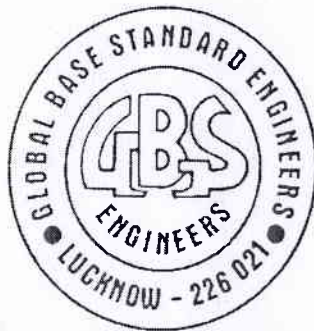


A REPORT
ON SUB SOIL INVESTIGATION

FOR PROPOSED CONSTRUCTION OF 02 LANE YAMUNA
RIVER BRIDGE ON RAHANKALAN-RAIPUR-BAMRAULI
KATARA ROAD (O.D.R.)

at

SAMOGHAR GHAT
BRIDGE CONSTRUCTION UNIT, AGRA
UP STATE BRIDGE CORPORATION LTD.



Presented By

G. B. S. ENGINEERS

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1.00 INTRODUCTION :

For proposed construction of Bridge over Yamuna river at Samoghar Ghat between Raipur & Samoghar Ghat, in District of Agra (UP), the construction agency UP State Bridge Corporation Ltd, Lucknow through its Bridge Construction Unit, Agra, felt necessity for Safe Bearing Capacity of Soil for design of foundation and accordingly soil investigation was resorted to. The work of soil investigation has been assigned to our concern G.B.S. ENGINEERS, 1 & 2, Bilal market, Near Old Forest Check Post, Khadri, Sitapur road, Lucknow. The investigation results will be used for foundation design for proposed structure.

2.00 WORK SCOPE :

In all three (03) numbers of investigation points each as per the details mentioned on bore log chart are taken up for investigation. The field testing such as Standard Penetration Test and Recording of Water Table was carried out and soil samples were collected for determination of Index properties. And based on these, to determine Safe Bearing Capacity of the foundation soil and Safety against Liquefaction.

3.00 LOCATION AND PERIOD OF INVESTIGATION :


All the investigation points are duly marked on the attached layout plan with this report. The approach to easy and accessible. The investigations have been carried out during September' 2024. The weather was humid and moderate.

4.00 SITE INVESTIGATIONS & IN-SITU TESTS :

The investigation at site itself includes Standard Penetration Test (SPT) and observation of water table. As per procedure laid down in IS:2131-1985, starting from 0.55M depth, the SPT was conducted at a regular interval of 1.50M and also wherever strata changed. Starting from 1.00M depth, the UDS samples were taken up immediately after completion of SPT at the regular interval of 1.50M. All the recorded and corrected SPT values are plotted on the bore log chart Annexure-C in this report.

5.00 STANDARD PENETRATION TEST:

Out of a number of similar tests, this test is one of the most important tests conducted at the site. This test is specially suited for the Cohesionless soils which are difficult to be sampled and is extremely useful for reporting the relative density and angle of shearing resistance of Cohesionless soils. It can also be used for determining the unconfined compressive strength of cohesive soils. The standard penetration test (SPT) is conducted in a borehole using a standard split spoon sampler. The split spoon is consisting of a driving shoe about 75mm long, steel tube about 450mm long which could be split into two halves longitudinally and the coupling at the top of the tube about 150mm long. The inside and outside diameters of the split tube are 35mm and 50.8mm respectively. The test is carried out by deriving the split-spoon sampler into the soil by a hammer weighing 65.00 kg and falling freely from a height of 750mm, through the guide rod. Each hammer blow derives the sampler into the soil. The number of blows for each penetration of 150mm of the sampler is recorded in succession till the total penetration becomes 450mm. The number of hammer blows for the first 150mm penetrations are discarded considering them as seating derives. The total number of blows recorded for the last two 150mm penetrations are added to report the Standard Penetration Number (N). The recorded value of standard penetration number is corrected for Dilatency Correction as well as Overburden Correction. The Standard Penetration Tests were conducted as per IS:2131-1963 in each bore hole at a regular interval as specified by IS code upto end of investigation or refusal, whichever occurs earlier and the values are indicated in the Bore log chart attached with this report.


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6.00 SAMPLING :

The disturbed and undisturbed samples were taken with utmost care and brought to laboratory for testing. Proper attention was paid during extraction of samples for laboratory testing to arrive at rational results. The Thin walled Sampler as per IS:2132-1986 and IS:11594-1985 (Reaffirmed 2006) was used for extracting undisturbed soil samples. The UDS samples were extracted immediately after termination of first SPT if UDS samples unable then Disturbed Samples DS collected i.e. or filled up soil whichever is more, at a regular interval of 1.50M in each bore holes or wherever strata changed.

7.00 POSITION OF WATER TABLE :

The details of the water table encountered in each of the points of investigation during exploration has been duly mentioned in the respective bore holes and also on the lab test results sheet.

8.00 LABORATORY INVESTIGATIONS :

The selected the Disturbed and the Un-disturbed samples collected from the site were tested for the following Index properties in the laboratory:

- 8.1 Grain Size Distribution/Sieve Analysis as per IS : 2720 (Part4)-1985, (Reaff. 1995)
- 8.2 Atterberg's limits as per IS:2720 (Part 5) - 1985, (Reaffirmed 1995)
- 8.3 Natural moisture content as per IS : 2720 (Part II) - 1973, (Reaffirmed 2002)
- 8.4 Bulk density as per IS : 2720 (Part 28) - 1974, (Reaffirmed 1995)
- 8.5 Specific Gravity as per IS : 2720 (Part 3/Sec 1 &2) - 1980, (Reaffirmed 1997)
- 8.6 c & ϕ test/Tri-axial compression Test as per IS : 2720 (Part 12)-1981, (Reaff. 1997)
- 8.7 Consolidation test as per IS : 2720 (Part 13) - 1986, (Reaffirmed 1997)

9.00 METHODOLOGY AND APPROACH :

The bearing capacity of shallow foundations is worked out on two considerations, firstly, foundations should be safe against shear failure as per IS: 6403-1981 and, secondly, it should be safe against excessive settlement as per IS: 1904-1978. The depth of foundation is governed by para 4.2, sub-para 4.2.1(d) of IS: 1080-1980 and the various IRC codes based on the scour depth as also on desired bearing capacity. Investigations have been carried out in reference to Indian Standard Specifications. The minimum value of results for evaluation of Safe Bearing capacity has been considered.

10.0 BEARING CAPACITY CALCULATIONS :

Further, due regard have been paid to the recorded values of Standard Penetration Test (N-values) as also to economic considerations for the type of foundation. As per IS code, the factor of safety on ultimate bearing capacity is to be taken from 2.5 to 3.0. The value of F.O.S. is decided reasonably depending on the nature of sub soil and loading on it. In the present case the factor of safety has been considered as 2.5.

11.0 LIQUEFACTION OF SUBSOIL STRATUMS :

It is the phenomenon in which the soil starts behaving as liquid under certain set of conditions. It is associated with decrease in safe bearing capacity of subsoil during earthquake. It occurs under 3 situation only, namely, when subsoil is saturated, loose sandy soil (fines < 5%) and SPT values is less than 15. With these conditions, liquefaction becomes the function of earth quake intensity on seismic coefficient as per adopted/ recommended as IS code. If subsoil at any place does not fulfill any of these three conditions, the liquefaction will not occur. In the event of Earthquake, additional shear


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stress are generated in subsoil which are termed as Cyclic Stress Ratio (CSR). These additional shear stress must be considered while evaluating Safe Bearing Capacity of subsoil so that the structure should also remain stable during occurrence of earthquake. If equivalent average shear stress τ_{av} is anticipated in founding subsoil due to earthquake, then it could be used as an important parameter for safety against liquefaction.

The additional shear stresses generated in the subsoil during earthquake must be considered while evaluating Safe Bearing Capacity of subsoil. If the equivalent average shear stress due to earthquake is τ_{av} , then the normalised average shear stress τ_{av} with initial effective overburden pressure (σ_o) is termed as Seismic Demand of soil layer for safety against liquefaction. This Seismic demand is termed as **Cyclic Stress Resistance (CSR)** against earthquake.

The Cyclic Stress Ratio (CSR) and Cyclic Resistance Ratio (CRR) values are evaluated at different depths and the depth prone to Liquefaction, and hence safety against liquefaction can be determined. The probability of Liquefaction exists if FS_L is less than 1.0, otherwise safe. As per IS:1892 (Part-II)-2016, the Factor of safety against liquefaction should be taken as 1.10.

12.0 GENERAL NATURE OF UNDERNEATH SOIL :

Based on investigation conducted at three points being 60.00M deep propose conduction of 02 Lane Yamuna River Bridge on Rahankalan-Raipur-Bamrauli Katara Road, at Samoghar Ghat, in District of Agra (UP) and results obtained from samples collected from therein, an opinion may be framed regarding general nature of subsoil. The location and scope of investigation is decided by the client. The layout of points are duly marked on the layout plan attached with this report. The results of soil stratum in the bore bores are largely at variance in vertical as well as lateral directions and the subsoil stratum varies not only in terms respective levels but in terms of index properties and difficult to be compared. However, reasonable comparison may be made by considering the respective position and levels of subsoil stratum and adjusting index properties at the desired level without inviting significant error. The client has desired to determine the Safe Bearing Capacity at 40.00M depth from L.WL, for Well foundation of Dia. 8.00 M. Broadly, the subsoil is consisting of cohesive soil from surface followed by non-cohesive soil and thereafter cohesive soil again starts and continues till the end of investigation i.e. 60.00M. The non-cohesive soil is fine sand or clean sand of SP group primarily coarse sand. The silty clay of low plasticity CL group contains the kankars and gravels in variable percentages in its upper as well as lower stratum. The Water Table is lying lowest at less than 2M below NGL and the corresponding levels are mentioned on the borelog chart. The seasonal variations are expected in the present level of water table and during monsoon season these would vary considerably depending on the depth of river water. The penetration resistance of the soil is satisfactory.


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13.0 SUGGESTIONS & RECOMMENDATIONS :

The investigation is conducted at three (03) points of 60.00M deep from existing ground level with respect bore hole level for determination of Safe Bearing Capacity of subsoil for proposed construction of Bridge of Yamuna river at Samoghar Ghat between Raipur & Samoghar Ghat in District of Agra (UP). The foundation is proposed at 40.00M depth below LWL. The results of soil stratum in the bore holes are nearly similar and reasonably comparable and, thus, can be correlated in lateral directions without inviting significant error. The client has desired the Safe Bearing Capacity at 40.00M depth from LWL, as such, sample calculations are carried out for safe bearing capacity for Well foundation of Dia. 8.00M placed at 40.00M depth below LWL and evaluated results are being tabulated as follows.

WELL FOUNDATION

Borehole No.	Well Dia. (M)	Footing depth below (LWL)	RL of Footing	Footing depth from bore hole Top	Lowest Water Level (LWL)	Shear Parameters			Allowable Bearing Pressure (T/m ²)		
						Cohesion 'c'	Internal friction ϕ	Void ratio (e)	Shear Criteria	Settlement Criteria	Adopt
						kg/cm ²	ϕ	(e)			
1	8.00	40.00	148.150	45.18	142.970	0.31	12.00	0.539	104.33	371.67	104.33
2	8.00	40.00	151.850	48.88	142.970	0.33	14.00	0.676	92.26	118.18	92.26
3	8.00	40.00	150.750	47.78	142.970	0.30	13.00	0.616	97.88	317.76	97.88
Adopt Safe Bearing Capacity											98.16

Therefore, for Well footing dia. of 8.00M placed at 40.00M depth below LWL, the values of Safe Bearing Capacity and other related parameters as reported above may be adopted for the depth below corresponding bore holes.

As per provisions of IS:1893-2016, the substructure/foundation should also be safe against seismic forces in the corresponding seismic within which structure is proposed, the Cyclic Resistance of subsoil must greater than Cyclic Stress Ratio at footing level as well as below foundation. The Cyclic Stress Ratio and Cyclic Resistance Ratio is determined at foundation level and below footing by analysing subsoil data and the results evaluated are being furnished as follows;

CPMG, AGR

Recommended and forwarded for approval

1. Spc 40.00m below LWL - 90.00 T/m²
2. Value of c (cohesion) - 0.33 kg/cm²
3. Value of ϕ (Internal friction) - 14.00°
4. Value of Ksf (ult fact) - 1.06


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(शशि भूषण)

मुख्य परियोजना प्रबन्धक
उ०प्र० राज्य सेतु निगम लि०
आगरा



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AT FOUNDATION LEVEL

Borehole No.	At Footing Level	Cyclic Stress Ratio (CSR)	Cyclic Resistance Ratio at CRR _{reqd}	Cyclic Resistance Ratio, CRR	Uncorrected SPT (N _m)	Corrected SPT (N ₁) ₆₀	Available FOS FS _{L(Avail)}	Required FOS FS _{L(Reqd)}	Safety against Seismic Forces (Liquefaction)
1	45.18	0.1113	0.2545	0.2545	87	34.68	1.439	1.100	Hence, Safe under Seismic Forces
2	48.88	0.1196	0.1444	0.1444	72	29.67	1.767	1.100	Hence, Safe under Seismic Forces
3	47.78	0.1169	0.1983	0.1983	78	31.49	1.696	1.100	Hence, Safe under Seismic Forces

BELOW FOUNDATION LEVEL

Borehole No.	Below Footing Level	Cyclic Stress Ratio (CSR)	Cyclic Resistance Ratio at CRR _{reqd}	Cyclic Resistance Ratio, CRR	Uncorrected SPT (N _m)	Corrected SPT (N ₁) ₆₀	Available FOS FS _{L(Avail)}	Required FOS FS _{L(Reqd)}	Safety against Seismic Forces (Liquefaction)
1	45.18	0.1113	0.2577	0.2577	103.0	46.13	2.319	1.100	Hence, Safe under Seismic Forces
2	48.88	0.1196	0.3282	0.3282	103.0	52.33	2.744	1.100	Hence, Safe under Seismic Forces
3	47.78	0.1169	0.2800	0.2800	93.00	48.06	2.395	1.100	Hence, Safe under Seismic Forces

From the above Liquefaction analysis, it is found that Cyclic Resistance Ratio (CRR) is sufficiently more than 10% over Cyclic Stress Ratio at footing level of 40.00M below LWL i.e. at the corresponding depth from respective top of bore holes as well as below footing for entire range of investigation. As such, subsoil is safe against probable phenomenon of Liquefaction due to seismic activities at footing level as well as below footing depth for the investigation range from footing level upto 55.00M. The Silt factor K_{sf} is 1.06



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14.0 LIMITATIONS :

Every investigation for any technological work always has its own boundaries within which it is applicable. Therefore a number of assumptions are made for arriving at practicable inference. Some of these may or may not be within the control of investigator, however all possible attention have been paid thereupon. The present report has been prepared with utmost care with respect to investigational results and consequent recommendations within the framework of IS specifications are made. But still it has got the following limitations, which are beyond the control of any engineer, and depends only on given conditions.

- a The present report is based on the results of investigations carried out by manual auguring and Wash boring/Pressure boring and the report, and corresponding recommendations, are based on these values.
- b The natural moisture content of the soil is an important property and is an instant characteristic and changes from time to time depending upon surface drainage conditions as well as surface recharge and ground water recharge conditions. As such the value of natural water content represents natural water content at the site as well as at the given level at the time of investigations.
- c The most important field test, namely Standard Penetration Test has been carried out at the site to assess the in-situ penetration resistance of the soil at present conditions which may vary under different moisture contents. However soil below the site is mostly clayey for considerable depth and application of suitable correction serves the purpose.
- d Average value of the particle size, as per IS code, have been considered as such all particles falling in the range of one mesh size to the next shall pass through the opening.
- e Only those values have used which are reliable and those giving absurd results are neglected and slipped soil samples has not been considered.
- f Type of foundation and its depth has been considered as desired by client. In case of Pile foundation, dia. and length of Pile has been considered from load capacity and available firm soil strata considerations and with cut-off depth based on founding level. Also different Pile dia. and length would yield different load capacities.
- g In case of clayey soil stratum consisting of Low and Intermediate plasticities or from intermediate to high plasticities, the change in depth of silty clay of low plasticity to that into intermediate plasticity etc. has been considered suitably as it was only be ascertained based on test results and not during boring operation.
- h Modulus of Subgrade Reaction has been assumed suitably for the given condition of clayey soil for estimation of immediate settlement.
- i Grain Size Distribution curves are attached for only one bore hole since these being the graphic presentation and their data is already given in the Results data sheet.
- j For estimation of immediate settlement the value of Poisson's ratio has been considered as provided in the IS code i.e. 0.50
- k Safe Bearing Capacities for open/deep foundation correspond for desired size. If safe bearing capacity at any other depth or for any other size is desired, the same could be determined with the procedure given the sample calculations.



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ANNEXURE - B										
RECORDED & CORRECTED VALUES OF STANDARD PENETRATION TEST										
Site/Location		Proposed Construction of 02 Lane Yamuna River Bridge on Rahankalan-Raipur-Bamrauli Katara Road, at Samoghar Ghat Agra (UP).								
Client/ Agency		Dy. Project Manager, BCU, Agra, UPSBC Ltd.								
Bore Hole No. 1		Sep' 2024		River Bridge		142.970		BH LVL		148.150
		Filled Up		1.500		Water Table		1.350		
SN	Depth	Recorded SPT/N-Values				Soil Type Fill/ Cohesive/ Non-cohesive	Due to Overburden		Due to Dilatency	
		N ₁	N ₂	N ₃	N'		Correction	N' _{corrected}	Correction	N' _{corrected}
1	0.55 - 1.00	2	3	4	7	Cohesive	0.00	7.00	0.00	7.00
2	2.05 - 2.50	4	5	5	10	Non Cohesive	1.40	14.00	0.00	14.00
3	3.55 - 4.00	5	6	6	12	Non Cohesive	1.20	14.40	0.00	14.40
4	5.05 - 5.50	6	7	8	15	Non Cohesive	1.20	18.00	1.50	16.50
5	6.55 - 7.00	7	8	9	17	Non Cohesive	1.00	17.00	1.00	16.00
6	8.05 - 8.50	8	9	10	19	Non Cohesive	1.00	19.00	2.00	17.00
7	9.55 - 10.00	9	11	15	26	Non Cohesive	0.84	21.84	3.42	18.42
8	11.05 - 11.50	10	15	17	32	Non Cohesive	0.84	26.88	5.94	20.94
9	12.55 - 13.00	15	17	20	37	Non Cohesive	0.78	28.68	6.84	21.84
10	14.05 - 14.50	17	19	22	41	Non Cohesive	0.78	31.78	8.39	23.39
11	15.55 - 16.00	17	20	25	45	Non Cohesive	0.70	31.50	8.25	23.25
12	17.05 - 17.50	18	20	26	46	Non Cohesive	0.65	29.90	7.45	22.45
13	18.55 - 19.00	20	25	28	53	Non Cohesive	0.65	34.45	9.73	24.73
14	20.05 - 20.50	19	27	30	57	Non Cohesive	0.60	34.20	9.60	24.60
15	21.55 - 22.00	20	30	29	59	Non Cohesive	0.60	35.40	10.20	25.20
16	23.05 - 23.50	22	30	30	60	Non Cohesive	0.55	33.00	9.00	24.00
17	24.55 - 25.00	22	25	28	53	Non Cohesive	0.55	29.15	7.08	22.08
18	26.05 - 26.50	20	23	26	49	Non Cohesive	0.50	24.50	4.75	19.75
19	27.55 - 28.00	23	27	29	56	Non Cohesive	0.40	22.40	3.70	18.70
20	29.05 - 29.50	25	30	32	62	Non Cohesive	0.40	24.80	4.90	19.90
21	30.55 - 31.00	22	27	30	57	Non Cohesive	0.40	22.80	3.90	18.90
22	32.05 - 32.50	22	29	31	60	Non Cohesive	0.40	24.00	4.50	19.50
23	33.55 - 34.00	25	32	34	66	Non Cohesive	0.40	26.40	5.70	20.70
24	35.05 - 35.50	25	33	35	68	Non Cohesive	0.40	27.20	6.10	21.10
25	36.55 - 37.00	26	38	39	77	Non Cohesive	0.40	30.80	7.90	22.90
26	38.05 - 38.50	25	40	42	82	Non Cohesive	0.40	32.80	8.90	23.90
27	39.55 - 40.00	22	38	44	82	Cohesive	0.00	82.00	0.00	82.00
28	41.05 - 41.50	21	40	43	83	Cohesive	0.00	83.00	0.00	83.00
29	42.55 - 43.00	23	41	42	83	Cohesive	0.00	83.00	0.00	83.00
30	44.05 - 44.50	23	43	44	87	Cohesive	0.00	87.00	0.00	87.00
31	45.55 - 46.00	22	40	45	85	Cohesive	0.00	85.00	0.00	85.00
32	47.05 - 47.50	20	42	44	86	Cohesive	0.00	86.00	0.00	86.00
33	48.55 - 49.00	18	38	40	78	Cohesive	0.00	78.00	0.00	78.00
34	50.05 - 50.50	20	43	45	88	Non Cohesive	0.40	35.20	10.10	25.10
35	51.55 - 52.00	23	46	47	93	Non Cohesive	0.40	37.20	11.10	26.10
36	53.05 - 53.50	25	50	53	103	Non Cohesive	0.40	41.20	13.10	28.10
37	54.55 - 55.00	22	43	45	88	Non Cohesive	0.40	35.20	10.10	25.10


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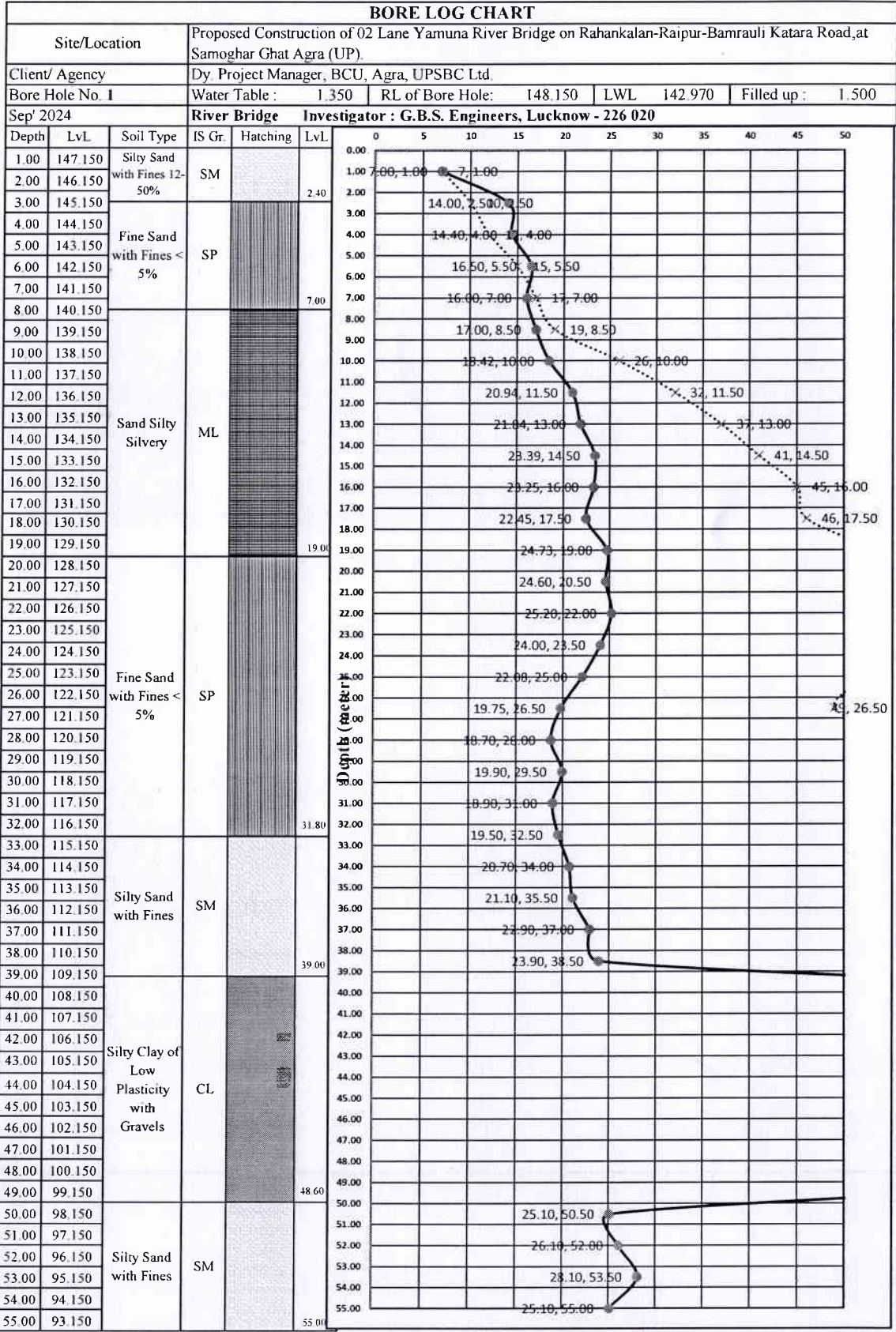
Bore Hole No. 2		Sep' 2024	ver Brid	142.970	BH LVL	151.850	Filled Up	0.000	Water Table	8.400
SN	Depth	Recorded SPT/N-Values				Soil Type Fill/ Cohesive/ Non-cohesive	Due to Overburden		Due to Dilatency	
		N ₁	N ₂	N ₃	N'		Correction	N' _{corrected}	Correction	N' _{corrected}
1	0.55 - 1.00	2	3	4	7	Non Cohesive	2.00	14.00	0.00	14.00
2	2.05 - 2.50	2	3	4	7	Non Cohesive	1.40	9.80	0.00	9.80
3	3.55 - 4.00	3	4	4	8	Non Cohesive	1.20	9.60	0.00	9.60
4	5.05 - 5.50	3	4	5	9	Non Cohesive	1.20	10.80	0.00	10.80
5	6.55 - 7.00	4	5	6	11	Non Cohesive	1.00	11.00	0.00	11.00
6	8.05 - 8.50	4	5	7	12	Non Cohesive	1.00	12.00	0.00	12.00
7	9.55 - 10.00	5	6	8	14	Non Cohesive	0.84	11.76	0.00	11.76
8	11.05 - 11.50	5	8	10	18	Non Cohesive	0.84	15.12	0.06	15.06
9	12.55 - 13.00	6	11	13	24	Non Cohesive	0.78	18.60	1.80	16.80
10	14.05 - 14.50	8	14	16	30	Non Cohesive	0.78	23.25	4.13	19.13
11	15.55 - 16.00	8	17	20	37	Non Cohesive	0.70	25.90	5.45	20.45
12	17.05 - 17.50	9	20	22	42	Non Cohesive	0.70	29.40	7.20	22.20
13	18.55 - 19.00	6	12	15	27	Non Cohesive	0.65	17.55	1.28	16.28
14	20.05 - 20.50	7	12	16	28	Non Cohesive	0.65	18.20	1.60	16.60
15	21.55 - 22.00	9	19	17	36	Non Cohesive	0.60	21.60	3.30	18.30
16	23.05 - 23.50	10	20	20	40	Non Cohesive	0.60	24.00	4.50	19.50
17	24.55 - 25.00	18	20	21	41	Non Cohesive	0.55	22.55	3.78	18.78
18	26.05 - 26.50	18	21	22	43	Non Cohesive	0.55	23.65	4.33	19.33
19	27.55 - 28.00	20	25	29	54	Non Cohesive	0.50	27.00	6.00	21.00
20	29.05 - 29.50	19	27	30	57	Non Cohesive	0.40	22.80	3.90	18.90
21	30.55 - 31.00	21	30	32	62	Non Cohesive	0.40	24.80	4.90	19.90
22	32.05 - 32.50	22	30	32	62	Non Cohesive	0.40	24.80	4.90	19.90
23	33.55 - 34.00	20	32	35	67	Non Cohesive	0.40	26.80	5.90	20.90
24	35.05 - 35.50	18	33	36	69	Non Cohesive	0.40	27.60	6.30	21.30
25	36.55 - 37.00	19	34	38	72	Non Cohesive	0.40	28.80	6.90	21.90
26	38.05 - 38.50	16	32	36	68	Cohesive	0.00	68.00	0.00	68.00
27	39.55 - 40.00	17	34	37	71	Cohesive	0.00	71.00	0.00	71.00
28	41.05 - 41.50	19	36	38	74	Cohesive	0.00	74.00	0.00	74.00
29	42.55 - 43.00	16	30	33	63	Cohesive	0.00	63.00	0.00	63.00
30	44.05 - 44.50	15	31	34	65	Cohesive	0.00	65.00	0.00	65.00
31	45.55 - 46.00	17	33	35	68	Cohesive	0.00	68.00	0.00	68.00
32	47.05 - 47.50	18	35	37	72	Cohesive	0.00	72.00	0.00	72.00
33	48.55 - 49.00	20	30	36	66	Non Cohesive	0.40	26.40	5.70	20.70
34	50.05 - 50.50	20	31	38	69	Non Cohesive	0.40	27.60	6.30	21.30
35	51.55 - 52.00	22	29	41	70	Non Cohesive	0.40	28.00	6.50	21.50
36	53.05 - 53.50	24	45	49	94	Non Cohesive	0.40	37.60	11.30	26.30
37	54.55 - 55.00	25	50	53	103	Non Cohesive	0.40	41.20	13.10	28.10


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 Bridge Construction Unit-Agra

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Site/Location		Proposed Construction of 02 Lane Yamuna River Bridge on Rahankalan-Raipur-Bamrauli Katara Road, at Samoghar Ghat Agra (UP).								
Client/ Agency		Dy. Project Manager, BCU, Agra, UPSBC Ltd								
Bore Hole No. 3		Sep' 2024	ver Brid	142 970	BH LVL	150.750	Filled Up	0.000	Water Table	5.600
SN	Depth	Recorded SPT/N-Values				Soil Type Fill/ Cohesive/ Non-cohesive	Due to Overburden		Due to Dilatency	
		N ₁	N ₂	N ₃	N'		Correction	N _{corrected}	Correction	N _{corrected}
1	0.55 - 1.00	4	4	5	9	Non Cohesive	2.00	18.00	1.50	16.50
2	2.05 - 2.50	4	5	6	11	Non Cohesive	1.40	15.40	0.20	15.20
3	3.55 - 4.00	5	6	6	12	Non Cohesive	1.20	14.40	0.00	14.40
4	5.05 - 5.50	5	6	8	14	Non Cohesive	1.20	16.80	0.90	15.90
5	6.55 - 7.00	7	8	10	18	Non Cohesive	1.00	18.00	1.50	16.50
6	8.05 - 8.50	8	11	13	24	Non Cohesive	1.00	24.00	4.50	19.50
7	9.55 - 10.00	8	14	18	32	Non Cohesive	0.84	26.88	5.94	20.94
8	11.05 - 11.50	9	17	20	37	Non Cohesive	0.84	31.08	8.04	23.04
9	12.55 - 13.00	11	20	20	40	Non Cohesive	0.78	31.00	8.00	23.00
10	14.05 - 14.50	10	18	20	38	Non Cohesive	0.78	29.45	7.23	22.23
11	15.55 - 16.00	10	19	21	40	Non Cohesive	0.70	28.00	6.50	21.50
12	17.05 - 17.50	12	21	23	44	Cohesive	0.00	44.00	0.00	44.00
13	18.55 - 19.00	10	20	21	41	Cohesive	0.00	41.00	0.00	41.00
14	20.05 - 20.50	13	23	28	51	Cohesive	0.00	51.00	0.00	51.00
15	21.55 - 22.00	11	21	25	46	Non Cohesive	0.60	27.60	6.30	21.30
16	23.05 - 23.50	10	22	27	49	Non Cohesive	0.55	26.95	5.98	20.98
17	24.55 - 25.00	13	20	23	43	Non Cohesive	0.55	23.65	4.33	19.33
18	26.05 - 26.50	12	22	25	47	Non Cohesive	0.50	23.50	4.25	19.25
19	27.55 - 28.00	10	22	28	50	Non Cohesive	0.50	25.00	5.00	20.00
20	29.05 - 29.50	12	25	30	55	Non Cohesive	0.40	22.00	3.50	18.50
21	30.55 - 31.00	15	30	36	66	Non Cohesive	0.40	26.40	5.70	20.70
22	32.05 - 32.50	13	28	35	63	Non Cohesive	0.40	25.20	5.10	20.10
23	33.55 - 34.00	11	29	36	65	Non Cohesive	0.40	26.00	5.50	20.50
24	35.05 - 35.50	12	31	38	69	Non Cohesive	0.40	27.60	6.30	21.30
25	36.55 - 37.00	15	34	40	74	Non Cohesive	0.40	29.60	7.30	22.30
26	38.05 - 38.50	14	30	37	67	Non Cohesive	0.40	26.80	5.90	20.90
27	39.55 - 40.00	11	28	32	60	Non Cohesive	0.40	24.00	4.50	19.50
28	41.05 - 41.50	12	30	34	64	Non Cohesive	0.40	25.60	5.30	20.30
29	42.55 - 43.00	14	32	36	68	Cohesive	0.00	68.00	0.00	68.00
30	44.05 - 44.50	13	35	37	72	Cohesive	0.00	72.00	0.00	72.00
31	45.55 - 46.00	15	38	40	78	Cohesive	0.00	78.00	0.00	78.00
32	47.05 - 47.50	18	34	44	78	Cohesive	0.00	78.00	0.00	78.00
33	48.55 - 49.00	21	35	48	83	Cohesive	0.00	83.00	0.00	83.00
34	50.05 - 50.50	23	27	50	77	Cohesive	0.00	77.00	0.00	77.00
35	51.55 - 52.00	25	40	53	93	Cohesive	0.00	93.00	0.00	93.00
36	53.05 - 53.50	24	38	50	88	Cohesive	0.00	88.00	0.00	88.00
37	54.55 - 55.00	26	43	49	92	Cohesive	0.00	92.00	0.00	92.00


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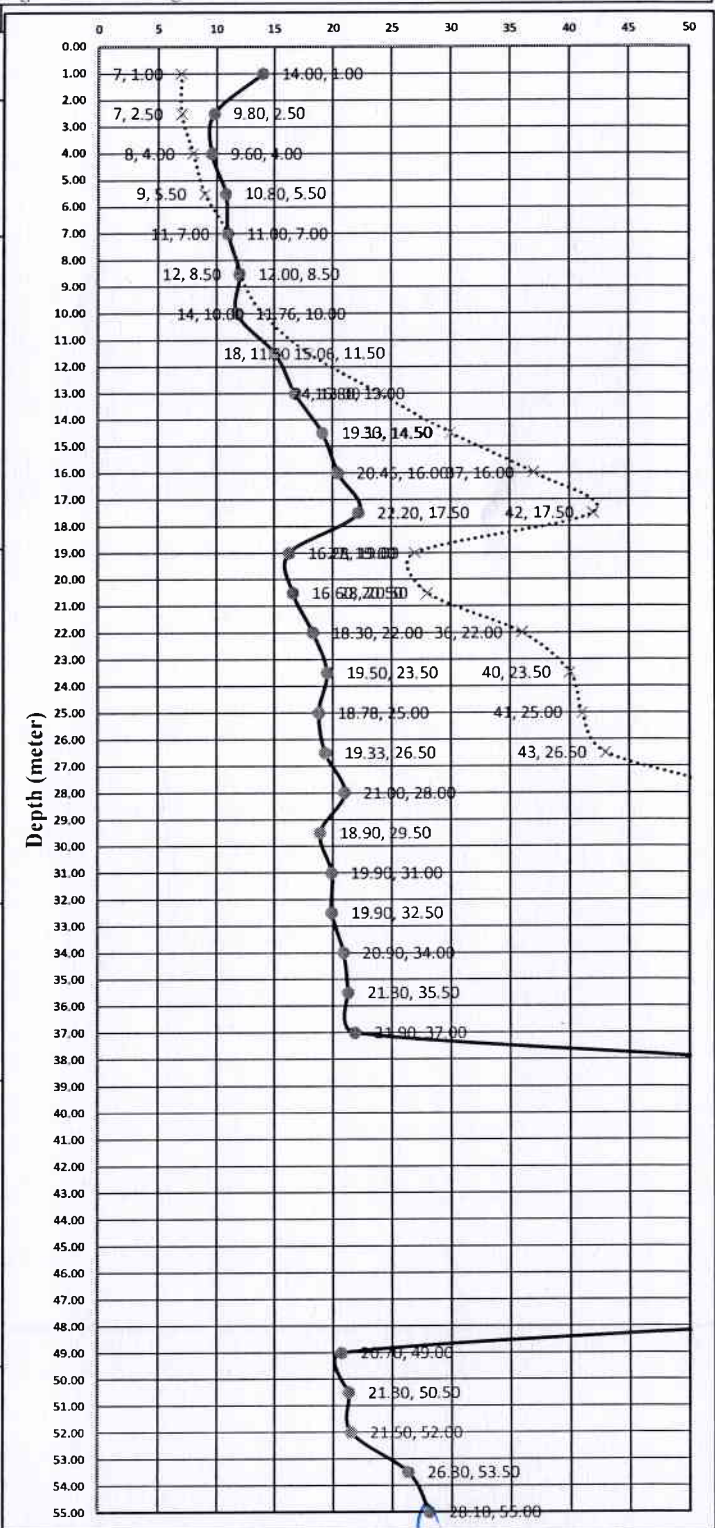



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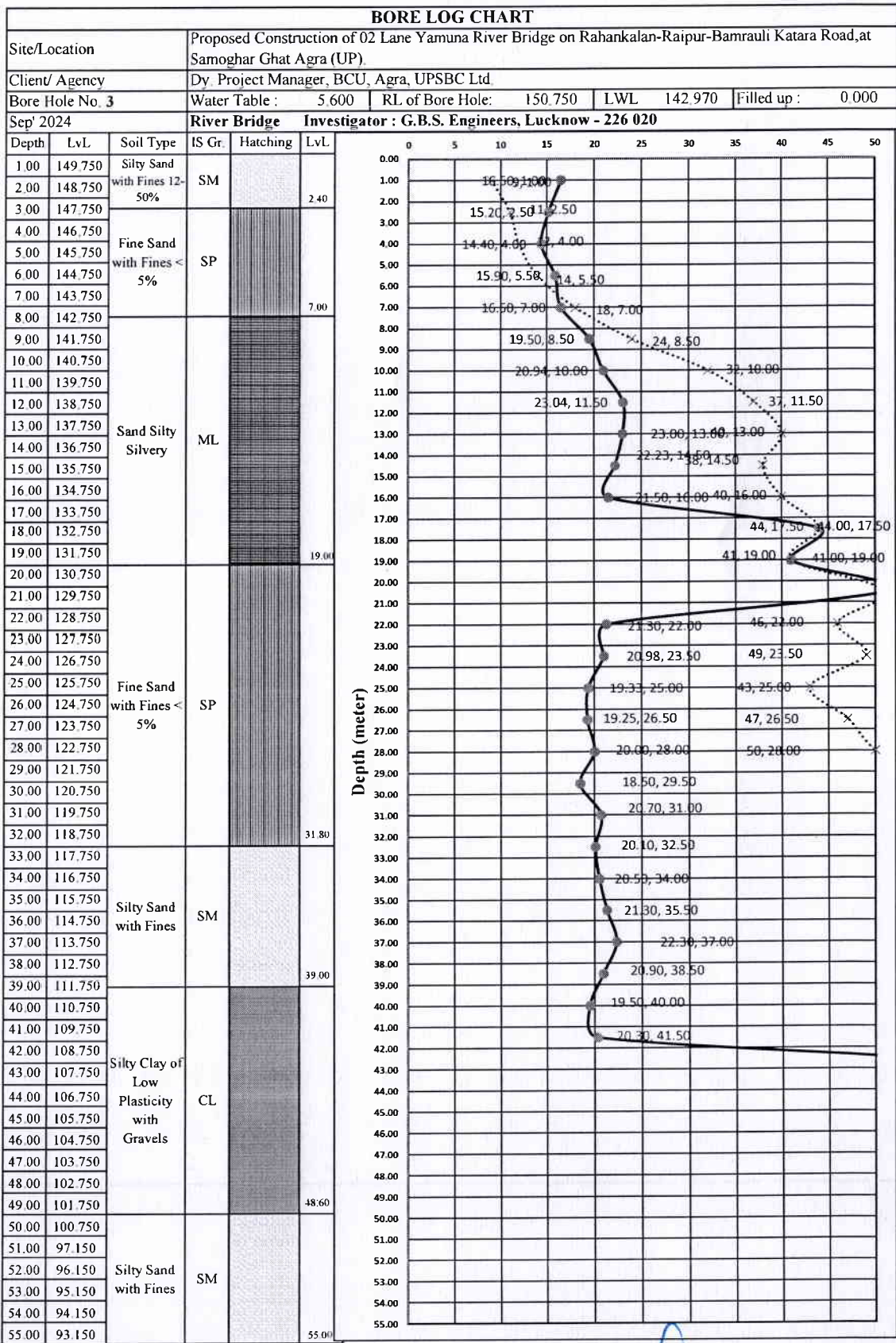
BORE LOG CHART

Site/Location	Proposed Construction of 02 Lane Yamuna River Bridge on Rahankalan-Raipur-Barnrauli Katara Road, at Samoghar Ghat Agra (UP).				
Client/ Agency	Dy. Project Manager, BCU, Agra, UPSBC Ltd				
Bore Hole No. 2	Water Table : 8 400	RL of Bore Hole: 151 850	LWL 142 97	Filled up : 0 000	
Sep' 2024	River Bridge Investigator : G.B.S. Engineers, Lucknow - 226 020				

Depth	LvL	Soil Type	IS Gr.	Hatching	LvL
1.00	150.850	Silty Sand with Fines 12-50%	SM		2.40
2.00	149.850				
3.00	148.850				
4.00	147.850	Fine Sand with Fines < 5%	SP		7.00
5.00	146.850				
6.00	145.850				
7.00	144.850				
8.00	143.850				
9.00	142.850	Sand Silty Silvery	ML		19.00
10.00	141.850				
11.00	140.850				
12.00	139.850				
13.00	138.850				
14.00	137.850				
15.00	136.850				
16.00	135.850				
17.00	134.850				
18.00	133.850				
19.00	132.850				
20.00	131.850	Fine Sand with Fines < 5%	SP		31.80
21.00	130.850				
22.00	129.850				
23.00	128.850				
24.00	127.850				
25.00	126.850				
26.00	125.850				
27.00	124.850				
28.00	123.850				
29.00	122.850				
30.00	121.850				
31.00	120.850				
32.00	119.850				
33.00	118.850	Silty Sand with Fines	SM		39.00
34.00	117.850				
35.00	116.850				
36.00	115.850				
37.00	114.850				
38.00	113.850				
39.00	112.850				
40.00	111.850	Silty Clay of Low Plasticity with Gravels	CL		48.60
41.00	110.850				
42.00	109.850				
43.00	108.850				
44.00	107.850				
45.00	106.850				
46.00	105.850				
47.00	104.850				
48.00	103.850				
49.00	102.850				
50.00	101.850	Silty Sand with Fines	SM		55.00
51.00	97.150				
52.00	96.150				
53.00	95.150				
54.00	94.150				
55.00	93.150				




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ANNEXURE - D

Site/Location : Proposed Construction of 02 Lane Yamuna River Bridge on Rahankalan-Raipur-Bamrauli Katara Road, at Samoghar Ghat Agra (UP).

Client/ Agency : Dy. Project Manager, BCU, Agra, UPSBC Ltd.

Bearing capacities are evaluated on shear failure as well as controlled settlement criteria separately and the least of these two value is reported as safe value for foundation design purposes.

Bore Hole No. 1

The design values are considered as follows:

Cohesion	c	: 0.310	RL of Bore hole at Top	: 148.150 M
Angle of internal friction,	ϕ	: 12.00	RL of LWL	: 142.970 M
Void Ratio	e	: 0.539	RL of Filled up soil	: 146.650 M
Footing depth below LWL,	D	: 40.00	RL of Footing	: 102.970 M
Since Actual void ratio is 0.539, hence General shear failure would occur corresponding to given range of 0.55-0.75,			Footing depth below LWL	: 45.180 M

Shape of Footing	: Circular	L/B ratio	= 1.000
Class of Footing	: Raft (Isolated/Raft)	D/V (B . L)	= 5.648 (B . L)/V D = 0.177
Size of Footing	: Width/Dia = 8.000 M	Rounded off	= 5.600 Rounded off = 0.100
	: Length = 8.000 M	Corresp. D_f	= 0.525 Corresp. D_f = FALSE
Filled up Soil	: 1.500 M	Depth Correction Factor, D_f	= 0.525
Depth of footing	: 45.180 M	Water Table Correction factor, W'	= 0.500
Water Table	: 1.350 M (Beyond)	Vertical Angle of Applied Load, α	= 0

Calculation for Safe Bearing Capacity

From Shear Consideration:

Average value of the effective overburden comes out to be

$$q = 43.68 \times 0.8773 / 10 = 3.8319 \text{ kg/cm}^2$$

Shape factors are: $S_c = 1.30$ $S_q = 1.20$ $S_\gamma = 0.60$

Depth factors are:

$$d_c = 1.0 + 0.2 \times (D_f/B \tan(45^\circ + \phi/2))$$

$$= 1.0 + 0.2 \times (45.18 / 8.00) \times 1.234897$$

$$= 2.3948$$

d_q & $d_\gamma = 1.0 + 0.1 \times (D_f/B \tan(45^\circ + \phi/2))$

$$= 1.0 + 0.1 \times (45.18 / 8.00) \times 1.2348972$$

$$= 1.6974$$

Inclination factors are: $I_c = 1.00$ $I_q = 1.00$ $I_\gamma = 1.00$

Bearing capacity factors N_c , N_q and N_γ for General shear failure are obtained for the given value by linear interpolation corresponding to respective lower and upper limit values of angle of internal friction, as follows:

Lower limit = 10.00 Upper Limit = 15.00

$$N_c = 10.98 - (10.98 - 8.35) \times (3.00 / 5)$$

$$= 10.98 - (2.630 \times 0.600)$$

$$= 10.98 - 1.578 = 9.402$$

$$N_q = 3.94 - (3.94 - 2.47) \times (3.00 / 5)$$

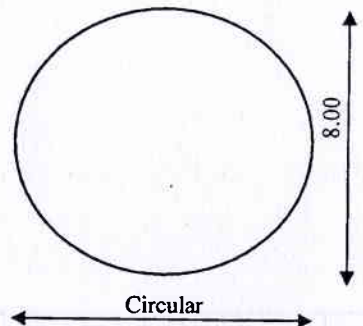
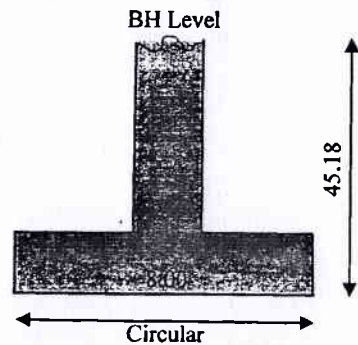
$$= 3.94 - (1.47 \times 0.600)$$

$$= 3.94 - 0.882 = 3.058$$

$$N_\gamma = 2.65 - (2.650 - 1.22) \times (3.00 / 5)$$

$$= 2.65 - (1.430 \times 0.600)$$

$$= 2.65 - 0.858 = 1.792$$



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Net ultimate bearing capacity as per IS code, for general shear failure, is given as follows:

$$\begin{aligned}
 q_d &= 0.31 \times 9.402 \times 1.30 \times 2.3948 \times 1.00 \\
 &\quad + 3.8319 (3.06 - 1.00) \times 1.200 \times 1.697 \times 1.00 \\
 &\quad + 0.5 \times 8.00 \times 0.8773 \times 1.792 \times 0.60 \times 1.6974 \times 1.00 \times 0.05 \\
 &= 9.07397 + 16.06304 + 0.320212 \\
 q_d &= 25.457 \text{ kg/cm}^2
 \end{aligned}$$

Considering, factor of safety as = 2.50

$$\begin{aligned}
 q_s &= 25.4572 / 2.50 \\
 q_s &= 10.183 \text{ kg/cm}^2 \\
 &= 10.18 \text{ kg/cm}^2 \quad (\text{Say})
 \end{aligned}$$

LOCAL SHEAR FAILURE

Mobilised Bearing Capacity factors N_c' , N_q' and N_γ' for Local shear failure are obtained for the given value by linear interpolation corresponding to respective lower and upper limit of angle of internal friction, as follows:

$$\begin{aligned}
 \text{Mobilised value of angle of internal friction } \phi_m &= \tan^{-1} (0.667 \times \tan \phi) \\
 &= \tan^{-1} (0.667 \times 0.21256) \\
 &= 8.06934
 \end{aligned}$$

Effective Range for the angle of internal friction:

$$\begin{aligned}
 \text{Lower limit} &= 5 & \text{Upper Limit} &= 10 \\
 N_c' &= 8.35 - (8.35 - 6.49) \times (1.9307 / 5) \\
 &= 8.35 - (1.860 \times 0.386) \\
 &= 8.35 - 0.718 = 7.632 \\
 N_q' &= 2.47 - (2.47 - 1.57) \times (1.9307 / 5) \\
 &= 2.47 - (0.900 \times 0.386) \\
 &= 2.47 - 0.348 = 2.122 \\
 N_\gamma' &= 1.22 - (1.22 - 0.45) \times (1.9307 / 5) \\
 &= 1.22 - (0.770 \times 0.386) \\
 &= 1.22 - 0.297 = 0.923
 \end{aligned}$$

Net ultimate bearing capacity as per IS code, for local shear failure, is given as follows:

$$\begin{aligned}
 q_d &= 0.21 \times 7.632 \times 1.30 \times 2.395 \times 1.00 \\
 &\quad + 3.8319 \times (2.122 - 1.0) \times 1.20 \times 1.6974 \times 1.00 \\
 &\quad + 0.5 \times 8.00 \times 0.8773 \times 0.923 \times 0.60 \times 1.6974 \times 1.00 \times 0.05 \\
 &= 4.91281 + 8.761163 + 0.164873 \\
 &= 13.83884 \text{ kg/cm}^2
 \end{aligned}$$

Considering factor of safety = 2.50

$$\begin{aligned}
 q_s &= 13.839 / 2.50 \\
 q_s &= 5.5355 \text{ kg/cm}^2 = 5.5355 \text{ kg/cm}^2 \quad (\text{Say})
 \end{aligned}$$

Actual value of safe bearing capacity may be evaluated by linear interpolation corresponding to actual value of voids ratio).

$$\begin{aligned}
 &= 10.18 - (10.183 - 5.536) \times (0.75 - 0.55) \} \times (0.539 - 0.550) \\
 &= 10.18 - (4.65 / 0.20) \times -0.011 \\
 &= 10.18 - -0.25 = 10.433 \text{ kg/cm}^2 \\
 &= 104.33 \text{ T/m}^2
 \end{aligned}$$


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Bore Hole No. 1

Calculations of the Immediate Settlement

Since the founding soil is cohesive soil, therefore, when footing is placed over cohesive soil it would undergo settlement on account of elastic compression of soil particles on immediate basis. This settlement is over and above the consolidation settlement which would occur over longer time duration.

- Immediate settlement is given as $S_i = \{(q.B)/E\} \times (1 - \mu^2) \times I$
- Pressure at footing level $q = 10.43 \text{ kg/cm}^2$
 - Width of footing $B = 8.00 \text{ M}$
 - Modulus of Elasticity $E = 8025 \text{ kg/cm}^2$ (Assumed)
 - Poisson's Ratio $\mu = 0.50$ As per BIS code
 - Influence Factor $I = 1.00$ Circular

Thence, immediate settlement, $S_i = \{(10.433 \times 8.00) / (8025) \times (1.0 - 0.25) \times 1.00$
 $= 0.0104 \times 0.75 \times 1.00$
 $= 0.0078 \text{ M}$
 $= 7.80 \text{ mm}$

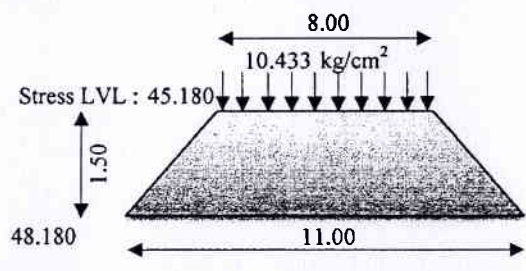
The total consolidation settlement due to all the layers $S_c = 47.86 \text{ mm}$ (As calculated above)
 Thus, total settlement of cohesive soil $= S_c + S_i = 47.86 + 7.80 = 55.66 \text{ mm}$

Total settlement under applied/residual stress for non-cohesive soil $= 27.88 \text{ mm}$ (As calculated above)
 Sum total of the settlement for non-cohesive and the cohesive soil $= 83.54 \text{ mm}$

Depth correction factor, $D_f = 0.525$
 Rigidity correction factor from IS code $= 0.800$
 Thus, the total correction factor $= 0.420$
 Total corrected settlement $= 35.09 \text{ mm}$
 Permissible settlement for footings on $= 125.00 \text{ mm}$

Thence, bearing capacity corresponding to permissible settlement $= 371.67 \text{ T/m}^2$
 And, the Safe bearing capacity corresponding to shear failure criteria $= 104.33 \text{ T/m}^2$ (As calculated above)

Adopt least of bearing capacity on account shear criteria and settlement criteria as $= 104.33 \text{ T/m}^2$



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ANNEXURE - F

16

Name of Site		Proposed Construction of 02 Lane Yamuna River Bridge on Rahankalan-Kapur-Banrauli Katara Road at Samoghar, Chat Agra (UP)										Client Name :		Dy. Project Manager, BCU, Agra, UPSBC Ltd.		G.B.S. Engineers									
SN	Depth (mtr)	BH Level	Samp Type	Percentage of Material Passing in mm/micron (μ)										Aterbergs' Limits		IS symbol		Bulk Den	Moist Cont. %age	Dry Den γ_d	Sp. Gr. G	Shear values		void ratio e	Comp Index C_c
				10.00	4.75	2.00	1.00	425	212	75	Gravel	Sand	Silt	Clay	LL	PL	PI					IS	IS		
1	1.00	141.97	UDS	100	100	74	70	56	38	33	0	67	33	0	Non Plastic (NP)	SM	1.6740	10.21	1.5189	2.66	0.00	20	0.751	0.0000	
2	2.50	140.47	UDS	100	100	73	69	55	38	31	0	69	31	0	Non Plastic (NP)	SM	1.7406	11.24	1.5648	2.66	0.00	21	0.700	0.0000	
3	4.00	138.97	UDS	100	100	78	67	53	27	12	0	38	12	0	Non Plastic (NP)	SP	1.6765	11.69	1.5010	2.71	0.00	22	0.805	0.0000	
4	5.50	137.47	UDS	100	100	76	65	51	29	12	0	38	12	0	Non Plastic (NP)	SP	1.6912	12.35	1.5052	2.70	0.00	22	0.794	0.0000	
5	7.00	135.97	UDS	100	100	77	73	48	44	24	0	76	24	0	Non Plastic (NP)	ML	1.7709	12.66	1.5719	2.67	0.00	24	0.699	0.0000	
6	8.50	134.47	D/S	100	100	75	71	47	42	26	0	74	26	0	Non Plastic (NP)	ML	1.7993	12.36	1.6014	2.67	0.00	24	0.667	0.0000	
7	10.00	132.97	D/S	100	100	76	72	47	41	25	0	75	25	0	Non Plastic (NP)	ML	1.8256	12.45	1.6234	2.67	0.00	24	0.645	0.0000	
8	11.50	131.47	D/S	100	100	74	70	45	40	25	0	75	25	0	Non Plastic (NP)	ML	1.8561	12.93	1.6437	2.67	0.00	25	0.624	0.0000	
9	13.00	129.97	D/S	100	100	72	69	46	39	24	0	76	24	0	Non Plastic (NP)	ML	1.8762	14.53	1.6381	2.67	0.00	25	0.630	0.0000	
10	14.50	128.47	D/S	100	100	72	68	44	37	23	0	77	23	0	Non Plastic (NP)	ML	1.8928	14.70	1.6502	2.67	0.00	25	0.618	0.0000	
11	16.00	126.97	D/S	100	100	70	67	43	36	22	0	78	22	0	Non Plastic (NP)	ML	1.9098	15.31	1.6562	2.67	0.00	26	0.612	0.0000	
12	17.50	125.47	D/S	100	100	69	67	42	36	24	0	76	24	0	Non Plastic (NP)	ML	1.9119	15.60	1.6538	2.67	0.00	26	0.614	0.0000	
13	19.00	123.97	D/S	100	100	74	69	39	33	9	0	91	9	0	Non Plastic (NP)	SP	1.9135	16.64	1.6406	2.70	0.00	28	0.646	0.0000	
14	20.50	122.47	D/S	100	100	73	67	38	31	9	0	91	9	0	Non Plastic (NP)	SP	1.9169	14.27	1.6774	2.70	0.00	30	0.610	0.0000	
15	22.00	120.97	D/S	100	100	73	67	39	32	8	0	92	8	0	Non Plastic (NP)	SP	1.9185	13.99	1.6832	2.70	0.00	30	0.604	0.0000	
16	23.50	119.47	D/S	100	100	72	65	32	30	6	0	94	6	0	Non Plastic (NP)	SP	1.9202	13.36	1.6938	2.70	0.00	30	0.594	0.0000	
17	25.00	117.97	D/S	100	100	70	66	30	26	5	0	95	5	0	Non Plastic (NP)	SP	1.9228	13.80	1.6896	2.72	0.00	30	0.610	0.0000	
18	26.50	116.47	D/S	100	100	70	67	29	25	5	0	95	5	0	Non Plastic (NP)	SP	1.9249	15.07	1.6728	2.72	0.00	31	0.626	0.0000	
19	28.00	114.97	D/S	100	100	70	67	29	25	5	0	95	5	0	Non Plastic (NP)	SP	1.9275	15.18	1.6734	2.72	0.00	31	0.625	0.0000	
20	29.50	113.47	D/S	100	100	71	68	29	25	5	0	95	5	0	Non Plastic (NP)	SP	1.9286	14.99	1.6772	2.72	0.00	31	0.622	0.0000	
21	31.00	111.97	D/S	100	100	69	64	27	24	5	0	95	5	0	Non Plastic (NP)	SP	1.9303	14.97	1.6789	2.72	0.00	32	0.620	0.0000	
22	32.50	110.47	D/S	100	100	68	63	26	20	5	0	95	5	0	Non Plastic (NP)	SM	1.9319	14.61	1.6856	2.67	0.00	32	0.584	0.0000	
23	34.00	108.97	D/S	100	100	76	70	62	55	35	0	65	35	0	Non Plastic (NP)	SM	1.9349	13.78	1.7006	2.67	0.00	32	0.570	0.0000	
24	35.50	107.47	D/S	100	100	76	71	61	56	34	0	66	34	0	Non Plastic (NP)	SM	1.9360	13.89	1.6999	2.67	0.00	33	0.571	0.0000	
25	37.00	105.97	D/S	100	100	73	69	60	54	34	0	66	34	0	Non Plastic (NP)	SM	1.9370	13.30	1.7096	2.67	0.00	33	0.562	0.0000	
26	38.50	104.47	D/S	100	100	71	67	59	55	31	0	69	31	0	Non Plastic (NP)	SM	1.9370	14.07	1.6995	2.64	0.20	10	0.553	0.0850	
27	40.00	102.97	D/S	100	42	40	40	38	37	35	58	7	11	24	29	14	15	15	14.07	1.6995	2.64	0.20	10	0.565	0.0884
28	41.50	101.47	D/S	100	44	41	40	37	36	35	56	9	12	23	31	15	16	15.29	1.6873	2.64	0.25	11	0.565	0.0884	
29	43.00	99.97	D/S	100	44	40	39	37	36	35	56	9	12	23	31	15	16	14.44	1.6984	2.64	0.28	11	0.554	0.0853	
30	44.50	98.47	D/S	100	42	40	39	36	36	34	58	8	12	22	32	15	17	13.42	1.7151	2.64	0.31	12	0.539	0.0808	
31	46.00	96.97	D/S	100	40	39	38	36	36	34	60	6	14	20	33	16	17	15.10	1.6916	2.64	0.32	12	0.561	0.0872	
32	47.50	95.47	D/S	100	46	44	44	43	41	40	39	54	7	15	24	17	16	15.42	1.6884	2.64	0.33	12	0.564	0.0881	
33	49.00	93.97	D/S	100	62	42	42	42	40	40	38	38	24	13	25	16	16	15.52	1.6883	2.64	0.32	12	0.564	0.0881	
34	50.50	92.47	D/S	100	100	74	69	46	43	25	0	75	25	0	Non Plastic (NP)	SM	1.9504	15.52	1.6897	2.66	0.00	26	0.574	0.0000	
35	52.00	90.97	D/S	100	100	72	66	44	41	26	0	74	26	0	Non Plastic (NP)	SM	1.9520	15.52	1.6897	2.66	0.00	25	0.573	0.0000	
36	53.50	89.47	D/S	100	100	72	65	42	39	26	0	74	26	0	Non Plastic (NP)	SM	1.9537	15.52	1.6912	2.66	0.00	24	0.577	0.0000	
37	55.00	87.97	D/S	100	100	70	65	40	36	24	0	76	24	0	Non Plastic (NP)	SM	1.9570	15.52	1.6941	2.67	0.00	25	0.576	0.0000	

55.00M - 60.00M (Sample Shipped)

R. B. DIWAKAR
 Dy. Project Manager
 U. P. State Bridge Corporation Ltd.
 Bridge Construction Unit-Agra

7

Name of Site		Proposed Construction of 02 Lane Yamuna River Bridge on Rahankalan-Raipur-Bamrauli Kanara Road, at Samoghar Chat Agra (UP).										Client Name :		Dy. Project Manager, BCU, Agra, UPSBC Ltd.																			
Bore Hole No. 2		W.T.					L.W.L.					142.970					151.850					0.000											
SN	Depth (in mtr)	Bore Hole LVL	Samp Type	Percentage of Material Passing in mm/micron (μ)										Grain Size Distribution					Aterbergs' Limits					Filled Up Soil					G.I.S. Engineers				
				10.00	4.75	2.00	1.00	425	212	75	Gravel	Sand	Silt	Clay	LL	PL	PI	Moist Cont.	Bulk Den	Y	%age	Dry Den	Sp. Gr.	G	e	ϕ	void ratio	Comp Index					
1	1.00	141.97	UDS	100	100	78	70	56	38	33	0	67	33	0	SM	1.5290	5.80	1.4452	2.66	0.00	20	0.841	0.0000										
2	2.50	140.47	UDS	100	100	76	69	55	38	31	0	69	31	0	SM	1.5509	12.12	1.3832	2.66	0.00	21	0.923	0.0000										
3	4.00	138.97	UDS	100	100	75	67	53	27	12	0	88	12	0	SP	1.5786	13.80	1.3871	2.70	0.00	22	0.946	0.0000										
4	5.50	137.47	UDS	100	100	75	65	51	29	12	0	88	12	0	SP	1.6012	15.38	1.3878	2.70	0.00	22	0.945	0.0000										
5	7.00	135.97	UDS	100	100	74	73	48	44	24	0	76	24	0	ML	1.6241	15.35	1.4080	2.67	0.00	24	0.896	0.0000										
6	8.50	134.47	UDS	100	100	73	71	47	42	26	0	74	26	0	ML	1.6474	15.77	1.4230	2.67	0.00	24	0.876	0.0000										
7	10.00	132.97	UDS	100	100	71	72	47	41	25	0	75	25	0	ML	1.6827	15.90	1.4518	2.67	0.00	24	0.839	0.0000										
8	11.50	131.470	D/S	100	100	71	70	45	40	25	0	75	25	0	ML	1.7356	16.32	1.4921	2.67	0.00	25	0.789	0.0000										
9	13.00	129.970	D/S	100	100	70	69	46	39	24	0	76	24	0	ML	1.7186	16.53	1.4748	2.67	0.00	25	0.810	0.0000										
10	14.50	128.470	D/S	100	100	69	68	44	37	23	0	77	23	0	ML	1.7723	16.50	1.5213	2.67	0.00	25	0.755	0.0000										
11	16.00	126.970	D/S	100	100	69	67	43	36	22	0	78	22	0	ML	1.7919	16.54	1.5375	2.67	0.00	26	0.737	0.0000										
12	17.50	125.470	D/S	100	100	68	67	42	36	24	0	76	24	0	ML	1.7933	16.71	1.5366	2.67	0.00	26	0.738	0.0000										
13	19.00	123.970	D/S	100	100	70	69	39	23	9	0	91	9	0	SP	1.7952	16.52	1.5407	2.70	0.00	28	0.752	0.0000										
14	20.50	122.470	D/S	100	100	42	67	38	26	9	0	91	9	0	SP	1.7966	16.89	1.5370	2.70	0.00	30	0.757	0.0000										
15	22.00	120.970	D/S	100	100	73	67	39	25	8	0	92	8	0	SP	1.7968	16.85	1.5376	2.70	0.00	30	0.756	0.0000										
16	23.50	119.470	D/S	100	100	72	65	32	24	6	0	94	6	0	SP	1.7971	16.87	1.5377	2.70	0.00	30	0.756	0.0000										
17	25.00	117.970	D/S	100	100	70	66	30	22	5	0	95	5	0	SP	1.8246	16.72	1.5632	2.72	0.00	30	0.740	0.0000										
18	26.50	116.470	D/S	100	100	70	67	29	25	5	0	95	5	0	SP	1.8280	16.50	1.5691	2.72	0.00	30	0.733	0.0000										
19	28.00	114.970	D/S	100	100	71	68	29	23	5	0	95	5	0	SP	1.8280	16.70	1.5665	2.72	0.00	30	0.736	0.0000										
20	29.50	113.470	D/S	100	100	67	64	27	20	5	0	95	5	0	SP	1.8264	16.65	1.5658	2.72	0.00	30	0.737	0.0000										
21	31.00	111.970	D/S	100	100	68	63	26	19	5	0	95	5	0	SP	1.8247	16.66	1.5641	2.72	0.00	30	0.739	0.0000										
22	32.50	110.470	D/S	100	100	67	70	62	55	35	0	65	35	0	SM	1.8247	16.69	1.5637	2.67	0.00	29	0.707	0.0000										
23	34.00	108.970	D/S	100	100	66	71	61	56	34	0	66	34	0	SM	1.8245	16.52	1.5658	2.67	0.00	29	0.705	0.0000										
24	35.50	107.470	D/S	100	100	73	69	60	54	34	0	66	34	0	SM	1.8249	16.50	1.5659	2.67	0.00	30	0.705	0.0000										
25	37.00	105.970	D/S	100	100	71	67	59	55	31	0	69	31	0	SM	1.8424	16.50	1.5814	2.68	0.00	31	0.695	0.0000										
26	38.50	104.470	D/S	100	40	39	38	37	35	33	60	7	21	12	CL	1.8837	16.67	1.6146	2.64	0.22	10	0.635	0.1095										
27	40.00	102.970	D/S	100	42	41	40	39	38	35	58	7	20	15	CL	1.8818	16.68	1.6127	2.64	0.27	10	0.637	0.1101										
28	41.50	101.470	D/S	100	38	37	35	34	32	31	62	7	19	12	CL	1.8802	16.69	1.6113	2.64	0.28	10	0.638	0.1105										
29	43.00	99.970	D/S	100	35	34	33	32	30	29	65	6	18	11	CL	1.8477	16.68	1.5835	2.64	0.31	11	0.667	0.1192										
30	44.50	98.470	D/S	100	36	35	33	32	30	29	64	7	16	13	CL	1.8423	16.85	1.5766	2.64	0.32	11	0.674	0.1213										
31	46.00	96.970	D/S	100	48	47	46	45	43	40	52	8	16	24	CL	1.8462	17.22	1.5749	2.64	0.33	14	0.676	0.1219										
32	47.50	95.470	D/S	100	52	50	48	48	47	45	48	7	17	28	CL	1.8698	16.90	1.5995	2.64	0.32	11	0.651	0.1142										
33	49.00	93.970	D/S	100	100	74	69	46	43	25	0	75	25	0	SM	1.8342	16.92	1.5688	2.69	0.00	25	0.715	0.0000										
34	50.50	92.470	D/S	100	100	72	66	44	41	26	0	74	26	0	SM	1.8342	16.92	1.5688	2.70	0.00	25	0.721	0.0000										
35	52.00	90.970	D/S	100	100	72	65	42	39	26	0	74	26	0	SM	1.8342	16.92	1.5688	2.70	0.00	25	0.721	0.0000										
36	53.50	89.470	D/S	100	100	70	65	40	36	24	0	76	24	0	SM	1.8342	16.92	1.5688	2.70	0.00	26	0.721	0.0000										
37	55.00	87.970	D/S	100	84	82	79	75	72	66	16	18	66	0	SM	1.8342	16.92	1.5688	2.70	0.00	26	0.721	0.0000										

55.00M - 60.00M (Sample Shipped)

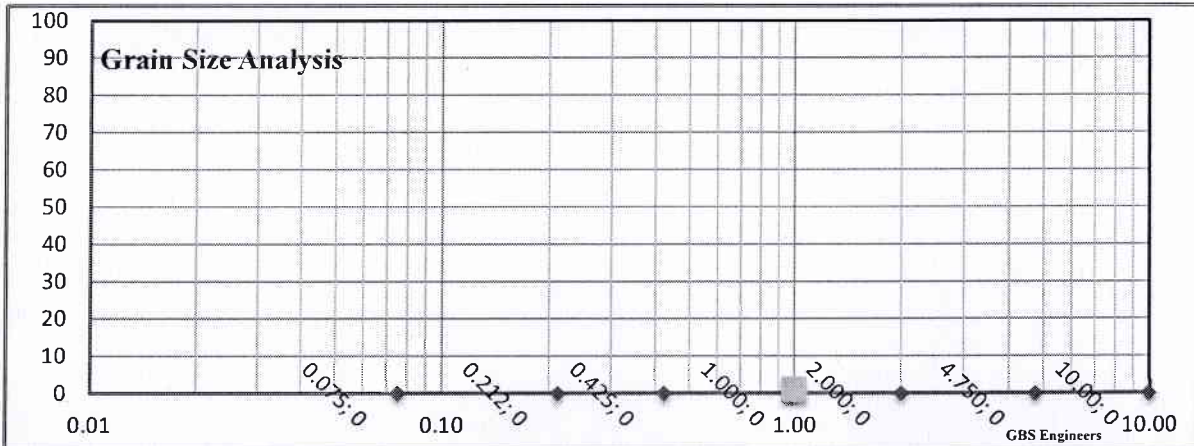
R. B. DIWAKAR
 Dy. Project Manager
 U. P. State Bridge Corporation Ltd.
 Bridge Construction Unit - Agra

Name of Site		Proposed Construction of 02 Lane Yamuna River Bridge on Rahankalan-Rajpur-Banaruli Kanara Road at Samnagar Chat Agra (UP)										Client Name :		Dy. Project Manager, BCU, Agra, UPSBC Ltd.		G.B.S. Engineers									
Bore Hole No. 3		W.T.					L.W.L					BH Level		150.750		Filled Up :		0.000							
SN	Depth (in mtr)	Bore Hole LVL	Saump Type	Percentage of Material Passing in mm/micron (μ)										Grain Size Distribution		IS symbol	Bulk Den	Moist Cont.	Dry Den	Sp. Gr.	Shear values		void ratio	Comp Index	
				10.00	4.75	2.00	1.00	425	212	75	Gravel	Sand	Silt	Clay	LL						PL	PI			γ
1	1.00	141.970	UDS	100	100	100	90	64	35	27	0	73	27	0	Non Plastic (NP)	SM	1.6332	6.25	1.5371	2.70	0.00	27	0.757	0.0000	
2	2.50	140.470	UDS	100	100	100	92	63	36	28	0	72	28	0	Non Plastic (NP)	SM	1.6566	11.25	1.4891	2.70	0.00	27	0.813	0.0000	
3	4.00	138.970	UDS	100	100	100	75	62	21	5	0	95	5	0	Non Plastic (NP)	SP	1.6862	11.75	1.5089	2.71	0.00	29	0.796	0.0000	
4	5.50	137.470	UDS	100	100	100	76	60	23	5	0	95	5	0	Non Plastic (NP)	SP	1.7103	15.52	1.4806	2.71	0.00	29	0.830	0.0000	
5	7.00	135.970	UDS	100	100	100	78	61	23	5	0	95	5	0	Non Plastic (NP)	SP	1.7348	15.16	1.5065	2.71	0.00	29	0.799	0.0000	
6	8.50	134.470	UDS	100	100	100	78	60	21	5	0	95	5	0	Non Plastic (NP)	SP	1.7597	15.25	1.5269	2.71	0.00	29	0.775	0.0000	
7	10.00	132.970	UDS	100	100	100	78	55	20	5	0	95	5	0	Non Plastic (NP)	SP	1.7974	15.38	1.5578	2.71	0.00	29	0.740	0.0000	
8	11.50	131.470	D/S	100	100	100	76	56	20	5	0	95	5	0	Non Plastic (NP)	SP	1.8539	15.50	1.6052	2.71	0.00	29	0.688	0.0000	
9	13.00	129.970	D/S	100	100	100	76	54	24	5	0	95	5	0	Non Plastic (NP)	SP	1.8358	15.51	1.5893	2.71	0.00	29	0.705	0.0000	
10	14.50	128.470	D/S	100	100	100	78	55	22	5	0	95	5	0	Non Plastic (NP)	SP	1.8931	15.56	1.6382	2.71	0.00	29	0.654	0.0000	
11	16.00	126.970	D/S	100	100	100	78	56	21	5	0	95	5	0	Non Plastic (NP)	SP	1.7919	15.57	1.5505	2.71	0.00	29	0.748	0.0000	
12	17.50	125.470	D/S	100	100	100	94	91	87	85	0	15	0	85	30	19	11	1.7933	15.95	1.5467	2.64	0.29	11	0.707	0.1311
13	19.00	123.970	D/S	100	100	100	92	90	88	85	0	15	0	85	30	20	10	1.7952	16.17	1.5453	2.64	0.28	12	0.708	0.1315
14	20.50	122.470	D/S	100	100	100	94	90	88	84	0	16	0	84	29	19	10	1.7966	16.12	1.5472	2.69	0.28	12	0.739	0.1406
15	22.00	120.970	D/S	100	100	100	64	45	32	25	0	76	24	0	Non Plastic (NP)	SM	1.7968	16.24	1.5458	2.68	0.00	24	0.734	0.0000	
16	23.50	119.470	D/S	100	100	100	62	44	31	24	0	76	24	0	Non Plastic (NP)	SM	1.7971	16.35	1.5446	2.68	0.00	24	0.735	0.0000	
17	25.00	117.970	D/S	100	100	100	75	60	42	29	23	0	77	23	0	Non Plastic (NP)	SM	1.8246	15.90	1.5743	2.68	0.00	25	0.702	0.0000
18	26.50	116.470	D/S	100	100	100	60	40	30	24	0	76	24	0	Non Plastic (NP)	SM	1.8280	15.52	1.5825	2.68	0.00	26	0.694	0.0000	
19	28.00	114.970	D/S	100	100	100	74	64	50	41	29	0	71	29	0	Non Plastic (NP)	SM	1.8280	16.17	1.5736	2.68	0.00	26	0.703	0.0000
20	29.50	113.470	D/S	100	100	100	62	50	40	27	0	73	27	0	Non Plastic (NP)	SM	1.8264	16.12	1.5728	2.68	0.00	28	0.704	0.0000	
21	31.00	111.970	D/S	100	100	100	73	60	49	37	24	0	76	24	0	Non Plastic (NP)	SM	1.8247	15.95	1.5737	2.68	0.00	28	0.703	0.0000
22	32.50	110.470	D/S	100	100	100	69	59	47	36	26	0	74	26	0	Non Plastic (NP)	SM	1.8247	16.80	1.5623	2.68	0.00	28	0.715	0.0000
23	34.00	108.970	D/S	100	100	100	68	55	46	35	25	0	75	25	0	Non Plastic (NP)	SM	1.8245	13.92	1.6016	2.70	0.00	32	0.686	0.0000
24	35.50	107.470	D/S	100	100	100	66	54	46	34	27	0	73	27	0	Non Plastic (NP)	SM	1.8249	13.72	1.6048	2.70	0.00	32	0.682	0.0000
25	37.00	105.970	D/S	100	100	100	64	53	43	30	24	0	76	24	0	Non Plastic (NP)	SM	1.8424	13.71	1.6202	2.70	0.00	33	0.666	0.0000
26	38.50	104.470	D/S	100	100	100	79	72	54	38	0	62	38	0	Non Plastic (NP)	ML	1.8280	13.31	1.6133	2.71	0.00	30	0.680	0.0000	
27	40.00	102.970	D/S	100	100	100	78	70	52	34	0	66	34	0	Non Plastic (NP)	ML	1.8471	12.51	1.6417	2.71	0.00	30	0.651	0.0000	
28	41.50	101.470	D/S	100	100	100	74	68	50	33	0	67	33	0	Non Plastic (NP)	ML	1.8455	12.51	1.6403	2.71	0.00	31	0.652	0.0000	
29	43.00	99.970	D/S	100	100	100	95	90	87	84	0	16	19	65	29	16	13	1.8477	12.52	1.6421	2.64	0.30	12	0.608	0.1013
30	44.50	98.470	D/S	100	100	100	92	90	87	84	0	16	18	66	29	16	13	1.8423	13.10	1.6288	2.64	0.30	13	0.621	0.1052
31	46.00	96.970	D/S	100	100	100	93	91	86	85	0	15	17	68	30	17	13	1.8462	12.99	1.6339	2.64	0.30	13	0.616	0.1037
32	47.50	95.470	D/S	100	100	100	96	92	86	86	0	14	17	69	30	18	12	1.8698	12.65	1.6599	2.64	0.30	13	0.590	0.0961
33	49.00	93.970	D/S	100	100	100	96	92	88	86	0	14	18	68	30	19	11	1.8342	12.51	1.6302	2.64	0.30	12	0.619	0.1048
34	50.50	92.470	D/S	100	100	100	94	92	86	86	0	14	18	68	31	20	11	1.8342	12.49	1.6306	2.64	0.30	12	0.619	0.1047
35	52.00	90.970	D/S	100	100	100	94	92	87	85	0	15	18	67	32	20	12	1.8342	12.55	1.6297	2.64	0.30	12	0.620	0.1050
36	53.50	89.470	D/S	100	100	100	92	90	85	85	0	15	17	68	33	20	13	1.8342	12.59	1.6290	2.64	0.30	12	0.621	0.1052
37	55.00	87.970	D/S	100	100	100	92	90	86	85	0	15	17	68	34	21	13	1.8342	12.59	1.6291	2.64	0.30	12	0.620	0.1051

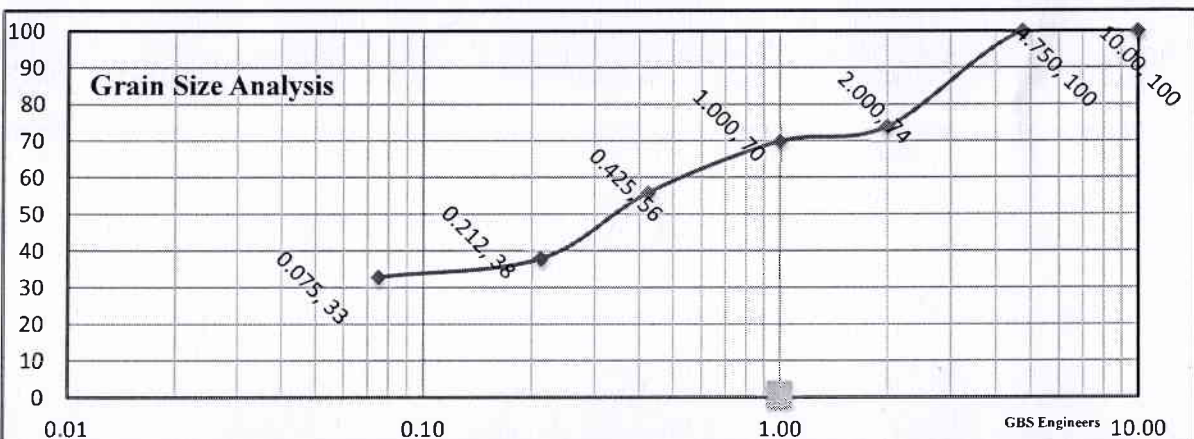
55.00M - 60.00M (Sample Shipped)

R. B. DIWAKAR
 Dy. Project Manager
 U. P. State Bridge Corporation Ltd.
 Bridge Construction Unit Agra

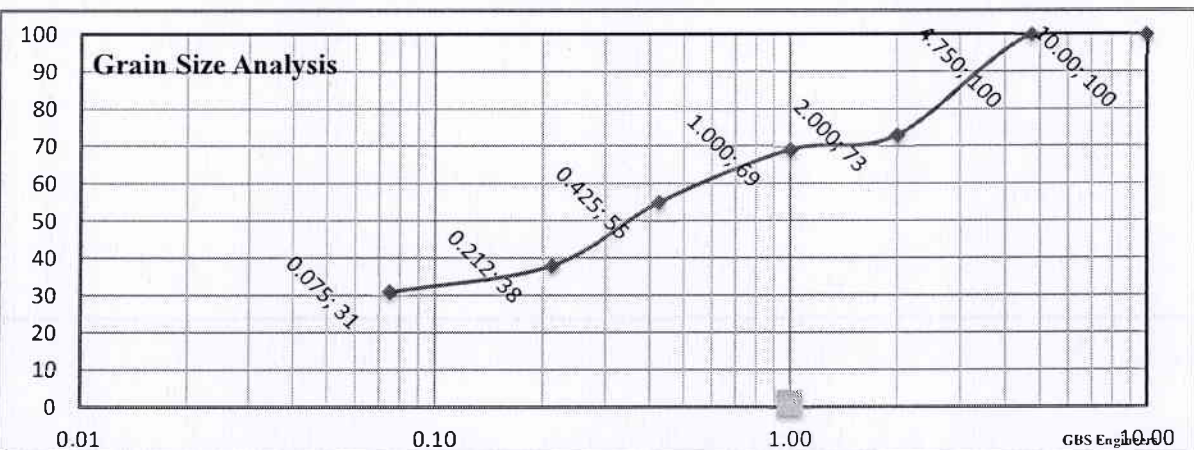
ANNEXURE -G



Bore Hole No. 1	: Depth: 1.00 - 2.50 M	X-axis: Seive sizes	Y-axis: % Material Passing
Name of Site	: Proposed Construction of 02 Lane Yamuna River Bridge on Rahankalan-Raipur-Bamrauli Katara F		
Client Name	: Dy. Project Manager, BCU, Agra, UPSBC Ltd.		

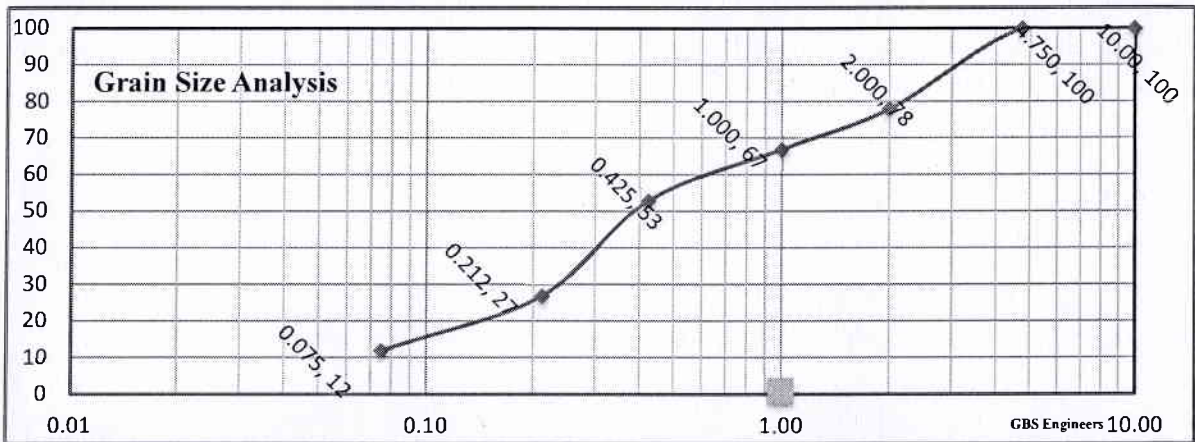


Bore Hole No. 1	: Depth: 2.50 - 4.00 M	X-axis: Seive sizes	Y-axis: % Material Passing
Name of Site	: Proposed Construction of 02 Lane Yamuna River Bridge on Rahankalan-Raipur-Bamrauli Katara F		
Client Name	: Dy. Project Manager, BCU, Agra, UPSBC Ltd.		

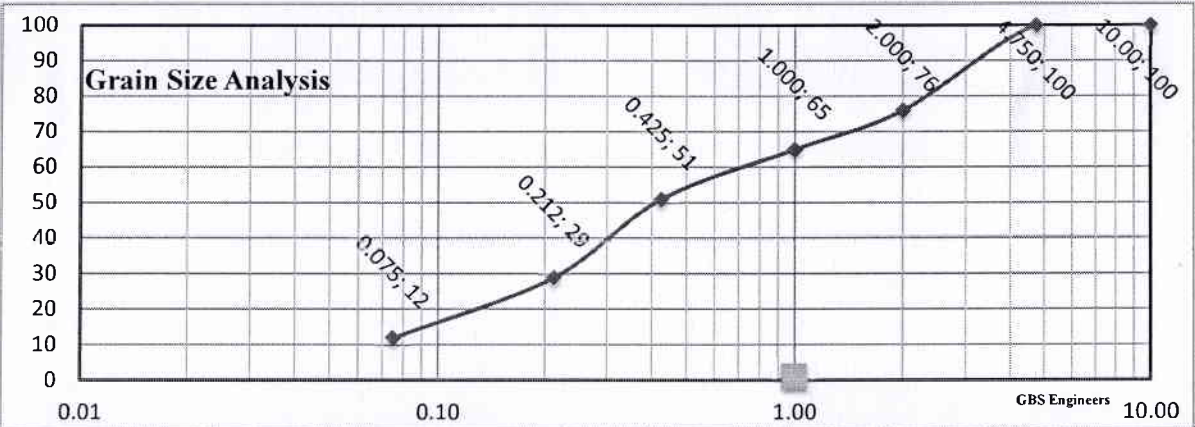


Bore Hole No. 1	: Depth: 4.00 - 5.50 M	X-axis: Seive sizes	Y-axis: % Material Passing
Name of Site	: Proposed Construction of 02 Lane Yamuna River Bridge on Rahankalan-Raipur-Bamrauli Katara F		
Client Name	: Dy. Project Manager, BCU, Agra, UPSBC Ltd.		

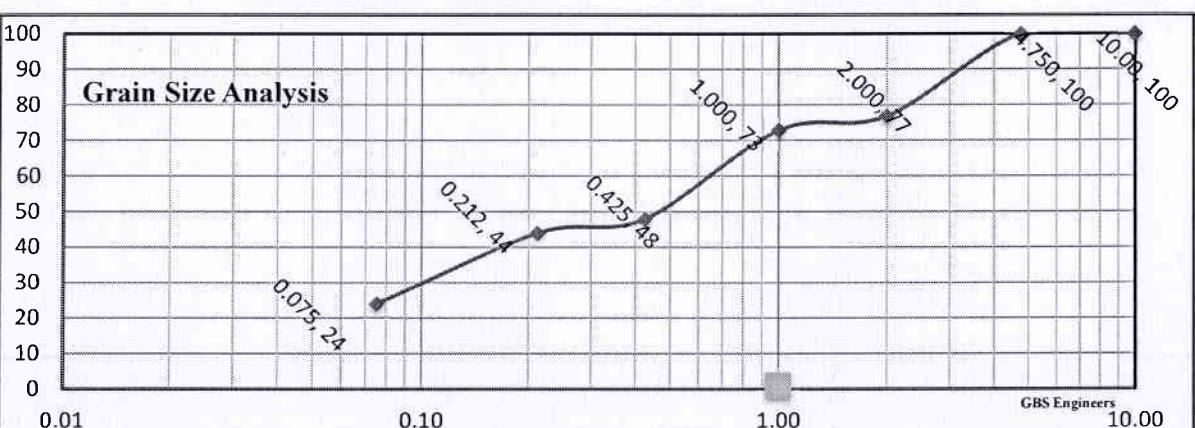
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Bore Hole No. 1	: Depth: 5.50 - 7.00 M	X-axis: Sieve sizes	Y-axis: % Material Passing
Name of Site	: Proposed Construction of 02 Lane Yamuna River Bridge on Rahankalan-Raipur-Bamrauli Katara		
Client Name	: Dy. Project Manager, BCU, Agra, UPSBC Ltd.		



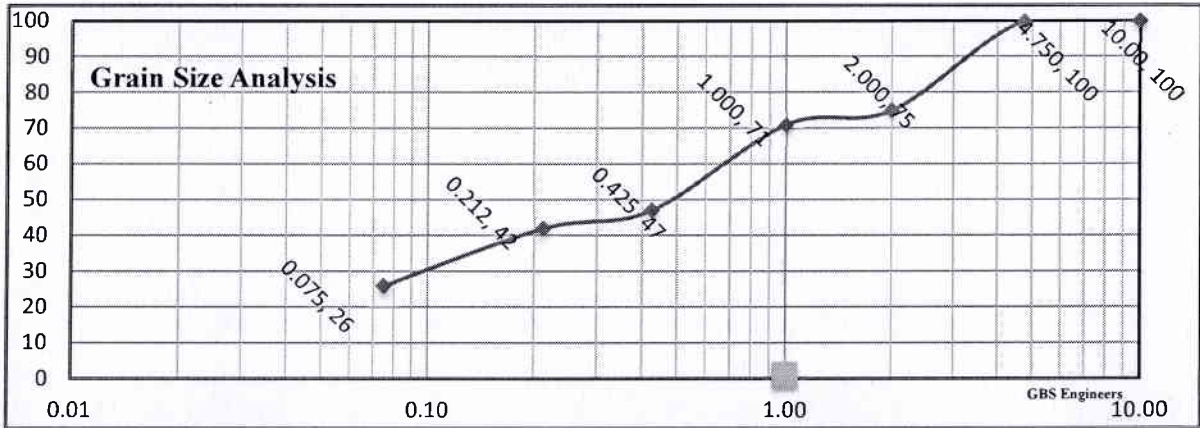
Bore Hole No. 1	: Depth: 7.00 - 8.50 M	X-axis: Sieve sizes	Y-axis: % Material Passing
Name of Site	: Proposed Construction of 02 Lane Yamuna River Bridge on Rahankalan-Raipur-Bamrauli Katara		
Client Name	: Dy. Project Manager, BCU, Agra, UPSBC Ltd.		



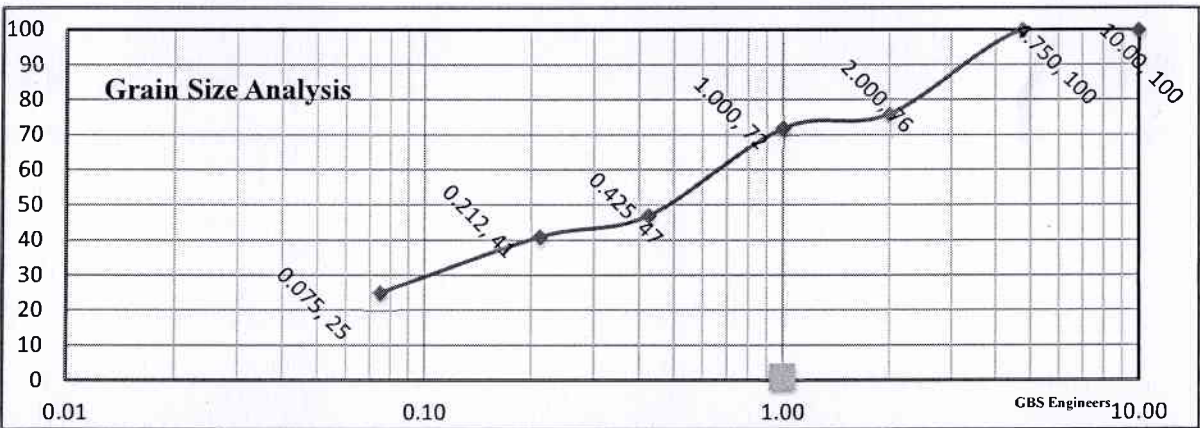
Bore Hole No. 1	: Depth: 8.50 - 10.00 M	X-axis: Sieve sizes	Y-axis: % Material Passing
Name of Site	: Proposed Construction of 02 Lane Yamuna River Bridge on Rahankalan-Raipur-Bamrauli Katara		
Client Name	: Dy. Project Manager, BCU, Agra, UPSBC Ltd.		


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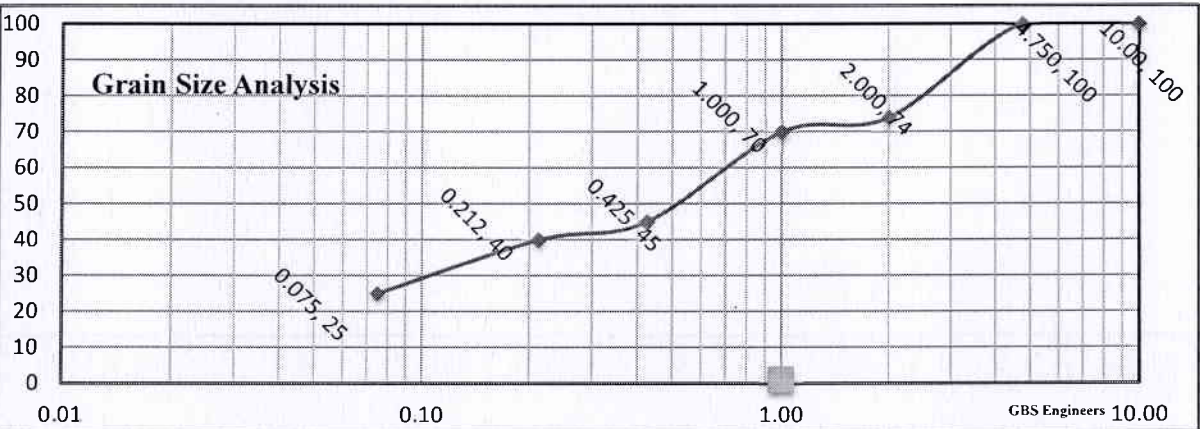
(21)




Bore Hole No. 1	: Depth: 10.00 - 11.50 M	X-axis: Sieve sizes	Y-axis: % Material Passing
Name of Site	: Proposed Construction of 02 Lane Yamuna River Bridge on Rahankalan-Raipur-Bamrauli Katara		
Client Name	: Dy. Project Manager, BCU, Agra, UPSBC Ltd.		

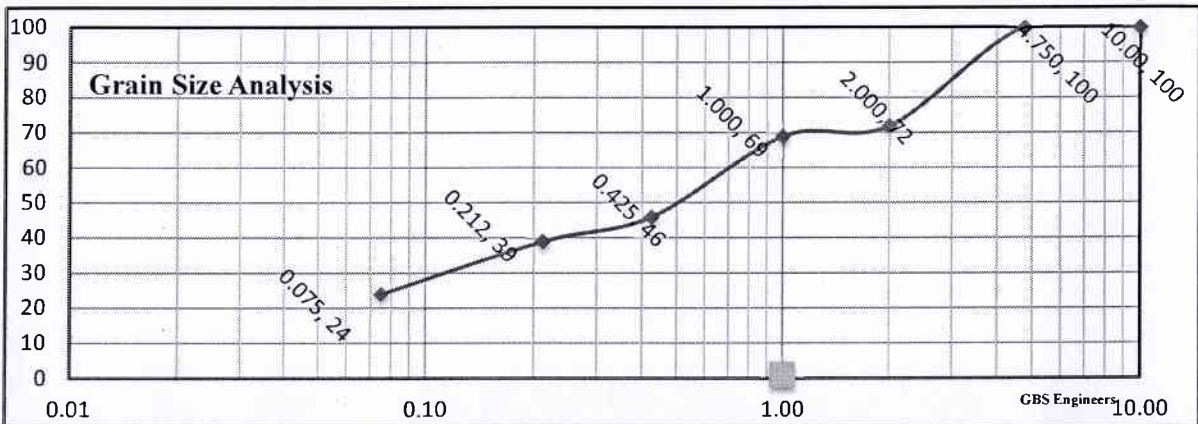


Bore Hole No. 1	: Depth: 11.50 - 13.00 M	X-axis: Sieve sizes	Y-axis: % Material Passing
Name of Site	: Proposed Construction of 02 Lane Yamuna River Bridge on Rahankalan-Raipur-Bamrauli Katara		
Client Name	: Dy. Project Manager, BCU, Agra, UPSBC Ltd.		

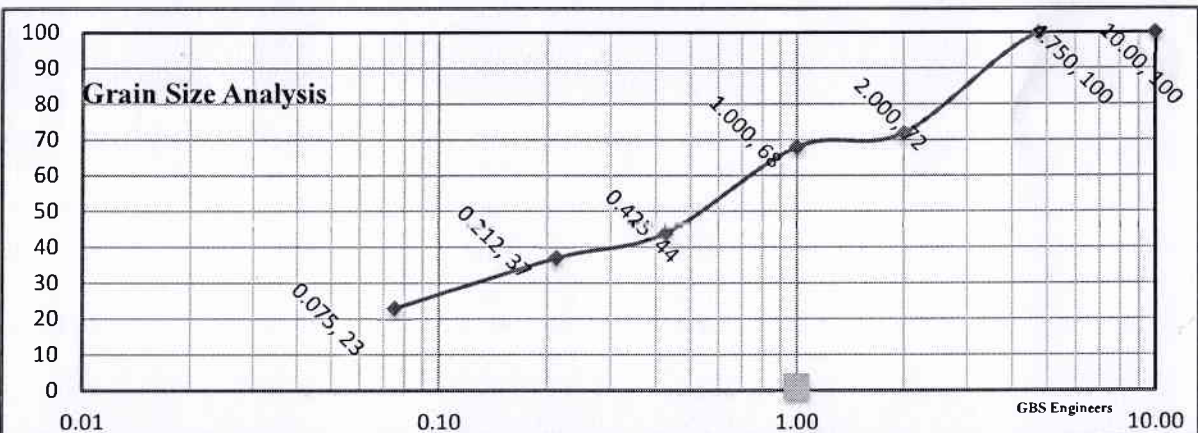


Bore Hole No. 1	: Depth: 13.00 - 14.50 M	X-axis: Sieve sizes	Y-axis: % Material Passing
Name of Site	: Proposed Construction of 02 Lane Yamuna River Bridge on Rahankalan-Raipur-Bamrauli Katara		
Client Name	: Dy. Project Manager, BCU, Agra, UPSBC Ltd.		

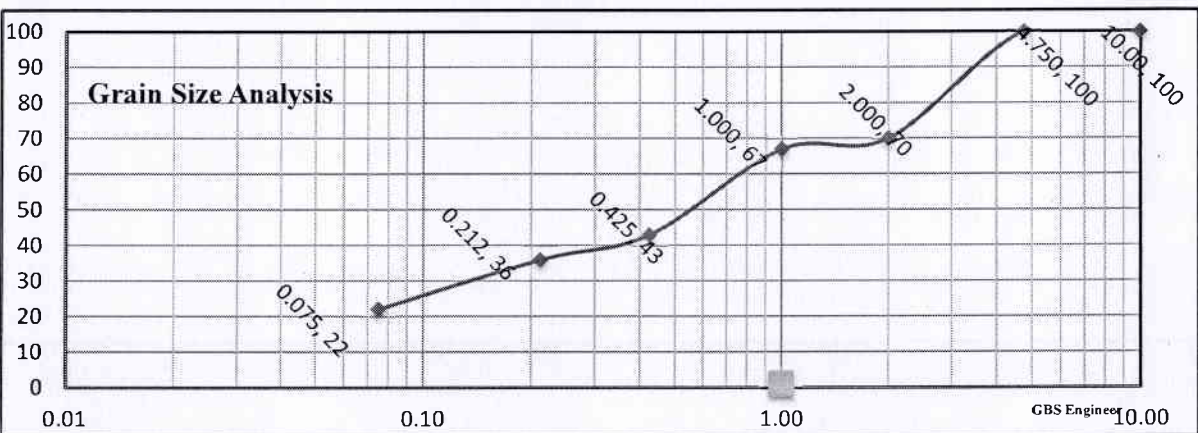

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Bore Hole No. 1	: Depth: 14.50 - 16.00 M	X-axis: Sieve sizes	Y-axis: % Material Passing
Name of Site	: Proposed Construction of 02 Lane Yamuna River Bridge on Rahankalan-Raipur-Bamrauli Katara		
Client Name	: Dy. Project Manager, BCU, Agra, UPSBC Ltd.		

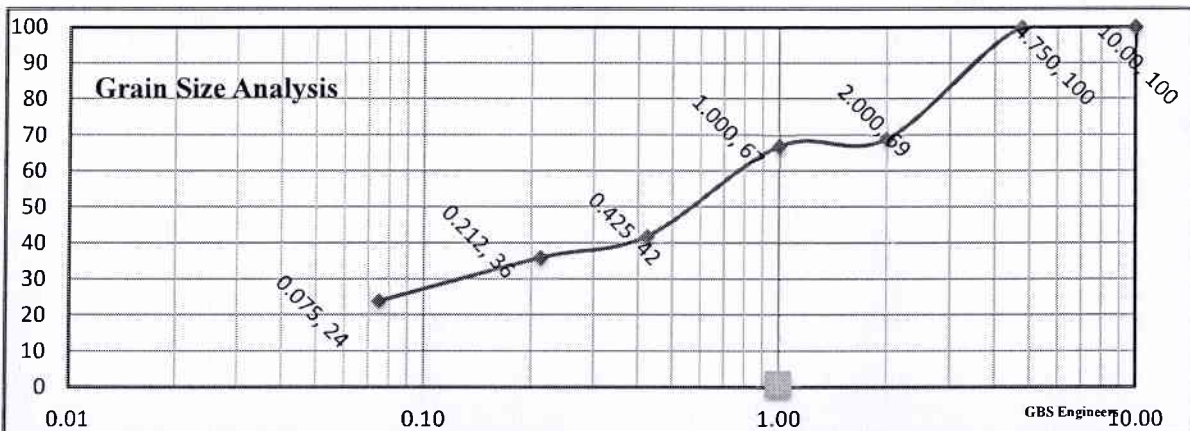


Bore Hole No. 1	: Depth: 16.00 - 17.50 M	X-axis: Sieve sizes	Y-axis: % Material Passing
Name of Site	: Proposed Construction of 02 Lane Yamuna River Bridge on Rahankalan-Raipur-Bamrauli Katara		
Client Name	: Dy. Project Manager, BCU, Agra, UPSBC Ltd.		

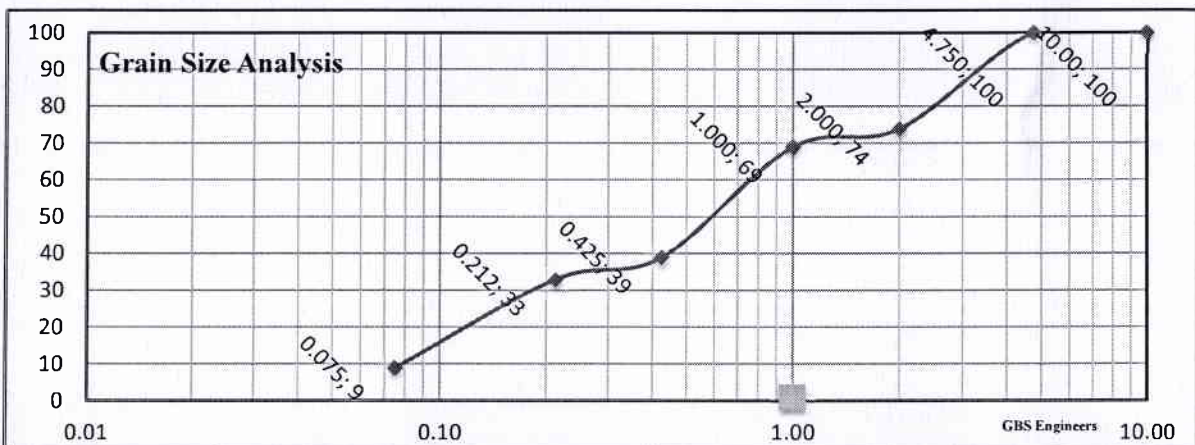


Bore Hole No. 1	: Depth: 17.50 - 19.00 M	X-axis: Sieve sizes	Y-axis: % Material Passing
Name of Site	: Proposed Construction of 02 Lane Yamuna River Bridge on Rahankalan-Raipur-Bamrauli Katara		
Client Name	: Dy. Project Manager, BCU, Agra, UPSBC Ltd.		

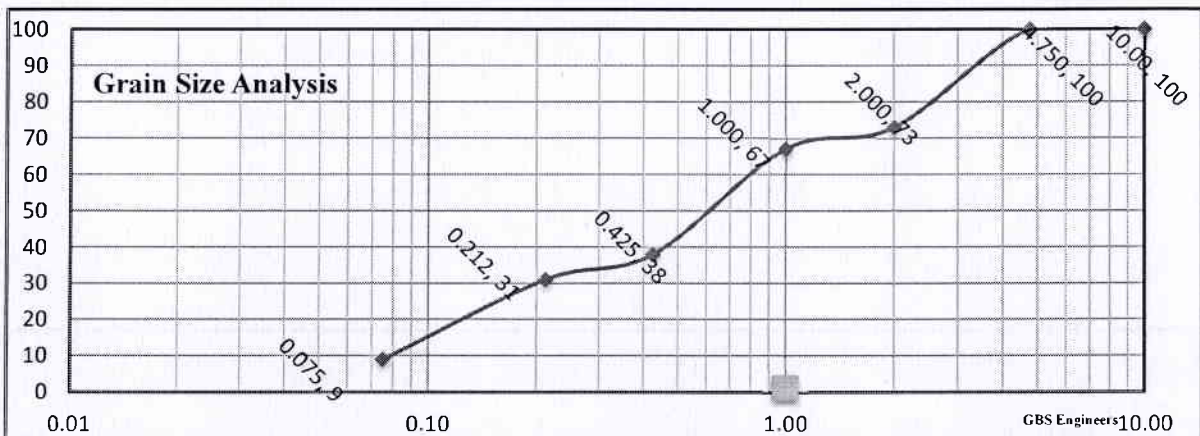
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Bore Hole No. 1	: Depth: 19.00 - 20.50 M	X-axis: Sieve sizes	Y-axis: % Material Passing
Name of Site	: Proposed Construction of 02 Lane Yamuna River Bridge on Rahankalan-Raipur-Bamrauli Katara F		
Client Name	: Dy. Project Manager, BCU, Agra, UPSBC Ltd.		

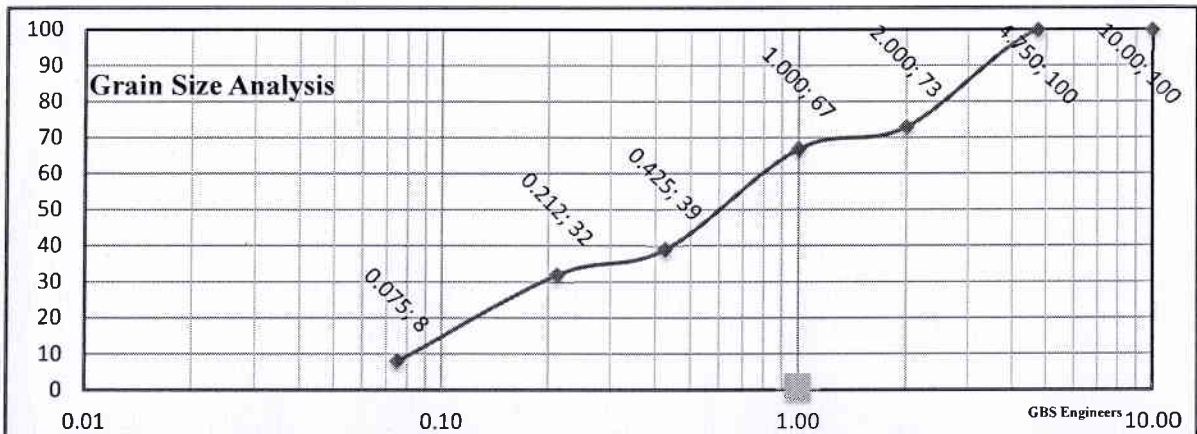


Bore Hole No. 1	: Depth: 20.50 - 22.00 M	X-axis: Sieve sizes	Y-axis: % Material Passing
Name of Site	: Proposed Construction of 02 Lane Yamuna River Bridge on Rahankalan-Raipur-Bamrauli Katara F		
Client Name	: Dy. Project Manager, BCU, Agra, UPSBC Ltd.		

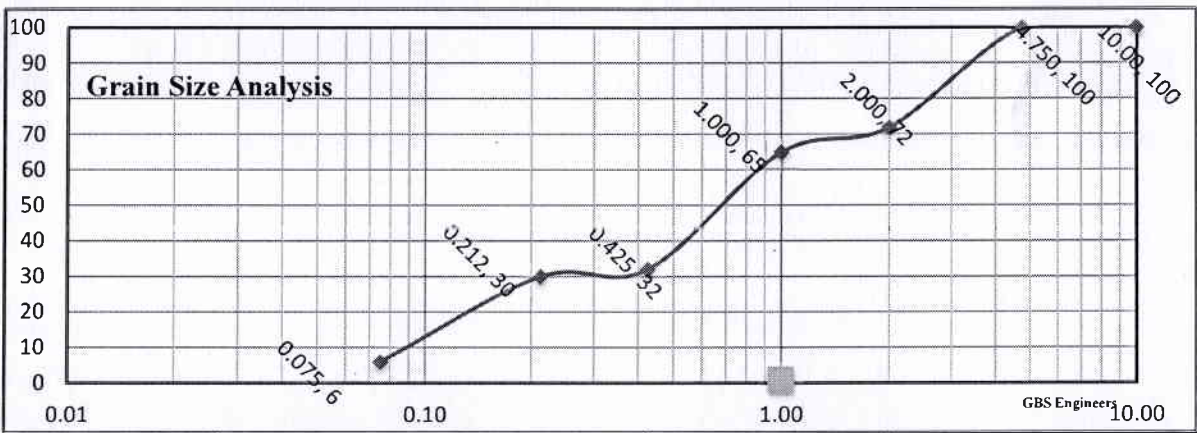


Bore Hole No. 1	: Depth: 22.00 - 23.50 M	X-axis: Sieve sizes	Y-axis: % Material Passing
Name of Site	: Proposed Construction of 02 Lane Yamuna River Bridge on Rahankalan-Raipur-Bamrauli Katara F		
Client Name	: Dy. Project Manager, BCU, Agra, UPSBC Ltd.		

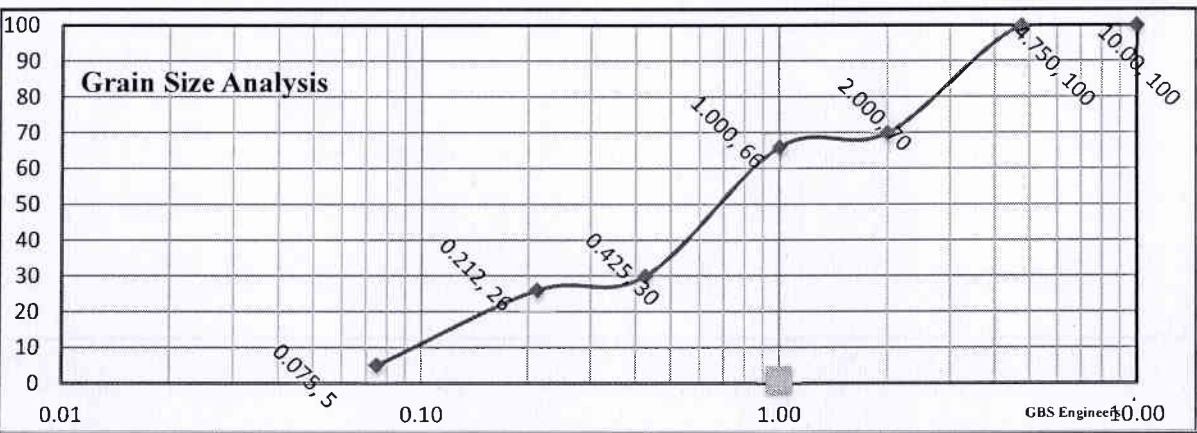

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Bore Hole No. 1	: Depth: 23.50 - 25.00 M	X-axis: Sieve sizes	Y-axis: % Material Passing
Name of Site	: Proposed Construction of 02 Lane Yamuna River Bridge on Rahankalan-Raipur-Bamrauli Katara		
Client Name	: Dy. Project Manager, BCU, Agra, UPSBC Ltd.		

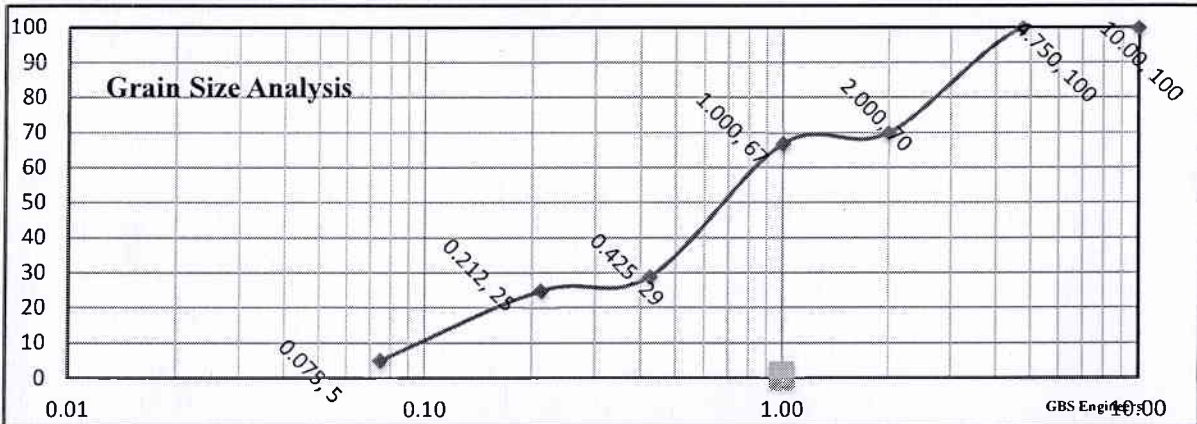


Bore Hole No. 1	: Depth: 25.00 - 26.50 M	X-axis: Sieve sizes	Y-axis: % Material Passing
Name of Site	: Proposed Construction of 02 Lane Yamuna River Bridge on Rahankalan-Raipur-Bamrauli Katara		
Client Name	: Dy. Project Manager, BCU, Agra, UPSBC Ltd.		

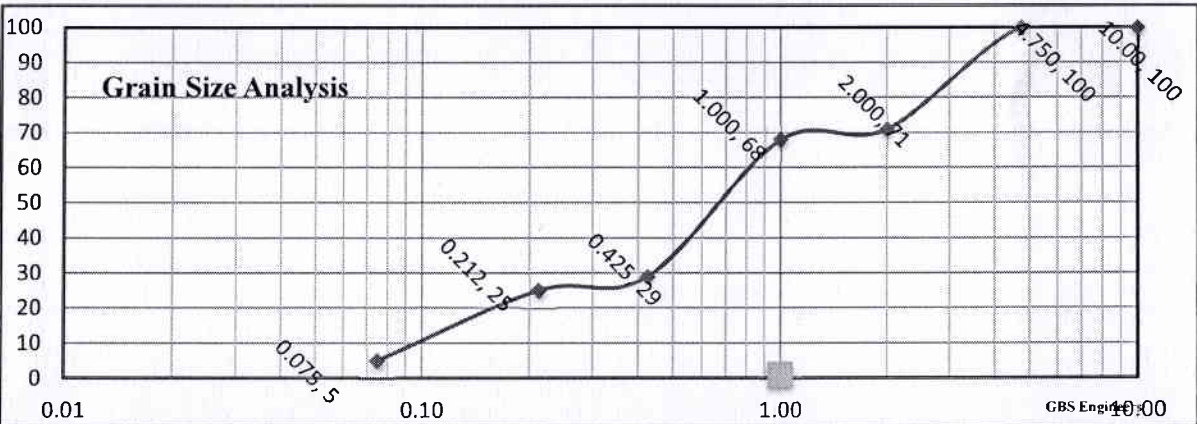


Bore Hole No. 1	: Depth: 26.50 - 28.00 M	X-axis: Sieve sizes	Y-axis: % Material Passing
Name of Site	: Proposed Construction of 02 Lane Yamuna River Bridge on Rahankalan-Raipur-Bamrauli Katara		
Client Name	: Dy. Project Manager, BCU, Agra, UPSBC Ltd.		

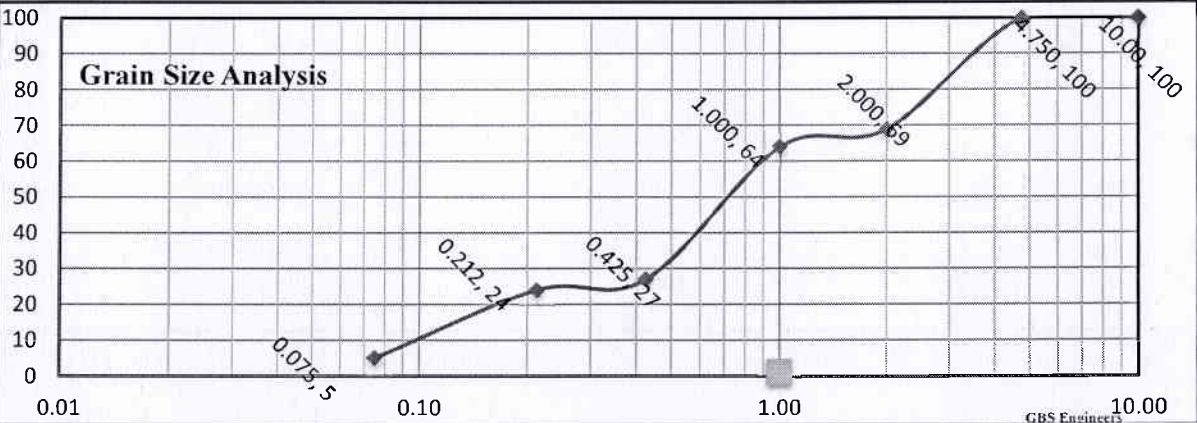

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Bore Hole No. 1	: Depth: 28.00 - 29.50 M	X-axis: Sieve sizes	Y-axis: % Material Passing
Name of Site	: Proposed Construction of 02 Lane Yamuna River Bridge on Rahankalan-Raipur-Bamrauli Katara		
Client Name	: Dy. Project Manager, BCU, Agra, UPSBC Ltd.		

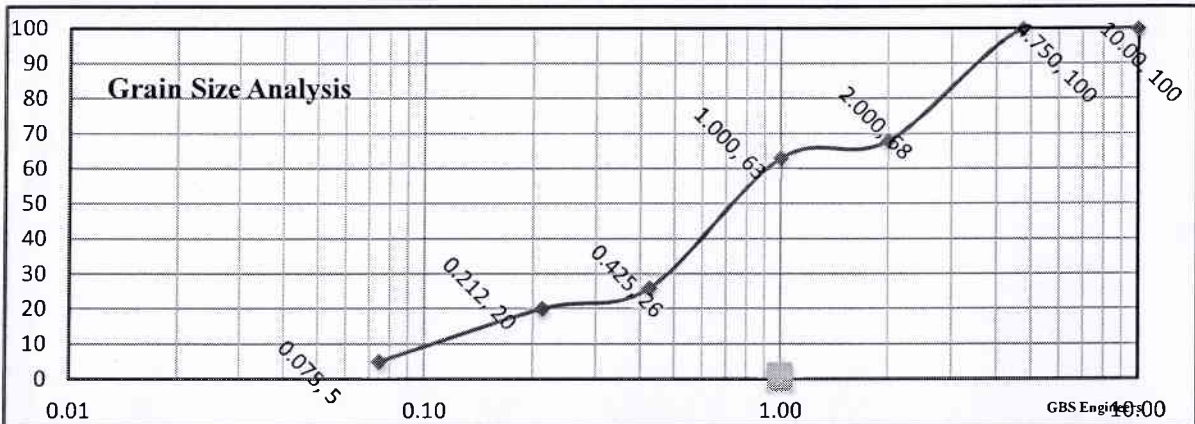


Bore Hole No. 1	: Depth: 29.50 - 31.00 M	X-axis: Sieve sizes	Y-axis: % Material Passing
Name of Site	: Proposed Construction of 02 Lane Yamuna River Bridge on Rahankalan-Raipur-Bamrauli Katara		
Client Name	: Dy. Project Manager, BCU, Agra, UPSBC Ltd.		

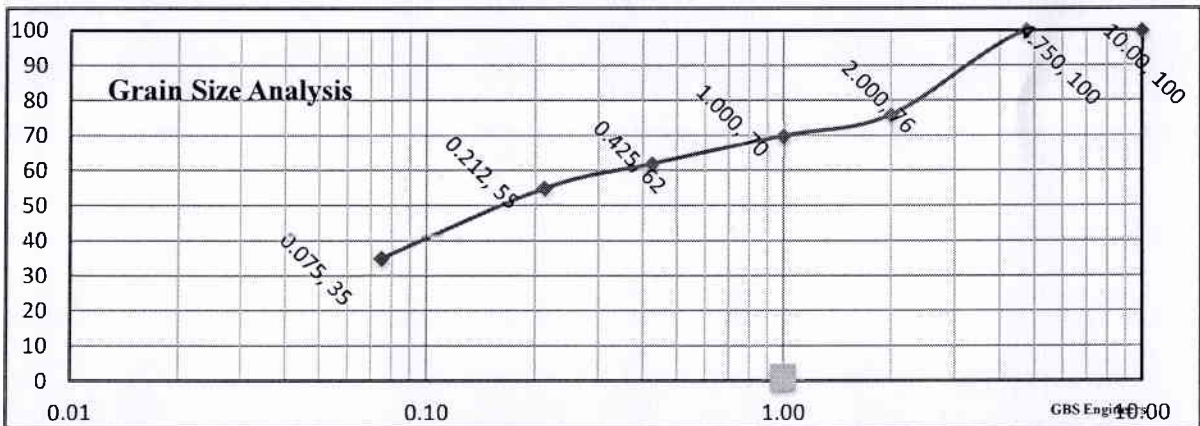


Bore Hole No. 1	: Depth: 31.00 - 32.50 M	X-axis: Sieve sizes	Y-axis: % Material Passing
Name of Site	: Proposed Construction of 02 Lane Yamuna River Bridge on Rahankalan-Raipur-Bamrauli Katara		
Client Name	: Dy. Project Manager, BCU, Agra, UPSBC Ltd.		

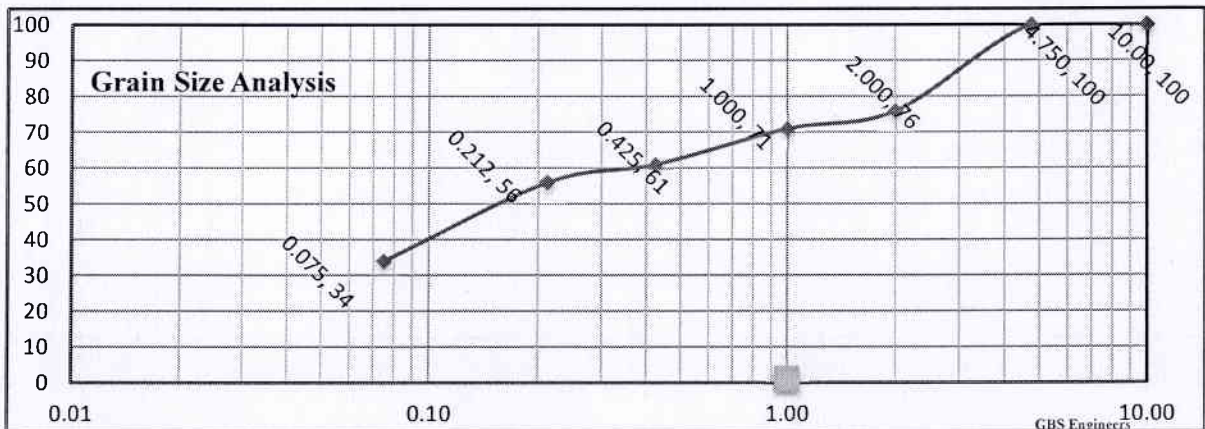

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Bore Hole No. 1	: Depth: 32.50 - 34.00 M	X-axis: Sieve sizes	Y-axis: % Material Passing
Name of Site	: Proposed Construction of 02 Lane Yamuna River Bridge on Rahankalan-Raipur-Bamrauli Katara F		
Client Name	: Dy. Project Manager, BCU, Agra, UPSBC Ltd.		



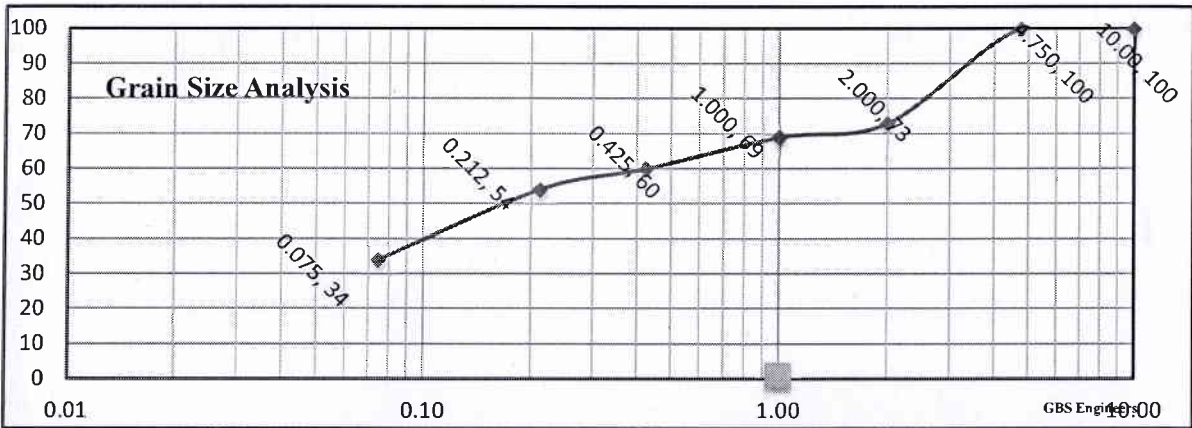
Bore Hole No. 1	: Depth: 34.00 - 35.50 M	X-axis: Sieve sizes	Y-axis: % Material Passing
Name of Site	: Proposed Construction of 02 Lane Yamuna River Bridge on Rahankalan-Raipur-Bamrauli Katara F		
Client Name	: Dy. Project Manager, BCU, Agra, UPSBC Ltd.		



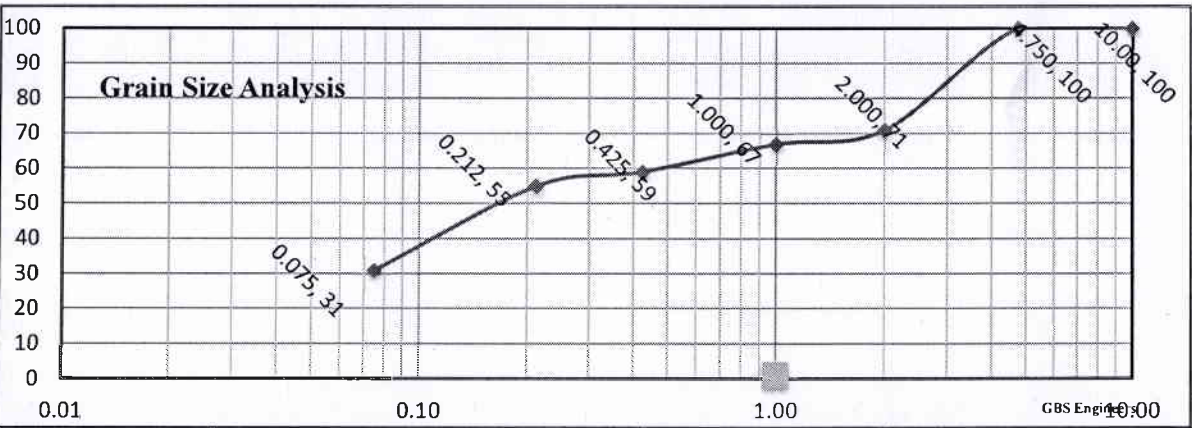
Bore Hole No. 1	: Depth: 35.50 - 37.00 M	X-axis: Sieve sizes	Y-axis: % Material Passing
Name of Site	: Proposed Construction of 02 Lane Yamuna River Bridge on Rahankalan-Raipur-Bamrauli Katara F		
Client Name	: Dy. Project Manager, BCU, Agra, UPSBC Ltd.		


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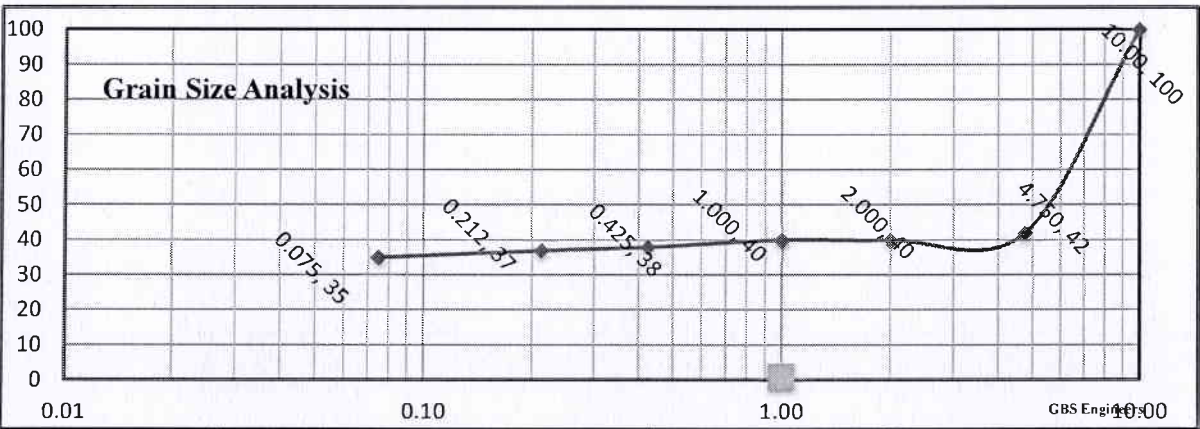
27



Bore Hole No. 1	: Depth: 37.00 - 38.50 M	X-axis: Sieve sizes	Y-axis: % Material Passing
Name of Site	: Proposed Construction of 02 Lane Yamuna River Bridge on Rahankalan-Raipur-Bamrauli Katara		
Client Name	: Dy. Project Manager, BCU, Agra, UPSBC Ltd.		

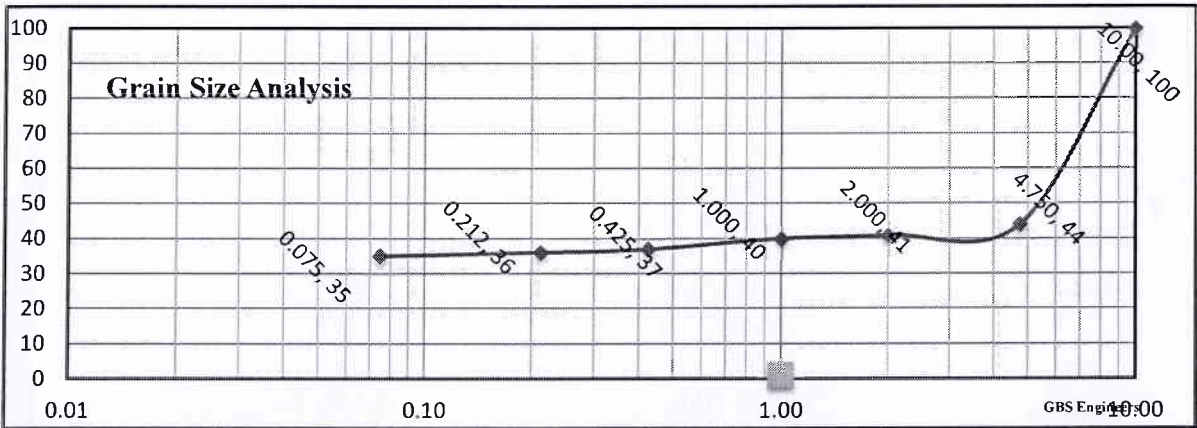


Bore Hole No. 1	: Depth: 38.50 - 40.00 M	X-axis: Sieve sizes	Y-axis: % Material Passing
Name of Site	: Proposed Construction of 02 Lane Yamuna River Bridge on Rahankalan-Raipur-Bamrauli Katara		
Client Name	: Dy. Project Manager, BCU, Agra, UPSBC Ltd.		

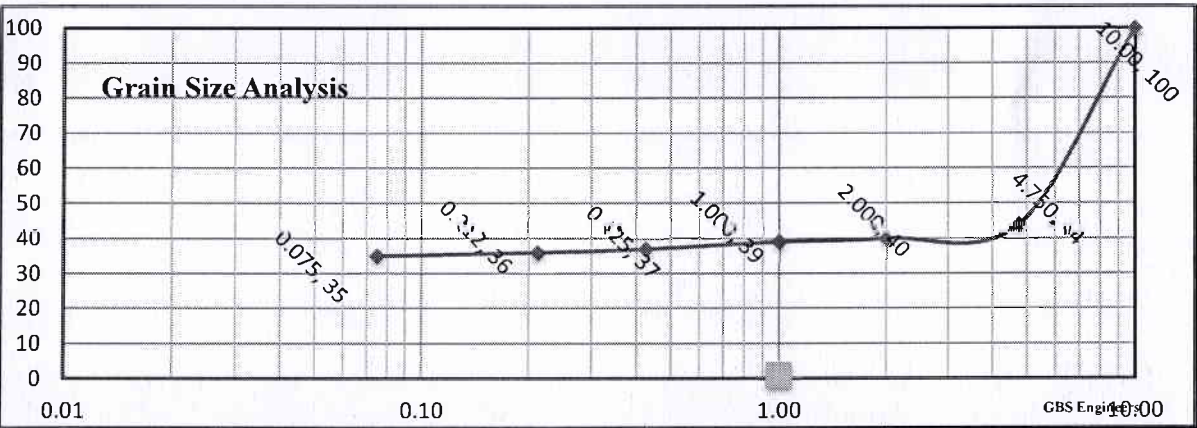


Bore Hole No. 1	: Depth: 40.00 - 41.50 M	X-axis: Sieve sizes	Y-axis: % Material Passing
Name of Site	: Proposed Construction of 02 Lane Yamuna River Bridge on Rahankalan-Raipur-Bamrauli Katara		
Client Name	: Dy. Project Manager, BCU, Agra, UPSBC Ltd.		

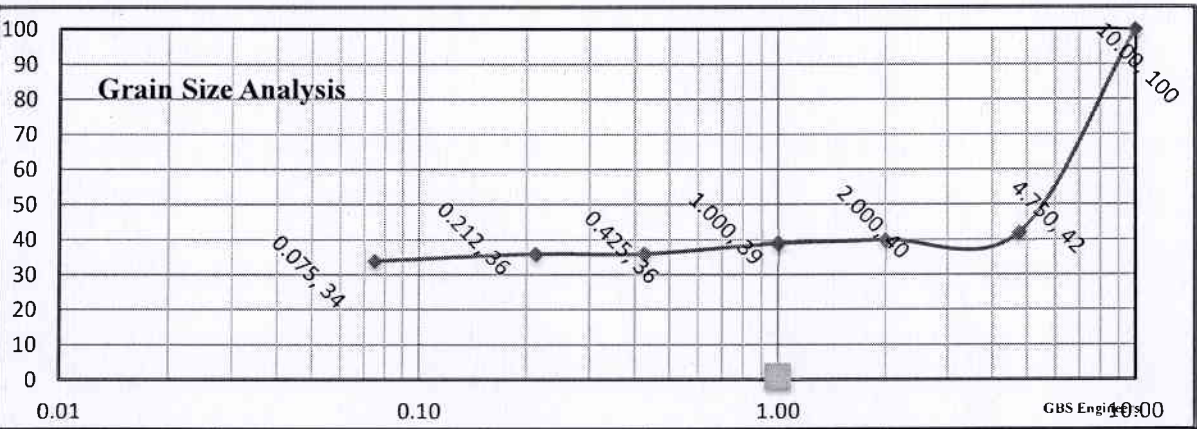
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Bore Hole No. 1	: Depth: 41.50 - 43.00 M	X-axis: Sieve sizes	Y-axis: % Material Passing
Name of Site	: Proposed Construction of 02 Lane Yamuna River Bridge on Rahankalan-Raipur-Bamrauli Katara		
Client Name	: Dy. Project Manager, BCU, Agra, UPSBC Ltd.		

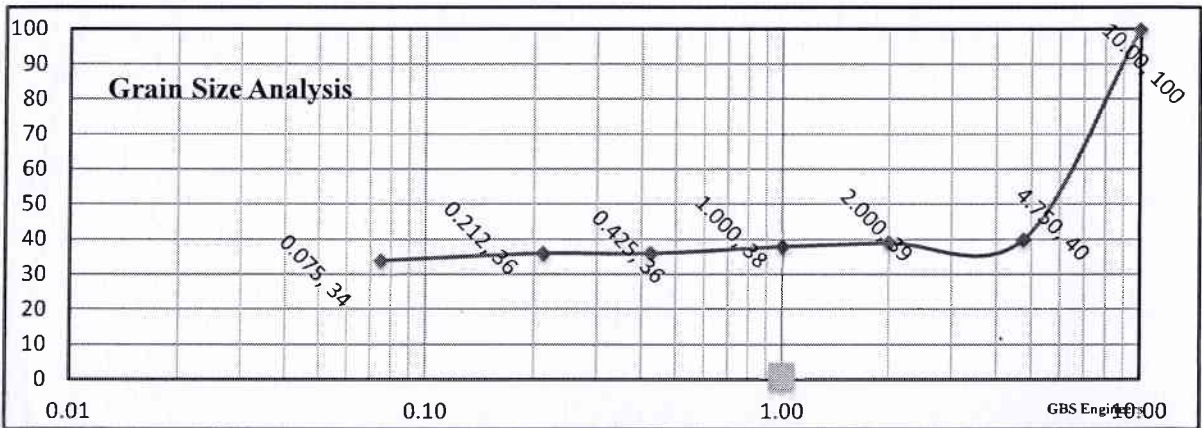


Bore Hole No. 1	: Depth: 43.00 - 44.50 M	X-axis: Sieve sizes	Y-axis: % Material Passing
Name of Site	: Proposed Construction of 02 Lane Yamuna River Bridge on Rahankalan-Raipur-Bamrauli Katara		
Client Name	: Dy. Project Manager, BCU, Agra, UPSBC Ltd.		

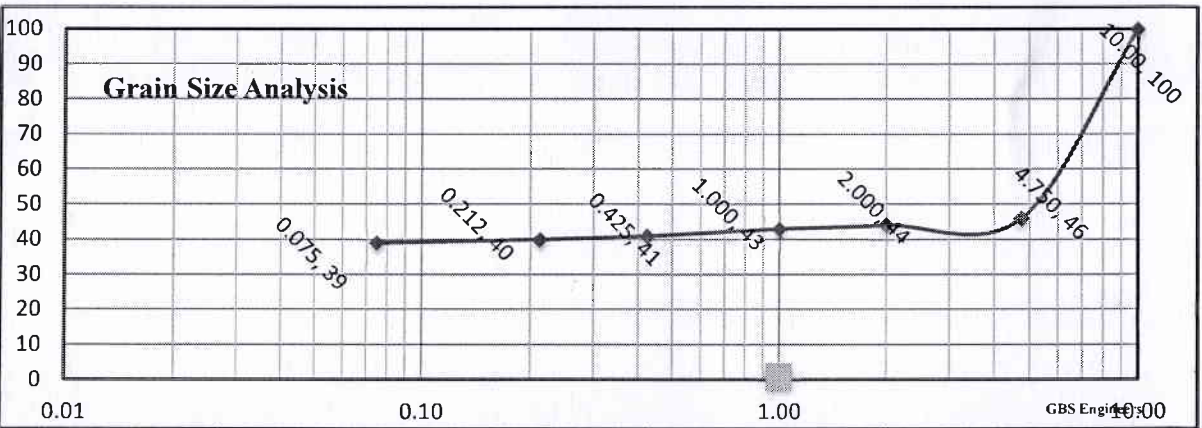


Bore Hole No. 1	: Depth: 44.50 - 46.00 M	X-axis: Sieve sizes	Y-axis: % Material Passing
Name of Site	: Proposed Construction of 02 Lane Yamuna River Bridge on Rahankalan-Raipur-Bamrauli Katara		
Client Name	: Dy. Project Manager, BCU, Agra, UPSBC Ltd.		

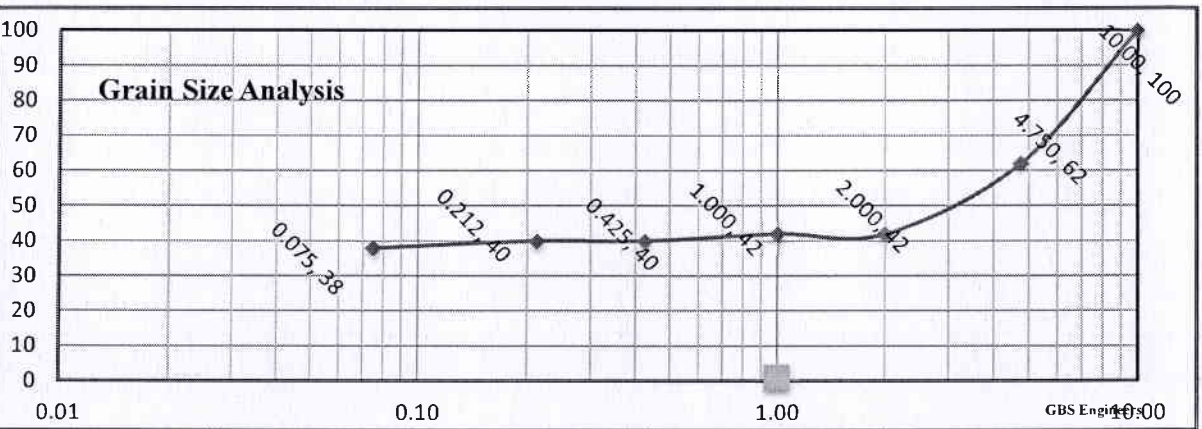

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Bore Hole No. 1	: Depth: 46.00 - 47.50 M	X-axis: Sieve sizes	Y-axis: % Material Passing
Name of Site	: Proposed Construction of 02 Lane Yamuna River Bridge on Rahankalan-Raipur-Bamrauli Katara		
Client Name	: Dy. Project Manager, BCU, Agra, UPSBC Ltd.		

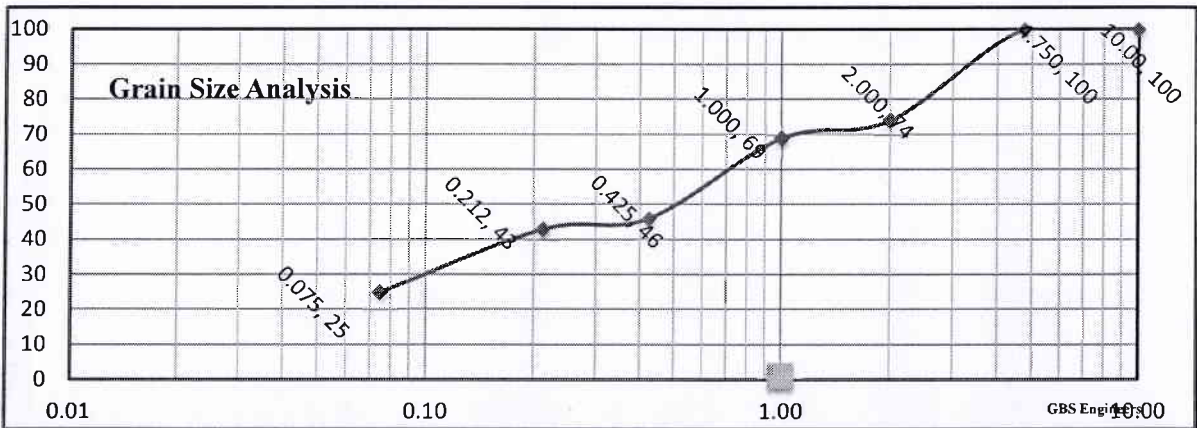


Bore Hole No. 1	: Depth: 47.50 - 49.00 M	X-axis: Sieve sizes	Y-axis: % Material Passing
Name of Site	: Proposed Construction of 02 Lane Yamuna River Bridge on Rahankalan-Raipur-Bamrauli Katara		
Client Name	: Dy. Project Manager, BCU, Agra, UPSBC Ltd.		

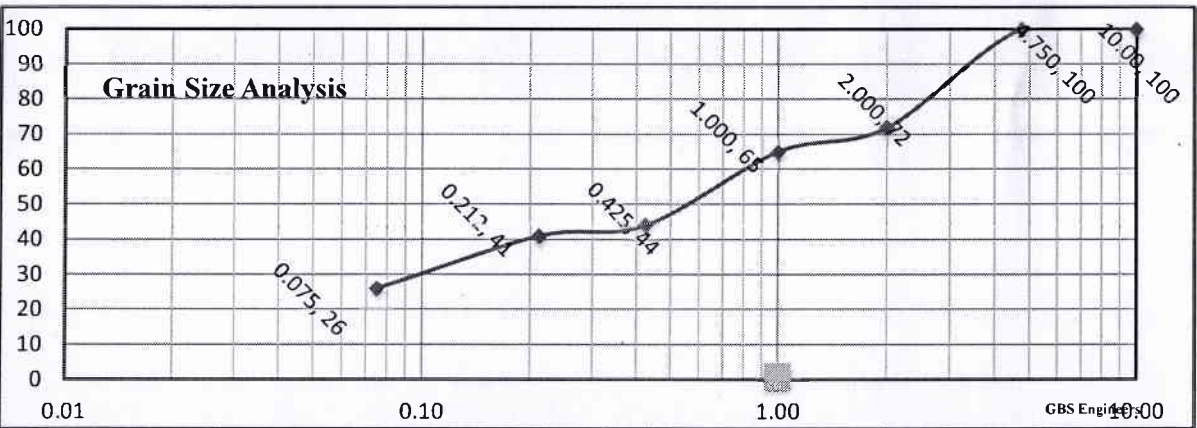


Bore Hole No. 1	: Depth: 49.00 - 50.50 M	X-axis: Sieve sizes	Y-axis: % Material Passing
Name of Site	: Proposed Construction of 02 Lane Yamuna River Bridge on Rahankalan-Raipur-Bamrauli Katara		
Client Name	: Dy. Project Manager, BCU, Agra, UPSBC Ltd.		

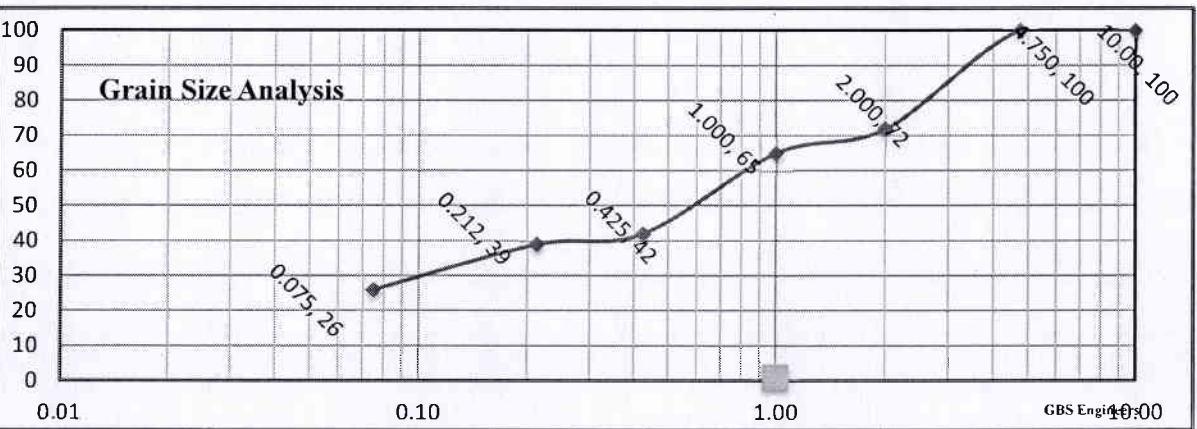
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Bore Hole No. 1	: Depth: 50.50 - 52.00 M	X-axis: Sieve sizes	Y-axis: % Material Passing
Name of Site	: Proposed Construction of 02 Lane Yamuna River Bridge on Rahankalan-Raipur-Bamrauli Katara		
Client Name	: Dy. Project Manager, BCU, Agra, UPSBC Ltd.		



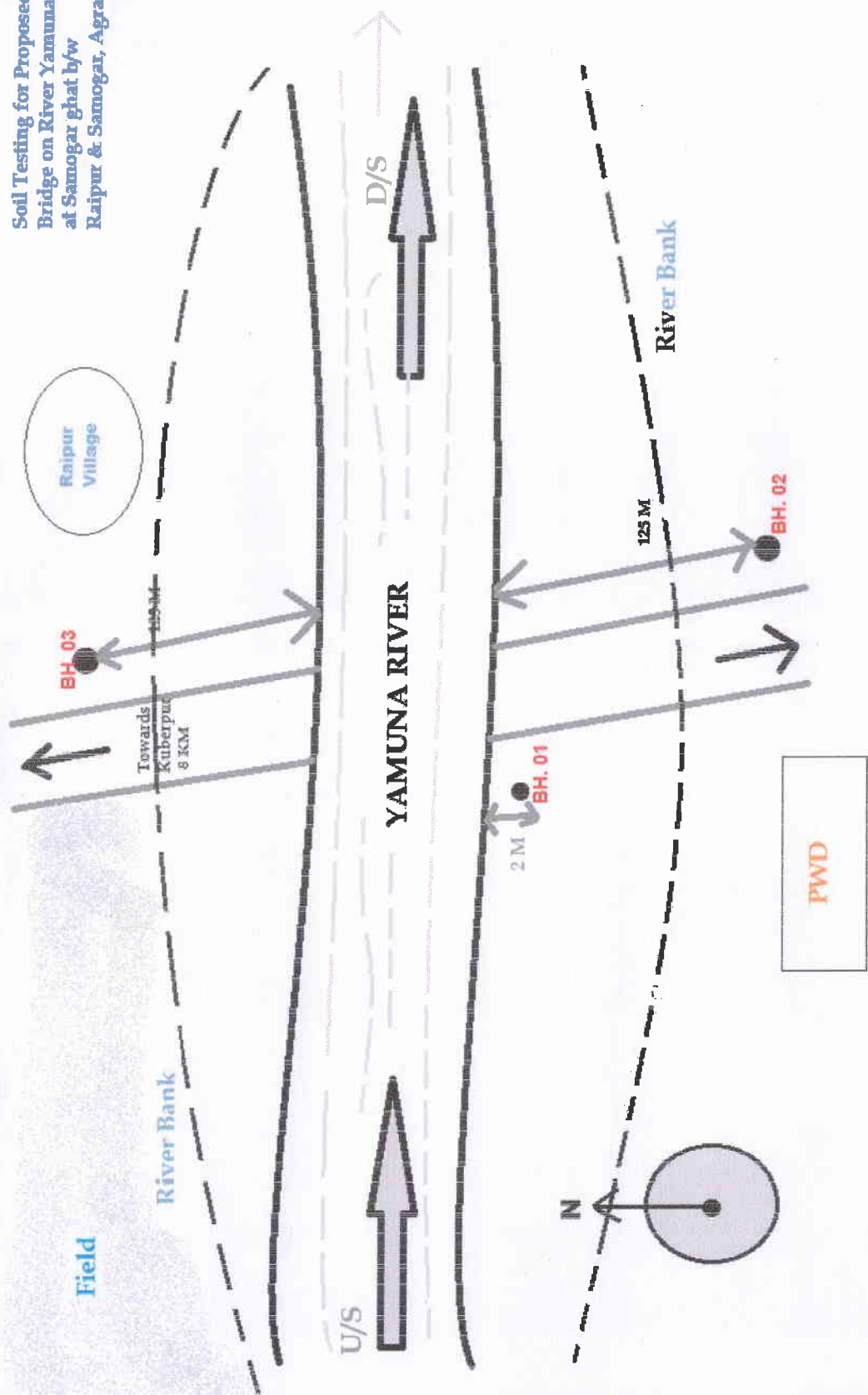
Bore Hole No. 1	: Depth: 52.00 - 53.50 M	X-axis: Sieve sizes	Y-axis: % Material Passing
Name of Site	: Proposed Construction of 02 Lane Yamuna River Bridge on Rahankalan-Raipur-Bamrauli Katara		
Client Name	: Dy. Project Manager, BCU, Agra, UPSBC Ltd.		



Bore Hole No. 1	: Depth: 53.50 - 55.00 M	X-axis: Sieve sizes	Y-axis: % Material Passing
Name of Site	: Proposed Construction of 02 Lane Yamuna River Bridge on Rahankalan-Raipur-Bamrauli Katara		
Client Name	: Dy. Project Manager, BCU, Agra, UPSBC Ltd.		


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Soil Testing for Proposed
Bridge on River Yamuna
at Samogar ghat b/w
Raipur & Samogar, Agra



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Construction of 02 Lane Yamuna River Bridge, Approach Road, Additional Approach Road and Protection work on Rahankalan-Raipur-Bamrauli Katara Road (O.D.R.) at Samogar Ghat in Distt. Agra.

Bore Hole No. 01



Construction of 02 Lane Yamuna River Bridge, Approach Road, Additional Approach Road and Protection work on Rahankalan-Raipur-Bamrauli Katara Road (O.D.R.) at Samogar Ghat in Distt. Agra.

Bore Hole No. 02



Construction of 02 Lane Yamuna River Bridge, Approach Road, Additional Approach Road and Protection work on Rahankalan-Raipur-Bamrauli Katara Road (O.D.R.) at Samogar Ghat in Distt. Agra

Bore Hole No. 03

