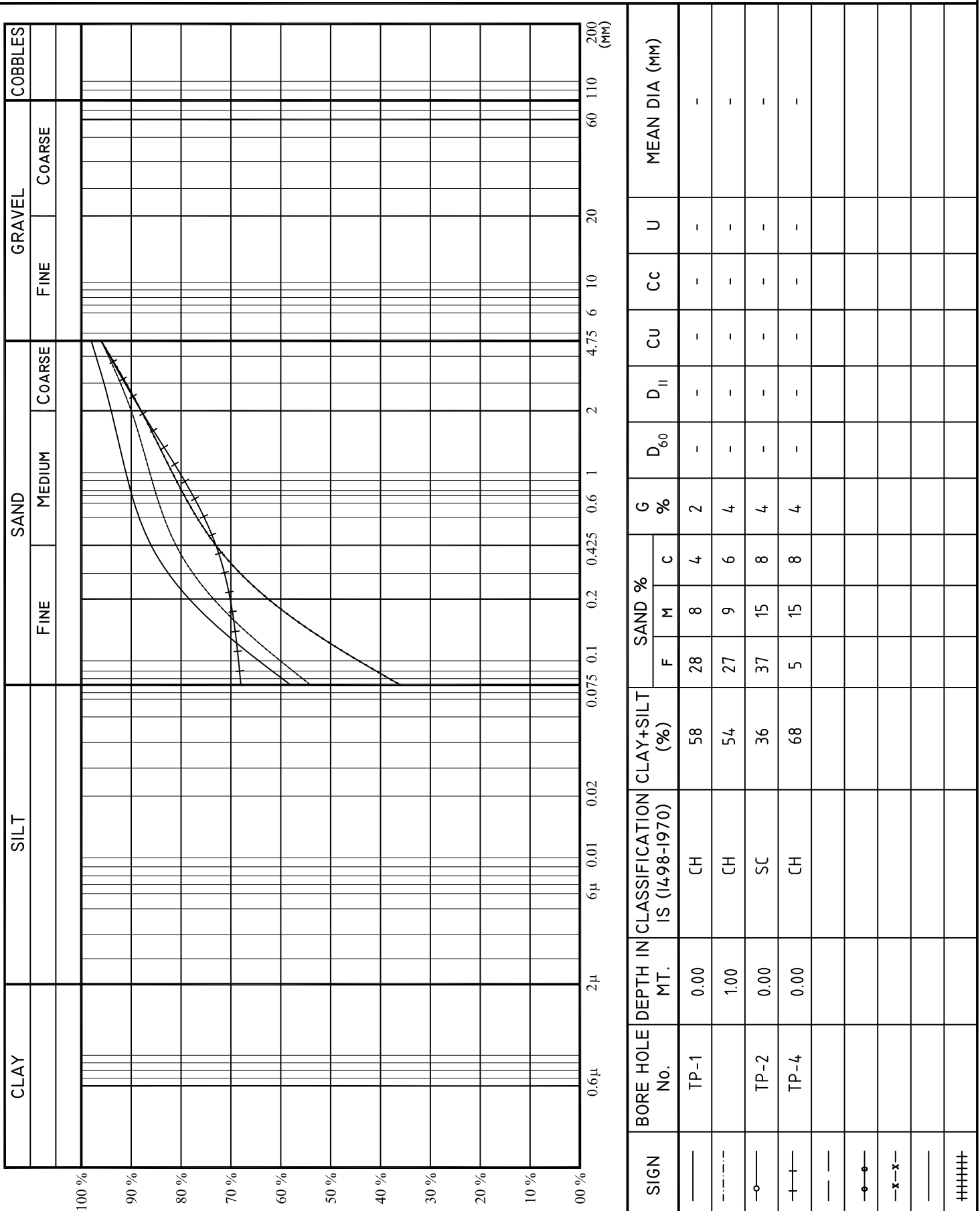
JOB NO.:- MK-29-05-16

PAGE NO.:- 27

# M.K. SOIL TESTING LABORATORY

SECTION:-

## GRAIN SIZE DISTRIBUTION



PROJECT:- SOIL INVESTIGATION WORK FOR 1\*50MWP SOLAR PV PROJECT, NTPC, MANDSOUR.  
 DIST : MANDSOUR. STATE : MADHYA PRADESH.

JOB NO.:-  
**MK-29-05-16**

PAGE NO.:-  
**28**