Marshal Geo Test Laboratory

For Testing of Civil Engineering Materials

ISO 9001:2015 Certified By : Standardisation Testing & Quality Certification Directorate

MSME No.: CG14E0001811

TEST REPORT

T. R. No. MGTL / TRR / R-0212201/001 **Date:-05/12/2020**

To,
The Executive Engineer (Civil)
Civil Transmission Division CSPTCL
Bhilai -3 (C.G.)- 490021

Subject: - Test result of Soil Sample for proposed Construction at 220 KV S/s Construction site at Litiya (Semariya), Distt.- Durg (C.G.).

Your Ref.: - Letter No.:- EEC/CSPTCL/Works/3007 Bhilai-3, Dt.:- 28/11/2020

Sample ID Mark :- Pit No.-01, Semariya Litiya, Durg (C.G.), Depth - 2.00 m.

Dear / Sir,
Vide subject and reference cited above, the test results report is as follows: -

SAFE BEARING CAPACITY OF SOIL BY PLATE LOAD TEST

FIELD & LAB JOB NO: - R-2012021			
Sr. No.	Name of Test	Test Method	Test Results
	Plate Load Test	As per IS:-1888 (RA-2016)	As Below
	PARTICULARS	LOCATION	
		PIT NO.- 01, SEMARIYA LITIYA, DURG (C.G.) (GPS CO-ORDINATE:- N-21°20'31" E-81°12'51")	
1	Date of Testing	01/12/2020	
2	Type Soil	Clayey Gravel	
3	Test Pit Level from EGL (m)	2.00	
4	Field Density (t/m^3)	2.20	
5	FOS	4.00	
6	Gross Safe Bearing Capacity (t/m^2)	24.05	

Remarks:-
1. **The SBC has been computed taking 1m × 1m footing size.**
2. **Settlement for 1m × 1m size of footing at failure pressure is 18.00 mm.**
3. **The test was conducted on moist Soil, so water table correction is applied.**
4. **Factor of safety of 4 is considered.**

Verified by
(Himanshu R. Varma)
(Geotechnical Engineer)

E.E.(C) CSPTCL, Dn,
Received No. 2927
Date 16/12/2020

Authorised Signatory
(Arun Bhave)

Note:-
1 Results are subject to limitations as per IS -code-1888
2 Samples may be destroyed / Removed away from Laboratory after Testing, unless otherwise particular request is made.
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**********END OF REPORT********

P.S. City Road, Near Kushalpur Chowk,
Changorabhata, Ring Road No. -01,
Raipur 492013 (C.G.) , Ph. : 7879798900
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raipur.marshal@gmail.com
Website : marshalgeoraipur.com

SHEET 1 OF 2

Date:-05/12/2020

T. R. No. / MGTL / TRR / R-0212201/002

To,
The Executive Engineer (Civil)
Civil Transmission Division CSPTCL
Bhilai -3 (C.G.)- 490021

Subject :- Test result of Soil Sample for proposed Construction at 220 KV S/s Construction site at Litiya (Semariya), Distt.- Durg (C.G.).

Your Ref.:- Letter No.:- EEC/CSPTCL/Works/3007 Bhilai-3, Dt.:- 28/11/2020

Sample ID Mark :- Pit No.-01, Semariya Litiya, Durg (C.G.), Depth - 2.00 m.

GPS CO-ORDINATE:- N-21°20'31" E-81°12'51"

Dear Sir,

Vide subject and reference cited above, the test results report is as follows: -

PARTICULAR OF SAMPLES (S) :-

Nature:- Soil Sample
Sample No.(S) Details:- One sample
Packing/Container :- Poly Bags
Dt. of Receipt in the Lab:- 02/12/2020

Testing Dt. :- 05/12/2020

LAB JOB NO.- R-2012021

TEST RESULTS

S. No.	Name of Test	Test Method	Results	Unit
A)	**Soil Sample**			
1	LL, PL & PI	As per IS : 2720 (Part V)- 1985 (RA-2015)	As per Table 1 Below	%
2	Grain Size Analysis	As per IS : 2720 (Part IV)-1985 (RA-2015)	As per table 2 below	%

Table -1

LAB JOB NO.- R-2012021

TEST RESULTS

Sr. No.	% of Fines	Type of Soil	LL %	PL %	PI %	
1	17.00	Clayey Gravel	46.00	21.52	24.48	

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raipur.marshal@gmail.com
Website : marshalgeoraipur.com

SHEET 2 OF 2

Table -2

LAB JOB NO.- R-2012021				TEST RESULTS	
Sr. No.	SIEVE SIZE (MM)	WT. RET.	% OF WT.RET	CUM.WT. RET.	PERCENTAGE FINER (%)
1	10	124.0	24.80	24.80	75.20
2	4.75	221.0	44.20	69.00	31.00
3	2	42.0	8.40	77.40	22.60
4	0.6	25.0	5.00	82.40	17.60
5	0.425	1.0	0.20	82.60	17.40
6	0.75	2.0	0.40	83.00	17.00

Gravel	Coarse Sand	Medium Sand	Fine Sand	Silt & Clay
69.00	8.40	5.20	0.40	17.00

Verified by
(Himanshu R. Varma)
(Geotechnical Engineer)

Authorised Signatory
(Arun Bhave)

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********END OF REPORT********

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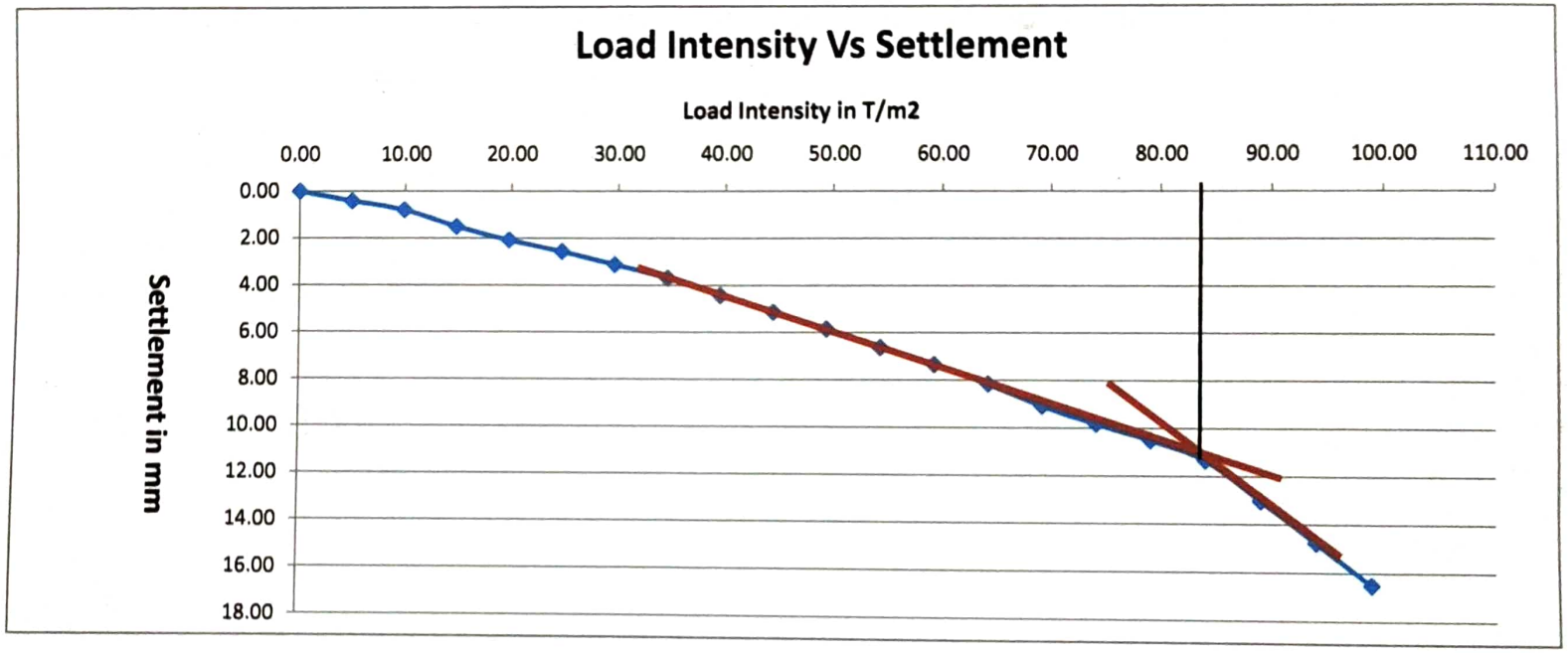
Website : marshalgeoraipur.com

PLATE LOAD TEST (As per IS-1888)

Client Name :-	Chattisgarh State Power Transmission Co. Ltd	MGTL Job No.-	R-0212201/001	Depth :-	2.00	Mtr.
				Bulk Density :-	2.20	T/m^3
Name of Work :-	Soil Testing at 220 KV Sub-station	Location :-	21°20'31"N, 81°12'51"E	plate size:-	0.45x0.45m	
		Dt of Testing:-	01-12-2020	Pit No :-	1	
Site Name :-	Litiya, Dist Durg			Type of soil:- Clayey Gravel		

PIT NO.- 01

LOAD Ton	Ave. Sett. (mm)
0	0.00
1	0.42
2	0.81
3	1.51
4	2.09
5	2.57
6	3.13
7	3.70
8	4.44
9	5.15
10	5.85
11	6.64
12	7.35
13	8.17
14	9.09
15	9.83
16	10.51
17	11.34
18	13.02
19	14.76
20	16.51



Ultimate Load Intensity	83.00	Ton/m^2	FOS	4
Plate Settlement at failure load		11	mm	
Net Ultimate Bearing Capacity (q_u)		78.60	T/m^2	
Net Safe Bearing Capacity (q_s)		19.65	T/m2	
Gross Safe Bearing Capacity (SBC)		24.05	T/m2	

Area of plate	0.203	m2
Overburden pressure	4.400	T/m^2

Remark:

1) The SBC has been computed taking 1m x 1m footing size.
2) Settlement for 1m x1m size of footing at failure pressure is 18.00 mm.
3) The test was conducted on moist Soil, so water table correction is applied.
4) **Factor of safety of 4 is considered.**

Prepared & Check By	*Authorised Signatury*

Marshal Geo Test Laboratory RAIPUR (C.G.)

Calculation for Footing Settlement

So Settlement of Footing at Safe Load Can be Calculated Using the following Formula: IS 1888

PIT NO.- 01

Width of Footing (B)	1	Mtr
Width of Plate (BP)	0.45	Mtr.
Plate Settlement (SP)	11.00	mm.

Settlement Calculation on Sandy Soils

$$S_F = S_p\{[B*(B_p+0.3)/[B_p*(B+0.3)]]\}^2$$

SF = Sp	{	B(Bp + 0.3) / Bp(B + 0.3)	}2
SF = 11	{	1(0.45+0.3) / 0.45(1+0.3)	}2

SF =	11.00	0.75 / 0.585

SF =	11.00	1.282

Permissible Settlement of Footing

SF =	18.08	mm
SF ≈	**18.00**	**mm**

Marshal Geo Test Laboratory
IC.G.

	Decimal	DMS
Latitude	21.342119	21°20'31" N
Longitude	81.214187	81°12'51" E

2020-12-01(Tue) 16:35

Marshal Geo Test Laboratory

For Testing of Civil Engineering Materials

ISO 9001:2015 Certified By : Standardisation Testing & Quality Certification Directorate
MSME No.: CG14E0001811

TEST REPORT

T. R. No. MGTL / TRR / R-0312201/001 **Date:-05/12/2020**

To,
The Executive Engineer (Civil)
Civil Transmission Division CSPTCL
Bhilai -3 (C.G.)- 490021

Subject: - Test result of Soil Sample for proposed Construction at 220 KV S/s Construction site at Litiya (Semariya), Distt.- Durg (C.G.).

Your Ref.: - Letter No.:- EEC/CSPTCL/Works/3007 Bhilai-3, Dt.:- 28/11/2020

Sample ID Mark :- Pit No.-02, Semariya Litiya, Durg (C.G.), Depth - 3.00 m.

Dear / Sir,
Vide subject and reference cited above, the test results report is as follows: -

SAFE BEARING CAPACITY OF SOIL BY PLATE LOAD TEST

FIELD & LAB JOB NO: - R-2012031

Sr. No.	Name of Test	Test Method	Test Results
	Plate Load Test	As per IS:-1888 (RA-2016)	As Below
	PARTICULARS	LOCATION	
		PIT NO.- 02, SEMARIYA LITIYA, DURG (C.G.) (GPS CO-ORDINATE:- N-21°20'31" E-81°12'51")	
1	Date of Testing	02/12/2020	
2	Type Soil	Clayey Gravel	
3	Test Pit Level from EGL (m)	3.00	
4	Field Density (t/m^3)	2.34	
5	FOS	4.00	
6	Gross Safe Bearing Capacity (t/m^2)	27.52	

Remarks:-
1. **The SBC has been computed taking 1m × 1m footing size.**
2. **Settlement for 1m × 1m size of footing at failure pressure is 17.50 mm.**
3. **The test was conducted on moist Soil, so water table correction is applied.**
4. **Factor of safety of 4 is considered.**

Verified by
(Himanshu R. Varma)
(Geotechnical Engineer)

Authorised Signatory
(Arun Bhave)

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Marshal Geo Test Laboratory

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MSME No.: CG14E0001811

T. R. No. / MGTL / TRR / R-0312201/002 **Date:-05/12/2020**

To,
The Executive Engineer (Civil)
Civil Tranmission Division CSPTCL
Bhilai -3 (C.G.)- 490021

Subject :- Test result of Soil Sample for proposed Construction at 220 KV S/s Construction site at Litiya (Semariya), Distt.- Durg (C.G.).

Your Ref.:- Letter No.:- EEC/CSPTCL/Works/3007 Bhilai-3, Dt.:- 28/11/2020

Sample ID Mark :- Pit No.-02, Semariya Litiya, Durg (C.G.), Depth - 3.00 m.

GPS CO-ORDINATE:- N-21°20'31" E-81°12'51"

Dear Sir,

Vide subject and reference cited above, the test results report is as follows: -

PARTICULAR OF SAMPLES (S) :-

Nature:- Soil Sample

Sample No.(S) Details:- One sample

Packing/Container :- Poly Bags

Dt. of Receipt in the Lab:- 03/12/2020 **Testing Dt. :- 05/12/2020**

LAB JOB NO.- R-2012031 **TEST RESULTS**

S. No.	Name of Test	Test Method	Results	Unit
A)	**Soil Sample**			
1	LL, PL & PI	As per IS : 2720 (Part V)- 1985 (RA-2015)	As per Table 1 Below	%
2	Grain Size Analysis	As per IS : 2720 (Part IV)-1985 (RA-2015)	As per table 2 below	%

Table -1

LAB JOB NO.- R-2012031 **TEST RESULTS**

Sr. No.	% of Fines	Type of Soil	LL %	PL %	PI %	
1	14.55	Clayey Gravel	40.00	20.02	19.98	

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Website : marshalgeoraipur.com

SHEET 2 OF 2

Table -2

LAB JOB NO.- R-2012031

TEST RESULTS

Sr. No.	SIEVE SIZE (MM)	WT. RET.	% OF WT.RET	CUM.WT. RET.	PERCENTAGE FINER (%)
1	10	1020.0	51.00	51.00	49.00
2	4.75	595.0	29.75	80.75	19.25
3	2	57.0	2.85	83.60	16.40
4	0.6	26.0	1.30	84.90	15.10
5	0.425	2.0	0.10	85.00	15.00
6	0.75	9.0	0.45	85.45	14.55

Gravel	Coarse Sand	Medium Sand	Fine Sand	Silt & Clay
80.75	2.85	1.40	0.45	14.55

Verified by
(Himanshu R. Varma)
(Geotechnical Engineer)

Authorised Signatory
(Arun Bhave)

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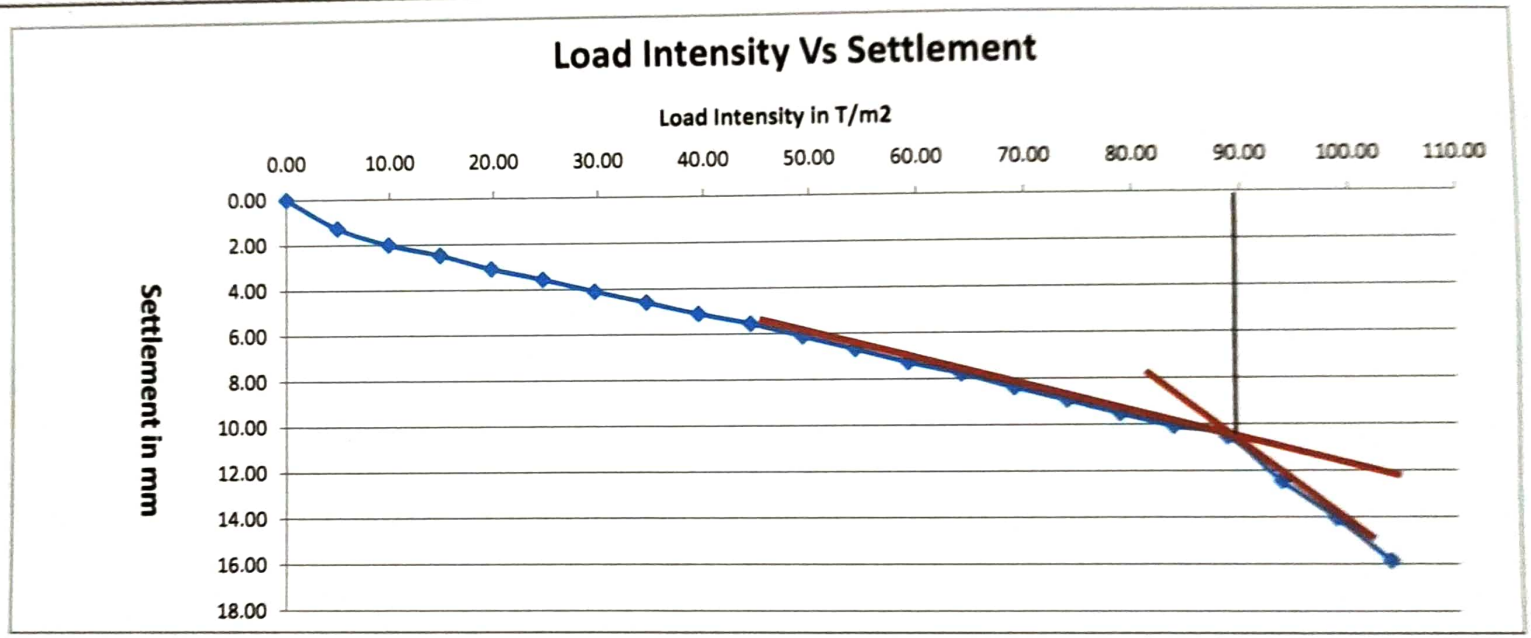
********END OF REPORT********

PLATE LOAD TEST (As per IS-1888)

Client Name :-	Chattisgarh State Power Transmission Co. Ltd	MGTL Job No.-	R-0312201/001	Depth :-	3.00	Mtr.
				Bulk Density :-	2.34	T/m^3
Name of Work :-	Soil Testing at 220 KV Sub-station	Location :-	21°20'31"N, 81°12'51"E	plate size:-	0.45x0.45m	
		Dt of Testing:-	02-12-2020	Pit No :-	2	
Site Name :-	Litiya, Dist Durg			**Type of soil**:- Clayey Gravel		

PIT NO.- 02

LOAD Ton	Ave. Sett. (mm)
0	0.00
1	1.27
2	2.01
3	2.48
4	3.09
5	3.56
6	4.10
7	4.60
8	5.11
9	5.55
10	6.12
11	6.69
12	7.27
13	7.77
14	8.38
15	8.94
16	9.53
17	10.09
18	10.54
19	12.46
20	14.04
21	15.86



Ultimate Load Intensity	89.00	Ton/m^2	**FOS**	4
Plate Settlement at failure load		10.5	mm	
Net Ultimate Bearing Capacity (q_u)		81.98	T/m^2	
Net Safe Bearing Capacity (q_s)		20.50	T/m2	
Gross Safe Bearing Capacity (SBC)		**27.52**	**T/m2**	

Area of plate	0.203	m2
Overburden pressure	7.020	T/m^2

Remark:

1) The SBC has been computed taking 1m x 1m footing size.
2) Settlement for 1m x1m size of footing at failure pressure is 17.50 mm.
3) The test was conducted on moist Soil, so water table correction is applied.
4) **Factor of safety of 4 is considered.**

Prepared & Check By	***Authorised Signatury***

Calculation for Footing Settlement

So Settlement of Footing at Safe Load Can be Calculated Using the following Formula: IS 1888

PIT NO.- 02

Width of Footing **(B)**	**1**	Mtr
Width of Plate **(BP)**	**0.45**	Mtr.
Plate Settlement **(SP)**	**10.54**	mm.

Settlement Calculation on Sandy Soils

$$S_F = S_p\{[B*(B_p+0.3)/[B_p*(B+0.3)]\}^2$$

$$SF = Sp\left\{\frac{B(Bp + 0.3)}{Bp(B + 0.3)}\right\}^2$$

$$SF = 10.54\left\{\frac{1(0.45+0.3)}{0.45(1+0.3)}\right\}^2$$

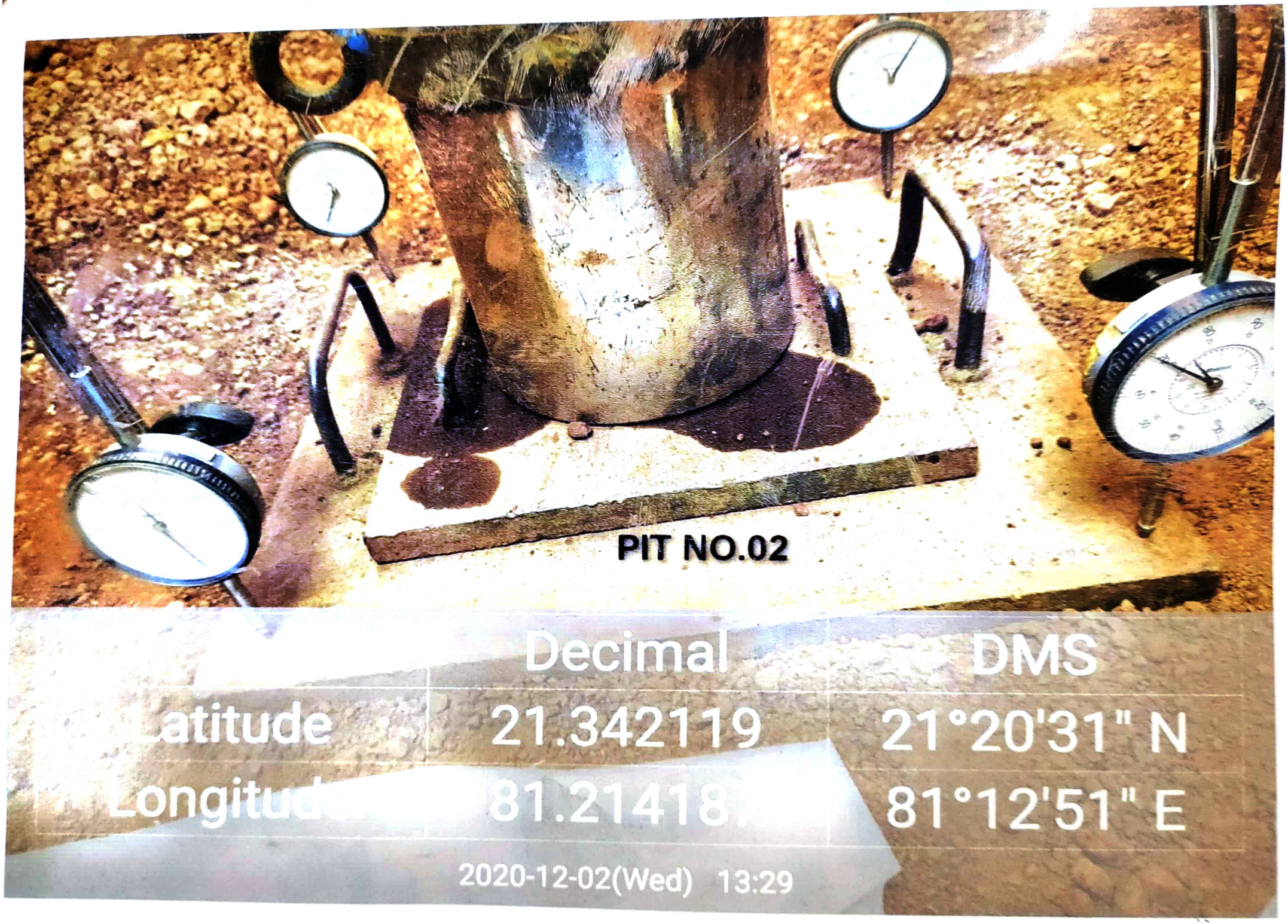
SF =	**10.54**	0.75
		0.585

SF =	**10.54**	**1.282**

Permissible Settlement of Footing

SF =	17.32	mm
SF ≈	**17.50**	**mm**

Geo Test Laboratory RAIPUR (C.G.)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81°12'51" E
2020-12-02(Wed) 13:29

Marshal Geo Test Laboratory
For Testing of Civil Engineering Materials
ISO 9001:2015 Certified By : Standardisation Testing & Quality Certification Directorate
MSME No.: CG14E0001811

TEST REPORT

T. R. No. MGTL / TRR / R-0312206/001 Date:-05/12/2020

To,
The Executive Engineer (Civil)
Civil Transmission Division CSPTCL
Bhilai -3 (C.G.)- 490021

Subject: - Test result of Soil Sample for proposed Construction at 220 KV S/s Construction site at Litiya (Semariya), Distt.- Durg (C.G.).

Your Ref.: - Letter No.:- EEC/CSPTCL/Works/3007 Bhilai-3, Dt.:- 28/11/2020

Sample ID Mark :- Pit No.-03, Semariya Litiya, Durg (C.G.), Depth - 1.50 m.

Dear / Sir,
Vide subject and reference cited above, the test results report is as follows: -

SAFE BEARING CAPACITY OF SOIL BY PLATE LOAD TEST

FIELD & LAB JOB NO: - R-2012036

Sr. No.	Name of Test	Test Method	Test Results
	Plate Load Test	As per IS:-1888 (RA-2016)	As Below
	PARTICULARS	LOCATION	
		PIT No.- 03, SEMARIYA LITIYA, DURG (C.G.) (GPS CO-ORDINATE:- N-21°20'55" E-81°12'58")	
1	Date of Testing	03/12/2020	
2	Type Soil	Clayey Gravel	
3	Test Pit Level from EGL (m)	1.50	
4	Field Density (t/m^3)	2.16	
5	FOS	4.00	
6	Gross Safe Bearing Capacity (t/m^2)	23.43	

Remarks:-
1. **The SBC has been computed taking 1m × 1m footing size.**
2. **Settlement for 1m × 1m size of footing at failure pressure is 16.50 mm.**
3. **The test was conducted on moist Soil, so water table correction is applied.**
4. **Factor of safety of 4 is considered.**

Verified by
(Himanshu R. Varma)
(Geotechnical Engineer)

Authorised Signatory
(Arun Bhave)

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MSME No.: CG14E0001811

T. R. No. / MGTL / TRR / R-0312206/002

Date:-05/12/2020

To,
The Executive Engineer (Civil)
Civil Tranmission Division CSPTCL
Bhilai -3 (C.G.)- 490021

Subject :- Test result of Soil Sample for proposed Construction at 220 KV S/s Construction site at Litiya (Semariya), Distt.- Durg (C.G.).

Your Ref.:- Letter No.:- EEC/CSPTCL/Works/3007 Bhilai-3, Dt.:- 28/11/2020

Sample ID Mark :- Pit No.-03, Semariya Litiya, Durg (C.G.), Depth - 1.50 m.

GPS CO-ORDINATE:- N-21°20'55" E-81°12'58"

Dear Sir,

Vide subject and reference cited above, the test results report is as follows: -

PARTICULAR OF SAMPLES (S) :-

Nature:- Soil Sample
Sample No.(S) Details:- One sample
Packing/Container :- Poly Bags
Dt. of Receipt in the Lab:- 03/12/2020

Testing Dt. :- 05/12/2020

LAB JOB NO.- R-2012036			TEST RESULTS	
S. No.	Name of Test	Test Method	Results	Unit
A)	**Soil Sample**			
1	LL, PL & PI	As per IS : 2720 (Part V)- 1985 (RA-2015)	As per Table 1 Below	%
2	Grain Size Analysis	As per IS : 2720 (Part IV)-1985 (RA-2015)	As per table 2 below	%

Table -1

LAB JOB NO.- R-2012036			TEST RESULTS			
Sr. No.	% of Fines	Type of Soil	LL %	PL %	PI %	
1	27.40	Clayey Gravel	42.00	22.20	19.80	

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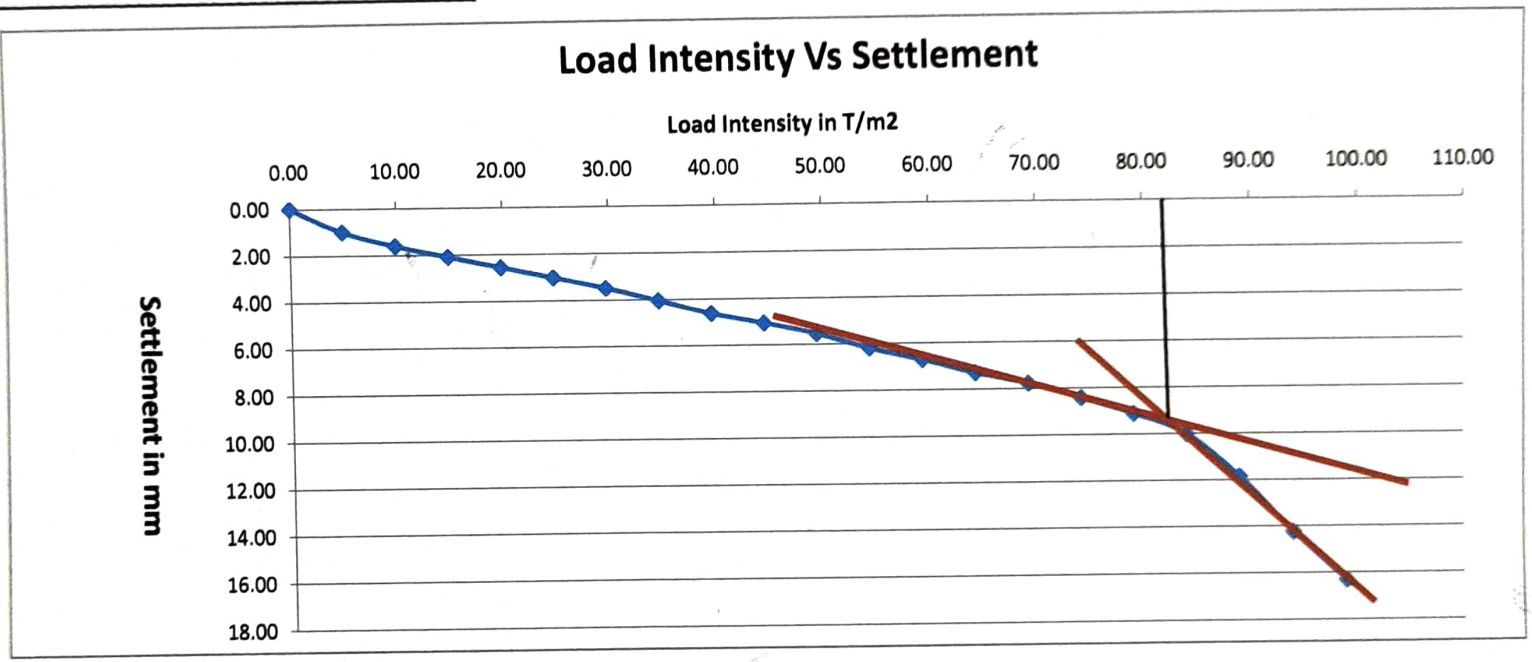
raipur.marshal@gmail.com
Website : marshalgeoraipur.com

PLATE LOAD TEST (As per IS-1888)

Client Name :-	Chattisgarh State Power Transmission Co. Ltd	MGTL Job No.-	R-0312206/001	Depth :-	1.50	Mtr.
				Bulk Density :-	2.16	T/m^3
Name of Work :-	Soil Testing at 220 KV Sub-station	Location :-	21°20'55"N, 81°12'58"E	plate size:-	0.45x0.45m	
		Dt of Testing:-	03-12-2020	Pit No :-	3	
Site Name :-	Litiya, Dist Durg			Type of soil:- Clayey Gravel		

PIT NO.- 03

LOAD Ton	Ave. Sett. (mm)
0	0.00
1	1.00
2	1.61
3	2.09
4	2.56
5	3.02
6	3.50
7	4.06
8	4.63
9	5.06
10	5.54
11	6.20
12	6.72
13	7.31
14	7.77
15	8.42
16	9.12
17	10.02
18	11.86
19	14.24
20	16.32
0	0.00



Ultimate Load Intensity	84.00	Ton/m^2	**FOS**	**4**	**Area of plate**	0.203	m2
Plate Settlement at failure load		10	mm		**Overburden pressure**	3.240	T/m^2
Net Ultimate Bearing Capacity (q_u)		80.76	T/m^2				
Net Safe Bearing Capacity (q_s)		20.19	T/m2				
Gross Safe Bearing Capacity (SBC)		**23.43**	**T/m2**				

Remark:

1) The SBC has been computed taking 1m x 1m footing size.
2) Settlement for 1m x1m size of footing at failure pressure is 16.50 mm.
3) The test was conducted on moist Soil, so water table correction is applied.
4) Factor of safety of 4 is considered.

Prepared & Check By	***Authorised Signatury***
	Marshal Geo Test Laboratory RAIPUR (C.G.)

Calculation for Footing Settlement

So Settlement of Footing at Safe Load Can be Calculated Using the following Formula: IS 1888

PIT NO.- 03

Width of Footing **(B)**	**1**	Mtr
Width of Plate **(BP)**	**0.45**	Mtr.
Plate Settlement **(SP)**	**10.00**	mm.

Settlement Calculation on Sandy Soils

$$S_F = S_p\{[B*(B_p+0.3)/[B_p*(B+0.3)]\}^2$$

$$SF = Sp\left\{\frac{B(Bp + 0.3)}{Bp(B + 0.3)}\right\}^2$$

$$\textbf{SF = 10.0}\left\{\frac{1(0.45+0.3)}{0.45(1+0.3)}\right\}^2$$

SF =	**10.00**	0.75
		0.585

SF =	**10.00**	**1.282**

Permissible Settlement of Footing

SF =	16.44	mm
SF ≈	**16.50**	**mm**

Marshal Geo Test Laboratory RAIPUR (C.G.)

PIT NO.03
Decimal
DMS
Latitude
21.348773
1°20'55" N
Longitude
81.216275
81°12'58" E
2020-12-03(Thu) 13:26