


 <b>NTPC</b> <b>Tenders</b> <small>A Maharatna Company</small>		<b>NTPC Limited eProcurement Portal</b> <b>Published Corrigendum Details</b>		
				Date : 04-Nov-2022 04:52 PM
				 Print
<b>Organisation Chain :</b>	NTPC Limited  Corporate Centre  USSC  CPG-1			
<b>Tender ID :</b>	2022_NTPC_69742_1			
<b>Tender Ref No :</b>	NTPC/USSC-CPG1/9900247363			
<b>Tender Title :</b>	Construction of Box push culvert below the existing operational rail			
<b>Corrigendum Type :</b>	Date			
<b>Corrigendum:2</b>				
Corrigendum Title	Corrigendum Description	Published Date	Document Name	Doc Size(in KB)
Date Extension-2	Date Extension-2	04-Nov-2022 04:52 PM	<a href="#">DateExtended.pdf</a> 	9.0
<b>Critical Dates</b>				
<b>Publish Date</b>	03-Oct-2022 03:00 PM	<b>Bid Opening Date</b>	12-Nov-2022 03:00 PM	
<b>Document Download/Sale Start Date</b>	03-Oct-2022 03:00 PM	<b>Document Download/Sale End Date</b>	11-Nov-2022 03:00 PM	
<b>Clarification Start Date</b>	03-Oct-2022 03:00 PM	<b>Clarification End Date</b>	25-Oct-2022 03:00 PM	
<b>Bid Submission Start Date</b>	03-Oct-2022 03:00 PM	<b>Bid Submission End Date</b>	11-Nov-2022 03:00 PM	
<b>Corrigendum:1</b>				
Corrigendum Title	Corrigendum Description	Published Date	Document Name	Doc Size(in KB)
Date Extn-1	BSD 04.11.22 and BOD 05.11.22	01-Nov-2022 11:05 AM	<a href="#">DateExtended.pdf</a> 	9.0
<b>Critical Dates</b>				
<b>Publish Date</b>	03-Oct-2022 03:00 PM	<b>Bid Opening Date</b>	05-Nov-2022 03:00 PM	
<b>Document Download/Sale Start Date</b>	03-Oct-2022 03:00 PM	<b>Document Download/Sale End Date</b>	04-Nov-2022 03:00 PM	
<b>Clarification Start Date</b>	03-Oct-2022 03:00 PM	<b>Clarification End Date</b>	25-Oct-2022 03:00 PM	
<b>Bid Submission Start Date</b>	03-Oct-2022 03:00 PM	<b>Bid Submission End Date</b>	04-Nov-2022 03:00 PM	
<b>Details Before Corrigendum</b>				
<b>Critical Dates</b>				
<b>Publish Date</b>	03-Oct-2022 03:00 PM	<b>Bid Opening Date</b>	02-Nov-2022 03:00 PM	
<b>Document Download/Sale Start Date</b>	03-Oct-2022 03:00 PM	<b>Document Download/Sale End Date</b>	31-Oct-2022 03:00 PM	
<b>Clarification Start Date</b>	03-Oct-2022 03:00 PM	<b>Clarification End Date</b>	25-Oct-2022 03:00 PM	
<b>Bid Submission Start Date</b>	03-Oct-2022 03:00 PM	<b>Bid Submission End Date</b>	31-Oct-2022 03:00 PM	



A Maharatna Company

## USSC CPG1-C&M Raipur

### Corrigendum-2

Ref. No: 9900247363

Date: 03.11.22.

**Sub: "Construction of Box push culvert below the existing operational rail tracks of NTPC and SCCL at NTPC Ramagundam/ Telangana Project"**

Dear Sir/Madam,

With reference to our Tender Id no. 2022\_NTPC\_69742\_1 dated 03.10.2022, the reply to the bidder queries is as per following:

SN	Query	Reply
1	As per the bore log, there is no hard rock presence in the soil strata. In case, the hard rock is encountered while execution, the removal of hard rock is to be paid extra to us.	Bidder to quote as per bore log data provided. The encountering of soil strata shall be dealt as per provisions of tender documents.
2	Also it is further stated that the rates quoted by us with intermittent bailing out of ground water, incase of seepage. If there is heavy seepage where continuous dewatering is involved the same is required to be paid extra.	Dewatering of all kinds to keep working site dry is in the scope of bidder as per provisions of tender documents.

All other terms and conditions of original tender document shall remain unaltered.

Thanking you,

Yours faithfully  
For & on Behalf of NTPC

**Hemant Raut**  
DGM (CS)



A Maharatna Company

## USSC CPG1-C&M Raipur



A Maharatna Company

## USSC CPG1-C&M Raipur

### Corrigendum-1

Ref. No: 9900247363

Date:01.11.22.

**Sub: “Construction of Box push culvert below the existing operational rail tracks of NTPC and SCCL at NTPC Ramagundam/ Telangana Project”**

Dear Sir/Madam,

With reference to our Tender Id no. 2022\_NTPC\_69742\_1 dated 03.10.2022, the reply to the bidder queries is as per following:

SN	Query	Reply
1	The approved General arrangement drawing with bore log data is not found in the bid document.	General Arrangement Drawing is available in Section-VI -Technical Specifications.  Bore log data is attached herewith.
2	Bore log data is necessary to ascertain the sub soil strata and ground water table.	Bore log data is attached herewith.
3	Whether the scope of excavation & removal of soil /rock and bailing out of seepage water is separate from main item of box pushing and casting of thrust bed.	As per BoQ items 20.10 to 20.50, dewatering is included in the item rates.
4	If it is included, how is it possible to quote the rate in absence of bore log data.	Bore log data is attached herewith.
5	If the extent of hard rock removal while excavation is more than 10% of the total the quantity , whether NTPC Ltd will bear the additional expenditure to be incurred for removal of rock while excavation as well as removal of huge seepage water.	The quantity deviations if any during the execution of work and it's payment shall be regulated as mentioned in the relevant clauses of GCC/ SCC and as per terms and conditions mentioned in the contract. The entire liability for executing the deviated quantities along with pumping out of water due to seepage/ rains/ surface flow/ sub surface flow, lie with the bidder and to be executed in line with the terms and conditions of the contract.
6	If the additional expenditure is also on contractor's account, how it is possible to guess the soil strata while quoting the rates for tender.	Bore log data is attached herewith.
7	Please provide complete description of DSR 2018 items.	DSR 2018 volumes can be downloaded from the internet.



## USSC CPG1-C&M Raipur

A Maharatna Company

8	Please fix and intimate the date and time for personal interaction with your officials to clarify further any details before tendering.	As per the bidding documents no Pre-bid meeting is envisaged.  For any clarification, details (phone number, email address etc.) of executives are provided in tender documents.
---	---	--

All other terms and conditions of original tender document shall remain unaltered.

Thanking you,

Yours faithfully  
For & on Behalf of NTPC

**Hemant Raut**  
DGM (CS)

---

**GEOTECHNICAL INVESTIGATION REPORT  
FOR  
PREPARATION OF DPR AND DETAILED ENGINEERING FOR PASSING  
2<sup>ND</sup> RAW WATER CONDUIT THROUGH BOX  
PUSH CULVERT / OTHER SUITABLE METHOD  
BELOW THE EXISTING OPERATIONAL RAIL  
TRACKS OF NTPC & SCCL AT NTPC  
RAMAGUNDAM –TELANGANA PROJECT**

**1.0 GENERAL**

- 1.1. The National Thermal Power Corporation Limited has mandated preparation of Detail Project Report and Detailed Engineering for passing 2<sup>nd</sup> Raw Water Conduit Through Box Push Culvert / other suitable method below the existing operational rail tracks of NTPC & SCCL at NTPC Ramagundam, Telangana Project.
- 1.2. M/s Matha Track & Infra Track - Secunderabad, Telangana had been appointed as consultant for the above project.
- 1.3. It was decided to carry out geotechnical investigations to determine the appropriate foundation system for the proposed facilities. Work of geotechnical investigation is awarded to Mr. Sufiyaan Ansari. The field work was executed in last week of October - 2018.
- 1.4. This report has been prepared by Geostruct Engineering Solutions on behalf of M/s Aman Drilling, Azmi Co-OP. Hsg. Society, Room No. 18, Sunder Compound, Azmi Nagar, Malvani, Malad (West), Mumbai 400095. (Mr. Sufiyaan Ansari, Cell : 6354 364 573 / 77385 22350). It covers data collected in field-work of two investigation bore holes and results of laboratory tests on selected rock/ water sample/s. The entire report is based on the field bore logs and rock and soil test results furnished by Mr. Sufiyaan Ansari. The author is not responsible for the correctness / accurateness of field and lab test data. Scope of preparation of this report does not include any site visits during foundation construction to confirm the founding stratum, bearing capacity, pile capacity etc. It is suggested to involve expert geotechnical engineer during design and execution stage.

# GEOSTRUCT ENGINEERING SOLUTIONS

Consulting Geotechnical Engineers  
B/707, "Golden Soil",  
Behind Raj Nagar, SV Road  
Jogeshwari (W) – Mumbai – 400 102  
Ph. No.: 9869080755 - 8097266780

## 2.0 SCOPE OF THE INVESTIGATIONS

- 2.1 Two bore holes are drilled to establish the subsurface stratification and to identify the type of foundations, based on the engineering properties of the samples retrieved.
- 2.2 Scope of the work also included the following:
- I) Drilling in rock (weathered and hard), obtain rock cores of Nx size, by diamond core drilling using the triple tube core barrels, determination of material characteristics (Strength/Structure/Colour/Texture/Grain size/Rock type), mass characteristics (State of weathering/existing natural discontinuities/fracture state), conducting laboratory tests for determining engineering properties (viz., unconfined compressive strength, unit weight etc.).
  - II) Conducting standard penetration tests, to obtain the shear strength parameters of the soil mass, at an interval of 1.5 m, and collect disturbed soil samples in the SPT split spoon.
  - III) Collect undisturbed soil samples from the cohesive soil stratum, to obtain information about their engineering properties.
  - IV) Prepare the geotechnical investigations report based on the data collected from the field and the laboratory tests on the selected soil, water and rock samples.
- 2.3 Details of the fieldwork are summarised in Table 1.

Table 1: Summary of the Bore Holes

Sr. No.	Bore Hole No.	Location	Ground Level (m)	Rock Level (m)	Depth of Bore Hole (m)	Depth of GWT (m)
1	BH-1	Singareni Line Side	159.741	3.5	20	12
2	BH-2	NTPC Line Side	160.193	3.5	20	9

## 3.0 METHODOLOGY

A brief methodology of the geotechnical investigations is presented in the following:

# **GEOSTRUCT ENGINEERING SOLUTIONS**

Consulting Geotechnical Engineers  
B/707, "Golden Soil",  
Behind Raj Nagar, SV Road  
Jogeshwari (W) – Mumbai – 400 102  
Ph. No.: 9869080755 - 8097266780

---

- 3.1 Geotechnical investigations are planned to obtain the subsoil stratification in the proposed project area and to collect soil, rock and water samples for laboratory testing to determine their engineering properties such as shear strength, compressibility, along with basic engineering classification of the subsurface stratum. This information will be useful for establishing the foundation design parameters.
- 3.2 Location of the bore holes are selected in consultation with the client representative.
- 3.3 For geotechnical investigation work, standard rotary type drilling rig is used. This rig is coupled with diesel engine and has tripod and all drilling accessories. Drilling rig deployed is suitable for and has arrangement for driving as well as extracting casing, boring drilling by mud circulation method, conducting Standard Penetration Test (SPT) collection of Undisturbed Soil Sample (UDS) and Disturbed or wash Soil Sample (DS). As the clay encountered is of stiff consistency, hence UDS could not be collected.
- 3.4 Drilling rig is installed at the specified borehole locations. Rig was stabilised by making level ground. Initially, casing of adequate diameter, to suit boring of 100 mm bore hole is lowered and boring was commenced.
- 3.5 Sampling in the bore hole is carried out, as per the guidelines presented in the IS codes. Disturbed soil samples were collected and SPTs are conducted at regular intervals.
- 3.6 Generally Standard Penetration Tests (SPT) are conducted as per IS 2131 specifications at 1.50 m interval. SPT split spoon sampler of standard dimensions are driven into the soil from the borehole bottom using 63.5 kg Hammer falling from 75 cm height. The SPT weight is mechanically lifted to the specified height and allowed to fall freely on the anvil with the use of cat-head winch with one to one and half turn of the drum. Blow counts for the penetration of every 15 cm are recorded and the N is reported as the blow counts for 30 cm penetration of the sampler leaving the first 15 cm penetration as seating drive. When the number of blows exceeded 50 to penetrate the first or second 15 cm length of the sampler, the SPT N is regarded as more than 100. The test is terminated in such case and a record of penetration of the sampler under 50 blows or more is made. SPT refusal is recorded when there is no penetration of the sampler at any stage and when a rebound of the sounding system is recorded. The samples in the split spoon assembly are treated as disturbed samples. The 'N' values are correlated with the relative density of non - cohesive soils and consistency of saturated cohesive soils.



# GEOSTRUCT ENGINEERING SOLUTIONS

Consulting Geotechnical Engineers  
B/707, "Golden Soil",  
Behind Raj Nagar, SV Road  
Jogeshwari (W) – Mumbai – 400 102  
Ph. No.: 9869080755 - 8097266780

- 3.7 Disturbed soil collected in the SPT sampler is preserved in polythene covers and transported to the laboratory. One more polythene cover was provided to prevent the loss of moisture during the transit.
- 3.8 Undisturbed samples are tried using 100mm diameter and 450mm long mild steel tubes provided with sampler head with ball check arrangement. Undisturbed soil samples are collected in soft to stiff clayey soils. Collection of undisturbed samples from the refusal strata is not possible.

Table 2: Consistency / Relative density of Soil with SPT values

Relative Density of Cohesionless Soils		Consistency of Cohesive Soil	
SPT 'N' Values	Relative Density	SPT 'N' Values	Consistency of Clays
0 – 4	Very Loose	0 – 2	Very Soft
5 – 10	Loose	2 – 4	Soft
11 – 30	Medium Dense	5 – 8	Medium Stiff
31 – 50	Dense	9 – 16	Stiff
> 50	Very Dense	17 – 31	Very Stiff
		> 32	Hard

- 3.9 When the rock is encountered, size of bore hole is changed to Nx. i.e., 75mm diameter. Double tube core barrels as per the guidelines of IS: 6926-1996 and Nx sized diamond bit fitted to double tube core barrel are used for drilling and recovering rock cores. The recovered rock cores are numbered serially and preserved in wooden core boxes as specified in IS: 4078-1980. The core recovery (CR) and the Rock Quality Designation (RQD) are computed for every run length drilled.

Rock classification in terms of weathering and state of fractures and strength is carried, as listed in Table 3.

It should be noted that all grades of weathering might not be exhibited by a given rock mass and in some cases a grade might be present to a very small extent.

**Table 3: Scale of Weathering of the Rock Mass**

Term	Description	Grade	Interpretation
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 51 % 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 11 % 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

**Relationship between RQD and In-situ Rock Quality**

Rock quality is further measured by the frequency of natural joints in the rock mass. Rock Quality Designation (RQD) is used to define state of fractures or the massiveness of the rock mass, as listed in Table 4.

**Classification of Rock mass with respect to Compressive Strength**

The rock mass is also classified by strength of the intact rock cores collected during drilling. The Unconfined Compressive strength (UCS) is used to define strength of the rock. Classification of the rocks is presented in the Table 2 of Appendix-2 of IRC: 78-2000 (March 2011 amendment), and the same is reproduced in Table 5.

**Table No.4: Rock Quality Designation (RQD) of Rock**

Rock Quality Designation (RQD)	Diagnostic Description of the Rock mass
> 90%	Excellent
90 % - 75 %	Good
75 % - 40 %	Fair
40 % - 25 %	Poor
< 25 %	Very Poor

**Table 5: Classification of the rock mass with respect to its compressive strength**

Rock Classification	UCS (kg/cm <sup>2</sup> )
Very High Strength	> 2200
High Strength	550 - 2200
Medium Strength	140 – 550
Low Strength	35 - 140
Very Low Strength	9 – 35

- 3.10 Generally bore hole is terminated after drilling 5m in the rock mass, in order to check its continuity and the rock core recovery, CR, and RQD are recorded. On completion of the bore holes, the selected rock, soil and water samples are sent to the laboratory for testing.
- 3.11 The field work is executed in accordance with the following codal provisions:
- IS - 1892: Code of practice for subsurface investigation of foundations.
  - IS - 1498: Classification and identification of soils for general engineering purposes.
  - IS - 2131: Method for standard penetration test for soils.
  - IS - 6926: Code of practice for diamond core drilling for site investigations.
  - IS - 5313: Guide for core drilling observations.
- 3.12 Laboratory testing is done following the testing procedures given in the relevant parts of IS - 2720 and the data is given in the enclosures.

# GEOSTRUCT ENGINEERING SOLUTIONS

Consulting Geotechnical Engineers  
B/707, "Golden Soil",  
Behind Raj Nagar, SV Road  
Jogeshwari (W) – Mumbai – 400 102  
Ph. No.: 9869080755 - 8097266780

---

## 4.0 GEOTECHNICAL ASSESSMENT

The bore logs drilled at the footprints of the proposed structures are studied together with the laboratory tests and the following stratifications is observed, from the ground level to the depth of termination of the investigations.

**Stratum One** : **Yellowish Brown Dense Clayey Sand**  
**Stratum Two** : **Reddish Brown Highly Weathered Sandstone**

### 4.1 STRATUM ONE : YELLOWISH BROWN DENSE CLAYEY SAND

The first stratum of the generalised subsurface profile encountered below the existing ground level is **Yellowish Brown Dense Clayey Sand**. This stratum is observed in both the bore holes. Thickness of this stratum is observed as 3.5m in both the bore holes.

Four SPTs are conducted in this stratum and the SPT 'N' values are found to be ranging between 31 and 37. The range of SPT 'N' values indicates dense relative density of the cohesionless stratum. The soil encountered is basically clayey fine to medium sand. This stratum has high shear strength to support the foundation load and medium potential to settlement under sustained loadings.

### 4.2 STRATUM TWO : REDDISH BROWN HIGHLY WEATHERED SANDSTONE

The second and the last stratum observed in both bore holes below the dense sand stratum is **Reddish Brown Highly Weathered Sandstone**. Both the bore holes are terminated in this stratum after penetrating between 16.5m in rock as indicated in Table: 1.

Boring method is changed to rotary drilling using diamond bits. The bore holes are progressed by drilling about 1m to 1.5m drill run and core recovery and rock quality designation is recorded for each run

Cores recovery in this stratum is observed between 9% and 63%. RQD observed between Nil and 58%. Range of CR and RQD indicates highly weathered rock with very poor to fair state of fractures in the rock mass

Four rock samples recovered from this stratum are tested for their UCS under soaked condition. Their strength is observed between 91.57/cm<sup>2</sup> and 162.53kg/cm<sup>2</sup>. This indicates low to medium strength of the rock mass.

A summary of the test results is presented in the following:

Thickness of Stratum	m	:	16.5
Range of Core Recovery	%	:	9 – 63
Range of RQD	%	:	Nil – 58
Soaked Compressive Strength	kg/cm <sup>2</sup>	:	92 – 163
Water Absorption, w	%	:	3.38 - 4.3
Porosity, n	%	:	7.2 – 8.99
Dry Density	Kg/cm <sup>3</sup>	:	2.07 - 2.13
Strength Classification		:	Low to Medium

## 5.0 GEOTECHNICAL ASSESSMENT

- 5.1 Proposed structure under this investigation is a Raw Water Conduit. Two bore holes are drilled at investigate the area under consideration. The data from the bore holes and laboratory tests are studied together to arrive at design parameter and to suggest foundation scheme.
- 5.2 First stratum of subsoil profile is 3.5m thick dense clayey Sand. This stratum has high shear strength to support the foundation load and medium potential to settlement under sustained loadings:
- 5.3 Both the bore holes are terminated in highly weathered Sandstone after penetrating 16.5m in the rock stratum. This stratum is in highly weathered state with very poor to fair state of fracture in the rock mass and with low to medium compressive strength of rock cores. Based on unconfined compression strength, core recovery and rock quality designation observed, this stratum can support the foundation without causing shear failure and excessive settlement.
- 5.4 The level of the proposed conduit is not known at the time of writing this report. Following design parameters are suggested to design the conduit.

# GEOSTRUCT ENGINEERING SOLUTIONS

Consulting Geotechnical Engineers  
B/707, "Golden Soil",  
Behind Raj Nagar, SV Road  
Jogeshwari (W) – Mumbai – 400 102  
Ph. No.: 9869080755 - 8097266780

Sr. No.	Stratum	Design SPT 'N'	Bulk Density	Undrained Cohesion, $c_u$ , T/m <sup>2</sup>	Angle of Internal Friction
1	Dense Sand	34	1.85	0.0	32°
2	Highly Weathered Sand Stone	70	2.1	0.0	36°

- 5.5 Proposed conduit within the 3.5m depth below EGL can be pushed hydraulically with higher efforts as the observed SPT values are high, whereas pushing in underlying highly weathered sand stone is extremely difficult to nearly impossible. In rock, the conduit can be pushed after manual excavation / control blasting. Depending upon the depth and quality of rock encountered, in absence of ground water table, cast in situ conduit can be built after controlled excavation. Temporary rock anchors / shotcreting may be required to support the excavated rock faces.

  
MDC/AARIF

M. Tech. (Geotech), IIT K  
Consulting Geotechnical Engineer

December 18<sup>th</sup>, 2018

## BOREHOLE RECORD

Job No. : 18SF2

Date : 12.12.18

As per ( IS 1892 : 1979, IS 4453 - 1980, IS 4464-1967 )

Page No. : 1 of 2

Project : Soil Investigations for Preparation of DPR & Detailed Engineering for passing 2nd Raw Water Conduit through Box push Culvert/other suitable method below the existing operational rail tracks of NTPC&SCCL at NTPC Ramagundam-Telangana Project

Client : **NATIONAL THERMAL POWER CORPORATION LIMITED**

Coordinates : 337376.60 E 2073586.53 N

Bore Hole No. : **BH-1**

Location : Singareni Line Side

Depth of Bore Hole : 20.00 m

Ground Level : 159.741 m

Date Commenced : 25/10/18

Depth of Casing : 3.00 m GWT. : 12.0 m

Date Completed : 26/10/18

Scale	Depth m	R. L. m	Log	Description	Sample No.	Type	Depth (m)		SPT 'N' Value					CR %	RQ %	P.R. m/hr	Remarks / Other Tests
							From	To	15	30	45	60	N				
1.0m 2.0m 3.0m	3.5	156.24		Yellowish Brown Dense Clayey SAND	1	DS	0	0.5									
					1	SPT	1.5	1.95	10	15	18		33				
					2	SPT	3.0	3.45	13	16	21		37				
4.0m 5.0m 6.0m 7.0m 8.0m 9.0m 10m 11m 12m 13m 14m 15m				Reddish Brown Highly Weathered SANDSTONE		DR-1	3.5	4.5						9	Nil		
						DR-2	4.5	6						9	Nil		
						DR-3	6	7.5						13	Nil		
						DR-4	7.5	9						16	7		
						DR-5	9	10.5						13	7		
						DR-6	10.5	12						24	15		
						DR-7	12	13.5						26	7		
						DR-8	13.5	15						39	24		

CR : Core Recovery

k : Permeability of Soil / Rock

UDS : Undisturbed Sample

RQD : Rock Quality Designation

PT : Packer Permeability Test

SPT : Standard Penetration Test

PR : Rate of Penetration

VST : Vane Shear Test

WS : Wash Sample

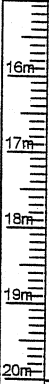
D : Disturbed Sample

Site Engg.	Drawn By	Chkd by	Clients Rept.

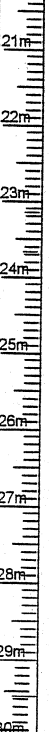
**MATHA TRACK & INFRA TECH**

<b>BOREHOLE RECORD</b>	Job No. : 18SF2
As per ( IS 1892 : 1979, IS 4453 - 1980, IS 4464-1967 )	Date : 12.12.18
	Page No. : 2 of 2

Project :	Soil Investigations for Preparation of DPR & Detailed Engineering for passing 2nd Raw Water Conduit through Box push Culvert/other suitable method below the existing operational rail tracks of NTPC&SCCL at NTPC Ramagundam-Telangana Project		
Client :	<b>NATIONAL THERMAL POWER CORPORATION</b>		
Coordinates :	337376.60	E	2073586.53 N
Location :	Singareni Line Side		Bore Hole No. : <b>BH-1</b>
Ground Level :	159.741	m	Depth of Bore Hole : 20.00 m
Depth of Casing :	3.00	m	Date Commenced : 25/10/18
	GWT :	12.0	Date Completed : 26/10/18

Scale	Depth m	R. L. m	Log	Description	Sample No.	Type	Depth ( m )		SPT 'N' Value					CR %	RQ %	P.R. m/hr	Remarks / Other Tests
							From	To	15	30	45	60	N				
	20.0	139.74		Reddish Brown Highly Weathered SANDSTONE		DR-9	15	16.5						63	58		
							16.5	18						25	13		
							18	19.5						37	19		
							19.5	20						34	16		

The Bore Hole is Terminated at 20m below EGL

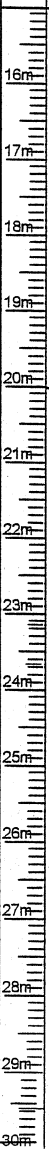


UDS : Undisturbed Sample SPT : Standard Penetration Test WS : Wash Sample	CR : Core Recovery RQD : Rock Quality Designation PR : Rate of Penetration D : Disturbed Sample	k : Permeability of Soil / Rock PT : Packer Permeability Test VST : Vane Shear Test
---	--	---

Site Engg.	Drawn By	Chkd by	Clients Rept.	<b>MATHA TRACK &amp; INFRA TECH</b>
------------	----------	---------	---------------	-------------------------------------



BOREHOLE RECORD											Job No. : 18SF2								
As per ( IS 1892 : 1979, IS 4453 - 1980, IS 4464-1967 )											Date : 12.12.18								
Soil Investigations for Preparation of DPR & Detailed Engineering for passing 2nd Raw Water Conduit through Box push Culvert/other suitable method below the existing operational rail tracks of NTPC&SCCL at NTPC Ramagundam-Telangana Project											Page No. : 1 of 2								
Project : NATIONAL THERMAL POWER CORPORATION LIMITED											Bore Hole No. : BH-2								
Coordinates : 337402.75 E 2073643.28 N											Depth of Bore Hole : 20.00 m								
Location : NTPC Line Side											Date Commenced : 25/10/18								
Ground Level : 160.193 m											Date Completed : 26/10/18								
Depth of Casing : 3.00 m GWT : 9.0 m																			
Scale	Depth m	R. L. m	Log	Description	Sample No.	Type	Depth ( m )		SPT 'N' Value					CR %	RQ %	P.R. m/hr	Remarks / Other Tests		
							From	To	15	30	45	60	N						
1.0m				Yellowish Brown Dense Clayey SAND	1	DS	0	0.5											
					1	SPT	1.5	1.95	8	14	17		31						
2.0m	3.5	125.19			2	SPT	3.0	3.45	11	16	20		36						
3.0m																			
4.0m				Reddish Brown Highly Weathered SANDSTONE		DR-1	3.5	4.5						11	Nil				
5.0m						DR-2	4.5	6								10	Nil		
6.0m						DR-3	6	7.5								17	Nil		
7.0m						DR-4	7.5	9								15	Nil		
8.0m						DR-5	9	10.5								22	7		
9.0m						DR-6	10.5	12								43	36		
10m						DR-7	12	13.5								21	10		
11m						DR-8	13.5	15								22	17		
12m																			
13m																			
14m																			
15m																			
UDS : Undisturbed Sample      SPT : Standard Penetration Test      WS : Wash Sample CR : Core Recovery              RQD : Rock Quality Designation      D : Disturbed Sample k : Permeability of Soil / Rock      PT : Packer Permeability Test PR : Rate of Penetration              VST : Vane Shear Test																			
Site Engg.	Drawn By	Chkd by	Clints Rept.	<b>MATHA TRACK &amp; INFRA TECH</b>															

BOREHOLE RECORD										Job No. : 18SF2							
As per ( IS 1892 : 1979, IS 4453 - 1980, IS 4464-1967 )										Date : 12.12.18							
Soil Investigations for Preparation of DPR & Detailed Engineering for passing 2nd Raw Water Conduit through Box push Culvert/other suitable method below the existing operational rail tracks of NTPC&SCCL at NTPC Ramagundam-Telangana Project										Page No. : 2 of 2							
Project :										Bore Hole No. : BH-2							
Client : NATIONAL THERMAL POWER CORPORATION										Depth of Bore Hole : 20.00 m							
Coordinates : 337402.75 E 2073643.28 N										Date Commenced : 25/10/18							
Location : NTPC Line Side										Date Completed : 26/10/18							
Ground Level : 160.193 m																	
Depth of Casing : 3.00 m				GWT : 9.0 m													
Scale	Depth m	R. L. m	Log	Description	Sample No.	Type	Depth ( m )		SPT 'N' Value					CR %	RQ %	P.R. m/hr	Remarks / Other Tests
							From	To	15	30	45	60	N				
	20.0	140.19		Reddish Brown Highly Weathered SANDSTONE		DR-9	15	16.5						23	15		
							16.5	18						50	17		
							18	19.5						49	40		
							19.5	20						45	38		
The Bore Hole is Terminated at 20m below EGL																	
<div style="display: flex; justify-content: space-between;"> <div style="width: 45%;"> <p>UDS : Undisturbed Sample</p> <p>SPT : Standard Penetration Test</p> <p>WS : Wash Sample</p> </div> <div style="width: 45%;"> <p>CR : Core Recovery</p> <p>RQD : Rock Quality Designation</p> <p>PR : Rate of Penetration</p> <p>D : Disturbed Sample</p> </div> <div style="width: 45%;"> <p>k : Permeability of Soil / Rock</p> <p>PT : Packer Permeability Test</p> <p>VST : Vane Shear Test</p> </div> </div>																	
Site Engg.	Drawn By	Chkd by	Clients Rept.	<b>MATHA TRACK &amp; INFRA TECH</b>													

**GEOSTRUCT ENGINEERING SOLUTIONS**

**SOIL TEST DATA SHEET**

<b>Client :</b> NATIONAL THERMAL POWER CORPORATION LIMITED													<b>Date</b>		12-Dec-18					
<b>Project :</b> Soil Investigations for Preparation of DPR & Detailed Engineering for passing 2nd Raw Water Conduit through Box push Culvert/other suitable method below the existing operational rail tracks of NTPC&SCCL at NTPC. Ramagundam-Telangana Project													<b>Project No.</b>		18SF2					
Sr. No.	Bore Hole No.	Type of Sample	Depth m	DENSITY		NMC %	S <sub>e</sub>	Grain Size Analysis				Consistency Limit			Soil Classification	Shear Parameter			Consolidation	
				γ <sub>b</sub> gm/cm <sup>3</sup>	γ <sub>d</sub> gm/cm <sup>3</sup>			GRAVEL %	SAND %	SILT %	CLAY %	W <sub>L</sub> %	W <sub>p</sub> %	I <sub>p</sub> %		Type of Test	C <sub>u</sub> Kg/cm <sup>2</sup>	φ <sub>u</sub> Deg.	e <sub>o</sub>	C <sub>c</sub> cm <sup>2</sup> / kg
1	BH-1	SPT	1.5-1.95	-	-	-	-	0	74	9	17	Non Plastic			SP	-	-	-	-	-
2	BH-2	SPT	1.5-1.95	-	-	-	-	0	79	6	15	Non Plastic			SP	-	-	-	-	-
γ <sub>b</sub> : Bulk Density				NMC : : Natural Moisture Content				W <sub>p</sub> : Plastic Limit				S <sub>e</sub> : Specific gravit		φ <sub>u</sub> :Undrained Angle of Friction						
γ <sub>d</sub> : Dry Density				W <sub>L</sub> : Liquid Limit				I <sub>p</sub> : Plasticity Index				C <sub>u</sub> : Undrain Cohe		C <sub>c</sub> :Compression Index						

## ROCK TEST RESULTS

Client : NATIONAL THERMAL POWER CORPORATION LIMITED													Date : 12-12-18			
Location : Soil Investigations for Preparation of DPR & Detailed Engineering for passing 2nd Raw Water Conduit through Box push Culvert/other suitable method below the existing operational rail tracks of NTPC&SCCL at NTPC Ramagundam-Telangana Project													Job No. : 18SF2			
Sr. No.	Bore Hole no.	Depth	Diameter	Height	H/D	Correction Factor	Condition of Test	Crushing Load	Point Load Index	UCS	Water absorption	Porosity	Dry density	Rock Type	Remark/s	
		m	cm	cm				kg	kg/cm <sup>2</sup>	kg/cm <sup>2</sup>	%	%	gm/cm <sup>3</sup>			
1	BH-1	4.5-6	5.36	10.88	2.03	1.00	Soaked	2875	—	127.60	4.13	8.55	2.07	Sandstone		
2	BH-1	9-10.5	5.38	10.59	1.97	1.01	Soaked	3125	—	138.44	3.93	8.31	2.11	Sandstone		
3	BH-1	12-13.5	5.37	10.86	2.02	1.00	Soaked	2725	—	120.58	3.88	8.13	2.09	Sandstone		
4	BH-1	16.5-18	5.36	9.85	1.84	1.02	Soaked	3450	—	155.78	3.38	7.20	2.13	Sandstone		
5	BH-2	6-7.5	5.34	7.22	1.35	1.07	Soaked	1925	—	91.57	3.87	8.04	2.08	Sandstone		
6	BH-2	10.5-12	5.36	10.35	1.93	1.01	Soaked	3175	—	142.19	4.30	8.99	2.09	Sandstone		
7	BH-2	13.5-15	5.40	11.45	2.12	0.99	Soaked	3450	—	149.61	4.20	8.77	2.09	Sandstone		
8	BH-2	18-19.5	5.38	10.69	1.99	1.01	Soaked	3675	—	162.53	3.92	8.23	2.10	Sandstone		
<b>GEOSTRUCT ENGINEERING SOLUTIONS</b>																