VOLUME – IA
Part I & II

TECHNICAL CONDITIONS OF CONTRACT (TCC)

BHARAT HEAVY ELECTRICALS LIMITED

CONTENTS

VOLUME - IA PART – I CHAPTER – I
PROJECT INFORMATION

ENNORE SEZ SUPERCRITICAL TPS UNITS- 1 & 2 [2 x 660 MW] is being set up by **TAMILNADU GENERATION AND DISTRIBUTION CORPORATION** at a site in Vayalur Village Near Ennore Port, Tamilnadu, India. Plant will be set up in existing Ash Dyke of NCTPS by reclamation of some portion of the Ash Dyke. The Bidder shall acquaint himself by a visit to the site, if felt necessary, with the conditions prevailing at site before submission of the bid. The information given here in under is for general guidance and shall not be contractually binding on BHEL/Owner. All relevant site data /information as may be necessary shall have to be obtained /collected by the Bidder.

APPROACH TO SITE

The proposed plant will be located at Ash dyke of North Chennai Thermal Power, approximately 35 km from Chennai, in the state of Tamilnadu, India. The site is occupying a coastal site near the village of Vayalur. The nearest commercial airport is at Chennai located at a distance of 60 kms from the project site.

Nearest Airport – Chennai
Nearest Airstrip – Chennai
Nearest Seaport – Ennore

A. Project Information & Location

Project Title: Ennore SEZ project of 2 x 660 MW Coal Based Super Critical Thermal Power Project at ash dyke of NCTPS

Plant Capacity: 1320 MW (2 units of 660 MW each)

Type of Project: Green field

Owner: Tamil Nadu Generation and Distribution Corporation Limited (TANGEDCO)

Plant site location: Ash dyke of North Chennai Thermal Power Station (NCTPS)

Location co-ordinates: 80o 18’ E to 80o 19’ E Longitude
13o 17’ N to 13o 18’ N Latitude

Nearest Village: Vayalur

Nearest Town & City: Chennai (35 Km)

State Capital: Chennai (35 Km)

Nearest Railway Station: Athipattu Pudunagar (~5 Km)

Nearest Airport: Chennai (~60 Km)

Nearest Seaport: Ennore (~5 Km)

Nearest Road access: All weather road from Pattamandri on the Thiruvottiyur – Ponneri district highway.

B Meteorological Condition

Owner: Tamil Nadu Generation and Distribution Corporation Limited (TANGEDCO)

Owner Consultant: DESEIN, DELHI,

Site Elevation: (+) 10.0 m above Mean Sea Level

Ambient Temperature: a. Maximum 32.0 Deg.C

b. Minimum 24 Deg.C

c. Design ambient temperature 35 Deg.C

Relative Humidity: a. Maximum 100%

b. Minimum 36%

c. Design 75%

Annual Rainfall: a. Maximum 2540 mm

b. Average 1600 mm

c. Minimum 1175 mm

Wind Data: a. Basic wind speed at 10m height : 50 m/sec

b. Wind pressure As per IS: 875 Part III-1984

Seismic Zone : Zone III as per IS: 1893-2002

Design ambient temperature: 50 Deg.C (For electrical Equipments)

VOLUME-IA PART-I CHAPTER – II
SCOPE OF WORKS

(All the works mentioned hereunder shall be carried out within the accepted rate unless otherwise specified.)

1.2.1 The scope of works comprises civil works to carryout ground improvement piles through Vibro-displacement method in various structures of CHP & AHP of 2 X 660MW ENNORE SEZ including supply of all materials, labour, tools & plants. The scope of work is indicative but not limited to the given below.

AREA OF WORK

1. Pipe rack FA silos to VPH2
2. BCN 2A/2B
3. Dozer shed
4. YBC - 1A
5. YBC - 1B
6. Cable Rack
7. Storm Anchor
8. BCN 3A/3B (TT-4- to TT-5)
9. BCN 3A/3B (TT-5- to TT-6)
10. Pent House
11. Conveyor RC-1
12. BCN 3A/3B (ST 1 - TT-8)
13. PMH 1B
14. Standalone portion (Pipe conveyor Zone 3)
15. PMH 1A
16. ERH Tunnel RC1
17. Ash Water Pump house
18. Pipe Rack M & N Row
19. Lighting Mast
20. Security Room
21. Weigh Bridge
22. AHP-Pipe pedestals(Inside)
23. AHP-Pipe pedestals(Outside)
24. CHP-Coal settling pond
25. Coal Shed
26. CHP Wind barrier
27. Coal Stock Pile

Note: The above provided list is indicative only for the bidder's guideline. **Any other building / structure / foundation not mentioned above, but required for completion of the package in total, deemed to have been included in the bidder scope under this contract.** Such work will be executed under this contract by bidder as per the direction of Engineer in charge. If any item of work not available in the rate schedule of this contract, the rate will be fixed in line with the provision mentioned in clause 2.15.7 of GCC.

1.2.2 The work includes supply of all materials, labour, tools and plants.

1.2.3 The works to be performed under this contract consist of providing all labour, supervision, material, construction equipment, tools and plants, temporary works, supplies including Petrol, Oil, Lubricants, transportation and all incidental items not shown or specified but reasonably implied or necessary for the proper completion of work in all respects. Testing of all materials, earthwork other allied works are included on the rates of items of work.

1.2.4 The area of work shall be cleared of all vegetation, rubbish and other objectionable matter and materials removed shall be burnt or otherwise disposed of as directed by the Engineer-in-Charge. No separate payment for these operations shall be made. The cost of all these operations shall be deemed to have been included in the unit rates derived for the different items under bill of quantities.

1.2.5 All the works areas shall be adequately flood lighted to the satisfaction of the Engineer-in-Charge when the work is in progress during the night shifts.

1.2.6 The unit rates shall include all material equipment, fixtures, labour, construction plant, temporary works and everything whether of permanent or temporary nature necessary for the completion of job in all respects.

1.2.7 The unit rates derived for various items of B.O.Q shall include all the stipulations mentioned in technical specifications and nothing extra over B.O.Q rates shall be payable.

1.2.8 Drawings showing enough details for the construction as per the specification, if any shall be furnished to the contractor in a phased manner.

1.2.9 The bidder should fully apprise himself of the prevailing conditions at the proposed site, climatic conditions including monsoon pattern, local conditions, soil strata and site specific parameters and shall include for all such conditions and contingent measures in the bid, including those which may have not been specifically brought out in the specifications.

1.2.10 **Special arrangements to be made for tackling pandemic**

Contractor shall make arrangements for stay of workers within their premises as far as possible and/ or adjacent building and for implementation of STANDARD OPERATING PROTOCOL (SOP) as per government order. The transportation of workers to work place shall be arranged by the contractor in dedicated transport by ensuring social distance. Any person violating the pandemic measures published vide government order time to time will be liable to be proceeded for legal action as per the government order. Following shall be observed in work place:

i. All work places shall have adequate arrangements for temperature screening and provide sanitizers at convenient places.
ii. Work places shall have a gap of one hour between shifts and will stagger the lunch breaks of staff, to ensure social distancing.
iii. Use of AROGYA SETU will be encouraged for all employees both private and public.
iv. Contractor shall sanitize their work place between shifts.
v. Large meetings to be prohibited. Spitting shall be strictly prohibited. Wearing of face cover is compulsory.
vi. Government order (state/ center) being issued time to time for protective measures of pandemic shall be complied with strictly untill government (state/ center) declares end of pandemic.

Standard operating procedure for social distancing for workplace and offices

The following measures shall be implemented by contractor for their office and workplaces:

1. All areas in the work premises including the following shall be disinfected completely using user friendly disinfectant mediums:
    a. Entrance gate of work place, office, if any
    b. Cafeteria and canteens, if any
    c. Meeting room, conference halls/ open area available/ verandah/ entrance gate of site, bunkers, porta cabins, buildings, etc.
    d. Equipment's and lifts
    e. Washroom, toilet, sink, water points, etc
    f. Wall/ all other surfaces
2. For workers coming from outside, special transportation facility shall be arranged without any dependency on the public transport system. These vehicles should be allowed to work only with 30-40% passenger capacity.

3. All vehicles and machinery entering the premise should be disinfected by spray mandatorily.
4. Mandatory thermal scanning of everyone entering and exiting the work place to be done.
5. Medical insurance for the workers to be made mandatory.
6. Provision for hand wash & sanitizer preferably with touch free mechanism shall be made at all entry and exit points and common areas. Sufficient quantities of all the items should be available.
7. Work places shall have a gap of one hour between shifts and will stagger the lunch breaks of staff, to ensure social distancing.
8. Large gatherings or meetings of 10 or more people to discouraged. Seating at least 6 feet away from others on job sites and in gatherings, meetings and training sessions.
9. Not more than 2/4 persons (depending on size) will be allowed to travel in lifts or hoists.
10. Use of staircase for climbing should be encourages.
11. There should be strict ban of gutka, tobacco, etc. and spitting should be strictly prohibited.
12. There should be total ban on non-essential visitors at sites.
13. Hospitals/ clinics in the nearby areas, which are authorized to treat pandemic patients, should be identified and list should be available at work place all the times.

VOLUME IA PART – I CHAPTER – III

FACILITIES IN THE SCOPE OF CONTRACTOR / BHEL

(SCOPE MATRIX)

Sl.No	Description	Scope to be taken care by		Remarks
	PART I	**BHEL**	**Bidder**	
1.3.1.1.0	**ESTABLISHMENT**			
1.3.1.1.1	FOR CONSTRUCTION PURPOSE:			
A	Open space for office	Yes		As provided by TANGEDCO
B	Open space for storage	Yes		As provided by TANGEDCO
C	Construction of bidder's office, canteen and storage building including supply of materials and other services		Yes	
D	Bidder's all office equipments, office / store / canteen consumables		Yes	
E	Canteen facilities for the bidder's staff, supervisors and engineers etc		Yes	
F	Firefighting equipments like buckets, extinguishers etc		Yes	
G	Fencing of storage area, office, canteen etc of the bidder		Yes	
1.3.1.1.2	FOR LIVING PURPOSES OF THE BIDDER			
A	Open space		Yes	
B	Living accommodation		Yes	
1.3.1.2.0	**ELECTRICITY**			
1.3.1.2.1	Electricity For construction purposes (to be specified whether chargeable or free)			
1.3.1.2.1.1	Single point source	Yes		Chargeable basis as per Prevailing rate of TANGEDCO
1.3.1.2.1.2	Further distribution for the work to be done which include supply of materials and execution		Yes	

Sl.No	Description	Scope to be taken care by		Remarks
	PART I	**BHEL**	**Bidder**	
1.3.1.2.2	Electricity for the office, stores, canteen etc of the bidder which include:		Yes	
1.3.1.2.2.1	Distribution from single point including supply of materials and service		Yes	
1.3.1.2.2.2	Supply, installation and connection of material of energy meter including operation and maintenance		Yes	
1.3.1.2.2.3	Duties and deposits including statutory clearances for the above		Yes	
1.3.1.2.2.4	Demobilization of the facilities after completion of works		Yes	
1.3.1.2.3	Electricity for living accommodation of the bidder's staff, engineers, supervisors, labour colony etc on the above lines.		Yes	
1.3.1.3.0	**WATER SUPPLY**			
1.3.1.3.1	For construction purposes:	Yes		Chargeable as per prevailing rate of TANGEDCO
1.3.1.3.1.1	Making the water available at single point	Yes		
1.3.1.3.1.2	Further distribution as per the requirement of work including supply of materials and execution		Yes	
1.3.1.3.2	Water supply for bidder's office, stores, canteen, labour colony etc		Yes	
1.3.1.4.0	**LIGHTING**			
1.3.1.4.1	For construction work (supply of all the necessary materials) At office storage area At the preassembly area At the construction site / area		Yes	
1.3.1.4.2	For construction work (Execution of the lighting work / arrangements) At office storage area At the preassembly area At the construction site /area		Yes	

Sl.No	Description PART I	Scope to be taken care by		Remarks
		BHEL	Bidder	
1.3.1.5.0	**COMMUNICATION FACILITIES for site operations of the bidder**	**-**		
1.3.1.5.1	Telephone, Fax, internet, intranet, email etc		Yes	

Sl. No.	Description PART II	Scope to be taken care by		Remarks
		BHEL	Bidder	
	CONSTRUCTION FACILITIES			
1.3.2.1.0	**Engineering works for construction (as applicable)**			
1.3.2.1.1	Providing the construction drawings for all the equipment's covered under this scope	Yes		
1.3.2.1.2	Drawings for construction methods		Yes	In consult-ation with BHEL
1.3.2.1.3	As-built drawings – wherever deviations observed and executed and also based on the decisions taken at site- example – routing of small bore pipes	Yes	Yes	"
1.3.2.1.4	Shipping lists etc. for reference and planning the activities	Yes	Yes	"
1.3.2.1.5	Preparation of site construction schedules and other input requirements		Yes	In consultation with BHEL
1.3.2.1.6	Review of performance and revision of site construction schedules in order to achieve the end dates and other commitments		Yes	
1.3.2.1.7	Weekly construction schedules based on Sl No 1.3.2.1.5		Yes	
1.3.2.1.8	Daily construction / work plan based on Sl No 1.3.2.1.7		Yes	For daily monitoring meeting at site

Sl. No.	Description PART II	Scope to be taken care by		Remarks
		BHEL	Bidder	
1.3.2.1.9	Periodic visit of the senior official of the bidder to site to review the progress so that works is completed as per schedule. It is suggested this review by the senior official of the bidder should be done once in every two months.		Yes	

1.3.3 OPEN SPACE:

Availability of land within plant boundary is very limited and the contractor has to plan and use the existing land considering the use of land by other Civil /mechanical/ electrical contractors and the storage of plant machineries and materials. The existing land shall be shared by all erections agencies. Land will be allocated with certain time frame and to the extent available/ considered necessary, and will be reviewed by BHEL depending upon the area availability. Area within plant premises for office, storage area etc. for construction purpose shall be provided as per availability free of cost. The contractor will be responsible for handing over back all lands, as handed over to him by BHEL/TANGEDCO.

Contractor has to make his own arrangements for labour colony at his cost. The contractor to construct labour colony as per his requirements after obtaining approval of formalities from statutory body. The contractor shall provide adequate water arrangement for drinking/washing/bathing with required toilets, drainage system, lighting facilities etc. in labour colony. Suitable paved area to be provided in the labour colony. The Contractor shall provide adequate arrangements for electricity requirements for labour colony.

1.3.4 ELECTRICITY:

1.3.4.1 Construction power will be provided to the contractor at one single point within the plant area by BHEL on chargeable basis as per the prevailing rates of TANGEDCO under LT tariff VI at the nearest substation.

1.3.4.2 The present LT tariff VI rate of TANGEDCO is

- Consumption charges at Rs.12.00 per unit
- Maximum demand (MD) charges as applicable per month
- Low Power Factor (LPF) charges
- Electricity Tax on total amount
- Any other miscellaneous charges charged by M/s TANGEDCO pertaining to construction power supply.

1.3.4.3 The TANGEDCO tariff and tax may vary from time to time and the same is applicable for the bidder. The required digital Energy meter for measuring the consumption and MD shall be provided and installed by the contractor. Any dispute regarding consumption, the BHEL engineer's decision is final. The contractor shall make his own arrangement for further distribution (as required within plant boundary and outside plant boundary) with necessary isolator / LCB etc.

1.3.4.4 Necessary "Capacitor Banks" to improve the Power factor to a minimum of 0.9 shall be provided by the contractor at his cost. Penalty if any levied by customer on this account will be recovered from contractor's bills.

1.3.4.5 Provision for distribution of electrical power from the given single central common point to the required places with proper distribution boards, approved cables and cable laying including supply of all materials like cables, switch boards, pipes etc., observing the safety rules laid down by electrical authority of the State / BHEL / their customer with appropriate statutory requirements shall be the responsibility of the tenderer / contractor.

1.3.4.6 BHEL is not responsible for any loss or damage to the contractor's equipment as a result of variations in voltage / frequency or interruptions in power supply.

1.3.4.7 Contractor has to make their own arrangements for electricity requirement for labour colony at their cost. Any duty, deposit involved in getting the Electricity for contractors use i.e. Office shed, labour colony etc shall be borne by the bidder.

1.3.4.8 As there are bound to be interruptions in regular power supply, power cut/ load shedding in any construction sites, contractor should make his own arrangement for alternative source of power supply through deployment of adequate number of DG sets at their cost during the power breakdown / failure to get urgent and important work to go on without interruptions. No separate payment shall be made for this contingency.

1.3.5 WATER:

1.3.5.1 Water (Raw water) required for construction purposes will be provided at one single point WITHIN THE PLANT AREA on **chargeable basis** at the prevailing rates of TANGEDCO. The contractor to Provide necessary meter for measuring the water consumption. The required pumps & accessories, pipes for drawing water from the given point and further distribution will be arranged by the contractor at their cost to go on without interruptions.

1.3.5.2 The water charges may vary from time to time as per TANGEDCO/Metro conditions. However, the prevailing water charge is Rs 174.00 per Kilo litres

and liable to change. Any dispute regarding consumption, the BHEL engineer decision will be final.

1.3.5.3 Incase non-availability of water or the TANGEDCO is not able to supply the water, the contractor shall make his own arrangements of water suitable for construction purpose to have uninterrupted work. No separate payment shall be made for any contingency arrangement made by contractor, due to delay / failure for providing water supply. Contractor has to make his own arrangements for their water requirement for their labour colony at their cost.

1.3.6 MATERIAL SUPPLY:

1.3.6.1 Supply / providing aggregate, M-sand/ Crushed stone sand and all other materials required for the work are in the scope of the contractor.

1.3.6.2 Fine aggregate source shall be manufactured crushed stone or rock sand, excluding fines which are by products/rejects of coarse aggregate production. The crushed stone sand shall be graded from fine to coarse with the coarse sizes predominating to give maximum density.

The amount of fine particles as ascertained by the laboratory sedimentation method shall not exceed 10% for crushed stone nor 4% for natural sand. The amount of material passing a 75 micron sieve (IS test sieve) shall not exceed the following limits:-

- a) Crushed stone sand concrete subject to abrasion 1% by weight
- b) All other concrete 3% by weight .

There shall be no clay or fine silt present. The amount of hollow shells like to form voids or remain partially unfilled and present in material retained on a IS 2.36 mm sieve, determined by direct visual separation, shall not exceed 3% by weight of the entire sample. Fine aggregate shall not contain appreciable amounts of flaky and/or elongated particles. The water absorption of fine aggregate, determined in accordance with BS 812 shall not exceed 2.0% by weight. Fine aggregate subjected to five cycles of the soundness test, specified in IS:2386 (Part-5), shall not show a loss exceeding 10% when sodium sulphate solution is used and 15% when magnesium sulphate solution is used, except where approved otherwise. Tests are to be executed in accordance with IS:2386. The grading of fine aggregate for concrete work shall comply with the requirements of IS:383. The grading of the aggregates should be such as to produce a concrete of the specified proportions which will work readily into position without segregation and without the use of an excessive water content. The grading should be controlled throughout the work so that it conforms closely to that used for the preliminary tests. A check on the moisture content of sand should be made at least once a day before concreting. The

amount of water to be added to the concrete mix should be adjusted accordingly. Any washing, screening, classifying and other operations on the fine aggregate required to meet this specification shall be done by the Contractor. Washing is required if the content of salt adhering to the aggregate is found to be unacceptably high.

1.3.7 CONSUMABLE

All consumables, like fuel, lubricants etc. required for the equipment's, shall be arranged by the contractor at his cost unless otherwise specifically mentioned in the contract.

In the event of failure of contractor to bring necessary and sufficient consumables, BHEL may arrange for the same at the risk and cost of the contractor. The entire cost towards this along-with overhead shall be paid by the contractor or deducted from the contractor's bills.

1.3.8 LIGHTING FACILITY:

Adequate lighting facilities such as flood lamps, hand lamps and area lighting shall be arranged by the contractor at the site of construction, and contractor's material storage area etc. at his cost.

1.3.9 CONTRACTOR'S OBLIGATION ON COMPLETION:

On completion of work, all the temporary buildings, structures, pipe lines, cables etc. shall be dismantled and leveled and debris shall be removed as per instructions of BHEL by the contractor at his cost. In the event of his failure to do so, the expenditure towards clearance of the same will be recovered from the contractor. The decision of BHEL Engineer in this regard is final.

1.3.10 DEWATERING

Contractor shall ensure at all times that his work area & approach/ access roads are free from accumulation of water, so that the materials are safe and the erection/ progress schedule are not affected. No separate claim in this regard shall be admitted by BHEL. No separate payments for dewatering of subsoil, surface water or catchments water, if required, at any time during execution of the work including monsoon period shall be considered by BHEL.

1.3.11 BID DRAWINGS

Bid drawings like plot plan or Layout plan enclosed along with this tender is only for information and may not be referred for scope of works and this may also get revised during execution.

1.3.12 AREA DEVELOPMENT AND APPROACHES

In construction projects of this magnitude it is possible that all the areas / approaches may not be ready. In such cases consolidation of ground/ temporary approaches including arrangement of sleeper's / sand bag filling etc for safe operation and movement of equipment including cranes / trailers/ transit mixers/ rigs/ tippers etc shall be the responsibility of the contractor at his cost. No compensation on this account shall be payable.

VOLUME-IA PART-I CHAPTER – IV

T&PS and MMEs TO BE DEPLOYED BY CONTRACTOR

1.4.1 All the tools and plants required for satisfactory completion of the work have to be arranged by the contractor.

1.4.2 The contractor is required to arrange the following tentative T&Ps and any other required T&Ps for the satisfactory completion of the work.

Sl No	T&P items	Mobilizing time from the date of commencement of work at site
1	4 nos - Ground improvement rigs and accessories capable of installing stone column through vibro displacement method in all types of strata/ash etc	02 Nos within 15 days 02 Nos within 30 days
2	Back hoe cum loader like JCB	02 Nos within 15 days 02 Nos within 30 days
3	5 nos. dumper/Tipper (Min 15 cum each)	02 Nos within 15 days 03 Nos within 30 days
4	1 no. total station with adequate arrangement for Surveyor.	01 Nos within 15 days
5	1 nos. auto level & staff	As per site requirement.
6	Arrangements for plate load test – 02 set.	01 set within 15 days another within 30 days.
7	1 no. drinking water tank – 5000 lit.	As per site requirement.
8	1 no truck mounted water tank capacity with sprinkler arrangement	As per site requirement.
9	4 nos. mobile toilets for labour use	As per site requirement.
10	Construction water Pipeline (100mm/75mm/32mm/25mm dia GI Pipe)	As per site requirement.

Note:

1. T&P and the mobilization schedule shown in the above mentioned list is tentative requirement considering parallel working. However, Mobilization schedule and quantity/ numbers of T & Ps, and period of deployment as

mutually agreed at site for major T&Ps, have to be adhered to. Numbers/ time of requirement will be reviewed time to time at site and contractor will provide required T&P/ equipment's to ensure completion of entire work within schedule/ target date of completion without any additional financial implication to BHEL. Vendor will give advance intimation & certification regarding capacity etc. prior to dispatch of heavy equipment's. Also on completion of the respective activity, demobilization of T&P in total or in part can be done with the due approval of engineer in charge. Retaining of the T&P's during the contract period will be mutually agreed in line with construction requirement.

2. All T&P and all IMTEs, which are required for successful and timely execution of the work covered within the scope of this tender, shall be arranged and provided by the contractor at his own cost in working condition.

3. In the event of contractor failing to arrange the required tools, plants, machineries, equipment, material or non-availability of the same owing to breakdown, BHEL will make alternative arrangement at the risk and cost of the contractor.

   Case 1: BHEL provides its own Capital T&P.
   In case the BHEL provides any T&P which is owned by BHEL, hire charges (as per BHEL norms) will be recovered from the contractor as per the prevailing BHEL corporate hire charges. In case, the T&P is specifically listed in "T&Ps to be deployed by Contractor", "Hire charges applicable to outside agencies other than contractors working for BHEL" will apply. If not listed, "hire charges applicable to contractor working for BHEL" will apply. The hire charges of Capital tools & plants are exclusive of operating expenses e.g. operator, fuel & consumables and the same shall be arranged by the contractor at his cost.

   Case 2: In all cases other than that specified in case 1 above, actual expenses incurred by BHEL along with applicable overheads will be back-charges to the contractor.

4. In the event of need of change of type of any of major T&Ps, approval shall be taken from BHEL Engineer in-charge prior to mobilization. The decision of Number of T&P required due to replacing the enlisted T&P as per above table, shall be taken after analyzing the production capacity and suitability of both the T&Ps.

5. Chapter - VI of this specification (i.e. TCC) shall be referred for date of start of work.

1.4.3 In addition to the above, any other tools and plants required for execution of the above work are in contractor's scope.

1.4.4 The Bidder shall establish and maintain a field laboratory as per work requirement at the site and this laboratory shall be available at all time for testing required as per approved FQP.

1.4.5 The laboratory must have qualified technicians to carry out all tests and must be adequately equipped to ensure that all necessary testing work can carried out in compliance with the standards.

1.4.6 Field and laboratory testing procedures for materials follow Indian Standard Specifications with necessary equipment as mentioned therein.

1.4.7 Contractor shall have at all times experienced operators and technicians for routine and breakdown maintenance of the equipment. Any delay in rectification of defects will warrant BHEL rectifying the defect and charging the cost to the contractor.

1.4.8 The age of the contractor deployed cranes upto 150 T should be within 15 years as on date of deployment. Contractor has to provide documentary proof for the age of the crane at the time of deployment to the BHEL Engineer.

1.4.9 In construction projects of this magnitude, all the areas / approaches may not be ready. In such cases consolidation of ground and arrangement of sleepers / sand bag filling etc for safe operation / movement of equipment including cranes / trailers etc shall be the responsibility of the contractor at his cost. No compensation on this account shall be payable.

VOLUME-IA PART-I CHAPTER - V
T&Ps AND MMEs TO BE DEPLOYED BY BHEL ON SHARING BASIS

1.5.1 BHEL shall not provide any T&Ps for this scope of work. However, if in any unforeseen circumstances, requirement of any T&Ps (available with BHEL at site) arises, on request of bidder the same may be provided on chargeable basis as applicable. BHEL reserves the right of provision of such T&Ps. Charges shall be applied as per BHEL norms and guidelines and direction of engineer in-charge.

VOLUME-IA PART-I CHAPTER - VI
TIME SCHEDULE

1.6.1 TIME SCHEDULE

1.6.1.1 The date of commencement of work at site shall be mutually agreed between successful bidder and BHEL Site In-Charge.

1.6.1.2 The entire scope of work of Ground Improvement piles as per the tender specification for 2x660MW ENNORE SEZ Unit 1 and 2 shall be completed within **6 (Six) months** from the date of commencement of work at site. The detailed schedule is as mentioned below:

Sl No	Description	Completion month from the contractual date of start of the work
1	Completion of 4000 Nos GI pile	2nd month
2	Completion of 10000 Nos (cumulative) GI Pile	4th month
3	Balance GI piles	5th month
4	Documentation & submission of final bill	6th month

1.6.1.3 **Intermediate Milestones**

Sl No	Description	Completion month from the contractual date of start of the work
M 1	Completion of 4000 Nos GI pile	2nd month
M 2	Completion of 10000 Nos (cumulative) GI pile	4th month

Note: Please refer Sl No. 7 Part II Chapter-1 of Technical Conditions of Contract (Volume 1A of Volume I Book I) for Penalty for Intermediate Milestones

1.6.1.4 During the total period of contract, the contractor has to carry out the activities in a phased manner as required by BHEL and the program of milestone events.

1.6.1.5 The contractor is required to refer Form 15 in Volume 1- BOOK 2 for all the instructions to be taken immediately after receipt of LOI.

1.6.2 **MOBILISATION**

The Contractor has to augment his resources in a prudent manner to achieve the completion of work as per the site requirement.

The above time allowed for completion of work including Sundays and Holidays is from the date of commencement of work. Detailed program to be prepared by the tenderer taking in to consideration of the COMPLETION SCHEDULES /site decision on drawings flow (latest) and submitted for BHEL's approval.

1.6.3 In order to meet above schedule in general, and any other intermediate targets set, to meet customer / project schedule requirements, contractor shall arrange & augment all necessary resources from time to time on the instructions of BHEL within the quoted rate.

1.6.4 In case the project is to be advanced, the civil works in the scope of the contractor is to be advanced to meet the project requirement. No extra payment whatsoever shall be paid on this account.

1.6.5 **PERT CHART AND PROGRESS REPORTS**

The contractor shall submit a detailed L2 and L3 network to meet the agreed project schedule covering various activities. This network shall also clearly indicate the interface facilities/inputs to be provided by BHEL/Customer and the dates by which such facilities/inputs are required. The schedule shall be acceptable to BHEL for meeting project's mile stone targets/schedule.

1.6.6 **GUARANTEE PERIOD**

Guarantee period of 12 months shall commence from the date of completion of the whole of the work certified by the Engineer in-charge.

1.6.7 **CONSTRUCTION SCHEDULE FOR ENNORE SEZ 2X660 MW**

1.6.7.1 The bidder must submit a detail schedule (area wise) for completion of work to meet the project schedule within 7 days from the date of issue of LOI.

VOLUME-IA PART-I CHAPTER - VII
TERMS OF PAYMENT

1.7.1 SECURED ADVANCE

Not Applicable

1.7.2 ADVANCE FOR MOBILIZATION

Not Applicable

1.7.3 INTERIM PAYMENT

1.7.3.1 Interim bills in the form of monthly running bills prepared by the contractor in soft as well as Hard copies shall be based on the quantities executed and measured.

1.7.3.2 95% item rate shall be released after completion of works certification by Engineer in charge.

1.7.3.3 5% of the item rate shall be released after submission of the quality check formats as per the quality plan for the quantum of work billed and duly certified by engineer.

1.7.3.4 BHEL Site Engineer, at discretion, may operate the part rate of the items where supply and installation are involved, on receipt of the materials at site.

1.7.3.5 For Retention amount: Please refer Sl No.16 of Vol-1A Part II Chapter-1.

1.7.4 METHOD OF MEASUREMENT

Mode of measurement shall be as per relevant clauses of IS 1200 in conjunction of IS code 3385 shall be adopted. In case the same is also not available, the standard procedure adopted in CPWD shall be adopted. In case the same is also not available in CPWD, the measurement of the work done will be based on the mutual agreement between BHEL and contractor. In all the above cases, the interpretation of BHEL will be final and binding to the contractor.

1.7.5 NO CLAIM WHAT SO EVER MAY BE, WILL BE ENTERTAINED UNDER THIS CONTRACT, AFTER DULY SIGNING THE FINAL BILL ALONG WITH MEASURMENT BOOKS AND ACCEPTED BY BHEL.

1.7.6 NOTES TO TERMS OF PAYMENT:

Please Refer Part-II, Chapter-1 of Technical Conditions of Contract for PVC, ORC and Performance Security Deposit.

VOLUME-IA PART-I CHAPTER - VIII
TAXES AND OTHER DUTIES

1.8.1 Goods and Service Tax (GST) & Cess

1.8.1.1 The successful bidder shall furnish proof of GST registration with GSTN Portal in the State in which the Project is being executed, covering the services under this contract. Registration should also bear endorsement for the premises from where the billing shall be done by the successful bidder on BHEL for this project/ work.

1.8.1.2 Contractor's price/rates shall be exclusive of GST & Cess (if applicable) (herein after termed as GST). Contractor shall submit to BHEL the GST compliant tax invoice/debit note/revised tax invoice on the basis of which BHEL will claim the input tax credit in its return. Since this is a works contract, the applicable rate shall be @ 18% GST, as applicable presently

1.8.1.3 Bidder shall note that the GST Tax Invoice complying with GST Invoice Rules wherein the 'Bill To' details will as below:

BHEL GSTN- 33AAACB4146P2ZL
NAME - BHARAT HEAVY ELECTRICALS LIMITED
ADDRESS - 2x660 MW ENNORE SEZ STPP, VAYALUR BR PO, MINJUR PO, TAMIL NADU

1.8.1.4 GST charged in the tax invoice/debit note/revised tax invoice by the contractor shall be released separately to the contractor only after contractor files the outward supply details in GSTR-1 on GSTN portal and input tax credit of such invoice is matched with corresponding details of outward supply of the contractor and has paid the GST at the time of filing the monthly return.

1.8.1.5 In case BHEL has to incur any liability (like interest / penalty etc.) due to denial/reversal / delay of input tax credit in respect of the invoice submitted by the contractor, for the reasons attributable to the contractor, the same shall be recovered from the contractor.

1.8.1.6 Further, in case BHEL is deprived of the Input tax credit due to any reason attributable to contractor, the same shall not be paid or Recovered if already paid to the contractor.

1.8.1.7 Tax invoice/debit Note/revised tax invoice shall contain all such particulars as prescribed in GST law and comply to the timelines for issue of the same. Invoices shall be submitted on time to the concerned BHEL Engineer In Charge.

1.8.1.8 TDS under GST (if/ as & when applicable) shall be deducted at prevailing rates on gross invoice value from the running bills.

1.8.1.9 E-way bills / Transit passes / Road Permits, if required for materials / T&P etc., bought into the project site is to be arranged by the Contractor only.

1.8.1.10 BHEL shall not reimburse any amounts towards any interest / penalty etc., incurred by contractor. Any additional claim at a later date due to issues such as wrong rates / wrong classification by contractor shall not be paid by BHEL.

1.8.2 **All taxes and duty other than GST & Cess**

The contractor shall pay all (except the specific exclusion viz GST & Cess) taxes, fees, license charges, deposits, duties, tools, royalty, commissions, Stamp Duties, or other charges / levies, which may be levied on the input goods & services consumed and output goods & services delivered in course of his operations in executing the contract and the same shall not be reimbursed by BHEL. In case BHEL is forced to pay any of such taxes, BHEL shall have the right to recover the same from his bills or otherwise as deemed fit.

1.8.3 **Statutory Variations**

Statutory variations are applicable under the GST Acts, against production of proof. The changes implemented by the Central / State Government during the tenure of the contract viz. increase / decrease in the rate of taxes, applicability, etc. and its impact on upward revision / downward revision are to be suitably paid/ adjusted from the date of respective variation. The bidder shall give the benefit of downward revision in favour of BHEL. No other variations shall be allowed during the tenure of the contract.

1.8.4 **New Taxes/Levies**

In case Government imposes any new levy / tax after submission of bid during the tenure of the contract, BHEL shall reimburse the same at actual on submission of documentary proof of payment subject to the satisfaction of BHEL that such new levy / tax is applicable to this contract.

1.8.5 **Direct Tax**

BHEL shall not be liable towards Income Tax of whatever nature including variations thereof arising out of this contract as well as tax liability of the bidder and their personnel. Deduction of tax at source at the prevailing rates shall be effected by BHEL before release of payment as a statutory obligation, unless exemption certificate is produced by the bidder. TDS certificate will be issued by BHEL as per the provisions of Income Tax Act.

VOLUME-IA PART-I CHAPTER -IX
BILL OF QUANTITY

As mentioned in the Volume II, Price Bid, Part-C

VOLUME-IA PART-I CHAPTER -X
GENERAL

1.10.1 Contractors are requested to furnish the following at PSSR-HQ, Chennai immediately after release of Letter of Intent (LOI)

I. Security Deposit and Additional Security Deposit (As applicable).
II. Unqualified Acceptance for Detailed LOI/ Work Order.
III. Rs.100/- Stamp Paper for preparation of Contract Agreement.
IV. Option (whether a or b of said clause) exercised towards Performance Security Deposit for the subject contract as per Sl. No. 16 of Volume IA Part II Chapter 1 of TCC.

1.10.2 Contractors are requested to furnish the proof of documents for the following at PSSR- Site.

I. Provident Fund Registration Number.
II. Labour License Number.
III. Workmen Insurance Policy Number.

1.10.3 **In addition to the clause 2.8 of General Conditions of Contract (Volume 1C of Book-II) the contractor shall comply with the following.**

1.10.3.1 **BOCW Act & BOCW Welfare Cess Act**

1.10.3.1.1 The Contractor Should Register their Establishment under BOCW Act 1996 read with rules 1998 by submitting Form I (Application for Registration of Establishment) and Form IV (Notice of Commencement /Completion of Building Other Construction Work) to the respective Labour Authorities i.e.,

a) Assistant Labour Commissioner (Central) in respect of the project premises which is under the purview of Central Govt.–NTPC, NTPL etc.

b) Appropriate State authorities in respect of the project premises which is under the purview of State Govt.

1.10.3.1.2 The Contractor should comply with the provisions of BOCW Welfare Cess Act 1996 in respect of the work awarded to them by BHEL.

1.10.3.1.3 The contractor should ensure compliance regarding Registration of Building Workers as Beneficiaries, Hours of work, welfare measures and other conditions of service with particular reference to Safety and Health measures like Safety Officers, safety committee, issue of Personal protective equipments, canteen, rest room, drinking water, Toilets, ambulance, first aid centre etc.,

1.10.3.1.4 The contractor irrespective of their nature of work and manpower (Civil, Mechanical, Electrical works etc) should register their establishment under BOCW Act 1996 and comply with BOCW Welfare Cess Act 1996.

1.10.3.1.5 Contractor shall make remittance of the BOCW cess as per Act in consultation with BHEL as per the rates in force (presently 1%). BHEL shall reimburse the same upon production of documentary evidence. However, BHEL shall not reimburse the Fee paid towards the registration of establishment, fess paid towards registration of beneficiaries and contribution of beneficiaries remitted.

1.10.3.1.6 Non-compliance to provisions of the BOCW act and BOCW welfare Cess act is not acceptable. In case of any non-compliance, BHEL reserves the right to withhold any sum it deems fit. Only upon total compliance to the BOCW act and also discharge of total payment of Cess under the BOCW Cess act by the contractor, BHEL shall consider refund of the amounts.

1.10.3.2 **PROVIDENT FUND**

1.10.3.2.1 The contractor is required to extend the benefit of Provident Fund to the labour employed by the contractor in connection with this contract as per the Employees Provident Fund and Miscellaneous Provisions Act 1952. For due implementation of the same, the contractor is hereby required to get themselves registered with the Provident Fund authorities for the purpose of reconciliation of PF dues and furnish to us the code number allotted to them by the Provident Fund authorities within one month from the date of issue of this letter of intent. Please note that in the event of contractor's failure to comply with the provisions of said Act, if recoveries therefore are enforced from payments due to BHEL by the customer or paid to statutory authorities by BHEL, such amount will be recovered from payments due to the contractor.

1.10.3.2.2 The final bill amount would be released only on production of clearance certificate from PF / ESI and labour authorities as applicable.

1.10.3.3 **OTHER STATUTORY REQUIREMENTS**

1.10.3.3.1 The Contractor shall submit a copy of Labour License obtained from the Licensing Officer (Form VI) u/r25 read with u/s 12 of Contract Labour (R&A) Act 1970 & rules and Valid WC Insurance copy or ESI Code (if applicable) and PF code no along with the first running bill.

1.10.3.3.2 The contactor shall submit monthly running bills along with the copies of monthly wages (of the preceding month) u/r78(1)(a)(1) of Contract Labour Rules, copies of monthly return of PF contribution with remittance Challans under Employees Provident Fund Act 1952 and copy of renewed WC Insurance policy or copies of monthly return of ESI contribution with Challans under ESI Act 1948 (if applicable) in respect of the workmen engaged by them.

1.10.3.3.3 The Contractor should ensure compliance of Sec 21 of Contract Labour (R&A)

Act 1970 regarding responsibility for payment of Wages. In case of "Non-compliance of Sec 21 or non-payment of wages" to the workmen before the expiry of wage period by the contactor, BHEL will reserve its right to pay the workmen under the orders of Appropriate authority at the risk and cost of the Contractor.

1.10.3.3.4 The Contractor shall submit copies of Final Settlement statement of disbursal of retrenchment benefits on retrenchment of each workman under I D Act 1948, copies of Form 6-A (Annual Return of PF Contribution) along with Copies of PF Contribution Card of each member under PF Act and copies of monthly return on ESI Contribution – Form 6 under ESI Act1948 (If applicable) to BHEL along with the Final Bill.

1.10.3.3.5 In case of any dispute pending before the appropriate authority under I D act 1948, WC Act 1923 or ESI Act 1948 and PF Act 1952, BHEL reserve the right to hold such amounts from the final bills of the Contractor which will be released on submission of proof of settlement of issues from the appropriate authority under the act.

1.10.3.3.6 In case of any dispute prolonged/pending before the authority for the reasons not attributable to the contractor, BHEL reserves the right to release the final bill of the contractor on submission of Indemnity bond by the contractor indemnifying BHEL against any claims that may arise at a later date without prejudice to the rights of BHEL.

1.10.3.4 1.10.3.4 **DEPLOYMENT OF SKILLED / SEMI-SKILLED TRADESMEN**

The following clause is applicable in case the contract value / contract price is Rs. Five crores and above.

The contractor shall, at all stages of work deploy skilled / semi-skilled tradesmen who are qualified and possess certificate in particular trade from CPWD Training Institute / Industrial Training. Institute / National Institute of Construction Management and Research (NICMAR), National Academy of Construction, CIDC or any similar reputed and recognized Institute managed / certified by State / Central Government. The number of such qualified tradesmen shall not be less than 20% of total skilled / semi-skilled workers required in each trade at any stage of work. The contractor shall submit number of man days required in respect of each trade, its scheduling and the list of qualified tradesmen along with requisite certificate from recognized Institute to Engineer-in-Charge for approval. Notwithstanding such approval, if the tradesmen are found to have inadequate skill to execute the work of respective trade, the contractor shall substitute such tradesmen within two days of written notice from Engineer-in-Charge. Failure on the part of contractor to obtain approval of Engineer-in-Charge or failure to deploy qualified tradesmen will attract a compensation to be paid by contractor at the rate of Rs. 100 per such tradesman per day. Decision of Engineer-in-Charge as to whether particular tradesman

possesses requisite skill and amount of compensation in case of default shall be final and binding.

1.10.3.5 **RECOVERY OF COMPENSATION PAID TO VICTIM(S) BY BHEL IN CASES OF DEATH/ PERMANENT INCAPACITATION OF PERSON DUE TO AN ACCIDENT DURING THE WORKS**

BHEL shall recover the amount of compensation paid to victim(s) by BHEL towards loss of life / permanent disability due to an accident which is attributable to the negligence of contractor, agency or firm or any of its employees as detailed below.

a) Victim: Any person who suffers permanent disablement or dies in an accident as defined below.

b) Accident: Any death or permanent disability resulting solely and directly from any unintended and unforeseen injurious occurrence caused during the manufacturing / operation and works incidental thereto at BHEL factories/ offices and precincts thereof, project execution, erection and commissioning, services, repairs and maintenance, trouble shooting, serving, overhaul, renovation and retrofitting, trial operation, performance guarantee testing undertaken by the company or during any works /during working at BHEL Units/ Offices/ townships and premises/ Project Sites.

c) Compensation in respect of each of the victims:

(i) In the event of death or permanent disability resulting from Loss of both limbs: Rs. 10,00,000/- (Rs. Ten Lakh)

(ii) In the event of other permanent disability: Rs. 7,00,000/- (Rs. Seven Lakh)

d) Permanent Disablement: A disablement that is classified as a permanent total disablement under the proviso to Section 2 (I) of the Employee's Compensation Act, 1923.

1.10.4 **GENERAL**

1.10.4.1 Site Visit by the Bidder

The bidder shall, prior to submitting his tender for the work, visit, examine and acquire full knowledge & information and necessary conditions prevailing at the site and its surroundings of the plant premises together with all statutory, obligatory, mandatory requirements of various authorities about the site of works at his own expense, and obtain and ascertain for himself on his own responsibility that may be for preparing his tender and entering into a contract, and take the same into account in the quoted contract price for the work.

1.10.4.2 The bidder shall satisfy themselves about the following factors:

i. Site conditions including access to the site, existing and required roads and other means of transport/communication for use by him in connection with the work including diverting and re-routing of services.

ii. Requirement and availability of land and other facilities of his enabling works, establishment of his nursery, office, stores etc.

iii. Ground conditions including those bearing upon transportation, disposal, handling and storage of materials required for the work or obtained there-from.

iv. Source and extent of availability of suitable materials, including water etc., and labour (skilled and unskilled) required for work, and laws and regulations governing their use and employment.

v. Geological, meteorological, topographical and other general features of the site and its surroundings as are pertaining to and needed for the performance of the work.

vi. The limit and extent of surface and subsurface water to be encountered during the performance of the work, and the requirement of drainage and pumping.

vii. The type of equipment and facilities needed, for and in the performance of the work;

viii. The extent of lead and lift required for the work in complete form over the entire duration of the contract, and

ix. All other information pertaining to and needed for the work including information as to the risks, contingencies and other circumstances which may influence or affect the work or the cost thereof under this contract.

1.10.4.3 The bidder should note that information, if any, in regard to the local conditions, as contained in these tender documents, has been given to tenderer merely for guidance and is not warranted to be complete.

1.10.4.4 A bidder shall be deemed to have full knowledge of the site, whether he inspects it or not, and no extra charges consequent on any misunderstanding or otherwise shall be allowed.

1.10.4.5 The bidder and any of his personnel or agents will be granted permission by the Site-In-Charge or his authorized nominee, on receipt of formal application in respect thereof a week in advance of the proposed date of inspection of site, to enter upon his premises and lands for purpose of such inspection, but only on the express condition that the tenderer (and his personnel and agents) will relieve and indemnify the Employer (and his personnel and agents) from and against all liability in respect thereof and will be responsible for personal injury (whether fatal or otherwise), loss of or damage to property and any other loss, damage, costs and expenses however caused which, but for the exercise of such permission, would not have arisen.

1.10.4.6 Scope of work covered under this specification requires quality workmanship, engineering and green belt management along with the supply of all consumables, tools and tackles and testing instruments. The contractor shall ensure timely completion of work. The contractor shall have adequate tools, measuring instruments etc. in his possession. He shall also have adequate trained, qualified and experienced engineers, supervisory staff and skilled personnel. The manpower deployment identified by contractor shall match with above scope of works.

1.10.4.7 It is not the intent to specify herein all details of all material. Any item related this work not covered by this but necessary to complete the system will be deemed to have been included in the scope of the work.

1.10.4.8 All the necessary certificates and licenses required to carry out this scope of work are to be arranged by the contractor then and there at no extra cost.

1.10.4.9 Site testing wherever required shall be carried out for all items / materials installed by the contractor to ensure proper installation and functioning in accordance with drawings, specifications and manufacturer's recommendations.

1.10.4.10 The contractor shall carry out additional tests, if any, which the Engineer feels necessary because of site conditions and also to meet system specification.

1.10.4.11 The work shall be executed under the usual conditions without affecting power plant construction / operation and in conjunction with other operations and contracting agencies at site. The contractor and his personnel shall co- operate with the personnel of other agencies, co-ordinate his work with others and proceed in a manner that shall not delay or hinder the progress of work as a whole.

1.10.4.12 All the work shall be carried out as per instructions of BHEL engineer. BHEL engineer's decision regarding the correctness of the work and method of working shall be final and binding on the contractor.

1.10.4.13 Wherever Construction sequences are furnished by BHEL, the contractor shall follow the same sequence. Contractor shall execute the supply and works as per sequence prescribed by BHEL at site engineer. No claims for extra payment from the contractor will be entertained on the grounds of deviation from the methods of execution of similar job in any other site or for any reasons whatsoever.

1.10.4.14 If required by BHEL, the contractor shall change the sequence of his operation so that work on priority sectors can be completed within the projects schedule. The contractor shall afford maximum assistance to BHEL in this connection without causing delay to agreed completion date.

1.10.4.15 Contractor shall, transport all materials to site and unload at site / working area for inspection and checking. All material handling equipment required shall be arranged by the contractor.

1.10.4.16 Contractor shall retain all T&P / Testing instrument / Material handling equipment's etc. at site as per advice of BHEL engineer and same shall be taken out from site only after getting the clearances from engineer in charge.

1.10.4.17 The contractor at his cost shall arrange necessary security measures for adequate protection of his machinery, equipment, tools, materials etc. BHEL shall not be responsible for any loss or damage to the contractor's construction equipment and materials. The contractor may consult the Engineer-in-Charge on the arrangements made for general site security for protection of his machinery equipment tools etc.

1.10.4.18 The Contractor may have to execute work in such a place and condition where other agencies also will be under such circumstances. However, completion time for construction, agreed will be subject to the condition that contractor's work is not hampered by the agencies.

1.10.4.19 Contractor has to work in close co-ordination with other agency at site. BHEL engineer will co-ordinate area clearance. In a project of such magnitude, it is possible that the area clearance may be less / more at a particular given time. Activities and Construction program have to be planned in such a way that the milestones are achieved as per schedule/ plans. Contractor shall arrange & augment the resources accordingly.

1.10.4.20 The contractor must obtain the signature and permission of the security personnel of the customer / BHEL for bringing any of their materials inside the site premises. Without the Entry Gate Pass these materials will not be allowed to be taken outside. Surplus materials including steel item brought at site by the contractors with proper documentation and Gate pass, shall be allowed to taken out of the project premises after completion of relevant works, on certification by BHEL in charge.

1.10.4.21 Contractor shall remove all scrap materials periodically generated from his working area and collect the same at one place earmarked for the same. Load of scraps is to be shifted to a place earmarked by BHEL. Failure to collect the scrap is likely to lead to accidents and as such BHEL reserves the right to collect and remove the scrap at contractor's risk and cost if there is any failure on the part of contractor in this respect.

1.10.4.22 The contractor shall ensure that his premises are always kept clean and tidy to the extent possible. Any untidiness noted on the part of the contractor shall be brought to the attention of the contractor's site representative who shall take

immediate action to clean the surroundings to the satisfaction of the Engineer-in-Charge.

1.10.4.23 The contractor is strictly prohibited from using BHEL's regular components like angles, channels, beams, plates, pipe / tubes, and handrails etc. for any temporary supporting or scaffolding works. Contractor shall arrange himself all such materials. In case of such misuse of BHEL materials, a sum as determined by BHEL engineer will be recovered from the contractor's bill. The decision of BHEL engineer is final and binding on the contractor.

1.10.4.24 No member of the already erected structure / buildings, other component and auxiliaries should be removed / modified without specific approval of BHEL engineer.

1.10.4.25 Contractors shall ensure that all their Staff / Employees are exposed to periodical training programme conducted by qualified agencies/ personnel on latest ISO 9001 Standards.

1.10.4.26 Sometimes, it may be required to re-schedule the activities to enable other agencies to commence/ continue the work so as to keep the overall project schedule.

1.10.4.27 The terminal points decided by BHEL are final and binding on the contractor for deciding the scope of work and effecting the payment for the work done up to the terminals.

1.10.4.28 Crane operators deployed by the contractor shall be tested by BHEL before he is allowed to operate the cranes.

1.10.4.29 On Completion of work, all the temporary buildings, structures, pipe lines, cable etc. shall be dismantled and leveled and debris shall be removed as per instruction of BHEL by the contractor at his cost. In the event of his failure to do so, the expenditure towards clearance of the same will be recovered from the contractor. The decision of BHEL Engineer in this regard is final.

1.10.4.30 It is the responsibility of the contractor to do the checking, testing etc. if necessary, repeatedly to satisfy BHEL Engineer with all the necessary tools and tackles, manpower etc. without any extra cost. The testing will be completed only when jointly certified so, by the BHEL Engineer.

1.10.4.31 If any item not covered but requires being executed, same shall be carried out by the contractor. Equivalent or proportional unit rate shall be considered wherever possible from the BOQ. The rates quoted by the contractor shall be uniform as far as possible for similar items appearing in rate schedule.

1.10.4.32 The contractor's work shall not hinder other work, either underground or over

ground, such as electrical, phone lines, water or sewage lines, etc. In areas of overlap, the contractor shall work in coordination with other related contractors. Any damage by the landscape contractor's team to such utilities will be penalized and contractor shall be responsible for cost for such damages.

1.10.4.33 The contractor will be responsible for the safe custody and proper accounting of all materials in connection with the work. If the contractor has drawn materials in excess of design requirements, recoveries will be effected for such excess drawls at the rate prescribed by manufacturing units.

1.10.4.34 Contractor has to clear the front, expeditiously and promptly as instructed by BHEL Engineer for other agencies, like Boiler, piping, Turbine, Generator erection, Cabling, instrumentation, insulation etc., to commence their work from / on the equipments coming under this scope.

1.10.4.35 For the purpose of planning, contractor shall furnish the estimated requirement of power (month wise) for execution of work in terms of maximum KW demand.

1.10.4.36 **DOCUMENTATION**

1.10.4.36.1 RECORDS TO BE MAINTAINED AT SITE:

1.10.4.36.1.1 Record of Quantity of FREE / Chargeable items issued by BHEL must be maintained during contract execution. Also reconciliation statement to be prepared at regular intervals.

1.10.4.36.1.2 The under mentioned Records/ Log-books/ Registers applicable to be maintained.

a. Hindrance Register.
b. Site Order Book.
c. Test Check of measurements.
d. Supply and Consumption Daily Register for Cement and Steel
e. Records of Test reports of Field tests.
f. Records of manufacturer's test certificates.
g. Records of disposal of scraps generated during and after the work completion.
h. List of T&Ps & MMEs.

1.10.4.36.1.3 Other documents / records as specified in chapter XI -Progress of work in PART- I of Technical conditions of Contract Volume IA (Volume I Book I).

1.10.4.36.1.4 L3 schedule as specified in Chapter VI –TIME SCHEDULE in PART- I of Technical conditions of Contract Volume IA (Volume I Book I).

1.10.4.37 **SITE INSPECTION**

1.10.4.37.1 The Owner or his authorized agents may inspect various stages of work

during the currency of the contract awarded to him. The contractor shall make necessary arrangements for such inspection and carry out the rectification pointed out by the Owner or his authorized agents without any extra cost to the Owner or his authorized agents. No cost whatsoever such duplication of inspection of work be entertained.

1.10.4.37.2 BHEL / Owner will have full power and authority to inspect the works at any time, either on the site or at the contractor's premises. The contractor shall arrange every facility and assistance to carry out such inspection. On no account will the contractor be allowed to proceed with work of any type unless such work has been inspected and entries are made in the site inspection register by Owner / BHEL.

1.10.4.37.3 The contractor shall maintain at site a joint protocol for recording actual measurement of work carried out at site, inspection and witnessing of various tests conducted by the contractor.

1.10.4.38 Field Quality Assurance (FQA) Formats:-

1.10.4.38.1 It is the responsibility of the contractor to collect and fill up the relevant FQA log sheets of BHEL and present the same to BHEL after carrying out the necessary checks as per the log sheets and obtaining the signature of BHEL and Owner as token of their acceptance. Payment to the contractor will be inked with the submission of these FQA log sheets.

1.10.4.38.2 Site testing wherever required shall be carried out for all items / materials installed by the contractor to ensure proper installation and functioning in accordance with drawings, specifications and manufacturer's recommendations.

1.10.4.38.3 Contractor shall, transport all materials to site and unload at site / working area for inspection and checking. All material handling equipment required shall be arranged by the contractor.

VOLUME – IA PART-I CHAPTER – XI
PROGRESS OF WORK

1.11.1 Refer forms F -14 to F-18 of volume I D of volume -I book-II. Plan and review will be done as per the formats.

1.11.2 Contractor is required to draw mutually agreed monthly construction programs in consultation with BHEL Site In-Charge well in advance of commencement of work at site. Contractor shall ensure completion of work as per agreed program and shall also timely arrange additional resources considered necessary at no extra cost to BHEL.

1.11.3 Progress review meetings will be held at site during which actual progress during the week vis-a-vis scheduled program shall be discussed for actions to be taken for achieving targets. Contractor shall also present the program for subsequent week. The contractor shall constantly update / revise his work program to meet the overall requirement. All quality problems shall also be discussed during above review meetings. Necessary preventive and corrective action shall be discussed and decided upon in such review meetings and shall be implemented by the contractor in time bound manner so as to eliminate the cause of nonconformities.

1.11.4 The contractor shall submit daily, weekly and monthly progress reports, manpower reports, materials reports, consumables report, T&Ps availability report and other reports as per Performa considered necessary by the Site Engineer as per the BHEL formats.

1.11.5 The contractor shall submit weekly / fortnightly / monthly statement report regarding consumption of all consumables for cost analysis purposes.

1.11.6 The monthly report ending on 24th of every month shall be submitted as a booklet and shall contain the following details: -

a) Colour Progress photographs to accompany the report should be submitted.

b) Construction progress in terms of quantity, CUM, etc., completed as relevant to the respective work areas against planned.

c) Site Organization chart of engineers & supervisors as on 24th of the month with further mobilization plan

d) Category- wise man hours engaged during the previous month under the categories. Data will be spilt up under the work area.

e) Consumables report during the previous month.

f) Availability report of T&Ps

g) Safety implementation report in the format

h) Any inputs required from BHEL for activities planned during the subsequent month.

1.11.7 The manpower reports shall clearly indicate the manpower deployed, category wise specifying also the activities in which they are engaged.

1.11.8 During the course of construction, if the progress is found unsatisfactory, or if the target dates fixed from time to time for every milestone are to be advanced, or in the opinion of BHEL, if it is found that the skilled workmen like fitters, operators, technicians etc employed are not sufficient BHEL will induct required additional workmen to improve the progress and recover all charges incurred on this account including all expenses together with BHEL overheads from contractor's bills.

1.11.9 It is the responsibility of the contractor to provide all relevant information on a regular basis regarding construction progress, labour availability, equipment deployment, testing, etc.

1.11.10 The progress reports shall indicate the progress achieved against plan, indicating reasons for delays, if any. The report shall also give remedial actions, which the contractor intends to make good the slippage or lost time so that further works can proceed as per the original plan & the slippages do not accumulate and affect the overall programme.

1.11.11 The contractor to reflect actual progress achieved during the month and will be submitted to BHEL, so that slippages can be observed and necessary action taken in order to ensure that the situation does not get out of control will update the construction schedule forming part of this contract each month.

VOLUME - IA PART – I CHAPTER – XII
MATERIAL HANDLING

1.12.1 Open land shall be provided by BHEL on free of cost basis as provided by TANGEDCO. As per requirement in site, hard surfacing of this yard and all round drain shall be carried out by the contractor at his own cost within the quoted rate. The bidder shall make complete arrangement of necessary security personnel, to safeguard their own materials in their custody.

1.12.2 The contractor shall in no case be entitled for any compensation or damages on account of any delay in supply or non-supply thereof for all or any such material.

1.12.3 The contractor shall maintain proper store account for all the materials brought in by the bidder and BHEL issued materials (if any) and shall give three copies of once in two months computerized reconciliation statement of such BHEL issued materials.

1.12.4 Materials shall not under any circumstances be taken out of the project site unless otherwise permitted by BHEL.

VOLUME-IA PART – II CHAPTER 1

CORRECTIONS / REVISIONS IN SPECIAL CONDITIONS OF CONTRACT, GENERAL CONDITIONS OF CONTRACT AND FORMS & PROCEDURES

Sl No: 1

Clause 4.1.11 under 'Obligations of Contractor' in SCC is deleted.

Sl No: 2:

OCCUPATIONAL HEALTH, SAFETY & ENVIRONMENT MANAGEMENT/ QUALITY ASSURANCE PROGRAMME

The following clauses in Occupational Health, Safety & Environment Management / Quality Assurance Programme published in Chapter-IX of Special Conditions of Contract (Volume I Book-II) is revised as under.

Chapter IX Clause 9.1 is modified as below:

Contractor will comply with HSE (Health, Safety & Environment) requirements of BHEL as per the "HSE Plan for Site Operations by Subcontractor" (Document No. HSEP: 14 Rev01) enclosed.

Chapter IX Clause 9.1.1 to 9.1.25 stands deleted.

Chapter IX Clause 9.2 to 9.62 stands deleted.

Sl No: 3:

Clause No. 10.5 on RA Bill Payments, in Special Conditions of Contract (SCC), Volume-IB, Book-II, is revised as under:

The payment for running bills will normally be released within 30 days of submission of running bill complete in all respects with all documents. It is the responsibility of the contractor to make his own arrangements for making timely payments towards labour wages, statutory payments, outstanding dues etc., and other dues in the meanwhile.

Sl No: 4:

Earnest Money Deposit (EMD) clause 1.9 in General Conditions of Contract (GCC) (Volume I Book-II) is revised as under.

1.9 EARNEST MONEY DEPOSIT

1.9.1 Every tenderer shall submit the prescribed amount of Earnest Money Deposit (EMD) to BHEL PSSR, only in the following forms: -

i. Electronic Fund Transfer credited in BHEL account (before tender opening)

ii. Through Online EMD payment portal of BHEL with SBI (before tender opening) by following steps as below:-

1. Visit www.onlinesbi.com -> Go to State Bank Collect (In the tab section)

2. Click Check box to proceed for payment -> Click on Proceed
3. Under State of Corporate/ Institution ->Select Tamilnadu
4. Under Type of Corporate/ Institution -> Select PSU – Public Sector Undertaking ->Go
5. Under PSU – Public Sector Undertaking Name -> Select BHEL PSSR CHENNAI and Submit
6. Under Select Payment Category ->-> SCT TENDER EMD & TENDER FEES

iii. Banker's cheque or Pay order or Demand Draft in favour of 'Bharat Heavy Electricals Limited' (along with offer) and payable at Chennai.

iv. Fixed Deposit Receipt (FDR) issued by Scheduled Banks/ Public Financial Institutions as defined in the Companies Act (FDR should be in the name of the Contractor, a/c BHEL) along with the offer.

v. In case EMD amount is more than Rs. Two Lakhs, Tenderer has the option to submit Rs. Two lakhs in the forms described above in clause no. 1.9.1. (i) to (iv) and the remaining amount over and above Rs. Two Lakhs in the form of Bank Guarantee from Scheduled Bank (along with the Offer).

Note:

a) Proforma of Bank Guarantee (in lieu of Earnest Money)- Form WAM 23 is enclosed with this Tender.
b) The Bank Guarantee shall be valid for at least six months from the due date of tender submission mentioned in the Notice Inviting Tender.
c) Date of Expiry of Claim shall be as given in Proforma of Bank Guarantee (in lieu of Earnest Money)- Form WAM 23.

Bank Details for the purpose of Taking EMD

Name and Address of Beneficiary:	Bharat Heavy Electricals Ltd. Tek Towers, No. 11, Old Mahabalipuram Road, Okkiyam Thoraipakkam, Chennai - 600097
Name of Bank:	State Bank Of India
Bank Branch Address:	SBI Saidapet Branch, EVR Periyar Building, Nandanam, Anna Salai, Chennai - 600035
IFSC Code :	SBIN0000912
Account No. :	10610819499

Details for SFMS (Structured Financial Messaging System) transmission of BG

Bank and Branch	SBI TFCPC Branch
Branch Code	5056
IFSC Code	SBIN0005056

1.9.2 EMD shall not carry any interest.

1.9.3 EMD by the Tenderer will be forfeited as per NIT Conditions, if:

i. After opening the tender and within the offer validity period, the Tenderer revokes his tender or makes any modification in his tender which is not acceptable to BHEL.

ii. The Contractor fails to deposit the required Security deposit or commence the work within the period as per LOI/Contract.

1.9.4 EMD given by all unsuccessful tenderers will be refunded normally within 15 days of award of work.

1.9.5 EMD of successful tenderer will be retained as part of Security Deposit.

1.9.6 EMD by the tenderer shall be withheld in case any action on the tenderer is envisaged under the provisions of extant" Guidelines on Suspension of Business dealings with suppliers/contactors" and forfeited / released based on the action determined under these guidelines.

Sl No: 5

SECURITY DEPOSIT The SECURITY DEPOSIT (SD) clause 1.10 published in General Conditions of Contract (Volume I Book-II) is revised as under.

1.10 Security Deposit:

1.10.1 Upon acceptance of Tender, the successful Tenderer should deposit the required amount of Security Deposit for satisfactory completion of work, as given below:

1.10.2 The total amount of Security Deposit will be 5% of the contract value. EMD of the successful tenderer shall be converted and adjusted towards the required amount of Security Deposit.

1.10.3 The security Deposit should be furnished before start of the work by the contractor.

1.10.4 Modes of deposit:

1.10.4.1 The balance amount to make up the required Security Deposit of 5% of the contract value may be furnished in any one of the following forms

i. Cash (as permissible under the extant Income Tax Act)

ii. Local cheques of Scheduled Banks (subject to realization)/ Pay Order/ Demand Draft/ Electronic Fund Transfer in favour of BHEL

iii. Bank Guarantee from Scheduled Banks / Public Financial Institutions as defined in the Companies Act. The Bank Guarantee format for Security Deposit shall be in the prescribed formats.

iv. Fixed Deposit Receipt issued by Scheduled Banks/ Public Financial Institutions as defined in the Companies Act. The FDR should be in the name of the contractor, A/C BHEL, duly discharged on the back.

v. Securities available from Indian Post offices such as National Savings Certificates, Kisan Vikas Patras etc. (Certificates should be held in the name of Contractor furnishing the security and duly endorsed/ hypothecated/ pledged, as applicable, in favour of BHEL and discharged on the back)

(Note: BHEL will not be liable or responsible in any manner for the collection of interest or renewal of the documents or in any other matter connected therewith)

1.10.5 At least 50% of the Security Deposit including the EMD should be deposited in any form as prescribed before start of the work and the balance 50% of the Security Deposit will be recovered by deducting 10% of the gross amount progressively from each running bills of the contractor till the total amount of the required Security Deposit is collected.

1.10.6 The recoveries made from running bills (cash deduction towards balance SD amount) will be released against submission of equivalent Bank Guarantee in the prescribed formats, but only once, before completion of work.

1.10.7 The Security Deposit shall not carry any interest.

1.10.8 If the value of work done at any time exceeds the contract value, the amount of Security Deposit shall be correspondingly enhanced and the excess Security Deposit due the enhancement shall be immediately deposited by the Contractor or recovered from payment/s due to the Contractor.

A) The validity of Bank Guarantees towards Security Deposit shall be initially upto the completion period as stipulated in the Letter of Intent/Award + 3 months, and the same shall be kept valid by proper renewal till the acceptance of Final Bills of the Contractor, by BHEL

B) Date of Expiry of Claim shall be as given in the prescribed formats for Bank Guarantee towards Security Deposit

1.10.9 BHEL reserves the right of forfeiture of Security Deposit in addition to other claims and penalties in the event of the Contractor's failure to fulfill any of the contractual obligations or in the event of termination of contract as per terms and conditions of contract. BHEL reserves the right to set off the Security Deposit against any claims of other contracts with BHEL.

1.10.10 <u>Penalty for Delayed Remittance of Security Deposit</u>

If the contractor fails to furnish SD before start of work, in line with 1.10.3 above, Simple Interest against delayed remittance of the Security Deposit shall be deducted from the sub-contractor at the rate of SBI PLR + 2% on the value of 50% SD of the contract, for the delayed period (i.e., period between start of work and date of remittance of Initial SD, i.e., atleast 50% of SD). In case, the delayed period has different SBI PLR rates, Simple Interest shall be calculated based on

different rates by considering the corresponding time period. On similar lines Penalty shall be levied for delayed remittance of Additional Security Deposit (if applicable).

Note: - Bank details & SFMS details provided above in Sl. No. 04 Earnest Money Deposit) may be used for the purpose of arranging Bank Guarantees towards Security Deposit / Additional Security Deposit also.

Sl No: 6

Clause 2.7.1, 2.7.2 and 2.7.3 in GCC regarding Rights of BHEL is revised as under:

2.7.1 To withdraw any portion of work and / or to restrict / alter quantum of work as indicated in the contract during the progress of work and get it done through other agencies to suit BHEL's commitment to its customer or in case BHEL decides to advance the date of completion due to other emergent reasons / BHEL's obligation to its customer.

In case of inadequate manpower deployed by the contractor, BHEL reserves the right to deploy additional manpower through any other agency for expediting activities in the interest of the project. Supplied manpower shall be put on job by the contractor and payments and other statutory compliances related to manpower shall be the contractor's responsibility. In case of contractor's failure to fulfill his obligations in respect of such manpower, BHEL reserves the right to take necessary action as per contract conditions.

2.7.2.

2.7.2.1 To terminate the contract or withdraw portion of work and get it done through other agency, at the risk and cost of the contractor after due notice of a period of 14 days' by BHEL in any of the following cases:

i. Contractor's poor progress of the work vis-à-vis execution timeline as stipulated in the Contract, backlog attributable to contractor including unexecuted portion of work does not appear to be executable within balance available period considering its performance of execution.
ii. Withdrawal from or abandonment of the work by contractor before completion of the work as per contract.
iii. Non-completion of work by the Contractor within scheduled completion period as per Contract or as extended from time to time, for the reasons attributable to the contractor.
iv. Termination of Contract on account of any other reason (s) attributable to Contractor.
v. Assignment, transfer, subletting of Contract without BHEL's written permission.

vi. Non-compliance to any contractual condition or any other default attributable to Contractor.

Risk & Cost Amount against Balance Work:

Risk & Cost amount against balance work shall be calculated as follows:

Risk & Cost Amount= [(A-B) + (A x H/100)]

Where,

A= Value of Balance scope of Work (*) as per rates of new contract

B= Value of Balance scope of Work (*) as per rates of old contract being paid to the contractor at the time of termination of contract i.e. inclusive of PVC & ORC, if any.

H = Overhead Factor to be taken as 5

In case (A-B) is less than 0 (zero), value of (A-B) shall be taken as 0 (zero).

* Balance scope of work (in case of termination of contract):

Difference of Contract Quantities and Executed Quantities as on the date of issue of Letter for 'Termination of Contract', shall be taken as balance scope of Work for calculating risk & cost amount. Contract quantities are the quantities as per original contract. If, Contract has been amended, quantities as per amended Contract shall be considered as Contract Quantities.

Items for which total quantities to be executed have exceeded the Contract Quantities based on drawings issued to contractor from time to time till issue of Termination letter, then for these items total Quantities as per issued drawings would be deemed to be contract quantities.

Substitute/ extra items whose rates have already been approved would form part of contract quantities for this purpose. Substitute/ extra items which have been executed but rates have not been approved, would also form part of contract quantities for this purpose and rates of such items shall be determined in line with contractual provisions.

However, increase in quantities on account of additional scope in new tender shall not be considered for this purpose.

NOTE: Incase portion of work is being withdrawn at risk & cost of contractor instead of termination of contract, contract quantities pertaining to portion of work withdrawn shall be considered as 'Balance scope of work' for calculating Risk & Cost amount.

LD against delay in executed work in case of Termination of Contract:

LD against delay in executed work shall be calculated in line with LD clause no. 2.7.9 of GCC, for the delay attributable to contractor. For limiting the maximum

value of LD, contract value shall be taken as Executed Value of work till termination of contract.

Method for calculation of "LD against delay in executed work in case of termination of contract" is given below.

i). Let the time period from scheduled date of start of work till termination of contract excluding the period of Hold (if any) not attributable to contractor = T1

ii). Let the value of executed work till the time of termination of contract= X

iii). Let the Total Executable Value of work for which inputs/fronts were made available to contractor and were planned for execution till termination of contract = Y

iv). Delay in executed work attributable to contractor i.e. T2=[1-(X/Y)] x T1

v). LD shall be calculated in line with LD clause (clause 2.7.9) of the Contract for the delay attributable to contractor taking "X" as Contract Value and "T2" as period of delay attributable to contractor.

1.7.2.2 In case Contractor fails to deploy the resources as per requirement, BHEL can deploy own/hired/otherwise arranged resources at the risk and cost of the contractor and recover the expenses incurred from the dues payable to contractor. Recoveries shall be actual expenses incurred plus 5% overheads or as defined in TCC.

2.7.3 **Recoveries arising out of Risk & Cost and LD or any other recoveries due from Contractor**

Following sequence shall be applicable for recoveries from contractor:

a) Dues available in the form of Bills payable to contractor, SD, BGs against the same contract.

b) Demand notice for deposit of balance recovery amount shall be sent to contractor, if funds are insufficient to effect complete recovery against dues indicated in (a) above.

c) If contractor fails to deposit the balance amount to be recovered within the period as prescribed in demand notice, following action shall be taken for balance recovery:

i) Dues payable to contractor against other contracts in the same Region shall be considered for recovery.

ii) If recovery cannot be made out of dues payable to the contractor as above, balance amount to be recovered, shall be informed to other Regions/Units for making recovery from the Unpaid Bills/Running Bills/SD/BGs/Final Bills of contractor.

iii) In-case recoveries are not possible with any of the above available options, Legal action shall be initiated for recovery against contractor.

Sl No: 7:

In addition to clause 2.7.9 of General Conditions of Contract (GCC), a New clause 2.7.9.1 is added as below.

2.7.9.1 Penalty for Intermediate Milestones

2.7.9.1.1 M1 and M2 shall be intermediate Milestones for this work.

2.7.9.1.2 In case of slippage of these identified Intermediate Milestones, Delay Analysis shall be carried out on achievement of each of these two Intermediate Milestones in reference to Form 14.

2.7.9.1.3 Incase delay in achieving M1 milestone is solely attributable to the contractor,0.5% per week of executable contract value* limited to Maximum 2% of executable contract value will be withheld.

2.7.9.1.4 Incase delay in achieving M2 milestone is solely attributable to the contractor,0.5% per week of executable contract value* limited to maximum 3% of executable contract value will be withheld.

2.7.9.1.5 Amount already withheld, if any, against slippage of M1 milestone, shall be released only if there is no delay attributable to contractor in achievement of M2 milestone.

2.7.9.1.6 Amount required to be withheld on account of slippage of identified intermediate milestone(s) shall be withheld out of respective milestone payment and balance amount (if any) shall be withheld @10% of RA Bill amount from subsequent RA bills.

2.7.9.1.7 Final deduction towards LD (if applicable), on account of delay attributable to contractor shall be based on final delay analysis on completion / closure of contract. Withheld amount, if any due to slippage of intermediate milestones shall be adjusted against LD or released as the case may be.

2.7.9.1.8 In case of termination of contract due to any reason attributable to contractor before completion of work, the amount already withheld against slippage of intermediate milestones shall not be released and be converted in to recovery.

Note: *Executable contract value-value of work for which inputs/fronts were made available to contractor and were scheduled for execution till the date of achievement of that milestone.

Sl No: 8:

The OVERRUN COMPENSATION (ORC) clause 2.12 published in General Conditions of Contract (Volume I Book II) is revised as under.

2.12 **OVERRUN COMPENSATION (ORC)**

Void. (Explanation: Over Run Compensation is not applicable for this tender.)

Sl No: 9

Clauses 2.13.1, 2.13.6 & 2.13.7 in GCC on Interest Bearing Recoverable Advances,

9.1 Clauses 2.13.1,2.13.6 & 2.13.7 in GCC is revised as under:

9.1.1 Clause 2.13.1 in GCC is revised as "Normally no advance payment shall be payable to the contractor. Mobilization advance payment in exceptional circumstances shall be interest bearing and secured through a Bank Guarantee and shall be limited to a maximum of 5% of contract value. This 'Interest Bearing Recoverable Advance' shall be payable in not less than two installments with any of the installment not exceeding 60% of the total eligible advance".

9.1.2 Clause 2.13.6 in GCC is revised as "The rate of interest applicable for the above advances shall be the Base rate of State Bank of India prevailing at the time of disbursement of the advance + 6%, and such rate will remain fixed till the total advance amount is recovered".

9.1.3 Clause 2.13.7 in GCC is revised as "Unadjusted amount of advances paid shall not exceed 5% of the total contract value at any point of time. Recovery of advances shall be made progressively from each Running Bill such that the advance amounts paid along with the interest is fully recovered by the time the contractor's billing reaches 90% of contract value."

Sl. No: 10: Void

Sl No: 11:

PRICE VARIATION COMPENSATION (PVC)

The PRICE VARIATION COMPENSATION (PVC) clause 2.17 published in General Conditions of Contract (Volume IC Book-II) is revised as under.

2.17 PRICE VARIATION COMPENSATION

Void. (Explanation: Price Variation Compensation is not applicable for this tender.)

Sl No: 12

Clauses 2.21 in GCC regarding Arbitration is amended as below

2.21 ARBITRATION & CONCILIATION

2.21.1 ARBITRATION:

2.21.1.1 Except as provided elsewhere in this Contract, in case Parties are unable to reach amicable settlement (whether by Conciliation to be conducted as provided in Clause 2.21.2 herein below or otherwise) in respect of any dispute or difference; arising out of the formation, breach, termination, validity or execution of the Contract; or, the respective rights and liabilities of the Parties; or, in relation to interpretation of any provision of the Contract; or. in any manner touching upon the Contract (hereinafter referred to as the 'Dispute'), then, either Party may, commence arbitration in respect of such Dispute by issuance of a notice in terms of section 21 of the Arbitration & Conciliation Act, 1996 (hereinafter referred to as the 'Notice'). The Notice shall contain the particulars of all claims to be referred to arbitration in sufficient detail and shall also indicate the monetary amount of such claim. The arbitration shall be conducted by a sole arbitrator to be appointed by the Head of the BHEL Power Sector Region issuing the Contract within 60 days of receipt of the complete Notice. The language of arbitration shall be English. The Arbitrator shall pass a reasoned award.

Subject as aforesaid, the provisions of Arbitration and Conciliation Act 1996 (India) or statutory modifications or re-enactments thereof and the rules made thereunder as in force from time to time shall apply to the arbitration proceedings under this clause. The seat of arbitration shall be **Chennai** (the place from where the contract is Issued). The Contract shall be governed by and be construed as per provisions of the laws of India. Subject to this provision 2.21.1.1 regarding ARBITRATION, the principal civil court exercising ordinary civil jurisdiction over the area where the seat of arbitration is located shall have exclusive jurisdiction over any DISPUTE to the exclusion of any other court.

2.21.1.2 In case of Contract with Public Sector Enterprise (PSE) or a Government Department, the following shall be applicable:

In the event of any dispute or difference relating to the interpretation and application of the provisions of commercial contract(s) between Central Public Sector Enterprises (CPSEs)/ Port Trusts inter se and also between CPSEs and Government Departments/Organizations (excluding disputes concerning Railways, Income Tax, Customs & Excise Departments), such dispute or difference shall be taken up by either party for resolution through AMRCD (Administrative Mechanism for Resolution of CPSEs Disputes) as mentioned in DPE OM No. 4(1)/2013-DPE(GM)/FTS-1835 dated 22-05-2018 as amended from time to time.

2.21.1.3 The cost of arbitration shall initially be borne equally by the Parties subject to the final allocation thereof as per the award/order passed by the Arbitrator.

2.21.1.4 Notwithstanding the existence of any dispute or differences and/or reference for the arbitration, the Contractor shall proceed with and continue without hindrance the performance of its obligations under this Contract with due diligence and expedition in a professional manner unless the dispute inter-alia relates to cancellation, termination or short-closure of the Contract by BHEL.

2.21.2 CONCILIATION:

If at any time (whether before, during or after the arbitral or judicial proceedings), any Disputes (which term shall mean and include any dispute, difference, question or disagreement arising in connection with construction, meaning, operation, effect, interpretation or breach of the agreement, contract), which the Parties are unable to settle mutually, arise inter-se the Parties, the same may, be referred by either party to Conciliation to be conducted through Independent Experts Committee (IEC) to be appointed by competent authority of BHEL from the BHEL Panel of Conciliators.

Notes:

1. No serving or a retired employee of BHEL/Administrative Ministry of BHEL shall be included in the BHEL Panel of Conciliators.
2. Any other person(s) can be appointed as Conciliator(s) who is/are mutually agreeable to both the parties from outside the BHEL Panel of Conciliators.

The proceedings of Conciliation shall broadly be governed by Part-III of the Arbitration and Conciliation Act 1996 or any statutory modification thereof and as provided in Procedure 2.3 enclosed in Vol 1A Part II Chapter 6. The Procedure 2.3 together with its Formats will be treated as if the same is part and parcel hereof and shall be as effectual as if set out herein in this GCC.

The Contractor hereby agrees that BHEL may make any amendments or modifications to the provisions stipulated in the Procedure 2.3 enclosed in Vol 1A Part II Chapter 5 from time to time and confirms that it shall be bound by such amended or modified provisions of the Procedure 2.3 with effect from the date as intimated by BHEL to it.

2.21.3 No Interest payable to Contractor

Notwithstanding anything to the contrary contained in any other document comprising in the Contract, no interest shall be payable by BHEL to Contractor on any moneys or balances including but not limited to the Security Deposit, EMD, Retention Money, RA Bills or the Final Bill, or any amount withheld

and/or appropriated by BHEL etc., which becomes or as the case may be, is adjudged to be due from BHEL to Contractor whether under the Contract or otherwise.

Sl No: 13

Procedure 2.3 that forms the part of Forms and Procedures is published as Chapter 6 in Volume IA Part II of this booklet (Volume-I Book-I).

Sl No: 14

The chapter Reverse auction procedure published in 'Forms and Procedures' of Volume I Book-II stands deleted. **Reverse Auction is not applicable for this tender.**

Sl. No.: 14

Existing format on Monthly Plan Review with Contractor, as available in Form No F-14 of Volume ID Forms and procedure stands Deleted. Form No.- F-14 (Rev 01) is enclosed.

Sl No.: 15

Existing format on Monthly Performance Evaluation of Contractor, as available in Form No F-15 of Volume ID Forms and procedure stands Deleted. Form No.- F-15 (Rev 02) is enclosed.

Sl No: 16

Clause 2.22 in GCC regarding Retention Amount is revised as under:

2.22 Performance security Deposit

2.22.1 After award of work, before commencement of work at site Vendor shall submit 5% of the contract value towards Performance Security Deposit, in the form of (a) or (b) below. In addition, Performance Security deposit on PVC will be recovered at the rate of 5% from every running bill.

(a) CASH (DD/Online payment), 5% of the contract Value towards Performance security deposit, before commencing the contract.
(or)
(b) Recovery 5% from Each Running Bill towards Performance security deposit.
(Note: Subcontractor has to choose either Option (a) or (b) before issue of Detailed LOI).

2.22.2 **Refund of Performance Security Deposit**:

a) 50% of Performance Security Deposit shall be released along with the final bill.
b) Balance 50% will be released after completion of Performance Guarantee Period (i.e., after expiry of Guarantee period), provided all the defects noticed during the guarantee period have been rectified to the satisfaction of BHEL Site Engineer/ BHEL Construction Manager, and after deducting all expenses/other amounts due to BHEL under the contract/ other contracts entered into by BHEL

with them. This portion of Performance Security Deposit, amount can be released on commencement of the Guarantee Period, on submission of equivalent Bank Guarantee.

Sl No: 17

Existing format for Integrity Pact, as available in Volume ID Forms and procedure stands Deleted. Revised Format is enclosed in NIT.

Sl No: 18

Existing format for BANK GUARANTEE FOR SECURITY DEPOSIT, as available in Form No. F-11 (Rev 00) of Volume ID Forms and procedures stands deleted. Refer Proforma of Bank Guarantee (in lieu of Security Deposit)-Form WAM 22 provided in Chapter-10, Part-II of Volume-IA Technical Conditions of Contract.

Sl No: 19

Clause 2.15.5 of GCC in Extra Works is revised as under:

2.15.5: After eligibility of extra works is established and finally accepted by BHEL engineer / designer, payment will be released on competent authority's approval at the following rate.

MAN-HOUR RATE FOR ELIGIBLE EXTRA WORKS:

Single composite average labour man-hour rate, including overtime if any, supervision, use of tools and tackles and other site expenses and incidentals, consumables for carrying out any major rework / repairs / rectification / modification / fabrication as certified by site as may arise during the course of erection, testing, commissioning or extra works arising out of transit, storage and erection damages, payment, if found due will be at Rs 108/- per man hour.

VOLUME-IA PART – II CHAPTER 2 to CHAPTER 10

In the next 190 pages as below:

CHAPTER	Details	No. of sheets
CHAPTER 2	Technical Specification For Installation Of Stone Column By Vibro Displacement Method (Dry Method) For 2 X 660 MW Ennore Sez Stps	08
CHAPTER 3	Report on Geo Technical Investigation Work for 2 x 660 MW Caol based STPP at Ennore SEZ	70
CHAPTER 4	Plot Plan	01
CHAPTER 5	HSE Plan For Site Operations By Subcontractor	82
CHAPTER 6	Procedure for conduct of Conciliation	11
CHAPTER 7	Proforma of Bank Guarantee (in lieu of Earnest Money)- Form WAM 23	03
CHAPTER 8	Proforma of Bank Guarantee (in lieu of Security Deposit)- Form WAM 22	03
CHAPTER 9	Format for Form no.: F-14 (Rev 01); Monthly Plan and Review with Contractors	06
CHAPTER 10	Format for Form no.: F-15 (Rev 02); Monthly Performance Evaluation of contractor	06

TECHNICAL SPECIFICATION FOR
INSTALLATION OF STONE COLUMN BY VIBRO DISPLACEMENT METHOD (DRY METHOD)
FOR
2 X 660MW ENNORE SEZ STPS

CONTENTS

TECHNICAL SPECIFICATION FOR
INSTALLATION OF STONE COLUMN BY VIBRO DISPLACEMENT METHOD (DRY METHOD)
FOR
2 X 660MW ENNORE SEZ STPS

1.00.0 SCOPE

1.01.0 This specification covers the installation of stone column by vibro displacement method. It also covers test to be carried out on the virgin as well as improved ground.

2.00.00 GENERAL REQUIREMENT

2.01.00 This specification covers the technical requirements for stone column by vibro displacement method.

2.02.00 The work shall include supplying and providing necessary materials, mobilization of all necessary equipments providing necessary engineering supervision through qualified and technical personnel, skilled and unskilled labour etc as required to carry out the complete stone column works including necessary testing and submission of records as per schedule.

2.03.00 All works shall be executed as per the specification to the satisfaction of the Engineer.

2.04.00 The design of detachable pile shoe shall be furnished for approval by BHEL / BSEB customer consultancy along with this specification.

2.05.00 It is essential that all equipments and instruments are properly calibrated both at commencement and immediately after the completion of tests so that they represent true values.

2.06.00 The coordinates and position of stone column as shall be as per the approved drawings. All the required survey instruments shall provide at site to the satisfaction of the Engineer so that the work can be carried out accurately according to specification and drawings.

2.07.00 The quality of stone column work including quality of sand and gravel used shall be approved at Site before use.

3.00.00 MATERIALS

3.01.00 GENERAL

All materials viz stone aggregate and sand shall conform to IS: 383. Sand and stone aggregate mix of 1 (sand): 2 (stone aggregate with size 50 mm and down) shall be used. For quality of materials refer to Cl 5.05.01

4.00.00 STONE COLUMN INSTALLATION

Installation of stone column shall be as per procedure outlined elsewhere in the specification, relevant drawings and as per the direction of the Engineer.

**TECHNICAL SPECIFICATION FOR
INSTALLATION OF STONE COLUMN BY VIBRO DISPLACEMENT METHOD (DRY METHOD)
FOR
2 X 660MW ENNORE SEZ STPS**

4.01.00 EQUIPMENT AND ACCESSORIES

4.01.01 The equipment and accessories for installation of stone column shall be with using ground improvement rigs and accessories capable of installing stone columns by Vibro-displacement method (dry method) using vibro flot/vibro cat/any other suitable means to suit the installation procedure mentioned below. These shall be of standard type and shall have the approval of the Engineer.

4.02.00 INSTALLATION PROCEDURE

4.02.01 Vibro flot/vibro cat/any other suitable means is used to support the bottom feed vibrator assembly and penetration of required depth by the combined actions of vibrations and a push down thrust. No water shall be used to penetrate the vibro flot/vibro cat in any case and it shall not be allowed in any circumstances. Once the vibrator is reached to the required depth, stone shall be filled to the tip of the vibrator. The vibrator shall be removed in small steps up and down to laterally displace the stone and simultaneously compact the stone and the surrounding in-situ soil/ash.

4.02.02 Filling of stone column shall be done for 800 mm depth with desired back fill material as specified elsewhere in the specification. This process shall be repeated up to ground level, leaving a well compacted, tightly interlocked stone column surrounded by soil/ash.

4.02.03 The vibrator shall not be removed from the ground during column construction in order to maintain stability of the sides to ensure that the stone shall reach the required depth.

4.02.04 After withdrawal/lifting the vibrator for about 800 mm, the backfill material inside the hole shall be thoroughly compacted using dynamic compaction method so as to achieve maximum compaction. Dynamic compaction may be done using a suitable means operating inside the hole.

4.02.05 Once the first layer is compacted, fill the casing pipe for another 800 mm height with the desired backfill material and the procedure mentioned above shall be repeated so as to achieve maximum compaction.

4.02.06 After achieving the compaction of 2nd layer, repeat the procedure as mentioned above layer wise till the stone column are installed up to the existing ground level.

4.02.07 While installing a large group of stone column, the sequence of installation shall be from the centre to the periphery or one side to the other for avoiding possibility of damaging the neighboring stone column and heaving of soil.

**TECHNICAL SPECIFICATION FOR
INSTALLATION OF STONE COLUMN BY VIBRO DISPLACEMENT METHOD (DRY METHOD)
FOR
2 X 660MW ENNORE SEZ STPS**

4.02.08 Centre to centre spacing of stone column shall be as per the relevant drawing.

4.03.00 CONTROL OF POSITION AND ALIGNMENT

4.03.01 Stone column shall be installed as accurately vertical as possible.

4.04.00 ADJACENT STRUCTURES

4.04.01 When working near existing structures care shall be taken to avoid any damage to such structures.

4.05.00 Reference of stone column installation

4.05.01 Each stone column shall be identified with a reference number.

4.06.00 Rejection and Replacement of Defective stone column

4.06.01 The Engineer reserves the right to reject any stone column which in his opinion is defective on account of position, alignment, quality of workmanship and materials etc. Stone column that are defective shall be left in place as judged convenient by the Engineer without affecting the performance of adjacent stone column. The Bidder shall install additional stone column to substitute the defective stone column as per the directions of the Engineer at no extra cost to BHEL.

4.07.00 Recording of stone column Data

4.07.01 The Bidder shall record all the information during installation of stone column. Typical data sheet for recording pile data shall be as shown in Annexure-D of IS: 15284, Part I. On completion of each stone column installation, stone column record in triplicate shall be submitted to Engineer.

5.00.00 TESTING AND QUALITY ASSURANCE

5.01.00 Facilities required for testing of stone column in field should be provided by the Bidder. The Bidder shall carry out all testing in accordance with the relevant Indian Standards and as per this Specification. Where no specific testing procedure is mentioned the tests shall be carried out as per the prevalent accepted engineering practice and as per the directions of the Engineer. Tests shall be done in the presence of the Engineer or his authorized representative. In case the Engineer requires additional tests, the same shall be arranged by BHEL.

5.02.00 All inspection and testing records shall be maintained which shall be made available to the Engineer.

5.03.00 Materials found unsuitable for acceptance shall be removed and replaced. The work done by this unsuitable material shall be redone as per specification requirements & and to the satisfaction of the Engineer.

5.04.00 Quality Assurance Programme

a) The installation procedure mentioned above shall be followed and any deviations in the same shall be brought to the notice of the Engineer. This shall also include setting up of a testing laboratory, arrangement of testing apparatus/equipment, deployment of qualified/experienced manpower, etc. The testing apparatus/equipment installed in the field laboratory shall be calibrated/ corrected by the qualified persons as frequently as possible to give accurate testing results.

b) Frequency of sampling and testing, etc. and Acceptance Criteria are given in Table - 1. The testing shall be done at field, laboratory or any other laboratory approved by the Engineer. However, the testing frequencies set forth are the desirable minimum and the Engineer shall have the full authority to call for tests as frequently as he may deem necessary to satisfy himself that the materials and works comply with the appropriate specifications. The materials shall be tested to meet all the specified requirements before acceptance at approved laboratory. Tests indicated in the table are for cross checking at site the conformity of the materials to some of the specifications.

5.05.00 TESTING OF MATERIALS

5.05.01 Sand and other materials shall be tested for quality, strength and other properties please refer to Table -1

5.05.02 Plate load test and Dynamic penetration test on virgin and improved ground shall be conducted as per required depth and location as shown in the relevant drawings.

5.05.03 The acceptance criteria shall be as mentioned in Table-1.

5.06.00 TESTING FOR POSITION AND ALIGNMENT

5.06.01 Each stone column shall be checked for its position and alignment as per relevant drawings.

**TECHNICAL SPECIFICATION FOR
INSTALLATION OF STONE COLUMN BY VIBRO DISPLACEMENT METHOD (DRY METHOD)
FOR
2 X 660MW ENNORE SEZ STPS**

6.00.00 FIELD TESTS

The following tests shall be carried out as per relevant Indian Standards or as directed by Engineer.

6.01.00 DYNAMIC CONE PENETRATION TEST

6.01.01 The specification for the equipment and accessories required for performing the test, test procedure, field observations and reporting of results shall conform to IS:4968, Part-I. The location and depth of the test shall be as given in the drawing or as indicated by the engineer-in-charge.

6.02.00 PLATE LOAD TEST

6.02.01 The specification for equipment and accessories required for conducting the test, the test procedure, field observations and reporting of results etc shall conform to IS: 1888. The location and depth of the test shall be as given in the drawing or as indicated by the engineer-in-charge.

TECHNICAL SPECIFICATION FOR
INSTALLATION OF STONE COLUMN BY VIBRO DISPLACEMENT METHOD (DRY METHOD)
FOR
2 X 660MW ENNORE SEZ STPS

ANNEXURE-A

TABLE -1

FREQUENCY PLAN OF SAMPLING AND TESTING

Sl. No	Type of material / work	Nature of Test/ characteristics	Method of Test & frequency	No. of test	Acceptance Criteria
1.	stone column				
	a) diameter		Physical measurement	Each stone column	As per specification
	b) length				
2.	Position and Alignment	-	Survey Instrument / any Approved method	Each stone column	As per specification
3.	Stone aggregate and sand	As per IS:383	Site Lab test regularly / In approved lab on change in source		As Below
a	50 mm and down stone aggregates	Aggregate Crushing Value	In approved lab, as per IS 2386 Part-IV	One test for every 5000 m3 and at every source	as per IS 2386 Part-IV
b	50 mm and down stone aggregates	Sieve Analysis	Site Lab test regularly / In approved lab on change in source	-do-	As per Annexure-B
c	Sand	Grading of Sand	Site Lab test regularly / In approved lab on change in source	-do-	Zone-I/Zone-II/Zone-III As per IS 383 Table- 4

TECHNICAL SPECIFICATION FOR
INSTALLATION OF STONE COLUMN BY VIBRO DISPLACEMENT METHOD (DRY METHOD)
FOR
2 X 660MW ENNORE SEZ STPS

ANNEXURE-B

Grading Requirement of 50 mm and down stone aggregates

Sieve size, mm	Percent passing the sieve, by weight
50	100
40	35 - 70
20	0 - 10
10	0 - 5

Job No: 3388

REPORT ON
GEOTECHNICAL INVESTIGATION WORK FOR
2 x 660MW COAL BASED STPP AT ENNORE SEZ
AT ASH DYKE OF NCTPS, CHENNAI,
TAMILNADU

VOLUME 2
(*Borelogs, Field & Laboratory Test Results, Graphs, Charts etc.*)

Client:

M/s, Bharat Heavy Electricals Limited
Power Sector - Southern Region
690, Annasalai, Nandanam,
Chennai - 600035

Foundation Consultants:

C. E. Testing Company Pvt. Limited
An ISO 9001, 14001& OHSAS 18001 Certified Company
NABL Accredited Laboratory
124A, N.S.C. Bose Road : Kolkata - 700 092
Phones: 2428-6221/6222/6223 Fax: (033) 2428-6220
Email: cetest@cetestindia.com

February – 2015

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PART I: ALL FIELD TESTS RESULTS

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Project : Geotech. Inv. Work for 2x660MW Coal Based STPP at Ash Dyke of NCTPS, Chennai. CETEST

Job No : 3388 | Created by : Chandrani | Created on : 22/01/2015 | Sheet No:

BORE LOG DATA SHEET

BORE HOLE NO.1

Co-ordinates E=2800.000 N=4678.000

Field Test	Nos	Samples	Nos
Penetrometer (SPT)	22	Undisturbed (UDS)	8
Cone (Pc)		Penetrometer (SPT)	22
Vane (V)		Disturbed (DS)	21
		Water Sample (WS)	0

Commencement Date : 26/12/14
Completion Date : 27/12/14
Bore Hole Diameter : 150 mm.
Level Of Ground : 8.407 m.
Water Struck At :
Standing Water Level : 0.70 m.

DESCRIPTION	SYMBOL	N-VALUE (EACH DIVN. = 15cm.)				SAMPLES	
						Ref. No	Depth (m)
0.00m							
Very soft, greyish brown, silty clay with kankars.					0	DS-1	0.50
1.45m		0	0	0		SPT-1	1.00-1.45
						*UDS-1	2.00-2.45
		0	0	1	1	SPT-2	3.00-3.45
Very loose, deep grey, silty sand / sandy silt.						*UDS-2	4.00-4.45
		0	1	0	1	SPT-3	5.00-5.45
6.45m						*UDS-3	6.00-6.45
		0	1	2	3	SPT-4	7.00-7.45
Very loose to loose, brownish grey, silty sand / sandy silt with steel grey patches.						UDS-4	8.00-8.45
		3	5	5	10	SPT-5	9.00-9.45
						*UDS-5	10.00-10.45
11.00m						DS-2	11.00
		8	11	12	23	SPT-6	11.50-11.95
Very stiff, light greenish grey, silty clay / clayey silt.						DS-3	12.50
						*UDS-6	13.00-13.45
						DS-4	14.00
14.50m		9	14	17	31	SPT-7	14.50-14.95
						DS-5	15.50
						*UDS-7	16.00-16.45
						DS-6	17.00
Medium dense to dense, light yellowish grey, silty sand / sandy silt.		5	6	9	15	SPT-8	17.50-17.95
						DS-7	18.50
						UDS-8	19.00-19.45
						DS-8	20.00
Dense, light brownish yellow, silty sand / sandy silt. Obs. steel grey patches. 20.50m		13	18	22	40	SPT-9	20.50-20.95
21.50m						DS-9	21.50

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Project : Geotech. Inv. Work for 2x660MW Coal Based STPP at Ash Dyke of NCTPS, Chennai. CETEST

Job No : 3388 | Created by : Chandrani | Created on : 22/01/2015 | Sheet No:

BORE LOG DATA SHEET

BORE HOLE NO.1

Co-ordinates E=2800.000 N=4678.000

Field Test	Nos	Samples	Nos
Penetrometer (SPT)	22	Undisturbed (UDS)	8
Cone (Pc)		Penetrometer (SPT)	22
Vane (V)		Disturbed (DS)	21
		Water Sample (WS)	0

Commencement Date : 26/12/14
Completion Date : 27/12/14
Bore Hole Diameter : 150 mm.
Level Of Ground : 8.407 m.
Water Struck At :
Standing Water Level : 0.70 m.

DESCRIPTION	SYMBOL	N-VALUE (EACH DIVN. = 15cm.)				SAMPLES Ref. No	SAMPLES Depth (m)
Dense, light brownish yellow, silty sand / sandy silt. Obs. steel grey patches.		17	20	25	45	SPT-10	22.00-22.45
						DS-10	23.00
Very dense, yellowish brown, silty sand.		18	22	30	52	SPT-11	23.50-23.95
						DS-11	24.50
		20	27	31	58	SPT-12	25.00-25.45
						DS-12	26.00
Hard, brownish grey, silty clay with sand mixture. Obs. steel grey patches, yellowish spots.		18	22	33	55	SPT-13	26.50-26.95
						DS-13	27.50
		18	21	30	51	SPT-14	28.00-28.45
						DS-14	29.00
		17	21	29	50	SPT-15	29.50-29.95
						DS-15	30.50
Very dense, light yellow, silty sand.		31	33	35	68	SPT-16	31.00-31.45
						DS-16	32.00
		37	40	41	81	SPT-17	32.50-32.95
						DS-17	33.50
Very dense, light brownish yellow, silty sand.		30	39	45	84	SPT-18	34.00-34.45
						DS-18	35.00
		35	45	50	95	SPT-19	35.50-35.95
						DS-19	36.50
Hard, brownish yellow, silty clay / clayey silt with traces of sand.		28	30	31	61	SPT-20	37.00-37.45
						DS-20	38.00
		27	29	31	60	SPT-21	38.50-38.95
						DS-21	39.50
		26	31	32	63	SPT-22	40.00-40.45

21.50m
22.00m
26.00m
31.00m
34.00m
37.00m
40.45m

N.B. - '*' means sample could not be recovered.

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Project : Geotech. Inv. Work for 2x660MW Coal Based STPP at Ash Dyke of NCTPS, Chennai. CETEST

Job No : 3388 | Created by : Chandrani | Created on : 12/01/2015 | Sheet No:

BORE LOG DATA SHEET

BORE HOLE NO.2

Co-ordinates E=3374.000 N=4500.000

Field Test	Nos	Samples	Nos
Penetrometer (SPT)	22	Undisturbed (UDS)	8
Cone (Pc)		Penetrometer (SPT)	22
Vane (V)		Disturbed (DS)	21
		Water Sample (WS)	0

Commencement Date : 24/12/14
Completion Date : 25/12/14
Bore Hole Diameter : 150 mm.
Level Of Ground : 8.39 m.
Water Struck At :
Standing Water Level : 0.8 m.

DESCRIPTION	SYMBOL	N-VALUE (EACH DIVN. = 15cm.)				SAMPLES Ref. No	SAMPLES Depth (m)
0.00m							
Very soft, brownish grey, silty clay with kankars.					0	DS-1	0.50
1.45m		0	0	0		SPT-1	1.00-1.45
						UDS-1	2.00-2.45
Very loose, deep grey, clayey silty sand.		0	0	1	1	SPT-2	3.00-3.45
						*UDS-2	4.00-4.45
5.45m		0	1	1	2	SPT-3	5.00-5.45
						*UDS-3	6.00-6.45
Very loose, brownish grey, silty sand / sandy silt with steel grey patches		0	1	2	3	SPT-4	7.00-7.45
						*UDS-4	8.00-8.45
9.00m		4	5	6	11	SPT-5	9.00-9.45
Medium dense, light greenish grey, silty sand with traces of clay binder.						UDS-5	10.00-10.45
						DS-2	11.00
11.45m		5	9	14	23	SPT-6	11.45-11.90
						DS-3	12.50
						*UDS-6	13.00-13.45
						DS-4	14.00
		5	7	11	18	SPT-7	14.50-14.95
Medium, light greenish grey, silty sand / sandy silt.						DS-5	15.50
						UDS-7	16.00-16.45
						DS-6	17.00
17.50m		11	14	17	31	SPT-8	17.50-17.95
						DS-7	18.50
Dense to very dense, light yellowish grey, silty sand / sandy silt with steel grey patches.						UDS-8	19.00-19.45
						DS-8	20.00
21.00m		15	16	20	36	SPT-9	20.50-20.95

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Project : Geotech. Inv. Work for 2x660MW Coal Based STPP at Ash Dyke of NCTPS, Chennai. CETEST

Job No : 3388 | Created by : Chandrani | Created on : 12/01/2015 | Sheet No:

BORE LOG DATA SHEET

BORE HOLE NO.2

Co-ordinates E=3374.000 N=4500.000

Field Test	Nos	Samples	Nos
Penetrometer (SPT)	22	Undisturbed (UDS)	8
Cone (Pc)		Penetrometer (SPT)	22
Vane (V)		Disturbed (DS)	21
		Water Sample (WS)	0

Commencement Date : 24/12/14
Completion Date : 25/12/14
Bore Hole Diameter : 150 mm.
Level Of Ground : 8.39 m.
Water Struck At :
Standing Water Level : 0.8 m.

DESCRIPTION	SYMBOL	N-VALUE (EACH DIVN. = 15cm.)				SAMPLES Ref. No	SAMPLES Depth (m)
21.00m							
Dense to very dense, light yellowish grey, silty sand / sandy silt with steel grey patches.		19	25	30	55	DS-9	21.50
						SPT-10	22.00-22.45
						DS-10	23.00
23.50m		31	37	42	79	SPT-11	23.50-23.95
Very dense, brownish yellow, silty sand.						DS-11	24.50
		35	38	40	78	SPT-12	25.00-25.45
						DS-12	26.00
26.50m		27	31	45	76	SPT-13	26.50-26.95
Very dense, light yellowish grey, silty sand / sandy silt. Obs. reddish spot.						DS-13	27.50
		25	31	38	69	SPT-14	28.00-28.45
						DS-14	29.00
29.50m		18	22	27	49	SPT-15	29.50-29.95
Dense, light yellowish grey, silty sand with traces of clay binder.						DS-15	30.50
31.00m		15	20	24	44	SPT-16	31.00-31.45
Hard, steel grey, silty clay / clayey silt with fine sand mixture.						DS-16	32.00
		17	19	32	51	SPT-17	32.50-32.95
						DS-17	33.50
34.00m		25	39	33	72	SPT-18	34.00-34.45
Very dense, yellowish grey, silty sand / sandy silt.						DS-18	35.00
		22	23	55	78	SPT-19	35.50-35.95
						DS-19	36.50
37.00m		25	32	50	85	SPT-20	37.00-37.45
Hard, deep brown, silty clay / clayey silt with coarse sand mixture.						DS-20	38.00
38.50m		27	31	55	86	SPT-21	38.50-38.95
Hard, deep brown, silty clay.						DS-21	39.50
		17	22	47	69	SPT-22	40.00-40.45
40.45m							

N.B. – '*' means sample could not be recovered.

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Project : Geotech. Inv. Work for 2x660MW Coal Based STPP at Ash Dyke of NCTPS, Chennai. CETEST

Job No : 3388 | Created by : Chandrani | Created on : 12/01/2015 | Sheet No:

BORE LOG DATA SHEET

BORE HOLE NO.3

Co-ordinates E=3737.000 N=4156.000

Field Test	Nos	Samples	Nos
Penetrometer (SPT)	22	Undisturbed (UDS)	8
Cone (Pc)		Penetrometer (SPT)	22
Vane (V)		Disturbed (DS)	21
		Water Sample (WS)	0

Commencement Date : 21/12/14
Completion Date : 23/12/14
Bore Hole Diameter : 150 mm.
Level Of Ground : 8.454 m.
Water Struck At :
Standing Water Level : 0.85 m.

DESCRIPTION	SYMBOL	N-VALUE (EACH DIVN. = 15cm.)				SAMPLES	
						Ref. No	Depth (m)
0.00m							
Very soft, brownish grey, silty clay with moorum.						DS-1	0.50
1.00m					0		
		0	0	0		SPT-1	1.00-1.45
Very loose, dark grey, clayey silty sand.						UDS-1	2.00-2.45
					0		
		0	0	0		SPT-2	3.00-3.45
4.00m						*UDS-2	4.00-4.45
					1		
		0	0	1		SPT-3	5.00-5.45
Very loose, brownish grey, clayey sandy silt with steel grey patches.						*UDS-3	6.00-6.45
					3		
7.45m		0	1	2		SPT-4	7.00-7.45
						*UDS-4	8.00-8.45
					12		
		2	5	7		SPT-5	9.00-9.45
						UDS-5	10.00-10.45
Medium dense, light greenish grey, silty sand.						DS-2	11.00
					24		
		4	10	14		SPT-6	11.45-11.90
						DS-3	12.50
						*UDS-6	13.00-13.45
14.00m						DS-4	14.00
					27		
Very stiff, light greenish grey, silty clay with high % of fine sand mixture.		8	10	17		SPT-7	14.50-14.95
						DS-5	15.50
16.00m						UDS-7	16.00-16.45
						DS-6	17.00
Hard, greenish grey, silty clay / clayey silt with sand mixture.					37		
		14	15	22		SPT-8	17.50-17.95
18.50m						DS-7	18.50
						UDS-8	19.00-19.45
Dense to very dense, light yellowish grey, silty sand with steel grey patches.						DS-8	20.00
					37		
21.00m		10	17	20		SPT-9	20.50-20.95

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Project : Geotech. Inv. Work for 2x660MW Coal Based STPP at Ash Dyke of NCTPS, Chennai. CETEST

Job No : 3388 | Created by : Chandrani | Created on : 12/01/2015 | Sheet No:

BORE LOG DATA SHEET

BORE HOLE NO.3

Co-ordinates E=3737.000 N=4156.000

Field Test	Nos	Samples	Nos
Penetrometer (SPT)	22	Undisturbed (UDS)	8
Cone (Pc)		Penetrometer (SPT)	22
Vane (V)		Disturbed (DS)	21
		Water Sample (WS)	0

Commencement Date : 21/12/14
Completion Date : 23/12/14
Bore Hole Diameter : 150 mm.
Level Of Ground : 8.454 m.
Water Struck At :
Standing Water Level : 0.85 m.

DESCRIPTION	SYMBOL	N-VALUE (EACH DIVN. = 15cm.)				SAMPLES	
						Ref. No	Depth (m)
21.00m						DS-9	21.50
Dense to very dense, light yellowish grey, silty sand with steel grey patches.		33	46	50	96	SPT-10	22.00-22.45
						DS-10	23.00
23.45m		31	37	48	85	SPT-11	23.45-23.90
						DS-11	24.50
Very dense, light brownish yellow, silty sand.		25	40	43	83	SPT-12	25.00-25.45
						DS-12	26.00
		22	40	51	91	SPT-13	26.50-26.95
						DS-13	27.50
28.00m		23	45	45	90	SPT-14	28.00-28.45
						DS-14	29.00
Very dense, light greyish yellow, silty coarse sand.		23	54	43	97	SPT-15	29.50-29.95
						DS-15	30.50
		25	43	48	91	SPT-16	31.00-31.45
						DS-16	32.00
32.50m		32	38	47	85	SPT-17	32.50-32.95
Very dense, brownish yellow, silty fine sand.						DS-17	33.50
34.00m		15	24	28	52	SPT-18	34.00-34.45
						DS-18	35.00
Hard, deep brownish grey, silty clay. Obs. yellow patches.		13	18	25	43	SPT-19	35.50-35.95
						DS-19	36.50
37.00m		32	38	50	88	SPT-20	37.00-37.45
						DS-20	38.00
Very dense, greyish yellow, silty sand / sandy silt with grey patches. Obs. greyish brown silty clay (SPT-22).		28	23	55	78	SPT-21	38.50-38.95
						DS-21	39.50
40.55m		12	32	42	74	SPT-22	40.10-40.55

N.B. - '*' means sample could not be recovered.

BH-3/Sheet-2

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Project : Geotech. Inv. Work for 2x660MW Coal Based STPP at Ash Dyke of NCTPS, Chennai. CETEST

Job No : 3388 | Created by : Chandrani | Created on : 05/01/2015 | Sheet No:

BORE LOG DATA SHEET

BORE HOLE NO.4

Co-ordinates E=(-)3627.000 N=3567.000

Field Test	Nos	Samples	Nos
Penetrometer (SPT)	22	Undisturbed (UDS)	8
Cone (Pc)		Penetrometer (SPT)	22
Vane (V)		Disturbed (DS)	21
		Water Sample (WS)	0

Commencement Date : 19/12/14
Completion Date : 20/12/14
Bore Hole Diameter : 150 mm.
Level Of Ground : 8.525 m.
Water Struck At :
Standing Water Level : 1.0 m.

DESCRIPTION	SYMBOL	N-VALUE (EACH DIVN. = 15cm.)					SAMPLES Ref. No	SAMPLES Depth (m)
0.00m								
Filled up soil consists of reddish brown, moorum.							DS-1	0.50
0.70m						0		
		0	0	0			SPT-1	1.00-1.45
Very soft, brownish grey, silty clay with traces of kankars.							*UDS-1	2.00-2.45
3.00m						1		
		0	0	1			SPT-2	3.00-3.45
							*UDS-2	4.00-4.45
						0		
		0	0	0			SPT-3	5.00-5.45
Very loose, deep grey, clayey silty sand.							*UDS-3	6.00-6.45
						2		
		0	0	1	1		SPT-4	7.00-7.45
							*UDS-4	8.00-8.45
8.50m						4		
		2	2	2			SPT-5	9.00-9.45
							UDS-5	10.00-10.45
							DS-2	11.00
Loose, light greenish grey, sandy silt / silty sand.						10		
		3	3	7			SPT-6	11.45-11.90
							DS-3	12.50
							*UDS-6	13.00-13.45
14.00m							DS-4	14.00
						27		
		9	11	16			SPT-7	14.45-14.90
Medium dense, light greenish grey, sandy silt / silty sand.							DS-5	15.50
							UDS-7	16.00-16.45
							DS-6	17.00
17.50m						31		
		11	15	16			SPT-8	17.45-17.90
Hard, greenish grey, silty clay / clayey silt with sand mixture.							DS-7	18.50
19.00m							UDS-8	19.00-19.45
		13						
							DS-8	20.00
Dense to very dense, brownish grey, silty coarse sand.						39		
			15	24			SPT-9	20.50-20.95
21.00m								

BH-4/Sheet-1

141886/2020/PS-SR-PM

Project : Geotech. Inv. Work for 2x660MW Coal Based STPP at Ash Dyke of NCTPS, Chennai. CETEST

Job No : 3388 | Created by : Chandrani | Created on : 05/01/2015 | Sheet No:

BORE LOG DATA SHEET

BORE HOLE NO.4

Co-ordinates E=(-)3627.000 N=3567.000

Field Test	Nos	Samples	Nos
Penetrometer (SPT)	22	Undisturbed (UDS)	8
Cone (Pc)		Penetrometer (SPT)	22
Vane (V)		Disturbed (DS)	21
		Water Sample (WS)	0

Commencement Date : 19/12/14
Completion Date : 20/12/14
Bore Hole Diameter : 150 mm.
Level Of Ground : 8.525 m.
Water Struck At :
Standing Water Level : 1.0 m.

DESCRIPTION	SYMBOL	N-VALUE (EACH DIVN. = 15cm.)				SAMPLES Ref. No	SAMPLES Depth (m)
21.00m						DS-9	21.50
		16	18	25	43	SPT-10	22.00-22.45
						DS-10	23.00
Dense to very dense, brownish grey, silty coarse sand.		16	26	38	64	SPT-11	23.50-23.95
						DS-11	24.50
		17	27	40	67	SPT-12	25.00-25.45
26.50m						DS-12	26.00
		14	21	27	48	SPT-13	26.50-26.95
						DS-13	27.50
Hard, brownish grey, silty clay.		14	20	29	49	SPT-14	28.00-28.45
						DS-14	29.00
29.50m					45		
		13	20	25		SPT-15	29.50-29.95
						DS-15	30.50
Dense to very dense, brownish yellow, silty coarse sand. Obs. steel grey patches.		15	24	27	51	SPT-16	31.00-31.45
						DS-16	32.00
32.50m					78		
		13	33	45		SPT-17	32.50-32.95
						DS-17	33.50
Very dense, brownish grey, silty coarse sand.		16	30	41	71	SPT-18	34.00-34.45
						DS-18	35.00
35.50m					50		
		11	20	30		SPT-19	35.50-35.95
						DS-19	36.50
Very dense, brownish grey, silty coarse sand with clay binder. Obs. reddish spot.		13	20	34	54	SPT-20	37.00-37.45
						DS-20	38.00
38.50m					78		
		20	33	45		SPT-21	38.50-38.95
						DS-21	39.50
Very dense, brownish grey, silty sand with clay lamination. Obs. silty clay in SPT-22.					75		
40.45m		26	35	40		SPT-22	40.00-40.45

N.B. - '*' means sample could not be recovered.

BH-4/Sheet-2

141886/2020/PS-SR-PM

Project : Geotech. Inv. Work for 2x660MW Coal Based STPP at Ash Dyke of NCTPS, Chennai. CETEST

Job No : 3388 | Created by : Chandrani | Created on : 05/01/2015 | Sheet No:

BORE LOG DATA SHEET

BORE HOLE NO.5

Co-ordinates E=(-)3681.000 N=2973.000

Field Test	Nos	Samples	Nos
Penetrometer (SPT)	22	Undisturbed (UDS)	8
Cone (Pc)		Penetrometer (SPT)	22
Vane (V)		Disturbed (DS)	20
		Water Sample (WS)	1

Commencement Date : 16/12/14
Completion Date : 18/12/14
Bore Hole Diameter : 150 mm.
Level Of Ground : 8.857 m.
Water Struck At :
Standing Water Level : 1.1 m.

DESCRIPTION	SYMBOL	N-VALUE (EACH DIVN. = 15cm.)					SAMPLES Ref. No	SAMPLES Depth (m)
0.00m								
Filled up soil consists of reddish brown, moorum & stone pieces.		4	9	9		18	DS-1	0.50
1.50m							SPT-1	1.00-1.45
							WS-1	1.10
							*UDS-1	2.00-2.45
		0	0	0	0	0	SPT-2	3.00-3.45
							*UDS-2	4.00-4.45
Very loose to loose, yellowish brown to light grey, clayey silty sand.		0	0	1		1	SPT-3	5.00-5.45
							UDS-3	6.00-6.45
		2	4	5		9	SPT-4	7.00-7.45
							UDS-4	8.00-8.45
9.00m		4	6	8		14	SPT-5	9.00-9.45
							*UDS-5	10.00-10.45
Medium dense, light greenish grey, silty sand / sandy silt.							DS-2	11.00
		5	11	14		25	SPT-6	11.50-11.95
12.50m							DS-3	12.50
							*UDS-6	13.00-13.45
		8	14	18		32	SPT-7	14.50-14.95
Dense, light greenish grey, silty sand / sandy silt.							DS-4	15.50
							UDS-7	16.00-16.45
17.00m							DS-5	17.00
		14	17	19		36	SPT-8	17.50-17.95
Hard, light grey, silty clay / clayey silt with laminated fine sand mixture.							DS-6	18.50
							UDS-8	19.00-19.45
20.00m							DS-7	20.00
Dense to very dense, yellowish brown, silty sand with traces of laminated clay binders.		17	21	24		45	SPT-9	20.50-20.95
21.00m								

BH-5/Sheet-1

141886/2020/PS-SR-PM

Project : Geotech. Inv. Work for 2x660MW Coal Based STPP at Ash Dyke of NCTPS, Chennai. CETEST

Job No : 3388 | Created by : Chandrani | Created on : 05/01/2015 | Sheet No:

BORE LOG DATA SHEET

BORE HOLE NO.5

Co-ordinates E=(-)3681.000 N=2973.000

Field Test	Nos	Samples	Nos
Penetrometer (SPT)	22	Undisturbed (UDS)	8
Cone (Pc)		Penetrometer (SPT)	22
Vane (V)		Disturbed (DS)	20
		Water Sample (WS)	1

Commencement Date : 16/12/14
Completion Date : 18/12/14
Bore Hole Diameter : 150 mm.
Level Of Ground : 8.857 m.
Water Struck At :
Standing Water Level : 1.1 m.

DESCRIPTION	SYMBOL	N-VALUE (EACH DIVN. = 15cm.)	SAMPLES Ref. No	SAMPLES Depth (m)
			DS-8	21.50
		15 20 33 = 53	SPT-10	22.00-22.45
			DS-9	23.00
Dense to very dense, yellowish brown, silty sand with traces of laminated clay binders.		25 38 45 = 83	SPT-11	23.50-23.95
			DS-10	24.50
		19 29 38 = 67	SPT-12	25.00-25.45
21.00m			DS-11	26.00
		12 16 24 = 40	SPT-13	26.50-26.95
			DS-12	27.50
		11 20 25 = 45	SPT-14	28.00-28.45
Hard, brownish grey, silty clay / clayey silt with whitish grey / steel grey patches & laminated sand mixture.			DS-13	29.00
		19 23 26 = 49	SPT-15	29.50-29.95
			DS-14	30.50
		15 25 32 = 57	SPT-16	31.00-31.45
			DS-15	32.00
26.00m		26 37 47 = 84	SPT-17	32.50-32.95
			DS-16	33.50
		24 39 48 = 87	SPT-18	34.00-34.45
			DS-17	35.00
		31 44 53 = 97	SPT-19	35.50-35.95
Very dense, yellowish brown, silty sand. Obs. clay binder.			DS-18	36.50
		35 52 50 = >100 (10.0 cm Pentn.)	SPT-20	37.00-37.40
			DS-19	38.00
		37 47 50 = >100 (10.0 cm Pentn.)	SPT-21	38.50-38.90
			DS-20	39.50
33.00m				
		43 56 50 = >100 (9.0 cm Pentn.)	SPT-22	40.10-40.49
40.49m				

N.B. – '*' means sample could not be recovered.

BH-5/Sheet-2

141886/2020/PS-SR-PM

Project : Geotech. Inv. Work for 2x660MW Coal Based STPP at Ash Dyke of NCTPS, Chennai. CETEST

Job No : 3388 | Created by : Chandrani | Created on : 30/01/2015 | Sheet No:

BORE LOG DATA SHEET

BORE HOLE NO.6

Co-ordinates E=(-)3181.000 N=3041.000

Field Test	Nos	Samples	Nos
Penetrometer (SPT)	22	Undisturbed (UDS)	8
Cone (Pc)		Penetrometer (SPT)	22
Vane (V)		Disturbed (DS)	21
		Water Sample (WS)	0

Commencement Date : 13/01/15
Completion Date : 14/01/15
Bore Hole Diameter : 150 mm.
Level Of Ground : 9.731 m.
Water Struck At :
Standing Water Level : 0.80 m.

DESCRIPTION	SYMBOL	N-VALUE (EACH DIVN. = 15cm.)				SAMPLES Ref. No	SAMPLES Depth (m)
0.00m							
					0	DS-1	0.50
Filled up soil consists of light grey, fly ash.		0	0	0		SPT-1	1.00-1.45
						*UDS-1	2.00-2.45
3.00m					2		
		0	1	1		SPT-2	3.00-3.45
						*UDS-2	4.00-4.45
Very soft, greyish brown, silty clay.					3		
		1	1	2		SPT-3	5.00-5.45
						UDS-3	6.00-6.45
7.00m					1		
		0	0	1		SPT-4	7.00-7.45
						UDS-4	8.00-8.45
Very soft, dark grey, silty clay with fine sand mixture.					1		
		0	0	1		SPT-5	9.00-9.45
						UDS-5	10.00-10.45
						DS-2	11.00
11.50m					8		
Loose, whitish grey to greenish grey, silty sand with clay binder.		3	4	4		SPT-6	11.50-11.95
12.50m						DS-3	12.50
						UDS-6	13.00-13.45
						DS-4	14.00
					20		
Medium dense, whitish grey to greenish grey, silty sand with clay binder.		6	8	12		SPT-7	14.50-14.95
						DS-5	15.50
						*UDS-7	16.00-16.45
						DS-6	17.00
17.50m					22		
		4	8	14		SPT-8	17.50-17.95
						DS-7	18.50
Very stiff, light yellow, silty sandy clay.						*UDS-8	19.00-19.45
						DS-8	20.00
20.50m					37		
		9	18	19		SPT-9	20.50-20.95
Dense, greyish yellow, silty sand.							
21.50m						DS-9	21.50

BH-6/Sheet-1

141886/2020/PS-SR-PM

Project : Geotech. Inv. Work for 2x660MW Coal Based STPP at Ash Dyke of NCTPS, Chennai. CETEST

Job No : 3388 | Created by : Chandrani | Created on : 30/01/2015 | Sheet No:

BORE LOG DATA SHEET

BORE HOLE NO.6

Co-ordinates E=(-)3181.000 N=3041.000

Field Test	Nos	Samples	Nos
Penetrometer (SPT)	22	Undisturbed (UDS)	8
Cone (Pc)		Penetrometer (SPT)	22
Vane (V)		Disturbed (DS)	21
		Water Sample (WS)	0

Commencement Date : 13/01/15
Completion Date : 14/01/15
Bore Hole Diameter : 150 mm.
Level Of Ground : 9.731 m.
Water Struck At :
Standing Water Level : 0.80 m.

DESCRIPTION	SYMBOL	N-VALUE (EACH DIVN. = 15cm.)				SAMPLES Ref. No	SAMPLES Depth (m)
21.50m							
		11	20	22	42	SPT-10	22.00-22.45
						DS-10	23.00
		12	17	19	36	SPT-11	23.50-23.95
						DS-11	24.50
Dense, greyish yellow, silty sand.		14	22	24	46	SPT-12	25.00-25.45
						DS-12	26.00
		14	22	18	40	SPT-13	26.50-26.95
						DS-13	27.50
		10	15	26	41	SPT-14	28.00-28.45
						DS-14	29.00
29.50m							
		7	14	23	37	SPT-15	29.50-29.95
						DS-15	30.50
Hard, light grey, silty clay.		10	13	19	32	SPT-16	31.00-31.45
32.00m						DS-16	32.00
		35	42	46	88	SPT-17	32.50-32.95
						DS-17	33.50
		32	41	48	89	SPT-18	34.00-34.45
						DS-18	35.00
Very dense, light greyish yellow, silty coarse sand.		34	42	51	93	SPT-19	35.50-35.95
						DS-19	36.50
		28	39	48	87	SPT-20	37.00-37.45
						DS-20	38.00
38.50m							
		31	45	46	91	SPT-21	38.50-38.95
						DS-21	39.50
Very dense, reddish to greyish yellow, silty coarse sand. Obs. gravels.		25	47	48	95	SPT-22	40.00-40.45
40.45m							

N.B. - '*' means sample could not be recovered.

BH-6/Sheet-2

141886/2020/PS-SR-PM

Project : Geotech. Inv. Work for 2x660MW Coal Based STPP at Ash Dyke of NCTPS, Chennai. CETEST

Job No : 3388 | Created by : Chandrani | Created on : 04/12/2014 | Sheet No:

BORE LOG DATA SHEET

BORE HOLE NO.7

Co-ordinates E=(-)2359.000 N=4273.000

Field Test	Nos	Samples	Nos
Penetrometer (SPT)	22	Undisturbed (UDS)	8
Cone (Pc)		Penetrometer (SPT)	22
Vane (V)		Disturbed (DS)	21
		Water Sample (WS)	0

Commencement Date : 23/11/14
Completion Date : 28/11/14
Bore Hole Diameter : 150 mm.
Level Of Ground : 8.33 m.
Water Struck At :
Standing Water Level : 0.50 m.

DESCRIPTION	SYMBOL	N-VALUE (EACH DIVN. = 15cm.)				SAMPLES Ref. No	SAMPLES Depth (m)
0.00m							
Filled up soil consists of light grey, fly ash.						DS-1	0.50
0.80m					0		
		0	0	0		SPT-1	1.00-1.45
						*UDS-1	2.00-2.45
Very losoe, brownish grey, silty sand with clay binder.					0		
		0	0	0		SPT-2	3.00-3.45
						*UDS-2	4.00-4.45
					1		
5.45m		0	0	1		SPT-3	5.00-5.45
						UDS-3	6.00-6.45
Stiff, light grey to greyish brown, silty clay with high % of sand.					14		
		3	5	9		SPT-4	7.00-7.45
8.00m						UDS-4	8.00-8.45
Loose, steel grey, clayey silt with coarse sand to fine sand. Obs. kanakrs & gravels.					7		
		2	3	4		SPT-5	9.00-9.45
10.00m						UDS-5	10.00-10.45
						DS-2	11.00
Medium dense, pinkish grey, sandy silt with clay binders / clayey silty sand.					18		
		3	7	11		SPT-6	11.50-11.95
						DS-3	12.50
13.00m						UDS-6	13.00-13.45
						DS-4	14.00
					30		
		7	12	18		SPT-7	14.50-14.95
Dense, brownish grey, silty sand.						DS-5	15.50
						UDS-7	16.00-16.45
						DS-6	17.00
17.50m					40		
		12	18	22		SPT-8	17.50-17.95
						DS-7	18.50
Hard, brownish grey, clayey silt with high % of sand.						UDS-8	19.00-19.45
						DS-8	20.00
20.50m							

BH-7/Sheet-1

141886/2020/PS-SR-PM

Project : Geotech. Inv. Work for 2x660MW Coal Based STPP at Ash Dyke of NCTPS, Chennai. CETEST

Job No : 3388 | Created by : Chandrani | Created on : 04/12/2014 | Sheet No:

BORE LOG DATA SHEET

BORE HOLE NO.7

Co-ordinates E=(-)2359.000 N=4273.000

Field Test	Nos	Samples	Nos
Penetrometer (SPT)	22	Undisturbed (UDS)	8
Cone (Pc)		Penetrometer (SPT)	22
Vane (V)		Disturbed (DS)	21
		Water Sample (WS)	0

Commencement Date : 23/11/14
Completion Date : 28/11/14
Bore Hole Diameter : 150 mm.
Level Of Ground : 8.33 m.
Water Struck At :
Standing Water Level : 0.50 m.

DESCRIPTION	SYMBOL	N-VALUE (EACH DIVN. = 15cm.)	SAMPLES Ref. No	SAMPLES Depth (m)
20.50m				
Hard, brownish grey, clayey silt with high % of sand.		8 13 18 — 31	SPT-9	20.50-20.95
21.00m			DS-9	21.50
		10 13 16 — 29	SPT-10	22.00-22.45
			DS-10	23.00
Dense, brownish grey, silty medium sand.		10 14 19 — 33	SPT-11	23.50-23.95
			DS-11	24.50
		13 17 22 — 39	SPT-12	25.00-25.45
26.00m			DS-12	26.00
		25 57 68 — >100	SPT-13	26.50-26.95
			DS-13	27.50
		25 30 37 — 67	SPT-14	28.00-28.45
			DS-14	29.00
		22 27 35 — 62	SPT-15	29.50-29.95
Hard, brownish grey, silty clay / clayey silt. Obs. deep brown spot & kankars.			DS-15	30.50
		13 21 27 — 48	SPT-16	31.00-31.45
			DS-16	32.00
		12 23 27 — 50	SPT-17	32.50-32.95
			DS-17	33.50
		13 27 39 — 66	SPT-18	34.00-34.45
35.00m			DS-18	35.00
		17 31 43 — 74	SPT-19	35.50-35.95
			DS-19	36.50
Hard, light grey, silty clay / clayey silt with laminated sand. Obs. brownish spot.		17 33 48 — 81	SPT-20	37.00-37.45
			DS-20	38.00
		16 38 44 — 82	SPT-21	38.50-38.95
39.00m			DS-21	39.50
Very dense, yellowish grey, silty coarse sand. Obs. clay binder.		41 65 — >100	SPT-22	40.05-40.26
40.26m				
N.B. - '*' means sample could not be recovered.		6.0 cm Penetn.		

BH-7/Sheet-2

141886/2020/PS-SR-PM

Project : Geotech. Inv. Work for 2x660MW Coal Based STPP at Ash Dyke of NCTPS, Chennai. CETEST

Job No : 3388 | Created by : Chandrani | Created on : 04/12/2014 | Sheet No:

BORE LOG DATA SHEET

BORE HOLE NO.8

Co-ordinates E=(-)1953.000 N=8894.000

Field Test	Nos	Samples	Nos
Penetrometer (SPT)	16	Undisturbed (UDS)	8
Cone (Pc)		Penetrometer (SPT)	16
Vane (V)		Disturbed (DS)	15
		Water Sample (WS)	0

Commencement Date : 28/11/14
Completion Date : 30/11/14
Bore Hole Diameter : 150 mm.
Level Of Ground : 8.00 m.
Water Struck At :
Standing Water Level : 0.48 m.

DESCRIPTION	SYMBOL	N-VALUE (EACH DIVN. = 15cm.)	SAMPLES Ref. No	SAMPLES Depth (m)
0.00m				
Filled up soil consists of light brown to light grey, fly ash.		0 0 0 (0)	DS-1	0.50
			SPT-1	1.00-1.45
2.00m			*UDS-1	2.00-2.45
Very loose, deep grey, clayey sand.		0 0 0 (0)	SPT-2	3.00-3.45
			UDS-2	4.00-4.45
		0 0 0 (0)	SPT-3	5.00-5.45
			UDS-3	6.00-6.45
6.50m				
Very soft, light grey, silty clay with sand mixture.		0 0 0 (0)	SPT-4	7.00-7.45
			UDS-4	8.00-8.45
		0 0 0 (0)	SPT-5	9.00-9.45
9.50m				
Deep grey, clayey silty sand.			UDS-5	10.00-10.45
			DS-2	11.00
11.50m		3 7 9 (16)	SPT-6	11.50-11.95
Medium dense, pinkish grey, sandy silt / silty sand. Obs. clay binders.			DS-3	12.50
			UDS-6	13.00-13.45
			DS-4	14.00
14.50m		4 7 10 (17)	SPT-7	14.50-14.95
Medium dense, steel grey, silty fine sand with clay lamination.			DS-5	15.50
15.75m				

BH-8/Sheet-1

141886/2020/PS-SR-PM

Project : Geotech. Inv. Work for 2x660MW Coal Based STPP at Ash Dyke of NCTPS, Chennai. CETEST

Job No : 3388 | Created by : Chandrani | Created on : 04/12/2014 | Sheet No:

BORE LOG DATA SHEET

BORE HOLE NO.8

Co-ordinates E=(-)1953.000 N=8894.000

Field Test	Nos	Samples	Nos
Penetrometer (SPT)	16	Undisturbed (UDS)	8
Cone (Pc)		Penetrometer (SPT)	16
Vane (V)		Disturbed (DS)	15
		Water Sample (WS)	0

Commencement Date : 28/11/14
Completion Date : 30/11/14
Bore Hole Diameter : 150 mm.
Level Of Ground : 8.00 m.
Water Struck At :
Standing Water Level : 0.48 m.

DESCRIPTION	SYMBOL	N-VALUE (EACH DIVN. = 15cm.)	SAMPLES Ref. No	SAMPLES Depth (m)
			*UDS-7	16.00-16.45
Medium dense, steel grey, silty fine sand with clay lamination.			DS-6	17.00
15.75m / 17.50m		5 9 12 — 21	SPT-8	17.50-17.95
Medium dense, light brownish grey, silty medium sand. Obs. kankars.			DS-7	18.50
			*UDS-8	19.00-19.45
20.00m			DS-8	20.00
		13 25 36 — 61	SPT-9	20.50-20.95
			DS-9	21.50
Dense to very dense, brownish grey, silty coarse sand. Obs. clay binders & kankars.		12 20 24 — 44	SPT-10	22.00-22.45
			DS-10	23.00
		12 27 36 — 63	SPT-11	23.50-23.95
24.50m			DS-11	24.50
		16 34 42 — 76	SPT-12	25.00-25.45
Very dense, steel grey, silty coarse sand. Obs. kankars.			DS-12	26.00
		22 63 54 — >100 (5.0 cm Pentn.)	SPT-13	26.50-26.85
27.50m			DS-13	27.50
		26 65 52 — >100 (5.0 cm Pentn.)	SPT-14	28.00-28.35
			DS-14	29.00
Hard, light brownish grey, silty clay / clayey silt. Obs. micasists.		52 54 — >100 (3.0 cm Pentn.)	SPT-15	29.50-29.68
			DS-15	30.50
N.B. - '*' means sample could not be recovered.		31 75 54 — >100 (2.0 cm Pentn.)	SPT-16	31.00-31.32
31.32m				

BH-8/Sheet-2

141886/2020/PS-SR-PM

Project : Geotech. Inv. Work for 2x660MW Coal Based STPP at Ash Dyke of NCTPS, Chennai. CETEST

Job No : 3388 | Created by : Chandrani | Created on : 22/01/2015 | Sheet No:

BORE LOG DATA SHEET

BORE HOLE NO.9

Co-ordinates E=(-)1876.000 N=3315.000

Field Test	Nos	Samples	Nos
Penetrometer (SPT)	22	Undisturbed (UDS)	8
Cone (Pc)		Penetrometer (SPT)	22
Vane (V)		Disturbed (DS)	21
		Water Sample (WS)	1

Commencement Date : 28/12/14
Completion Date : 01/01/15
Bore Hole Diameter : 150 mm.
Level Of Ground : 8.409 m.
Water Struck At :
Standing Water Level : 0.60 m.

DESCRIPTION	SYMBOL	N-VALUE (EACH DIVN. = 15cm.)				SAMPLES Ref. No	SAMPLES Depth (m)
0.00m							
Filled up soil consists of brownish grey, silty clay with moourm.						DS-1	0.50
						WS-1	0.60
1.00m					2		
		0	1	1		SPT-1	1.00-1.45
						*UDS-1	2.00-2.45
					1		
		0	0	1		SPT-2	3.00-3.45
						*UDS-2	4.00-4.45
Very soft to soft, light brownish grey to deep grey, silty clay.					0		
		0	0	0		SPT-3	5.00-5.45
						UDS-3	6.00-6.45
					1		
		0	1	0		SPT-4	7.00-7.45
8.00m						UDS-4	8.00-8.45
					3		
		0	1	2		SPT-5	9.00-9.45
						UDS-5	10.00-10.45
Soft to medium, deep grey, silty clay with high % of sand mixture.						DS-2	11.00
					8		
		2	3	5		SPT-6	11.50-11.95
						DS-3	12.50
13.00m						UDS-6	13.00-13.45
						DS-4	14.00
					17		
		7	7	10		SPT-7	14.50-14.95
						DS-5	15.50
						UDS-7	16.00-16.45
Medium dense, deep grey, silty sand. Obs. traces of clay.						DS-6	17.00
					19		
		6	8	11		SPT-8	17.50-17.95
						DS-7	18.50
						UDS-8	19.00-19.45
20.00m						DS-8	20.00
Dense to very dense, yellowish grey, silty sand with traces of clay.					41		
20.80m		15	17	24		SPT-9	20.50-20.95

BH-9/Sheet-1

141886/2020/PS-SR-PM

Project : Geotech. Inv. Work for 2x660MW Coal Based STPP at Ash Dyke of NCTPS, Chennai. CETEST

Job No : 3388 | Created by : Chandrani | Created on : 22/01/2015 | Sheet No:

BORE LOG DATA SHEET

BORE HOLE NO.9

Co-ordinates E=(-)1876.000 N=3315.000

Field Test	Nos	Samples	Nos
Penetrometer (SPT)	22	Undisturbed (UDS)	8
Cone (Pc)		Penetrometer (SPT)	22
Vane (V)		Disturbed (DS)	21
		Water Sample (WS)	1

Commencement Date : 28/12/14
Completion Date : 01/01/15
Bore Hole Diameter : 150 mm.
Level Of Ground : 8.409 m.
Water Struck At :
Standing Water Level : 0.60 m.

DESCRIPTION	SYMBOL	N-VALUE (EACH DIVN. = 15cm.)			SAMPLES Ref. No	SAMPLES Depth (m)
					DS-9	21.50
		17	19	25 (44)	SPT-10	22.00-22.45
					DS-10	23.00
		22	25	27 (52)	SPT-11	23.50-23.95
Dense to very dense, yellowish grey, silty sand with traces of clay.					DS-11	24.50
		21	27	32 (59)	SPT-12	25.00-25.45
					DS-12	26.00
		23	29	38 (67)	SPT-13	26.50-26.95
					DS-13	27.50
28.00m		15	23	32 (55)	SPT-14	28.00-28.45
					DS-14	29.00
Hard, brownish grey, silty clay with yellow patches.		17	25	37 (62)	SPT-15	29.50-29.95
					DS-15	30.50
31.00m		19	24	35 (59)	SPT-16	31.00-31.45
					DS-16	32.00
Very dense, brownish yellow, silty sand / sandy silt.		21	33	37 (70)	SPT-17	32.50-32.95
					DS-17	33.50
34.00m		24	37	42 (79)	SPT-18	34.00-34.45
					DS-18	35.00
		25	40	48 (88)	SPT-19	35.50-35.95
					DS-19	36.50
Very dense, light brownish grey, silty sand.		27	43	47 (90)	SPT-20	37.00-37.45
					DS-20	38.00
		23	47	58 (>100)	SPT-21	38.50-38.95
					DS-21	39.50
40.45m		31	44	57 (>100)	SPT-22	40.00-40.45

N.B. - '*' means sample could not be recovered.

BH-9/Sheet-2

141886/2020/PS-SR-PM

Project : Geotech. Inv. Work for 2x660MW Coal Based STPP at Ash Dyke of NCTPS, Chennai. CETEST

Job No : 3388 | Created by : Chandrani | Created on : 22/01/2015 | Sheet No:

BORE LOG DATA SHEET

BORE HOLE NO.10

Co-ordinates E=(-)2120.000 N=3037.000

Field Test	Nos	Samples	Nos
Penetrometer (SPT)	22	Undisturbed (UDS)	8
Cone (Pc)		Penetrometer (SPT)	22
Vane (V)		Disturbed (DS)	21
		Water Sample (WS)	0

Commencement Date : 02/01/15
Completion Date : 03/01/15
Bore Hole Diameter : 150 mm.
Level Of Ground : 7.931 m.
Water Struck At :
Standing Water Level : 0.60 m.

DESCRIPTION	SYMBOL	N-VALUE (EACH DIVN. = 15cm.)				SAMPLES Ref. No	SAMPLES Depth (m)
0.00m							
Filled up soil consists of brownish grey, silty clay with moorum.						DS-1	0.50
1.00m		0	1	0	1	SPT-1	1.00-1.45
						*UDS-1	2.00-2.45
Very soft to soft, light brownish grey to deep grey, silty clay.		1	1	1	2	SPT-2	3.00-3.45
						*UDS-2	4.00-4.45
		0	1	1	2	SPT-3	5.00-5.45
6.45m						UDS-3	6.00-6.45
		0	1	2	3	SPT-4	7.00-7.45
Soft to medium, deep grey, silty clay with sand mixture.						UDS-4	8.00-8.45
		1	2	4	6	SPT-5	9.00-9.45
10.00m						UDS-5	10.00-10.45
						DS-2	11.00
		2	5	8	13	SPT-6	11.50-11.95
						DS-3	12.50
Stiff to very stiff, deep grey, silty clay with traces of sand mixture.						*UDS-6	13.00-13.45
						DS-4	14.00
		3	6	10	16	SPT-7	14.50-14.95
						DS-5	15.50
						*UDS-7	16.00-16.45
						DS-6	17.00
17.50m		7	10	14	24	SPT-8	17.50-17.95
Very stiff, light greenish grey, clayey silt with sand.						DS-7	18.50
20.50m						UDS-8	19.00-19.45
Dense, light yellowish grey, silty sand with traces of clay binder.						DS-8	20.00
20.50m							

BH-10/Sheet-1

141886/2020/PS-SR-PM

Project : Geotech. Inv. Work for 2x660MW Coal Based STPP at Ash Dyke of NCTPS, Chennai. CETEST

Job No : 3388 | Created by : Chandrani | Created on : 22/01/2015 | Sheet No:

BORE LOG DATA SHEET

BORE HOLE NO.10

Co-ordinates E=(-)2120.000 N=3037.000

Field Test	Nos	Samples	Nos
Penetrometer (SPT)	22	Undisturbed (UDS)	8
Cone (Pc)		Penetrometer (SPT)	22
Vane (V)		Disturbed (DS)	21
		Water Sample (WS)	0

Commencement Date : 02/01/15
Completion Date : 03/01/15
Bore Hole Diameter : 150 mm.
Level Of Ground : 7.931 m.
Water Struck At :
Standing Water Level : 0.60 m.

DESCRIPTION	SYMBOL	N-VALUE (EACH DIVN. = 15cm.)			SAMPLES Ref. No	SAMPLES Depth (m)
20.50m						
Dense, light yellowish grey, silty sand with traces of clay binder.		15	19	24 (43)	SPT-9	20.50-20.95
					DS-9	21.50
		15	21	25 (46)	SPT-10	22.00-22.45
					DS-10	23.00
23.50m						
Very dense, light brownish grey, silty sand.		17	23	29 (52)	SPT-11	23.50-23.95
					DS-11	24.50
		19	27	33 (60)	SPT-12	25.00-25.45
					DS-12	26.00
26.50m						
Very dense, light brownish grey, silty sand with traces of clay.		19	32	37 (69)	SPT-13	26.50-26.95
					DS-13	27.50
		16	29	34 (63)	SPT-14	28.00-28.45
					DS-14	29.00
29.50m						
Hard, steel grey, silty clay. Obs. brownish patches.		14	23	29 (52)	SPT-15	29.50-29.95
					DS-15	30.50
		15	21	26 (47)	SPT-16	31.00-31.45
					DS-16	32.00
32.50m						
Very dense, steel grey, silty sand.		23	35	40 (75)	SPT-17	32.50-32.95
					DS-17	33.50
		21	33	39 (72)	SPT-18	34.00-34.45
					DS-18	35.00
		22	31	38 (69)	SPT-19	35.50-35.95
					DS-19	36.50
		25	37	48 (85)	SPT-20	37.00-37.45
					DS-20	38.00
		28	53	50 (>100)	SPT-21	38.50-38.88
				8.0 cm Pentn.		
					DS-21	39.50
		26	42	51 (93)	SPT-22	40.00-40.45
40.45m						

N.B. - '*' means sample could not be recovered.

BH-10/Sheet-2

141886/2020/PS-SR-PM

Project : Geotech. Inv. Work for 2x660MW Coal Based STPP at Ash Dyke of NCTPS, Chennai. CETEST

Job No : 3388 | Created by : Chandrani | Created on : 11/02/2015 | Sheet No:

BORE LOG DATA SHEET

BORE HOLE NO.11

Co-ordinates E=(-)2596.000 N=3167.000

Field Test	Nos	Samples	Nos
Penetrometer (SPT)	22	Undisturbed (UDS)	8
Cone (Pc)		Penetrometer (SPT)	22
Vane (V)		Disturbed (DS)	21
		Water Sample (WS)	1

Commencement Date : 21/01/15
Completion Date : 23/01/15
Bore Hole Diameter : 150 mm.
Level Of Ground : 8.083 m.
Water Struck At :
Standing Water Level : 0.71 m.

DESCRIPTION	SYMBOL	N-VALUE (EACH DIVN. = 15cm.)				SAMPLES Ref. No	SAMPLES Depth (m)
0.00m							
Filled up soil consists with kankar & moorum.		2	2	3	5	DS-1	0.50
						WS-1	0.71
						SPT-1	1.00-1.45
1.45m							
Very soft / soft, brownish grey, silty clay. Obs. kankars.						UDS-1	2.00-2.45
		0	1	1	2	SPT-2	3.00-3.45
3.45m							
Soft to medium, yellowish brown, silty clay with kankars & sand mixture.						*UDS-2	4.00-4.45
		1	2	2	4	SPT-3	5.00-5.45
5.45m							
						*UDS-3	6.00-6.45
Loose, deep grey, clayey silty sand.		1	3	2	5	SPT-4	7.00-7.45
						*UDS-4	8.00-8.45
		3	5	4	9	SPT-5	9.00-9.45
9.45m							
						UDS-5	10.00-10.45
						DS-2	11.00
					16		
		4	8	8		SPT-6	11.50-11.95
Medium dense, clayey silty sand.						DS-3	12.50
						UDS-6	13.00-13.45
						DS-4	14.00
					19		
14.50m							
		5	9	10		SPT-7	14.50-14.95
						DS-5	15.50
						*UDS-7	16.00-16.45
						DS-6	17.00
					29		
Very stiff, light greenish grey, silty clay / clayey silt with sand mixture.		11	11	18		SPT-8	17.50-17.95
						DS-7	18.50
						*UDS-8	19.00-19.45
						DS-8	20.00
					29		
		12	15	14		SPT-9	20.50-20.95
21.00m							

BH-11/Sheet-1

Project : Geotech. Inv. Work for 2x660MW Coal Based STPP at Ash Dyke of NCTPS, Chennai. CETEST

141886/2020/PS-SR-PM

Job No : 3388 | Created by : Chandrani | Created on : 11/02/2015 | Sheet No:

BORE LOG DATA SHEET

BORE HOLE NO.11

Co-ordinates E=(-)2596.000 N=3167.000

Field Test	Nos	Samples	Nos
Penetrometer (SPT)	22	Undisturbed (UDS)	8
Cone (Pc)		Penetrometer (SPT)	22
Vane (V)		Disturbed (DS)	21
		Water Sample (WS)	1

Commencement Date : 21/01/15
Completion Date : 23/01/15
Bore Hole Diameter : 150 mm.
Level Of Ground : 8.083 m.
Water Struck At :
Standing Water Level : 0.71 m.

DESCRIPTION	SYMBOL	N-VALUE (EACH DIVN. = 15cm.)				SAMPLES	
						Ref. No	Depth (m)
Very stiff, light greenish grey, silty clay / clayey silt with sand mixture. 21.00m – 21.50m						DS-9	21.50
		15	19	28	47	SPT-10	22.00-22.45
						DS-10	23.00
Dense, yellowish brown, silty sand / sandy silt with clay binder.		10	16	19	35	SPT-11	23.50-23.95
						DS-11	24.50
25.00m		16	28	33	61	SPT-12	25.00-25.45
Hard, brownish grey, silty clay wtih sand mixture.						DS-12	26.00
26.50m		29	41	48	89	SPT-13	26.50-26.95
						DS-13	27.50
Very dense, yellowish grey, silty fine sand.		30	42	49	91	SPT-14	28.00-28.45
						DS-14	29.00
29.50m		20	24	27	51	SPT-15	29.50-29.95
						DS-15	30.50
Very dense, brownish yellow, silty sand with clay binder.		27	29	42	71	SPT-16	31.00-31.45
						DS-16	32.00
32.50m		30	33	41	74	SPT-17	32.50-32.95
						DS-17	33.50
		28	32	30	62	SPT-18	34.00-34.45
						DS-18	35.00
Hard, brownish grey, silty clay. Obs. yellow patches.		12	14	18	32	SPT-19	35.50-35.95
						DS-19	36.50
		15	20	25	45	SPT-20	37.00-37.45
						DS-20	38.00
38.50m		19	32	35	67	SPT-21	38.50-38.95
						DS-21	39.50
Very dense, light yellow, silty fine sand.		18	25	39	64	SPT-22	40.05-40.50
40.50m							
N.B. – '*' means sample could not be recovered.							

141886/2020/PS-SR-PM

Project : Geotech. Inv. Work for 2x660MW Coal Based STPP at Ash Dyke of NCTPS, Chennai. CETEST

Job No : 3388 | Created by : Chandrani | Created on : 11/02/2015 | Sheet No:

BORE LOG DATA SHEET

BORE HOLE NO.12

Co-ordinates E=(-)2507.411 N=3081.000

Field Test	Nos	Samples	Nos
Penetrometer (SPT)	22	Undisturbed (UDS)	8
Cone (Pc)		Penetrometer (SPT)	22
Vane (V)		Disturbed (DS)	21
		Water Sample (WS)	0

Commencement Date : 24/01/15
Completion Date : 26/01/15
Bore Hole Diameter : 150 mm.
Level Of Ground : 7.838 m.
Water Struck At :
Standing Water Level :

DESCRIPTION	SYMBOL	N-VALUE (EACH DIVN. = 15cm.)			SAMPLES Ref. No	SAMPLES Depth (m)
0.00m					DS-1	0.50
Medium, brownish grey, silty clay with moorum & kankars.		2	2	3	SPT-1	1.00-1.45
					*UDS-1	2.00-2.45
3.00m		1	1	2	SPT-2	3.00-3.45
Very loose, light grey, clayey silty sand.					*UDS-2	4.00-4.45
5.00m		2	2	3	SPT-3	5.00-5.45
					UDS-3	6.00-6.45
Medium, deep grey, silty clay.		1	3	2	SPT-4	7.00-7.45
					*UDS-4	8.00-8.45
9.00m		4	5	5	SPT-5	9.00-9.45
					UDS-5	10.00-10.45
					DS-2	11.00
Medium dense, light greenish grey / steel grey, silty sand / sandy silt.		4	6	7	SPT-6	11.50-11.95
					DS-3	12.50
					UDS-6	13.00-13.45
					DS-4	14.00
14.50m		5	7	12	SPT-7	14.50-14.95
					DS-5	15.50
					*UDS-7	16.00-16.45
Medium dense, light greenish grey, silty fine sand.		11	10	15	DS-6	17.00
					SPT-8	17.50-17.95
					DS-7	18.50
					*UDS-8	19.00-19.45
20.00m					DS-8	20.00
Dense to very dense, light grey, light yellow, silty sand.		15	21	25	SPT-9	20.50-20.95
21.00m						

BH-12/Sheet-1

141886/2020/PS-SR-PM

Project : Geotech. Inv. Work for 2x660MW Coal Based STPP at Ash Dyke of NCTPS, Chennai. CETEST

Job No : 3388 | Created by : Chandrani | Created on : 11/02/2015 | Sheet No:

BORE LOG DATA SHEET

BORE HOLE NO.12

Co-ordinates E=(-)2507.411 N=3081.000

Field Test	Nos	Samples	Nos
Penetrometer (SPT)	22	Undisturbed (UDS)	8
Cone (Pc)		Penetrometer (SPT)	22
Vane (V)		Disturbed (DS)	21
		Water Sample (WS)	0

Commencement Date : 24/01/15
Completion Date : 26/01/15
Bore Hole Diameter : 150 mm.
Level Of Ground : 7.838 m.
Water Struck At :
Standing Water Level :

DESCRIPTION	SYMBOL	N-VALUE (EACH DIVN. = 15cm.)	SAMPLES Ref. No	SAMPLES Depth (m)
21.00m			DS-9	21.50
Dense to very dense, light grey, light yellow, silty sand.		16 22 30 (52)	SPT-10	22.00-22.45
			DS-10	23.00
		17 28 33 (61)	SPT-11	23.50-23.95
			DS-11	24.50
25.00m		19 22 30 (52)	SPT-12	25.00-25.45
Hard, light greyish yellow, silty clay / clayey silt with sand mixture.			DS-12	26.00
		22 23 32 (55)	SPT-13	26.50-26.95
			DS-13	27.50
28.00m		17 20 22 (42)	SPT-14	28.00-28.45
Hard, deep bownish grey, silty clay with yellow patches.			DS-14	29.00
		26 28 25 (53)	SPT-15	29.50-29.95
			DS-15	30.50
31.00m		16 18 25 (43)	SPT-16	31.00-31.45
Hard, yellowish brown, silty clay / clayey silt. Obs. reddish spot & kankars.			DS-16	32.00
32.50m		17 23 31 (54)	SPT-17	32.50-32.95
Very dense, brownish grey, silty sand with clay binder. Obs. yellow patches.			DS-17	33.50
34.00m		25 30 37 (67)	SPT-18	34.00-34.45
			DS-18	35.00
Very dense, light yellow, silty sand.		26 55 50 (>100) 5.0 cm Pentn.	SPT-19	35.50-35.85
			DS-19	36.50
37.00m		31 44 45 (89)	SPT-20	37.00-37.45
Very dense, yellowish brown, silty coarse sand. Obs. deep yellow, silty fine sand as pocket.			DS-20	38.00
38.50m		36 42 47 (89)	SPT-21	38.50-38.95
Very dense, deep grey, silty sand with clay binder.			DS-21	39.50
40.45m		16 29 32 (61)	SPT-22	40.00-40.45

N.B. - '*' means sample could not be recovered.

BH-12/Sheet-2

141886/2020/PS-SR-PM

Project : Geotech. Inv. Work for 2x660MW Coal Based STPP at Ash Dyke of NCTPS, Chennai. CETEST

Job No : 3388 | Created by : Chandrani | Created on : 22/01/2015 | Sheet No:

BORE LOG DATA SHEET

BORE HOLE NO.13

Co-ordinates E=(-)2435.000 N=2974.000

Field Test	Nos	Samples	Nos
Penetrometer (SPT)	22	Undisturbed (UDS)	8
Cone (Pc)		Penetrometer (SPT)	22
Vane (V)		Disturbed (DS)	21
		Water Sample (WS)	0

Commencement Date : 04/01/15
Completion Date : 05/01/15
Bore Hole Diameter : 150 mm.
Level Of Ground : 7.853 m.
Water Struck At :
Standing Water Level : 0.55 m.

DESCRIPTION	SYMBOL	N-VALUE (EACH DIVN. = 15cm.)				SAMPLES Ref. No	SAMPLES Depth (m)
0.00m							
Filled up soil consists of brownish grey, silty clay with moorum.						DS-1	0.50
1.00m		1	1	1	2	SPT-1	1.00-1.45
						*UDS-1	2.00-2.45
Very soft, light brownish grey to deep grey, silty clay.		1	0	1	1	SPT-2	3.00-3.45
						*UDS-2	4.00-4.45
		0	1	1	2	SPT-3	5.00-5.45
6.45m						UDS-3	6.00-6.45
Medium, deep grey, silty clay with sand mixture.		1	2	2	4	SPT-4	7.00-7.45
						UDS-4	8.00-8.45
9.00m		2	5	7	12	SPT-5	9.00-9.45
Stiff, dark grey, silty clay with sand mixture.						UDS-5	10.00-10.45
						DS-2	11.00
11.50m		9	14	21	35	SPT-6	11.50-11.95
						DS-3	12.50
						*UDS-6	13.00-13.45
						DS-4	14.00
		7	10	13	23	SPT-7	14.50-14.95
						DS-5	15.50
Dense, light brownish grey to steel grey, silty sand.						UDS-7	16.00-16.45
						DS-6	17.00
		14	18	23	41	SPT-8	17.50-17.95
						DS-7	18.50
						*UDS-8	19.00-19.45
						DS-8	20.00
20.75m		12	17	25	42	SPT-9	20.50-20.95

BH-13/Sheet-1

141886/2020/PS-SR-PM

Project : Geotech. Inv. Work for 2x660MW Coal Based STPP at Ash Dyke of NCTPS, Chennai. CETEST

Job No : 3388 | Created by : Chandrani | Created on : 22/01/2015 | Sheet No:

BORE LOG DATA SHEET

BORE HOLE NO.13

Co-ordinates E=(-)2435.000 N=2974.000

Field Test	Nos	Samples	Nos
Penetrometer (SPT)	22	Undisturbed (UDS)	8
Cone (Pc)		Penetrometer (SPT)	22
Vane (V)		Disturbed (DS)	21
		Water Sample (WS)	0

Commencement Date : 04/01/15
Completion Date : 05/01/15
Bore Hole Diameter : 150 mm.
Level Of Ground : 7.853 m.
Water Struck At :
Standing Water Level : 0.55 m.

DESCRIPTION	SYMBOL	N-VALUE (EACH DIVN. = 15cm.)				SAMPLES Ref. No	SAMPLES Depth (m)
20.75m							
Dense, light brownish grey to steel grey, silty sand.						DS-9	21.50
22.00m		13	19	27	46	SPT-10	22.00-22.45
						DS-10	23.00
Dense to very dens, light brownish grey, silty sand with traces of kankars.		15	22	29	51	SPT-11	23.50-23.95
						DS-11	24.50
25.00m		12	19	26	45	SPT-12	25.00-25.45
						DS-12	26.00
Hard, light brownish grey, silty clay.		13	20	27	47	SPT-13	26.50-26.95
						DS-13	27.50
28.00m		16	25	33	58	SPT-14	28.00-28.45
						DS-14	29.00
Hard, light brownish grey, silty clay with traces of sand.		19	26	35	61	SPT-15	29.50-29.95
						DS-15	30.50
		17	24	37	61	SPT-16	31.00-31.45
						DS-16	32.00
32.50m		22	35	38	73	SPT-17	32.50-32.95
						DS-17	33.50
		25	38	45	83	SPT-18	34.00-34.45
						DS-18	35.00
		27	39	49	88	SPT-19	35.50-35.95
Very dense, light brownish grey, silty sand. Obs. traces of clay binder.						DS-19	36.50
		29	42	51	93	SPT-20	37.00-37.45
						DS-20	38.00
		31	41	54	95	SPT-21	38.50-38.95
						DS-21	39.50
		30	45	57	>100	SPT-22	40.00-40.45
40.45m							

N.B. - '*' means sample could not be recovered.

BH-13/Sheet-2

141886/2020/PS-SR-PM

Project : Geotech. Inv. Work for 2x660MW Coal Based STPP at Ash Dyke of NCTPS, Chennai. CETEST

Job No : 3388 | Created by : Chandrani | Created on : 11/02/2015 | Sheet No:

BORE LOG DATA SHEET

BORE HOLE NO.14

Co-ordinates E=(-)2446.114 N=2873.000

Field Test	Nos	Samples	Nos
Penetrometer (SPT)	22	Undisturbed (UDS)	8
Cone (Pc)		Penetrometer (SPT)	22
Vane (V)		Disturbed (DS)	21
		Water Sample (WS)	0

Commencement Date : 27/01/15
Completion Date : 28/01/15
Bore Hole Diameter : 150 mm.
Level Of Ground : 7.838 m.
Water Struck At :
Standing Water Level :

DESCRIPTION	SYMBOL	N-VALUE (EACH DIVN. = 15cm.)				SAMPLES	
						Ref. No	Depth (m)
0.00m							
Deep brown, silty clay / clayey silt.						DS-1	0.50
1.00m		1	2	2	4	SPT-1	1.00-1.45
Soft to medium, yellowish brown, silty clay. Obs. steel grey patches.						UDS-1	2.00-2.45
		0	1	2	3	SPT-2	3.00-3.45
4.00m						*UDS-2	4.00-4.45
		1	1	2	3	SPT-3	5.00-5.45
						UDS-3	6.00-6.45
Very loose to loose deep grey, silty sand.		1	2	2	4	SPT-4	7.00-7.45
						*UDS-4	8.00-8.45
		3	3	4	7	SPT-5	9.00-9.45
10.00m						*UDS-5	10.00-10.45
						DS-2	11.00
		7	10	11	21	SPT-6	11.50-11.95
Medium dense, light greenish grey, silty fine sand.						DS-3	12.50
						*UDS-6	13.00-13.45
						DS-4	14.00
14.50m		9	12	19	31	SPT-7	14.50-14.95
						DS-5	15.50
Dense, light greenish grey, silty fine sand.						UDS-7	16.00-16.45
						DS-6	17.00
17.50m		12	17	19	36	SPT-8	17.50-17.95
						DS-7	18.50
Hard, light greenish grey, silty clay / clayey silt.						*UDS-8	19.00-19.45
						DS-8	20.00
		10	15	20	35	SPT-9	20.50-20.95
21.00m							

BH-14/Sheet-1

141886/2020/PS-SR-PM

Project : Geotech. Inv. Work for 2x660MW Coal Based STPP at Ash Dyke of NCTPS, Chennai. CETEST

Job No : 3388 | Created by : Chandrani | Created on : 11/02/2015 | Sheet No:

BORE LOG DATA SHEET

BORE HOLE NO.14

Co-ordinates E=(-)2446.114 N=2873.000

Field Test	Nos	Samples	Nos
Penetrometer (SPT)	22	Undisturbed (UDS)	8
Cone (Pc)		Penetrometer (SPT)	22
Vane (V)		Disturbed (DS)	21
		Water Sample (WS)	0

Commencement Date : 27/01/15
Completion Date : 28/01/15
Bore Hole Diameter : 150 mm.
Level Of Ground : 7.838 m.
Water Struck At :
Standing Water Level :

DESCRIPTION	SYMBOL	N-VALUE (EACH DIVN. = 15cm.)				SAMPLES	
						Ref. No	Depth (m)
21.00m							
Hard, light greenish grey, silty clay / clayey silt.						DS-9	21.50
21.50m					36		
		13	17	19		SPT-10	22.00-22.45
						DS-10	23.00
					48		
Hard, light greenish grey, silty clay with reddish patches.		10	23	25		SPT-11	23.50-23.95
						DS-11	24.50
					48		
		15	21	27		SPT-12	25.00-25.45
26.00m						DS-12	26.00
					55		
		12	26	29		SPT-13	26.50-26.95
Hard, light brownish yellow, silty clay / clayey silt with steel grey patches. Obs. light yellow, silty sand in SPT-14 cutting shoe.						DS-13	27.50
					58		
		16	23	35		SPT-14	28.00-28.45
						DS-14	29.00
29.50m					46		
		14	21	25		SPT-15	29.50-29.95
Hard, light brownish grey, silty clay with yellow patches.						DS-15	30.50
					53		
		27	25	28		SPT-16	31.00-31.45
32.00m						DS-16	32.00
					65		
Hard, yellowish brown, silty clay with sand mixture.		24	30	35		SPT-17	32.50-32.95
33.50m						DS-17	33.50
					73		
		27	33	40		SPT-18	34.00-34.45
						DS-18	35.00
Very dense, light brownish yellow, silty sand.					78		
		30	36	42		SPT-19	35.50-35.95
						DS-19	36.50
37.00m					87		
		32	39	48		SPT-20	37.00-37.45
						DS-20	38.00
					93		
Very dense, light yellow, silty sand.		33	38	55		SPT-21	38.50-38.95
						DS-21	39.50
					>100		
40.35m		35	43	52		SPT-22	40.00-40.35
					5.0 cm Pentn.		

N.B. - '*' means sample could not be recovered.

BH-14/Sheet-2

141886/2020/PS-SR-PM

Project : Geotech. Inv. Work for 2x660MW Coal Based STPP at Ash Dyke of NCTPS, Chennai. CETEST

Job No : 3388 | Created by : Chandrani | Created on : 11/02/2015 | Sheet No:

BORE LOG DATA SHEET

BORE HOLE NO.15

Co-ordinates E=(-)2408.524 N=2756.123

Field Test	Nos	Samples	Nos
Penetrometer (SPT)	22	Undisturbed (UDS)	8
Cone (Pc)		Penetrometer (SPT)	22
Vane (V)		Disturbed (DS)	21
		Water Sample (WS)	0

Commencement Date : 28/01/15
Completion Date : 29/01/15
Bore Hole Diameter : 150 mm.
Level Of Ground : 7.891 m.
Water Struck At :
Standing Water Level :

DESCRIPTION	SYMBOL	N-VALUE (EACH DIVN. = 15cm.)				SAMPLES	
						Ref. No	Depth (m)
0.00m							
Very soft, brownish grey, silty clay.		1	1	1	2	DS-1	0.50
						SPT-1	1.00-1.45
						UDS-1	2.00-2.45
3.00m					0		
Very loose, light brownish grey, silty clayey sand.		0	0	0		SPT-2	3.00-3.45
						UDS-2	4.00-4.45
		0	1	0	1	SPT-3	5.00-5.45
						UDS-3	6.00-6.45
7.00m					12		
Stiff, dark grey, silty clay.		4	6	6		SPT-4	7.00-7.45
						UDS-4	8.00-8.45
9.00m					22		
Medium dense, light greenish grey, clayey silty sand.		6	9	13		SPT-5	9.00-9.45
						UDS-5	10.00-10.45
						DS-2	11.00
					33		
		9	14	19		SPT-6	11.50-11.95
						DS-3	12.50
						*UDS-6	13.00-13.45
						DS-4	14.00
14.50m					22		
Medium dense, light greenish / yellowish grey, silty sand.		5	10	12		SPT-7	14.50-14.95
						DS-5	15.50
						*UDS-7	16.00-16.45
						DS-6	17.00
17.50m					31		
Hard, light yellowish grey, silty clay / clayey silt with sand mixture.		10	15	16		SPT-8	17.50-17.95
						DS-7	18.50
						*UDS-8	19.00-19.45
20.00m						DS-8	20.00
Dense, brownish grey, silty clayey fine sand.		12	16	18	34	SPT-9	20.50-20.95
21.00m							

BH-15/Sheet-1

141886/2020/PS-SR-PM

Project : Geotech. Inv. Work for 2x660MW Coal Based STPP at Ash Dyke of NCTPS, Chennai. CETEST

Job No : 3388 | Created by : Chandrani | Created on : 11/02/2015 | Sheet No:

BORE LOG DATA SHEET

BORE HOLE NO.15

Co-ordinates E=(-)2408.524 N=2756.123

Field Test	Nos	Samples	Nos
Penetrometer (SPT)	22	Undisturbed (UDS)	8
Cone (Pc)		Penetrometer (SPT)	22
Vane (V)		Disturbed (DS)	21
		Water Sample (WS)	0

Commencement Date : 28/01/15
Completion Date : 29/01/15
Bore Hole Diameter : 150 mm.
Level Of Ground : 7.891 m.
Water Struck At :
Standing Water Level :

DESCRIPTION	SYMBOL	N-VALUE (EACH DIVN. = 15cm.)	SAMPLES Ref. No	SAMPLES Depth (m)
21.00m				
Dense, brownish grey, silty clayey fine sand.			DS-9	21.50
22.00m		10 17 20 (37)	SPT-10	22.00-22.45
			DS-10	23.00
Dense, light greyish yellow, silty clayey sand. Obs. steel grey patches.		13 18 14 (32)	SPT-11	23.50-23.95
			DS-11	24.50
25.00m		11 15 19 (34)	SPT-12	25.00-25.45
			DS-12	26.00
Dense, light whitish grey, silty sand.		15 21 23 (44)	SPT-13	26.50-26.95
			DS-13	27.50
28.00m		16 19 25 (44)	SPT-14	28.00-28.45
			DS-14	29.00
		18 26 30 (56)	SPT-15	29.50-29.95
			DS-15	30.50
		24 42 50 (92)	SPT-16	31.00-31.45
			DS-16	32.00
Dense to very dense, light brownish grey, silty coarse sand.		22 40 52 (92)	SPT-17	32.50-32.95
			DS-17	33.50
		21 39 56 (95)	SPT-18	34.50-34.95
			DS-18	35.00
		18 35 46 (81)	SPT-19	35.50-35.95
			DS-19	36.50
		23 40 49 (89)	SPT-20	37.00-37.45
38.00m			DS-20	38.00
		24 38 45 (83)	SPT-21	38.50-38.95
Very dense, brownish grey / yellowish grey, silty coarse sand. Obs. broken gravels pieces.			DS-21	39.50
		31 49 52 (>100)	SPT-22	40.00-40.45
40.45m				

N.B. - '*' means sample could not be recovered.

141886/2020/PS-SR-PM

Project : Geotech. Inv. Work for 2x660MW Coal Based STPP at Ash Dyke of NCTPS, Chennai. CETEST

Job No : 3388 | Created by : Chandrani | Created on : 11/02/2015 | Sheet No:

BORE LOG DATA SHEET

BORE HOLE NO.16

Co-ordinates E=(-)2328.524 N=2654.231

Field Test	Nos	Samples	Nos
Penetrometer (SPT)	22	Undisturbed (UDS)	8
Cone (Pc)		Penetrometer (SPT)	22
Vane (V)		Disturbed (DS)	21
		Water Sample (WS)	0

Commencement Date : 24/01/15
Completion Date : 27/01/15
Bore Hole Diameter : 150 mm.
Level Of Ground : 7.915 m.
Water Struck At :
Standing Water Level :

DESCRIPTION	SYMBOL	N-VALUE EACH DIVN. = 15cm.				SAMPLES Ref. No	Depth (m)
0.00m						DS-1	0.50
Very soft, brownish grey, silty clay.		0	0	0	0	SPT-1	1.00-1.45
						*UDS-1	2.00-2.45
3.00m		0	0	0	0	SPT-2	3.00-3.45
						UDS-2	4.00-4.45
Very soft, dark grey, silty clay / clayey silt.		0	0	0	0	SPT-3	5.00-5.45
						*UDS-3	6.00-6.45
7.00m		2	2	3	5	SPT-4	7.00-7.45
Loose, dark grey, silty clayey coarse sand. Obs. traces of kankars.						UDS-4	8.00-8.45
9.00m		2	3	4	7	SPT-5	9.00-9.45
Loose, light greenish grey, silty sand.						*UDS-5	10.00-10.45
						DS-2	11.00
11.50m		6	8	11	19	SPT-6	11.50-11.95
						DS-3	12.50
						*UDS-6	13.00-13.45
						DS-4	14.00
Medium dense, whitish grey, silty sand. Obs. brown patches.		4	10	14	24	SPT-7	14.50-14.95
						DS-5	15.50
						*UDS-7	16.00-16.45
						DS-6	17.00
17.95m		7	11	12	23	SPT-8	17.50-17.95
						DS-7	18.50
						*UDS-8	19.00-19.45
Dense, light yellowish grey, silty clayey sand.						DS-8	20.00
21.00m		10	15	18	33	SPT-9	20.50-20.95

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Project : Geotech. Inv. Work for 2x660MW Coal Based STPP at Ash Dyke of NCTPS, Chennai. CETEST

Job No : 3388 | Created by : Chandrani | Created on : 11/02/2015 | Sheet No:

BORE LOG DATA SHEET

BORE HOLE NO.16

Co-ordinates E=(-)2328.524 N=2654.231

Field Test	Nos	Samples	Nos
Penetrometer (SPT)	22	Undisturbed (UDS)	8
Cone (Pc)		Penetrometer (SPT)	22
Vane (V)		Disturbed (DS)	21
		Water Sample (WS)	0

Commencement Date : 24/01/15
Completion Date : 27/01/15
Bore Hole Diameter : 150 mm.
Level Of Ground : 7.915 m.
Water Struck At :
Standing Water Level :

DESCRIPTION	SYMBOL	N-VALUE (EACH DIVN. = 15cm.)				SAMPLES Ref. No	SAMPLES Depth (m)
						DS-9	21.50
		9	13	16	29	SPT-10	22.00-22.45
						DS-10	23.00
Dense, light yellowish grey, silty clayey sand.		11	16	19	35	SPT-11	23.50-23.95
						DS-11	24.50
		10	12	21	33	SPT-12	25.00-25.45
21.00m							
						DS-12	26.00
		17	28	39	67	SPT-13	26.50-26.95
						DS-13	27.50
		20	31	38	69	SPT-14	28.00-28.45
Very dense, greyish yellow, silty coarse sand. Obs. traces of kankars.						DS-14	29.00
		25	38	57	95	SPT-15	29.50-29.95
						DS-15	30.50
		27	35	49	84	SPT-16	31.00-31.45
26.00m							
						DS-16	32.00
		27	30	36	66	SPT-17	32.50-32.95
						DS-17	33.50
		26	35	40	75	SPT-18	34.00-34.45
Vrey dense, yellowish grey, silty coarse sand.						DS-18	35.00
		21	33	38	71	SPT-19	35.50-35.95
						DS-19	36.50
		25	37	42	79	SPT-20	37.00-37.45
						DS-20	38.00
32.00m							
		19	55	61	>100	SPT-21	38.50-38.95
						DS-21	39.50
Very dense, whitish grey to yellowish grey, fine silty sand.					89		
		35	38	51		SPT-22	40.00-40.45
38.50m							
40.45m							

N.B. - '*' means sample could not be recovered.

BH-16/Sheet-2

141886/2020/PS-SR-PM

Project : Geotech. Inv. Work for 2x660MW Coal Based STPP at Ash Dyke of NCTPS, Chennai. CETEST

Job No : 3388 | Created by : Chandrani | Created on : 11/02/2015 | Sheet No:

BORE LOG DATA SHEET

BORE HOLE NO.17

Co-ordinates E=(-)2344.182 N=2536.638

Field Test	Nos	Samples	Nos
Penetrometer (SPT)	22	Undisturbed (UDS)	8
Cone (Pc)		Penetrometer (SPT)	22
Vane (V)		Disturbed (DS)	21
		Water Sample (WS)	0

Commencement Date : 28/01/15
Completion Date : 29/01/15
Bore Hole Diameter : 150 mm.
Level Of Ground : 7.884 m.
Water Struck At :
Standing Water Level :

DESCRIPTION	SYMBOL	N-VALUE (EACH DIVN. = 15cm.)				SAMPLES Ref. No	SAMPLES Depth (m)
0.00m							
					4	DS-1	0.50
Soft, light brownish grey, silty clay.		2	2	2		SPT-1	1.00-1.45
						*UDS-1	2.00-2.45
2.50m					2		
Very loose, light grey, clayey silty sand.		0	1	1		SPT-2	3.00-3.45
						*UDS-2	4.00-4.45
4.50m					1		
		0	0	1		SPT-3	5.00-5.45
						UDS-3	6.00-6.45
					2		
Very loose, deep grey, clayey silty sand.		0	1	1		SPT-4	7.00-7.45
						UDS-4	8.00-8.45
					4		
		1	2	2		SPT-5	9.00-9.45
						*UDS-5	10.00-10.45
11.00m						DS-2	11.00
					19		
Medium dense, light grey, clayey silty sand.		5	7	12		SPT-6	11.50-11.95
						DS-3	12.50
13.00m						UDS-6	13.00-13.45
						DS-4	14.00
					29		
Medium dense, light greenish grey, clayey silty sand.		9	12	17		SPT-7	14.50-14.95
						DS-5	15.50
						*UDS-7	16.00-16.45
17.00m						DS-6	17.00
					21		
Medium dense, light yellowish grey, clayey silty sand. Obs. steel grey patches.		8	10	11		SPT-8	17.50-17.95
						DS-7	18.50
						UDS-8	19.00-19.45
20.00m						DS-8	20.00
					35		
Dense, light brownish grey, clayey sand.		10	14	21		SPT-9	20.50-20.95
21.00m							

BH-17/Sheet-1

141886/2020/PS-SR-PM

Project : Geotech. Inv. Work for 2x660MW Coal Based STPP at Ash Dyke of NCTPS, Chennai. CETEST

Job No : 3388 | Created by : Chandrani | Created on : 11/02/2015 | Sheet No:

BORE LOG DATA SHEET

BORE HOLE NO.17

Co-ordinates E=(-)2344.182 N=2536.638

Field Test	Nos	Samples	Nos
Penetrometer (SPT)	22	Undisturbed (UDS)	8
Cone (Pc)		Penetrometer (SPT)	22
Vane (V)		Disturbed (DS)	21
		Water Sample (WS)	0

Commencement Date : 28/01/15
Completion Date : 29/01/15
Bore Hole Diameter : 150 mm.
Level Of Ground : 7.884 m.
Water Struck At :
Standing Water Level :

DESCRIPTION	SYMBOL	N-VALUE (EACH DIVN. = 15cm.)	SAMPLES Ref. No	SAMPLES Depth (m)
21.00m / 21.50m			DS-9	21.50
Dense, light brownish grey, clayey sand.		16 21 30 — 51	SPT-10	22.00-22.45
			DS-10	23.00
Hard, light brownish grey, sandy silty clay.		14 21 27 — 48	SPT-11	23.50-23.95
24.50m			DS-11	24.50
		12 17 25 — 42	SPT-12	25.00-25.45
			DS-12	26.00
Dense, light brownish grey, clayey silty sand. Obs. yellow patches.		13 18 23 — 41	SPT-13	26.50-26.95
			DS-13	27.50
28.00m		22 34 41 — 75	SPT-14	28.00-28.45
			DS-14	29.00
Very dense, steel grey, clayey silty sand.		23 36 43 — 79	SPT-15	29.50-29.95
			DS-15	30.50
31.00m		26 43 47 — 90	SPT-16	31.00-31.45
			DS-16	32.00
		27 40 46 — 86	SPT-17	32.50-32.95
Very dense, light brownish grey, silty sand.			DS-17	33.50
		24 45 48 — 93	SPT-18	34.00-34.45
			DS-18	35.00
		28 42 57 — 99	SPT-19	35.50-35.95
36.50m			DS-19	36.50
		38 84 50/5.0 cm Pentn. — >100	SPT-20	37.00-37.35
			DS-20	38.00
Very dense, light brownish grey, silty sand. Obs. traces of kankars & gravels.		40 88 50/5.0 cm Pentn. — >100	SPT-21	38.50-38.85
			DS-21	39.50
40.45m		42 86 50/15.0 cm Pentn. — >100	SPT-22	40.00-40.45

N.B. – '*' means sample could not be recovered.

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141886/2020/PS-SR-PM

Project : Geotech. Inv. Work for 2x660MW Coal Based STPP at Ash Dyke of NCTPS, Chennai. CETEST

Job No : 3388 | Created by : Chandrani | Created on : 11/02/2015 | Sheet No:

BORE LOG DATA SHEET

BORE HOLE NO.18

Co-ordinates E=(-)2253.000 N=2460.000

Field Test	Nos	Samples	Nos
Penetrometer (SPT)	22	Undisturbed (UDS)	8
Cone (Pc)		Penetrometer (SPT)	22
Vane (V)		Disturbed (DS)	21
		Water Sample (WS)	0

Commencement Date : 26/01/15
Completion Date : 27/01/15
Bore Hole Diameter : 150 mm.
Level Of Ground : 7.427 m.
Water Struck At :
Standing Water Level :

DESCRIPTION	SYMBOL	N-VALUE (EACH DIVN. = 15cm.)				SAMPLES Ref. No	SAMPLES Depth (m)
0.00m							
Loose, light brownish grey, clayey silty sand.		2	3	3	6	DS-1	0.50
						SPT-1	1.00-1.45
						*UDS-1	2.00-2.45
2.50m							
Very soft, deep grey, silty clay / clayey silt with sand.		0	0	0	0	SPT-2	3.00-3.45
						*UDS-2	4.00-4.45
		0	0	1	1	SPT-3	5.00-5.45
						UDS-3	6.00-6.45
		0	1	2	3	SPT-4	7.00-7.45
8.00m						UDS-4	8.00-8.45
Very loose, light grey, clayey silty sand.		1	2	2	4	SPT-5	9.00-9.45
						*UDS-5	10.00-10.45
11.00m						DS-2	11.00
Loose, light whitish grey, clayey silty sand.		2	3	4	7	SPT-6	11.50-11.95
						DS-3	12.50
						UDS-6	13.00-13.45
						DS-4	14.00
14.50m							
Very dense, light greenish grey, silty sand.		15	25	32	57	SPT-7	14.50-14.95
						DS-5	15.50
						UDS-7	16.00-16.45
17.00m						DS-6	17.00
Medium dense, light brownish grey, clayey silty sand.		7	9	15	24	SPT-8	17.50-17.95
						DS-7	18.50
						UDS-8	19.00-19.45
20.00m						DS-8	20.00
Hard, light greenish grey, sandy silty clay. Obs. yellow patches.		15	30	56	86	SPT-9	20.50-20.95
21.00m							

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141886/2020/PS-SR-PM

Project : Geotech. Inv. Work for 2x660MW Coal Based STPP at Ash Dyke of NCTPS, Chennai. CETEST

Job No : 3388 | Created by : Chandrani | Created on : 11/02/2015 | Sheet No:

BORE LOG DATA SHEET

BORE HOLE NO.18

Co-ordinates E=(-)2253.000 N=2460.000

Field Test	Nos	Samples	Nos
Penetrometer (SPT)	22	Undisturbed (UDS)	8
Cone (Pc)		Penetrometer (SPT)	22
Vane (V)		Disturbed (DS)	21
		Water Sample (WS)	0

Commencement Date : 26/01/15
Completion Date : 27/01/15
Bore Hole Diameter : 150 mm.
Level Of Ground : 7.427 m.
Water Struck At :
Standing Water Level :

DESCRIPTION	SYMBOL	N-VALUE (EACH DIVN. = 15cm.)		SAMPLES Ref. No	SAMPLES Depth (m)
				DS-9	21.50
		15 27 50 5	82	SPT-10	22.00-22.45
Hard, light greenish grey, sandy silty clay. Obs. yellow patches.		15 24 50	74	DS-10	23.00
				SPT-11	23.00-23.45
24.50m.				DS-11	24.50
		16 28 30	58	SPT-12	25.00-25.45
				DS-12	26.00
Very dense, light grey, silty clayey sand. Obs. brown spots.		17 30 29	59	SPT-13	26.50-26.95
				DS-13	27.50
28.00m.		23 36 40	76	SPT-14	28.00-28.45
				DS-14	29.00
		26 40 42	82	SPT-15	29.50-29.95
				DS-15	30.50
		25 41 60	>100	SPT-16	31.00-31.45
				DS-16	32.00
		24 40 63	>100	SPT-17	32.50-32.95
				DS-17	33.50
Very dense, light brownish grey, silty sand.		25 37 52	89	SPT-18	34.00-34.45
				DS-18	35.00
		24 34 50	84	SPT-19	35.50-35.95
				DS-19	36.00
		50 79 50 5.0 cm Pentn.	>100	SPT-20	37.00-37.35
				DS-20	38.00
		56 86 50 5.0 cm Pentn.	>100	SPT-21	38.50-38.85
				DS-21	39.50
40.35m.		55 89 50 5.0 cm Pentn.	>100	SPT-22	40.00-40.35

N.B. - '*' means sample could not be recovered.

BH-18/Sheet-2

141886/2020/PS-SR-PM

Project : Geotech. Inv. Work for 2x660MW Coal Based STPP at Ash Dyke of NCTPS, Chennai. CETEST

Job No : 3388 | Created by : Chandrani | Created on : 11/02/2015 | Sheet No:

BORE LOG DATA SHEET

BORE HOLE NO.19

Co-ordinates E=(-)2168.000 N=2375.000

Field Test	Nos	Samples	Nos
Penetrometer (SPT)	22	Undisturbed (UDS)	8
Cone (Pc)		Penetrometer (SPT)	22
Vane (V)		Disturbed (DS)	21
		Water Sample (WS)	0

Commencement Date : 24/01/15
Completion Date : 25/01/15
Bore Hole Diameter : 150 mm.
Level Of Ground : 7.143 m.
Water Struck At :
Standing Water Level :

DESCRIPTION	SYMBOL	N-VALUE (EACH DIVN. = 15cm.)				SAMPLES	
						Ref. No	Depth (m)
0.00m							
Soft, brownish grey, silty clay.						DS-1	0.50
1.00m		2	2	1	3	SPT-1	1.00-1.45
Very loose, light brownish grey, clayey silty sand.						*UDS-1	2.00-2.45
3.00m		0	0	0	0	SPT-2	3.00-3.45
						*UDS-2	4.00-4.45
		0	0	0	0	SPT-3	5.00-5.45
Very loose, deep grey, clayey silty sand. Obs. clay pocket in UDS-04.						UDS-3	6.00-6.45
		0	0	1	1	SPT-4	7.00-7.45
						UDS-4	8.00-8.45
9.00m		0	1	2	3	SPT-5	9.00-9.45
Very loose, light grey, clayey silty sand.						UDS-5	10.00-10.45
						DS-2	11.00
11.50m		5	11	13	24	SPT-6	11.50-11.95
Medium dense, light greenish grey, silty sand.						DS-3	12.50
						*UDS-6	13.00-13.45
						DS-4	14.00
14.50m		13	21	29	50	SPT-7	14.50-14.95
						DS-5	15.50
						*UDS-7	16.00-16.45
Very dense, light brownish grey, clayey silty sand.		16	20	33	53	DS-6	17.00
						SPT-8	17.50-17.95
						DS-7	18.50
						*UDS-8	19.00-19.45
20.00m						DS-8	20.00
Hard, light grey, silty clay / clayey silt with sand.		9	14	21	35	SPT-9	20.50-20.95
21.00m							

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141886/2020/PS-SR-PM

Project : Geotech. Inv. Work for 2x660MW Coal Based STPP at Ash Dyke of NCTPS, Chennai. CETEST

Job No : 3388 | Created by : Chandrani | Created on : 11/02/2015 | Sheet No:

BORE LOG DATA SHEET

BORE HOLE NO.19

Co-ordinates E=(-)2168.000 N=2375.000

Field Test	Nos	Samples	Nos
Penetrometer (SPT)	22	Undisturbed (UDS)	8
Cone (Pc)		Penetrometer (SPT)	22
Vane (V)		Disturbed (DS)	21
		Water Sample (WS)	0

Commencement Date : 24/01/15
Completion Date : 25/01/15
Bore Hole Diameter : 150 mm.
Level Of Ground : 7.143 m.
Water Struck At :
Standing Water Level :

DESCRIPTION	SYMBOL	N-VALUE (EACH DIVN. = 15cm.)	SAMPLES Ref. No	SAMPLES Depth (m)
21.00m			DS-9	21.50
Hard, light grey, silty clay / clayey silt with sand.		21 33 40 (73)	SPT-10	22.00-22.45
			DS-10	23.00
23.50m		12 15 25 (40)	SPT-11	23.50-23.95
Dense, light grey, silty sand.			DS-11	24.50
25.00m		12 18 24 (42)	SPT-12	25.00-25.45
Hard, light brownish grey, silty clay.			DS-12	26.00
		20 24 36 (60)	SPT-13	26.50-26.95
27.50m			DS-13	27.50
		20 26 42 (68)	SPT-14	28.00-28.45
			DS-14	29.00
		24 40 55 (95)	SPT-15	29.50-29.95
Very dense, light brownish grey, clayey silty coarse sand.			DS-15	30.50
		23 44 63 (>100)	SPT-16	31.00-31.45
			DS-16	32.00
		23 39 63 (>100)	SPT-17	32.50-32.95
			DS-17	33.50
34.00m		25 34 53 (87)	SPT-18	34.00-34.45
			DS-18	35.00
		21 40 57 (97)	SPT-19	35.50-35.95
			DS-19	36.50
Very dense, light brownish grey, silty sand.		24 42 50 (92)	SPT-20	37.00-37.45
			DS-20	38.00
		27 36 56 (92)	SPT-21	38.50-38.95
			DS-21	39.50
		25 39 52 (91)	SPT-22	40.00-40.45
40.45m				

N.B. - '*' means sample could not be recovered.

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141886/2020/PS-SR-PM

Project : Geotech. Inv. Work for 2x660MW Coal Based STPP at Ash Dyke of NCTPS, Chennai. CETEST

Job No : 3388 | Created by : Chandrani | Created on : 11/02/2015 | Sheet No:

BORE LOG DATA SHEET

BORE HOLE NO.20

Co-ordinates E=(-)2095.000 N=2288.000

Field Test	Nos	Samples	Nos
Penetrometer (SPT)	19	Undisturbed (UDS)	8
Cone (Pc)		Penetrometer (SPT)	19
Vane (V)		Disturbed (DS)	18
		Water Sample (WS)	0

Commencement Date : 22/01/15
Completion Date : 23/01/15
Bore Hole Diameter : 150 mm.
Level Of Ground : 7.78 m.
Water Struck At :
Standing Water Level :

DESCRIPTION	SYMBOL	N-VALUE (EACH DIVN. = 15cm.)				SAMPLES Ref. No	SAMPLES Depth (m)
0.00m							
Very soft, brownish grey, silty clay.					2	DS-1	0.50
1.00m		2	1	1		SPT-1	1.00-1.45
						*UDS-1	2.00-2.45
Very loose, light brownish grey, clayey silty sand.		0	0	0	0	SPT-2	3.00-3.45
						*UDS-2	4.00-4.45
5.00m		0	0	0	0	SPT-3	5.00-5.45
						UDS-3	6.00-6.45
Very loose, dark grey, clayey silty sand.		0	0	1	1	SPT-4	7.00-7.45
						UDS-4	8.00-8.45
9.00m		5	9	18	27	SPT-5	9.00-9.45
						UDS-5	10.00-10.45
						DS-2	11.00
Medium dense, light greenish grey, clayey silty sand.		8	11	14	25	SPT-6	11.50-11.95
						DS-3	12.50
						UDS-6	13.00-13.45
14.00m						DS-4	14.00
		8	10	11	21	SPT-7	14.50-14.95
Medium dense, light whitish grey, silty sand. Obs. yellow patches.						DS-5	15.50
						*UDS-7	16.00-16.45
17.00m						DS-6	17.00
Medium dense, light grey, clayey silty sand. Obs. yellow spots.		7	9	10	19	SPT-8	17.50-17.95
18.00m							

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141886/2020/PS-SR-PM

Project : Geotech. Inv. Work for 2x660MW Coal Based STPP at Ash Dyke of NCTPS, Chennai. CETEST

Job No : 3388 | Created by : Chandrani | Created on : 11/02/2015 | Sheet No:

BORE LOG DATA SHEET

BORE HOLE NO.20

Co-ordinates E=(-)2095.000 N=2288.000

Field Test	Nos	Samples	Nos
Penetrometer (SPT)	19	Undisturbed (UDS)	8
Cone (Pc)		Penetrometer (SPT)	19
Vane (V)		Disturbed (DS)	18
		Water Sample (WS)	0

Commencement Date : 22/01/15
Completion Date : 23/01/15
Bore Hole Diameter : 150 mm.
Level Of Ground : 7.78 m.
Water Struck At :
Standing Water Level :

DESCRIPTION	SYMBOL	N-VALUE (EACH DIVN. = 15cm.)	SAMPLES Ref. No	SAMPLES Depth (m)
18.00m				
Medium dense, light grey, clayey silty sand. Obs. yellow spots.			DS-7	18.50
			*UDS-8	19.00-19.45
20.00m			DS-8	20.00
Hard, grey, sandy silty clay.		10 0 0 0 44 (19 25)	SPT-9	20.50-20.95
			DS-9	21.50
22.00m		11 0 0 0 51 (21 30)	SPT-10	22.00-22.45
			DS-10	23.00
		11 0 0 0 54 (23 31)	SPT-11	23.50-23.95
			DS-11	24.50
		13 0 0 0 41 (17 24)	SPT-12	25.00-25.45
Very dense to dense, light brownish grey, clayey silty sand.			DS-12	26.00
		14 0 0 0 45 (18 27)	SPT-13	26.50-26.95
			DS-13	27.50
		15 0 0 0 47 (21 26)	SPT-14	28.00-28.45
			DS-14	29.00
		15 0 0 0 48 (20 28)	SPT-15	29.50-29.95
30.50m			DS-15	30.50
		35 0 0 45 >100 (50 7)	SPT-16	31.00-31.45
			DS-16	32.00
Very dense, light brownish grey, silty sand.		36 0 0 47 >100 (30 30)	SPT-17	32.50-32.95
			DS-17	33.50
		43 50/5.0 cm 50 0 >100 (0 0) Pentn.	SPT-18	34.00-34.35
			DS-18	35.00
N.B. - '*' means sample could not be recovered.		45 50/5.0 cm 50 0 >100 (0 0) Pentn.	SPT-19	35.50-35.85
35.85m				

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141886/2020/PS-SR-PM

Project : Geotech. Inv. Work for 2x660MW Coal Based STPP at Ash Dyke of NCTPS, Chennai. CETEST

Job No : 3388 | Created by : Chandrani | Created on : 28/01/2015 | Sheet No:

BORE LOG DATA SHEET

BORE HOLE NO.21

Co-ordinates E=(-)2036.000 N=2182.000

Field Test	Nos	Samples	Nos
Penetrometer (SPT)	22	Undisturbed (UDS)	8
Cone (Pc)		Penetrometer (SPT)	22
Vane (V)		Disturbed (DS)	21
		Water Sample (WS)	0

Commencement Date : 20/01/15
Completion Date : 21/01/15
Bore Hole Diameter : 150 mm.
Level Of Ground : 7.243 m.
Water Struck At :
Standing Water Level :

DESCRIPTION	SYMBOL	N-VALUE EACH DIVN. = 15cm.				SAMPLES Ref. No	Depth (m)
						DS-1	0.50
Very loose, clayey silty sand with reddish & brownish yellow patches. 1.00m		2	1	1	2	SPT-1	1.00-1.45
						UDS-1	2.00-2.45
		0	0	0	0	SPT-2	3.00-3.45
Very loose to loose, grey to deep grey, clayey silty sand.						*UDS-2	4.00-4.45
		0	0	0	0	SPT-3	5.00-5.45
						*UDS-3	6.00-6.45
7.00m		1	3	4	7	SPT-4	7.00-7.45
Loose, light greenish grey, clayey silty sand.						UDS-4	8.00-8.45
8.45m		5	11	19	30	SPT-5	9.00-9.45
Very stiff, steel grey, silty clay with sand mixture.						UDS-5	10.00-10.45
11.00m						DS-2	11.00
		8	11	14	25	SPT-6	11.50-11.95
Medium dense, light greenish grey, clayey silty sand. Obs. yellow spots.						DS-3	12.50
						*UDS-6	13.00-13.45
						DS-4	14.00
14.50m		8	10	11	21	SPT-7	14.50-14.95
Medium dense, light yellowish grey, clayey silty sand.						DS-5	15.50
						*UDS-7	16.00-16.45
						DS-6	17.00
17.50m		7	9	10	19	SPT-8	17.50-17.95
Medium dense, light brownish grey, clayey silty sand.						DS-7	18.50
						*UDS-8	19.00-19.45
						DS-8	20.00
Dense to very dense, light brownish grey, clayey silty sand. Obs. yellow & red spots. 20.50m		10	19	25	44	SPT-9	20.50-20.95
21.00m							

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141886/2020/PS-SR-PM

Project : Geotech. Inv. Work for 2x660MW Coal Based STPP at Ash Dyke of NCTPS, Chennai. CETEST

Job No : 3388 | Created by : Chandrani | Created on : 28/01/2015 | Sheet No:

BORE LOG DATA SHEET

BORE HOLE NO.21

Co-ordinates E=(-)2036.000 N=2182.000

Field Test	Nos	Samples	Nos
Penetrometer (SPT)	22	Undisturbed (UDS)	8
Cone (Pc)		Penetrometer (SPT)	22
Vane (V)		Disturbed (DS)	21
		Water Sample (WS)	0

Commencement Date : 20/01/15
Completion Date : 21/01/15
Bore Hole Diameter : 150 mm.
Level Of Ground : 7.243 m.
Water Struck At :
Standing Water Level :

DESCRIPTION	SYMBOL	N-VALUE (EACH DIVN. = 15cm.)	SAMPLES Ref. No	SAMPLES Depth (m)
21.00m			DS-9	21.50
		11 21 30 (51)	SPT-10	22.00-22.45
			DS-10	23.00
		12 23 31 (54)	SPT-11	23.50-23.95
Dense to very dense, light brownish grey, clayey silty sand. Obs. yellow & red spots.			DS-11	24.50
		14 25 40 (65)	SPT-12	25.00-25.45
			DS-12	26.00
		16 24 43 (67)	SPT-13	26.50-26.95
27.50m			DS-13	27.50
		15 23 32 (55)	SPT-14	28.00-28.45
Dense to very dense, light whitish grey, silty sand.			DS-14	29.00
		14 21 26 (47)	SPT-15	29.50-29.95
			DS-15	30.50
30.80m				
		29 42 45 (87)	SPT-16	31.00-31.45
			DS-16	32.00
Very dense, light brownish grey, silty sand.				
		32 47 52 (99)	SPT-17	32.50-32.95
			DS-17	33.50
34.00m				
		13 24 28 (52)	SPT-18	34.00-34.45
Hard, light brownish grey, silty clay.			DS-18	35.00
35.50m				
		14 32 33 (65)	SPT-19	35.50-35.95
			DS-19	36.50
		30 50 57 (>100)	SPT-20	37.00-37.45
Very dense, light whitish grey, silty sand. Obs. yellow spots.			DS-20	38.00
		33 52 60 (>100)	SPT-21	38.50-38.95
			DS-21	39.50
		32 50 52 (>100)	SPT-22	40.00-40.45
40.45m				

N.B. – '*' means sample could not be recovered.

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141886/2020/PS-SR-PM

Project : Geotech. Inv. Work for 2x660MW Coal Based STPP at Ash Dyke of NCTPS, Chennai. CETEST

Job No : 3388 | Created by : Chandrani | Created on : 11/02/2015 | Sheet No:

BORE LOG DATA SHEET

BORE HOLE NO.22

Co-ordinates E=(-)1967.000 N=2061.000

Field Test	Nos	Samples	Nos
Penetrometer (SPT)	22	Undisturbed (UDS)	8
Cone (Pc)		Penetrometer (SPT)	22
Vane (V)		Disturbed (DS)	21
		Water Sample (WS)	1

Commencement Date : 18/01/15
Completion Date : 19/01/15
Bore Hole Diameter : 150 mm.
Level Of Ground : 8.599 m.
Water Struck At :
Standing Water Level : 0.35 m.

DESCRIPTION	SYMBOL	N-VALUE (EACH DIVN. = 15cm.)				Ref. No	Depth (m)
0.00m						WS-1	0.35
						DS-1	0.50
Filled up soil consists of silty clayey reddish brown moorum.					2		
		2	1	1		SPT-1	1.00-1.45
2.00m						UDS-1	2.00-2.45
					2		
		1	1	1		SPT-2	3.00-3.45
Loose, deep grey, silty sand.						UDS-2	4.00-4.45
					1		
		0	0	1		SPT-3	5.00-5.45
6.00m						UDS-3	6.00-6.45
					2		
Very soft, deep grey, silty clay.		0	1	1		SPT-4	7.00-7.45
						UDS-4	8.00-8.45
9.00m					28		
		6	12	16		SPT-5	9.00-9.45
						UDS-5	10.00-10.45
						DS-2	11.00
Medium dense to dense, light greenish grey, clayey silty sand.					40		
		13	17	23		SPT-6	11.50-11.95
						DS-3	12.50
						UDS-6	13.00-13.45
14.00m						DS-4	14.00
					27		
		7	11	16		SPT-7	14.50-14.95
						DS-5	15.50
Medium dense, light greenish grey, silty sand.						UDS-7	16.00-16.45
						DS-6	17.00
					29		
		6	12	17		SPT-8	17.50-17.95
18.50m						DS-7	18.50
						UDS-8	19.00-19.45
Dense, light yellowish grey, silty sand.						DS-8	20.00
					45		
		10	17	28		SPT-9	20.50-20.95
21.00m							

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141886/2020/PS-SR-PM

Project : Geotech. Inv. Work for 2x660MW Coal Based STPP at Ash Dyke of NCTPS, Chennai. CETEST

Job No : 3388 | Created by : Chandrani | Created on : 11/02/2015 | Sheet No:

BORE LOG DATA SHEET

BORE HOLE NO.22

Co-ordinates E=(-)1967.000 N=2061.000

Field Test	Nos	Samples	Nos
Penetrometer (SPT)	22	Undisturbed (UDS)	8
Cone (Pc)		Penetrometer (SPT)	22
Vane (V)		Disturbed (DS)	21
		Water Sample (WS)	1

Commencement Date : 18/01/15
Completion Date : 19/01/15
Bore Hole Diameter : 150 mm.
Level Of Ground : 8.599 m.
Water Struck At :
Standing Water Level : 0.35 m.

DESCRIPTION	SYMBOL	N-VALUE (EACH DIVN. = 15cm.)	SAMPLES Ref. No	SAMPLES Depth (m)
Dense, light yellowish grey, silty sand.	21.00m / 21.50m	12 22 28 — 50	DS-9	21.50
			SPT-10	22.00-22.45
			DS-10	23.00
		13 23 29 — 52	SPT-11	23.50-23.95
			DS-11	24.50
		17 25 34 — 59	SPT-12	25.00-25.45
			DS-12	26.00
Very dense, brownish yellow, silty medium sand.		21 29 39 — 68	SPT-13	26.50-26.95
			DS-13	27.50
		19 30 36 — 66	SPT-14	28.00-28.45
			DS-14	29.00
		19 32 35 — 67	SPT-15	29.50-29.95
			DS-15	30.50
		21 35 47 — 82	SPT-16	31.00-31.45
			DS-16	32.00
Very dense, yellowish grey, silty sand. Obs. traces of kankars & gravels.	32.50m	24 54 69 — >100	SPT-17	32.50-32.95
	33.50m		DS-17	33.50
		25 42 53 — 95	SPT-18	34.00-34.45
Hard, steel grey, sandy silty clay with traces of kankars.			DS-18	35.00
		27 89 50 — >100 (5.0 cm Pentn.)	SPT-19	35.50-35.85
	36.50m		DS-19	36.50
		25 59 71 — >100	SPT-20	37.00-37.45
			DS-20	38.00
Very dens, yellowish grey, silty sand.		29 49 63 — >100	SPT-21	38.50-38.95
			DS-21	39.50
	40.45m	35 60 50 — >100 (15.0 cm Pentn.)	SPT-22	40.00-40.45

141886/2020/PS-SR-PM

Project : Geotech. Inv. Work for 2x660MW Coal Based STPP at Ash Dyke of NCTPS, Chennai. CETEST

Job No : 3388 | Created by : Chandrani | Created on : 11/02/2015 | Sheet No:

BORE LOG DATA SHEET

BORE HOLE NO.23

Co-ordinates E=(-)219.000 N=1293.000

Field Test	Nos	Samples	Nos
Penetrometer (SPT)	15	Undisturbed (UDS)	8
Cone (Pc)		Penetrometer (SPT)	15
Vane (V)		Disturbed (DS)	14
		Water Sample (WS)	0

Commencement Date : 26/01/15
Completion Date : 27/01/15
Bore Hole Diameter : 150 mm.
Level Of Ground : 10.345 m.
Water Struck At :
Standing Water Level :

DESCRIPTION	SYMBOL	N-VALUE (EACH DIVN. = 15cm.)				SAMPLES Ref. No	SAMPLES Depth (m)
0.00m							
Filled up soil consists of yellowish brown, silty sand.						DS-1	0.50
1.00m		6	9	11	20	SPT-1	1.00-1.45
						*UDS-1	2.00-2.45
		7	10	14	24	SPT-2	3.00-3.45
						*UDS-2	4.00-4.45
Medium dense to dense, light yellowish grey to steel grey, silty sand.		8	10	15	25	SPT-3	5.00-5.45
						*UDS-3	6.00-6.45
		10	14	19	33	SPT-4	7.00-7.45
						*UDS-4	8.00-8.45
8.50m							
		3	5	5	10	SPT-5	9.00-9.45
						UDS-5	10.00-10.45
						DS-2	11.00
Loose to medium dense, deep grey, clayey silty sand.		4	5	6	11	SPT-6	11.50-11.95
						DS-3	12.50
						UDS-6	13.00-13.45
						DS-4	14.00
		6	8	10	18	SPT-7	14.50-14.95
15.00m							

BH-23/Sheet-1

141886/2020/PS-SR-PM

Project : Geotech. Inv. Work for 2x660MW Coal Based STPP at Ash Dyke of NCTPS, Chennai. CETEST

Job No : 3388 | Created by : Chandrani | Created on : 11/02/2015 | Sheet No:

BORE LOG DATA SHEET

BORE HOLE NO.23

Co-ordinates E=(-)219.000 N=1293.000

Field Test	Nos	Samples	Nos
Penetrometer (SPT)	15	Undisturbed (UDS)	8
Cone (Pc)		Penetrometer (SPT)	15
Vane (V)		Disturbed (DS)	14
		Water Sample (WS)	0

Commencement Date : 26/01/15
Completion Date : 27/01/15
Bore Hole Diameter : 150 mm.
Level Of Ground : 10.345 m.
Water Struck At :
Standing Water Level :

DESCRIPTION	SYMBOL	N-VALUE (EACH DIVN. = 15cm.)	SAMPLES Ref. No	SAMPLES Depth (m)
15.00m. Loose to medium dense, deep grey, clayey silty sand. 15.50m.			DS-5	15.50
			UDS-7	16.00-16.45
			DS-6	17.00
Dense, light greenish grey, silty sand.		11 18 23 (41)	SPT-8	17.50-17.95
			DS-7	18.50
			*UDS-8	19.00-19.45
20.00m.			DS-8	20.00
		30 42 49 (91)	SPT-9	20.50-20.95
			DS-9	21.50
Very dense, light yellowish / greenish grey, silty sand.		14 24 32 (56)	SPT-10	22.00-22.45
			DS-10	23.00
		17 25 34 (59)	SPT-11	23.50-23.95
24.50m.			DS-11	24.50
		33 51 57 (>100)	SPT-12	25.00-25.45
			DS-12	26.00
		42 55 50 (>100) 10.0 cm Pentn.	SPT-13	26.50-26.90
Very dense, light greenish grey / steel grey, silty sand.			DS-13	27.50
		39 52 50 (>100) 10.0 cm Pentn.	SPT-14	28.00-28.40
			DS-14	29.00
N.B. - '*' means sample could not be recovered.		36 66 50 (>100) 8.0 cm Pentn.	SPT-15	29.50-29.88
29.88m.				

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141886/2020/PS-SR-PM

Project : Geotech. Inv. Work for 2x660MW Coal Based STPP at Ash Dyke of NCTPS, Chennai. CETEST

Job No : 3388 | Created by : Chandrani | Created on : 11/02/2015 | Sheet No:

BORE LOG DATA SHEET

BORE HOLE NO.24

Co-ordinates E=(-)209.000 N=1177.000

Field Test	Nos	Samples	Nos
Penetrometer (SPT)	15	Undisturbed (UDS)	8
Cone (Pc)		Penetrometer (SPT)	15
Vane (V)		Disturbed (DS)	14
		Water Sample (WS)	0

Commencement Date : 25/01/15
Completion Date : 25/01/15
Bore Hole Diameter : 150 mm.
Level Of Ground : 10.192 m.
Water Struck At :
Standing Water Level :

DESCRIPTION	SYMBOL	N-VALUE (EACH DIVN. = 15cm.)				Ref. No	Depth (m)
0.00m							
Deep brownish yellow, silty sand.						DS-1	0.50
1.00m		5	7	9	16	SPT-1	1.00-1.45
						*UDS-1	2.00-2.45
		7	10	12	22	SPT-2	3.00-3.45
						*UDS-2	4.00-4.45
Medium dense, grey to steel grey, silty sand.		8	11	14	25	SPT-3	5.00-5.45
						*UDS-3	6.00-6.45
		8	12	16	28	SPT-4	7.00-7.45
						*UDS-4	8.00-8.45
8.50m		3	4	4	8	SPT-5	9.00-9.45
Medium, deep grey, silty clay.						UDS-5	10.00-10.45
						DS-2	11.00
11.50m		6	9	16	25	SPT-6	11.50-11.95
Medium dense, deep grey, clayey silty sand.						DS-3	12.50
						UDS-6	13.00-13.45
14.00m						DS-4	14.00
		13	16	22	38	SPT-7	14.50-14.95
Dense, deep grey, clayey silty sand.						DS-5	15.50
16.00m							

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141886/2020/PS-SR-PM

Project : Geotech. Inv. Work for 2x660MW Coal Based STPP at Ash Dyke of NCTPS, Chennai. CETEST

Job No : 3388 | Created by : Chandrani | Created on : 11/02/2015 | Sheet No:

BORE LOG DATA SHEET

BORE HOLE NO.24

Co-ordinates E=(-)209.000 N=1177.000

Field Test	Nos	Samples	Nos
Penetrometer (SPT)	15	Undisturbed (UDS)	8
Cone (Pc)		Penetrometer (SPT)	15
Vane (V)		Disturbed (DS)	14
		Water Sample (WS)	0

Commencement Date : 25/01/15
Completion Date : 25/01/15
Bore Hole Diameter : 150 mm.
Level Of Ground : 10.192 m.
Water Struck At :
Standing Water Level :

DESCRIPTION	SYMBOL	N-VALUE (EACH DIVN. = 15cm.)	Ref. No	Depth (m)
16.00m.				
Dense, deep grey, clayey silty sand.			UDS-7	16.00-16.45
17.00m.			DS-6	17.00
		16 20 26 (46)	SPT-8	17.50-17.95
			DS-7	18.50
Dense to very dense, light greenish yellowish grey, silty sand.			*UDS-8	19.00-19.45
			DS-8	20.00
		18 26 29 (55)	SPT-9	20.50-20.95
21.50m.			DS-9	21.50
		31 37 44 (81)	SPT-10	22.00-22.45
			DS-10	23.00
		28 39 47 (86)	SPT-11	23.50-23.95
			DS-11	24.50
		29 48 65 (>100)	SPT-12	25.00-25.45
Very dense, yellowish grey, silty sand.			DS-12	26.00
		31 69 50 (>100) 10.0 cm Pentn.	SPT-13	26.50-26.90
			DS-13	27.50
		34 71 50 (>100) 10.0 cm Pentn.	SPT-14	28.00-28.40
			DS-14	29.00
		39 76 50 (>100) 8.0 cm Pentn.	SPT-15	29.50-29.88
29.88m.				

N.B. - '*' means sample could not be recovered.

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141886/2020/PS-SR-PM

Project : Geotech. Inv. Work for 2x660MW Coal Based STPP at Ash Dyke of NCTPS, Chennai. CETEST

Job No : 3388 | Created by : Chandrani | Created on : 11/02/2015 | Sheet No:

BORE LOG DATA SHEET

BORE HOLE NO.25

Co-ordinates E=(-)124.000 N=1092.000

Field Test	Nos	Samples	Nos
Penetrometer (SPT)	16	Undisturbed (UDS)	8
Cone (Pc)		Penetrometer (SPT)	16
Vane (V)		Disturbed (DS)	15
		Water Sample (WS)	1

Commencement Date : 24/01/15
Completion Date : 24/01/15
Bore Hole Diameter : 150 mm.
Level Of Ground : 10.282 m.
Water Struck At :
Standing Water Level : 2.90 m.

DESCRIPTION	SYMBOL	N-VALUE (EACH DIVN. = 15cm.)				SAMPLES Ref. No	SAMPLES Depth (m)
0.00m.							
Filled up soil consists of brownish yellow, silty sand.						DS-1	0.50
1.00m.		6	11	16	27	SPT-1	1.00-1.45
Medium dense, brownish yellow, silty sand.						*UDS-1	2.00-2.45
2.50m.						WS-1	2.90
		10	17	23	40	SPT-2	3.00-3.45
Medium dense, steel grey, silty sand.						*UDS-2	4.00-4.45
		12	20	23	43	SPT-3	5.00-5.45
6.00m.						*UDS-3	6.00-6.45
Dense, steel grey, silty sand.		7	13	16	29	SPT-4	7.00-7.45
						*UDS-4	8.00-8.45
8.50m.		5	7	10	17	SPT-5	9.00-9.45
						UDS-5	10.00-10.45
						DS-2	11.00
Medium dense, deep brown / light greenish grey, clayey silty sand.		6	8	12	20	SPT-6	11.50-11.95
						DS-3	12.50
						UDS-6	13.00-13.45
						DS-4	14.00
		5	7	9	16	SPT-7	14.50-14.95
						DS-5	15.50
16.00m.							

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141886/2020/PS-SR-PM

Project : Geotech. Inv. Work for 2x660MW Coal Based STPP at Ash Dyke of NCTPS, Chennai. CETEST

Job No : 3388 | Created by : Chandrani | Created on : 11/02/2015 | Sheet No:

BORE LOG DATA SHEET

BORE HOLE NO.25

Co-ordinates E=(-)124.000 N=1092.000

Field Test	Nos	Samples	Nos
Penetrometer (SPT)	16	Undisturbed (UDS)	8
Cone (Pc)		Penetrometer (SPT)	16
Vane (V)		Disturbed (DS)	15
		Water Sample (WS)	1

Commencement Date : 24/01/15
Completion Date : 24/01/15
Bore Hole Diameter : 150 mm.
Level Of Ground : 10.282 m.
Water Struck At :
Standing Water Level : 2.90 m.

DESCRIPTION	SYMBOL	N-VALUE (EACH DIVN. = 15cm.)	Ref. No	Depth (m)
16.00m				
Medium dense, deep brown / light greenish grey, clayey silty sand.			UDS-7	16.00-16.45
17.00m			DS-6	17.00
		13 19 23 — 42	SPT-8	17.50-17.95
			DS-7	18.50
			*UDS-8	19.00-19.45
			DS-8	20.00
Dense, light greenish grey, silty sand.		14 18 23 — 41	SPT-9	20.50-20.95
			DS-9	21.50
		16 21 25 — 46	SPT-10	22.00-22.45
			DS-10	23.00
23.50m		33 51 50/10.0 cm — >100 Pentn.	SPT-11	23.50-23.90
			DS-11	24.50
Very dense, steel grey to grey, silty sand.		22 30 39 — 69	SPT-12	25.00-25.45
26.00m			DS-12	26.00
		29 62 50/10.0 cm — >100 Pentn.	SPT-13	26.50-26.90
			DS-13	27.50
		36 60 50/8.0 cm — >100 Pentn.	SPT-14	28.00-28.38
Very dense, steel grey, silty sand. Obs. greyish patches.			DS-14	29.00
		32 61 50/10.0 cm — >100 Pentn.	SPT-15	29.50-29.90
			DS-15	30.50
		33 66 50/10.0 cm — >100 Pentn.	SPT-16	31.00-31.40
31.40m				

N.B. - '*' means sample could not be recovered.

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Project : Geotech. Inv. Work for 2x660MW Coal Based STPP at Ash Dyke of NCTPS, Chennai. CETEST

Job No : 3388 | Created by : Chandrani | Created on : 28/01/2015 | Sheet No:

BORE LOG DATA SHEET

BORE HOLE NO.26

Co-ordinates E=(−)24.000 N=1054.000

Field Test	Nos	Samples	Nos
Penetrometer (SPT)	22	Undisturbed (UDS)	8
Cone (Pc)		Penetrometer (SPT)	22
Vane (V)		Disturbed (DS)	21
		Water Sample (WS)	0

Commencement Date : 21/01/15
Completion Date : 22/01/15
Bore Hole Diameter : 150 mm.
Level Of Ground : 9.79 m.
Water Struck At :
Standing Water Level :

DESCRIPTION	SYMBOL	N-VALUE (EACH DIVN. = 15cm.)				SAMPLES Ref. No	SAMPLES Depth (m)
0.00m							
Filled up soil consists of brownish yellow, silty sand & stone chips & kankars.						DS-1	0.50
1.00m		17	26	31	57	SPT-1	1.00-1.45
Very dense, brownish yellow, silty sand with traces of kankars.						*UDS-1	2.00-2.45
3.00m		8	16	17	33	SPT-2	3.00-3.45
Dense, steel grey, silty sand. Obs. brownish patches.						*UDS-2	4.00-4.45
5.00m		9	14	19	33	SPT-3	5.00-5.45
Dense, grey, silty sand.						*UDS-3	6.00-6.45
7.00m		6	12	15	27	SPT-4	7.00-7.45
Medium dense, brownish yellow, silty sand.						*UDS-4	8.00-8.45
9.00m		3	5	7	12	SPT-5	9.00-9.45
Medium dense, deep grey, clayey sand.						UDS-5	10.00-10.45
10.00m						DS-2	11.00
		2	6	9	15	SPT-6	11.50-11.95
Medium dense, deep brownish grey, clayey silty sand.						DS-3	12.50
						UDS-6	13.00-13.45
						DS-4	14.00
		4	7	10	17	SPT-7	14.50-14.95
15.50m						DS-5	15.50
						UDS-7	16.00-16.45
						DS-6	17.00
		12	16	17	33	SPT-8	17.50-17.95
Dense, light greenish grey to steel grey, silty sand. Obs. clay pocket in SPT-04.						DS-7	18.50
						*UDS-8	19.00-19.45
						DS-8	20.00
		10	18	22	40	SPT-9	20.50-20.95
21.00m							

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141886/2020/PS-SR-PM

Project : Geotech. Inv. Work for 2x660MW Coal Based STPP at Ash Dyke of NCTPS, Chennai. CETEST

Job No : 3388 | Created by : Chandrani | Created on : 28/01/2015 | Sheet No:

BORE LOG DATA SHEET

BORE HOLE NO.26

Co-ordinates E=(−)24.000 N=1054.000

Field Test	Nos	Samples	Nos
Penetrometer (SPT)	22	Undisturbed (UDS)	8
Cone (Pc)		Penetrometer (SPT)	22
Vane (V)		Disturbed (DS)	21
		Water Sample (WS)	0

Commencement Date : 21/01/15
Completion Date : 22/01/15
Bore Hole Diameter : 150 mm.
Level Of Ground : 9.79 m.
Water Struck At :
Standing Water Level :

DESCRIPTION	SYMBOL	N−VALUE (EACH DIVN. = 15cm.)	SAMPLES Ref. No	SAMPLES Depth (m)
Dense, light greenish grey to steel grey, silty sand. Obs. clay pocket in SPT−04.			DS−9	21.50
		13 16 19 — 35	SPT−10	22.00−22.45
			DS−10	23.00
Dense, steel grey, silty sand with traces of clay lamination. Obs. greyish patches.		12 19 23 — 42	SPT−11	23.50−23.95
			DS−11	24.50
		22 29 37 — 66	SPT−12	25.00−25.45
			DS−12	26.00
Very dense, yellowish grey, silty medium to coarse sand.		53 71 50 — >100 (15.0 cm Pentn.)	SPT−13	26.50−26.95
			DS−13	27.50
Hard, light yellowish grey, silty clay.		19 23 29 — 52	SPT−14	28.00−28.45
			DS−14	29.00
		35 69 50 — >100 (15.0 cm Pentn.)	SPT−15	29.50−29.95
			DS−15	30.50
		31 55 50 — >100 (10.0 cm Pentn.)	SPT−16	31.00−31.40
			DS−16	32.00
		34 49 63 — >100	SPT−17	32.50−32.95
			DS−17	33.50
		28 51 59 — >100	SPT−18	34.00−34.45
Very dense, yellowish grey, silty sand.			DS−18	35.00
		26 52 63 — >100	SPT−19	35.50−35.95
			DS−19	36.50
		38 55 50 — >100 (10.0 cm Pentn.)	SPT−20	37.00−37.40
			DS−20	38.00
		31 50 50 — >100 (8.0 cm Pentn.)	SPT−21	38.50−38.88
			DS−21	39.50
		36 75 50 — >100 (5.0 cm Pentn.)	SPT−22	40.00−40.35

21.00m
21.50m
25.00m
28.00m
29.00m
40.45m

N.B. − '*' means sample could not be recovered.

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Project : Geotech. Inv. Work for 2x660MW Coal Based STPP at Ash Dyke of NCTPS, Chennai. CETEST

Job No : 3388	Created by : Chandrani	Created on : 11/02/2015	Sheet No:

BORE LOG DATA SHEET — BORE HOLE NO.27

Co-ordinates E=44.466 N=1027.945

Field Test	Nos	Samples	Nos
Penetrometer (SPT)	18	Undisturbed (UDS)	8
Cone (Pc)		Penetrometer (SPT)	18
Vane (V)		Disturbed (DS)	17
		Water Sample (WS)	0

Commencement Date : 22/01/15
Completion Date : 23/01/15
Bore Hole Diameter : 150 mm.
Level Of Ground : 10.226 m.
Water Struck At :
Standing Water Level :

DESCRIPTION	SYMBOL	N-VALUE (EACH DIVN. = 15cm.)	SAMPLES Ref. No	SAMPLES Depth (m)
0.00m				
Filled up soil consists of brownish yellow, silty sand.			DS-1	0.50
1.00m		5 10 17 — 27	SPT-1	1.00-1.45
			*UDS-1	2.00-2.45
Medium dense to dense, brownish yellow, silty sand.		8 13 21 — 34	SPT-2	3.00-3.45
			*UDS-2	4.00-4.45
5.00m		3 5 6 — 11	SPT-3	5.00-5.45
			UDS-3	6.00-6.45
Medium dense to loose, steel grey, silty sand.		3 4 5 — 9	SPT-4	7.00-7.45
			*UDS-4	8.00-8.45
9.00m		4 6 9 — 15	SPT-5	9.00-9.45
			UDS-5	10.00-10.45
			DS-2	11.00
Medium dense, deep brownish grey to light greenish grey, clayey silty sand.		6 9 15 — 24	SPT-6	11.50-11.95
			DS-3	12.50
			UDS-6	13.00-13.45
14.00m			DS-4	14.00
		10 15 20 — 35	SPT-7	14.50-14.95
			DS-5	15.50
Dense, light greenish grey to steel grey, silty sand.			UDS-7	16.00-16.45
			DS-6	17.00
		15 17 28 — 45	SPT-8	17.50-17.95
18.00m				

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Project : Geotech. Inv. Work for 2x660MW Coal Based STPP at Ash Dyke of NCTPS, Chennai. CETEST

Job No : 3388 | Created by : Chandrani | Created on : 11/02/2015 | Sheet No:

BORE LOG DATA SHEET

BORE HOLE NO.27

Co-ordinates E=44.466 N=1027.945

Field Test	Nos	Samples	Nos
Penetrometer (SPT)	18	Undisturbed (UDS)	8
Cone (Pc)		Penetrometer (SPT)	18
Vane (V)		Disturbed (DS)	17
		Water Sample (WS)	0

Commencement Date : 22/01/15
Completion Date : 23/01/15
Bore Hole Diameter : 150 mm.
Level Of Ground : 10.226 m.
Water Struck At :
Standing Water Level :

DESCRIPTION	SYMBOL	N-VALUE (EACH DIVN. = 15cm.)	SAMPLES Ref. No	SAMPLES Depth (m)
18.00m			DS-7	18.50
Dense, light greenish grey to steel grey, silty sand.			*UDS-8	19.00-19.45
			DS-8	20.00
20.50m		16 20 25 (45)	SPT-9	20.50-20.95
			DS-9	21.50
Dense, steel grey, silty sand. Obs. greyish patches.		14 19 23 (42)	SPT-10	22.00-22.45
			DS-10	23.00
		15 21 26 (47)	SPT-11	23.50-23.95
24.50m			DS-11	24.50
		23 33 42 (75)	SPT-12	25.00-25.45
Very dense, yellowish grey, silty coarse sand.			DS-12	26.00
		54 69 60 (>100) 5.0 cm Pentn.	SPT-13	26.50-26.85
27.50m			DS-13	27.50
Hard, brownish yellow, silty clay.		18 27 30 (57)	SPT-14	28.00-28.45
29.00m			DS-14	29.00
		42 76 50 (>100) 8.0 cm Pentn.	SPT-15	29.50-29.88
			DS-15	30.50
Very dense, yellowish grey, silty sand.		35 71 50 (>100) 10.0 cm Pentn.	SPT-16	31.00-31.40
			DS-16	32.00
		33 65 50 (>100) 10.0 cm Pentn.	SPT-17	32.50-32.90
			DS-17	33.50
34.35m		43 72 50 (>100) 5.0 cm Pentn.	SPT-18	34.00-34.35

N.B. - '*' means sample could not be recovered.

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141886/2020/PS-SR-PM

Project : Geotech. Inv. Work for 2x660MW Coal Based STPP at Ash Dyke of NCTPS, Chennai. CETEST

Job No : 3388 | Created by : Chandrani | Created on : 10/12/2014 | Sheet No:

BORE LOG DATA SHEET

BORE HOLE NO.28

Co-ordinates E=(-)2560.000 N=4061.000

Field Test	Nos	Samples	Nos
Penetrometer (SPT)	22	Undisturbed (UDS)	8
Cone (Pc)		Penetrometer (SPT)	22
Vane (V)		Disturbed (DS)	21
		Water Sample (WS)	0

Commencement Date : 01/12/14
Completion Date : 02/12/14
Bore Hole Diameter : 150 mm.
Level Of Ground : 9.081 m.
Water Struck At :
Standing Water Level : 0.55 m.

DESCRIPTION	SYMBOL	N-VALUE EACH DIVN. = 15cm.				SAMPLES Ref. No	SAMPLES Depth (m)
0.00m							
					0	DS-1	0.50
Filled up soil consists of light grey, fly ash.		0	0	0		SPT-1	1.00-1.45
						*UDS-1	2.00-2.45
					0		
3.45m		0	0	0		SPT-2	3.00-3.45
						UDS-2	4.00-4.45
					1		
Very soft, deep grey, silty clay / clayey silt with sand.		0	0	1		SPT-3	5.00-5.45
						UDS-3	6.00-6.45
					2		
		0	1	1		SPT-4	7.00-7.45
8.00m						UDS-4	8.00-8.45
					6		
Medium, brownish grey to steel grey, silty clay with sand mixture.		2	3	3		SPT-5	9.00-9.45
						UDS-5	10.00-10.45
						DS-2	11.00
11.50m					8		
		2	3	5		SPT-6	11.50-11.95
						DS-3	12.50
Medium, steel grey, silty sand with clay mixture.						UDS-6	13.00-13.45
						DS-4	14.00
14.50m					15		
		4	6	9		SPT-7	14.50-14.95
						DS-5	15.50
Medium dense, yellowish grey, silty fine sand. Obs. clay lamination.						UDS-7	16.00-16.45
						DS-6	17.00
17.50m					40		
		7	17	23		SPT-8	17.50-17.95
						DS-7	18.50
Hard, yellowish grey, clayey silt with fine sand mixture.						UDS-8	19.00-19.45
						DS-8	20.00
20.50m							

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Project : Geotech. Inv. Work for 2x660MW Coal Based STPP at Ash Dyke of NCTPS, Chennai. CETEST

Job No : 3388 | Created by : Chandrani | Created on : 10/12/2014 | Sheet No:

BORE LOG DATA SHEET

BORE HOLE NO.28

Co-ordinates E=(-)2560.000 N=4061.000

Field Test	Nos	Samples	Nos
Penetrometer (SPT)	22	Undisturbed (UDS)	8
Cone (Pc)		Penetrometer (SPT)	22
Vane (V)		Disturbed (DS)	21
		Water Sample (WS)	0

Commencement Date : 01/12/14
Completion Date : 02/12/14
Bore Hole Diameter : 150 mm.
Level Of Ground : 9.081 m.
Water Struck At :
Standing Water Level : 0.55 m.

DESCRIPTION	SYMBOL	N-VALUE (EACH DIVN. = 15cm.)				SAMPLES Ref. No	SAMPLES Depth (m)
20.50m							
Dense to very dense, brownish to yellowish grey, silty sand with traces of clay binders.		15	18	25	43	SPT-9	20.50-20.95
						DS-9	21.50
		11	20	27	47	SPT-10	22.00-22.45
						DS-10	23.00
		12	22	27	49	SPT-11	23.50-23.95
						DS-11	24.50
		16	25	31	56	SPT-12	25.00-25.45
						DS-12	26.00
26.50m							
Hard, brownish grey, silty clay with traces of sand mixture.		18	33	44	77	SPT-13	26.50-26.95
						DS-13	27.50
		16	28	33	61	SPT-14	28.00-28.45
						DS-14	29.00
		12	22	34	56	SPT-15	29.50-29.95
						DS-15	30.50
		21	39	45	84	SPT-16	31.00-31.45
						DS-16	32.00
32.50m							
Very dense, brownish grey, silty sand.		16	26	38	64	SPT-17	32.50-32.95
						DS-17	33.50
		16	27	38	65	SPT-18	34.00-34.45
						DS-18	35.00
		18	27	41	68	SPT-19	35.50-35.95
						DS-19	36.50
		19	28	44	72	SPT-20	37.00-37.45
37.50m							
Very dense, yellowish grey, silty mediun to coarse sand. Obs. clay laminated.						DS-20	38.00
		22	46	52	98	SPT-21	38.50-38.95
						DS-21	39.50
		36	47	52	>100	SPT-22	40.00-40.41
40.41m							
N.B. - '*' means sample could not be recovered.					11.0 cm Penth.		

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Project : Geotech. Inv. Work for 2x660MW Coal Based STPP at Ash Dyke of NCTPS, Chennai. CETEST

Job No : 3388 | Created by : Chandrani | Created on : 12/01/2015 | Sheet No:

BORE LOG DATA SHEET

BORE HOLE NO.29

Co-ordinates E=2487.000 N=4132.000

Field Test	Nos	Samples	Nos
Penetrometer (SPT)	22	Undisturbed (UDS)	8
Cone (Pc)		Penetrometer (SPT)	22
Vane (V)		Disturbed (DS)	21
		Water Sample (WS)	0

Commencement Date : 26/12/14
Completion Date : 28/12/14
Bore Hole Diameter : 150 mm.
Level Of Ground : 9.494 m.
Water Struck At :
Standing Water Level : 0.75 m.

DESCRIPTION	SYMBOL	N-VALUE (EACH DIVN. = 15cm.)				SAMPLES	
						Ref. No	Depth (m)
0.00m						DS-1	0.50
Filled up soil consists of light grey, fly ash.		0	0	0	0	SPT-1	1.00-1.45
						*UDS-1	2.00-2.45
2.50m							
Very soft, brownish grey, silty clay / clayey silt with sand mixture.		0	0	1	1	SPT-2	3.00-3.45
						*UDS-2	4.00-4.45
5.00m		0	1	0	1	SPT-3	5.00-5.45
						*UDS-3	6.00-6.45
Very soft, deep grey, silty clay / clayey silt with sand mixture.		0	1	1	2	SPT-4	7.00-7.45
						UDS-4	8.00-8.45
9.00m		0	3	4	7	SPT-5	9.00-9.45
Loose, light greenish grey, silty sand / sandy silt.						*UDS-5	10.00-10.45
11.00m						DS-2	11.00
		4	7	8	15	SPT-6	11.50-11.95
Medium dense, light greenish grey, silty sand / sandy silt.						DS-3	12.50
						*UDS-6	13.00-13.45
						DS-4	14.00
14.50m		7	9	15	24	SPT-7	14.50-14.95
Very stiff, light greenish grey, silty clay / clayey silt.						DS-5	15.50
						*UDS-7	16.00-16.45
						DS-6	17.00
17.50m		9	12	16	28	SPT-8	17.50-17.95
Very stiff, yellowish grey, silty clay / clayey silt with sand mixture & steel grey patches.						DS-7	18.50
						UDS-8	19.00-19.45
						DS-8	20.00
Very dense, light yellowish grey, silty sand / sandy silt. 20.50m		18	25	35	60	SPT-9	20.50-20.95
21.00m							

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141886/2020/PS-SR-PM

Project : Geotech. Inv. Work for 2x660MW Coal Based STPP at Ash Dyke of NCTPS, Chennai. CETEST

Job No : 3388 | Created by : Chandrani | Created on : 12/01/2015 | Sheet No:

BORE LOG DATA SHEET

BORE HOLE NO.29

Co-ordinates E=2487.000 N=4132.000

Field Test	Nos	Samples	Nos
Penetrometer (SPT)	22	Undisturbed (UDS)	8
Cone (Pc)		Penetrometer (SPT)	22
Vane (V)		Disturbed (DS)	21
		Water Sample (WS)	0

Commencement Date : 26/12/14
Completion Date : 28/12/14
Bore Hole Diameter : 150 mm.
Level Of Ground : 9.494 m.
Water Struck At :
Standing Water Level : 0.75 m.

DESCRIPTION	SYMBOL	N-VALUE (EACH DIVN. = 15cm.)		SAMPLES Ref. No	SAMPLES Depth (m)
21.00m				DS-9	21.50
		19 24 33	57	SPT-10	22.00-22.45
Very dense, light yellowish grey, silty sand / sandy silt.				DS-10	23.00
		21 37 39	76	SPT-11	23.50-23.95
				DS-11	24.50
25.00m		15 27 37	64	SPT-12	25.00-25.45
				DS-12	26.00
		16 31 40	71	SPT-13	26.50-26.95
				DS-13	27.50
Hard, light steel grey / light grey, silty clay with traces of sand mixture.		17 31 43	74	SPT-14	28.00-28.45
				DS-14	29.00
		19 33 43	76	SPT-15	29.50-29.95
				DS-15	30.50
31.00m		15 23 32	55	SPT-16	31.00-31.45
				DS-16	32.00
Hard, brownish grey, silty clay / clayey silt with sand mixture. Obs. yellow patches.		17 22 35	57	SPT-17	32.50-32.95
				DS-17	33.50
34.00m		20 22 39	61	SPT-18	34.00-34.45
				DS-18	35.00
Hard, steel grey, silty clay / clayey silt. Obs. yellow patches.		22 23 32	55	SPT-19	35.50-35.95
				DS-19	36.50
37.00m		25 28 30	58	SPT-20	37.00-37.45
Hard, deep brown, silty clay. Obs. reddish spot, yellow patches.				DS-20	38.00
38.50m		24 27 29	56	SPT-21	38.50-38.95
				DS-21	39.50
Hard, brownish grey, silty clay with traces of sand mixture. Obs. yellow patches.		27 29 35	64	SPT-22	40.00-40.45
40.45m					

N.B. - '*' means sample could not be recovered.

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141886/2020/PS-SR-PM

Project : Geotech. Inv. Work for 2x660MW Coal Based STPP at Ash Dyke of NCTPS, Chennai. CETEST

Job No : 3388 | Created by : Chandrani | Created on : 22/01/2015 | Sheet No:

BORE LOG DATA SHEET — BORE HOLE NO.30

Co-ordinates E =(-)2622.000 N=4182.000

Field Test	Nos	Samples	Nos
Penetrometer (SPT)	22	Undisturbed (UDS)	8
Cone (Pc)		Penetrometer (SPT)	22
Vane (V)		Disturbed (DS)	21
		Water Sample (WS)	1

Commencement Date : 28/12/14
Completion Date : 04/01/15
Bore Hole Diameter : 150 mm.
Level Of Ground : 9.074 m.
Water Struck At :
Standing Water Level : 0.65 m.

DESCRIPTION	SYMBOL	N-VALUE (EACH DIVN. = 15cm.)				SAMPLES Ref. No	SAMPLES Depth (m)
0.00m							
Filled up soil consists of light grey, fly ash.		0	0	0	0	DS-1	0.50
						WS-1	0.65
						SPT-1	1.00-1.45
						*UDS-1	2.00-2.45
2.50m							
Very loose, deep grey, silty sand / sandy silt.		0	0	0	0	SPT-2	3.00-3.45
						*UDS-2	4.00-4.45
		0	0	1	1	SPT-3	5.00-5.45
						*UDS-3	6.00-6.45
7.00m							
Very loose, brownish grey, silty sand / sandy silt. Obs. steel grey patches.		0	1	2	3	SPT-4	7.00-7.45
						UDS-4	8.00-8.45
9.45m		0	3	5	8	SPT-5	9.00-9.45
						UDS-5	10.00-10.45
						DS-2	11.00
		5	6	8	14	SPT-6	11.50-11.95
						DS-3	12.50
						*UDS-6	13.00-13.45
						DS-4	14.00
Medium dense, light greenish grey, silty sand / sandy silt.		9	11	16	27	SPT-7	14.50-14.95
						DS-5	15.50
						UDS-7	16.00-16.45
						DS-6	17.00
		12	12	17	29	SPT-8	17.50-17.95
						DS-7	18.50
						UDS-8	19.00-19.45
20.00m						DS-8	20.00
Dense to very dense, light yellowish grey, silty sand. 20.75m		18	20	27	47	SPT-9	20.50-20.95

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Project : Geotech. Inv. Work for 2x660MW Coal Based STPP at Ash Dyke of NCTPS, Chennai. CETEST

Job No : 3388 | Created by : Chandrani | Created on : 22/01/2015 | Sheet No:

BORE LOG DATA SHEET

BORE HOLE NO.30

Co-ordinates E =(-)2622.000 N=4182.000

Field Test	Nos	Samples	Nos
Penetrometer (SPT)	22	Undisturbed (UDS)	8
Cone (Pc)		Penetrometer (SPT)	22
Vane (V)		Disturbed (DS)	21
		Water Sample (WS)	1

Commencement Date : 28/12/14
Completion Date : 04/01/15
Bore Hole Diameter : 150 mm.
Level Of Ground : 9.074 m.
Water Struck At :
Standing Water Level : 0.65 m.

DESCRIPTION	SYMBOL	N-VALUE (EACH DIVN. = 15cm.)			SAMPLES Ref. No	SAMPLES Depth (m)
20.75m						
Dense to very dense, light yellowish grey, silty sand.		20	22	35 (57)	DS-9	21.50
					SPT-10	22.00-22.45
					DS-10	23.00
23.50m		22	21	37 (58)	SPT-11	23.50-23.95
Very dense, yellowish grey, silty fine sand.					DS-11	24.50
		15	26	36 (62)	SPT-12	25.00-25.45
					DS-12	26.00
26.50m		20	25	37 (62)	SPT-13	26.50-26.95
					DS-13	27.50
		20	21	35 (56)	SPT-14	28.00-28.45
					DS-14	29.00
Hard, whitish grey, silty clay with yellow patches.		22	35	32 (67)	SPT-15	29.50-29.95
					DS-15	30.50
		19	30	39 (69)	SPT-16	31.00-31.45
					DS-16	32.00
32.50m		23	29	31 (60)	SPT-17	32.50-32.95
					DS-17	33.50
Hard, deep brownish grey, silty clay with yellow patches & sand mixture.		25	28	37 (65)	SPT-18	34.00-34.45
					DS-18	35.00
35.50m		18	33	39 (72)	SPT-19	35.50-35.95
					DS-19	36.50
Hard, brownish grey, silty clay with sand mixture as pocket.		19	33	43 (76)	SPT-20	37.00-37.45
					DS-20	38.00
38.50m		24	36	47 (83)	SPT-21	38.50-38.95
					DS-21	39.50
Hard, yellowish grey, silty clay with sand mixture.		25	39	48 (87)	SPT-22	40.00-40.45
40.45m						

N.B. - '*' means sample could not be recovered.

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Project : Geotech. Inv. Work for 2x660MW Coal Based STPP at Ash Dyke of NCTPS, Chennai. CETEST

Job No : 3388 | Created by : Chandrani | Created on : 12/01/2015 | Sheet No:

BORE LOG DATA SHEET — BORE HOLE NO.31

Co-ordinates E=(-)3244.000 N=3980.000

Field Test	Nos	Samples	Nos
Penetrometer (SPT)	22	Undisturbed (UDS)	8
Cone (Pc)		Penetrometer (SPT)	22
Vane (V)		Disturbed (DS)	21
		Water Sample (WS)	0

Commencement Date : 24/12/14
Completion Date : 25/12/14
Bore Hole Diameter : 150 mm.
Level Of Ground : 9.264 m.
Water Struck At :
Standing Water Level : 0.6 m.

DESCRIPTION	SYMBOL	N-VALUE (EACH DIVN. = 15cm.)				SAMPLES Ref. No	SAMPLES Depth (m)
0.00m							
Filled up soil consists of light grey, fly ash.		0	1	1	2	DS-1	0.50
						SPT-1	1.00-1.45
						*UDS-1	2.00-2.45
3.00m		0	1	0	1	SPT-2	3.00-3.45
Very loose, light brownish grey to deep grey, sandy silt / silty sand with traces of clay binder.						*UDS-2	4.00-4.45
		0	0	0	0	SPT-3	5.00-5.45
						*UDS-3	6.00-6.45
		0	1	2	3	SPT-4	7.00-7.45
						UDS-4	8.00-8.45
9.45m		1	2	2	4	SPT-5	9.00-9.45
Medium dense, deep grey, clayey silty sand.						UDS-5	10.00-10.45
						DS-2	11.00
		1	5	8	13	SPT-6	11.50-11.95
						DS-3	12.50
13.00m						UDS-6	13.00-13.45
Dense, light greenish grey, silty sand.						DS-4	14.00
		7	13	17	30	SPT-7	14.50-14.95
						DS-5	15.50
						*UDS-7	16.00-16.45
						DS-6	17.00
		9	13	19	32	SPT-8	17.50-17.95
						DS-7	18.50
						UDS-8	19.00-19.45
						DS-8	20.00
Very dense, brownish grey, silty sand. Obs. traces of clay. 20.50m / 21.00m		13	22	28	50	SPT-9	20.50-20.95

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Project : Geotech. Inv. Work for 2x660MW Coal Based STPP at Ash Dyke of NCTPS, Chennai. CETEST

Job No : 3388 | Created by : Chandrani | Created on : 12/01/2015 | Sheet No:

BORE LOG DATA SHEET — BORE HOLE NO.31

Co-ordinates E=(-)3244.000 N=3980.000

Field Test	Nos	Samples	Nos
Penetrometer (SPT)	22	Undisturbed (UDS)	8
Cone (Pc)		Penetrometer (SPT)	22
Vane (V)		Disturbed (DS)	21
		Water Sample (WS)	0

Commencement Date : 24/12/14
Completion Date : 25/12/14
Bore Hole Diameter : 150 mm.
Level Of Ground : 9.264 m.
Water Struck At :
Standing Water Level : 0.6 m.

DESCRIPTION	SYMBOL	N-VALUE (EACH DIVN. = 15cm.)				SAMPLES Ref. No	SAMPLES Depth (m)
21.00m						DS-9	21.50
		19	22	31	53	SPT-10	22.00-22.45
Very dense, brownish grey, silty sand. Obs. traces of clay.						DS-10	23.00
		21	24	33	57	SPT-11	23.50-23.95
						DS-11	24.50
25.00m		17	22	31	53	SPT-12	25.00-25.45
						DS-12	26.00
		19	21	30	51	SPT-13	26.50-26.95
Hard, light brownish grey, silty clay. Obs. steel grey patches.						DS-13	27.50
		17	23	29	52	SPT-14	28.00-28.45
						DS-14	29.00
		19	24	31	55	SPT-15	29.50-29.95
						DS-15	30.50
31.00m		18	29	35	64	SPT-16	31.00-31.45
						DS-16	32.00
Hard, brownish grey, silty clay. Obs. steel grey patches & sand mixture.		19	29	38	67	SPT-17	32.50-32.95
						DS-17	33.50
34.00m		21	32	42	74	SPT-18	34.00-34.45
						DS-18	35.00
		21	34	43	77	SPT-19	35.50-35.95
						DS-19	36.50
Very dense, steel grey, silty sand with traces of clay. Obs. light brownish patches.		25	40	48	88	SPT-20	37.00-37.45
						DS-20	38.00
		26	36	53	89	SPT-21	38.50-38.95
						DS-21	39.50
40.45m		19	29	45	74	SPT-22	40.00-40.45

N.B. - '*' means sample could not be recovered.

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141886/2020/PS-SR-PM

Project : Geotech. Inv. Work for 2x660MW Coal Based STPP at Ash Dyke of NCTPS, Chennai. CETEST

Job No : 3388 | Created by : Chandrani | Created on : 22/01/2015 | Sheet No:

BORE LOG DATA SHEET

BORE HOLE NO.32

Co-ordinates E=(-)2864.000 N=4300.000

Field Test	Nos	Samples	Nos
Penetrometer (SPT)	22	Undisturbed (UDS)	8
Cone (Pc)		Penetrometer (SPT)	22
Vane (V)		Disturbed (DS)	21
		Water Sample (WS)	0

Commencement Date : 04/01/15
Completion Date : 05/01/15
Bore Hole Diameter : 150 mm.
Level Of Ground : 9.892 m.
Water Struck At :
Standing Water Level : 0.75 m.

DESCRIPTION	SYMBOL	N-VALUE (EACH DIVN. = 15cm.)				SAMPLES	
						Ref. No	Depth (m)
0.00m							
					0	DS-1	0.50
Filled up soil consists of light grey, fly ash.		0	0	0		SPT-1	1.00-1.45
						*UDS-1	2.00-2.45
					0		
3.45m		0	0	0		SPT-2	3.00-3.45
						*UDS-2	4.00-4.45
					1		
		0	1	0		SPT-3	5.00-5.45
						*UDS-3	6.00-6.45
Very loose, deep grey, silty sand / sandy silt.					2		
		0	1	1		SPT-4	7.00-7.45
						*UDS-4	8.00-8.45
					7		
		0	3	4		SPT-5	9.00-9.45
9.50m							
						UDS-5	10.00-10.45
						DS-2	11.00
					15		
Medium dense, light greenish grey, silty sand.		4	7	8		SPT-6	11.50-11.95
						DS-3	12.50
						*UDS-6	13.00-13.45
						DS-4	14.00
14.50m					24		
		7	10	14		SPT-7	14.50-14.95
Medium dense, light greenish grey, silty fine sand.						DS-5	15.50
16.00m						UDS-7	16.00-16.45
Brownish grey, silty sand. Obs. steel grey patches.						DS-6	17.00
17.50m					29		
		9	13	16		SPT-8	17.50-17.95
Medium dense, greenish grey, silty fine sand.						DS-7	18.50
						UDS-8	19.00-19.45
20.00m						DS-8	20.00
Very dense, greenish grey, silty fine sand.					53		
20.75m		18	22	31		SPT-9	20.50-20.95

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141886/2020/PS-SR-PM

Project : Geotech. Inv. Work for 2x660MW Coal Based STPP at Ash Dyke of NCTPS, Chennai. CETEST

Job No : 3388 | Created by : Chandrani | Created on : 22/01/2015 | Sheet No:

BORE LOG DATA SHEET

BORE HOLE NO.32

Co-ordinates E=(-)2864.000 N=4300.000

Field Test	Nos	Samples	Nos
Penetrometer (SPT)	22	Undisturbed (UDS)	8
Cone (Pc)		Penetrometer (SPT)	22
Vane (V)		Disturbed (DS)	21
		Water Sample (WS)	0

Commencement Date : 04/01/15
Completion Date : 05/01/15
Bore Hole Diameter : 150 mm.
Level Of Ground : 9.892 m.
Water Struck At :
Standing Water Level : 0.75 m.

DESCRIPTION	SYMBOL	N-VALUE (EACH DIVN. = 15cm.)		SAMPLES Ref. No	Depth (m)
20.75m					
Very dense, greenish grey, silty fine sand.				DS-9	21.50
21.50m		22 30 36	66	SPT-10	22.00-22.45
				DS-10	23.00
		21 36 45	81	SPT-11	23.50-23.95
				DS-11	24.50
Very dense, whitish grey, silty sand / sandy silt.		25 37 47	84	SPT-12	25.00-25.45
				DS-12	26.00
		23 32 40	72	SPT-13	26.50-26.95
				DS-13	27.50
28.00m		22 28 48	76	SPT-14	28.00-28.45
				DS-14	29.00
Hard, brownish grey, silty clay with kankars mixture.		20 34 50	84	SPT-15	29.50-29.95
				DS-15	30.50
31.00m		30 37 42	79	SPT-16	31.00-31.45
				DS-16	32.00
		37 41 53	94	SPT-17	32.50-32.95
Very dense, yellowish brown, silty sand. Obs. steel grey patches.				DS-17	33.50
		31 38 47	85	SPT-18	34.00-34.45
				DS-18	35.00
35.50m		25 39 46	85	SPT-19	35.50-35.95
				DS-19	36.50
		27 31 47	78	SPT-20	37.00-37.45
Very dense, yellowish brown, silty sand with clay lamination				DS-20	38.00
		22 37 45	82	SPT-21	38.50-38.95
				DS-21	39.50
40.45m		21 33 43	76	SPT-22	40.00-40.45

N.B. - '*' means sample could not be recovered.

BH-32/Sheet-2

141886/2020/PS-SR-PM

Project : Geotech. Inv. Work for 2x660MW Coal Based STPP at Ash Dyke of NCTPS, Chennai. CETEST

Job No : 3388 | Created by : Chandrani | Created on : 28/01/2015 | Sheet No:

BORE LOG DATA SHEET

BORE HOLE NO.33

Co-ordinates E=(-)2917.000 N=4176.000

Field Test	Nos	Samples	Nos
Penetrometer (SPT)	22	Undisturbed (UDS)	8
Cone (Pc)		Penetrometer (SPT)	22
Vane (V)		Disturbed (DS)	21
		Water Sample (WS)	0

Commencement Date : 16/01/15
Completion Date : 18/01/15
Bore Hole Diameter : 150 mm.
Level Of Ground : 8.746 m.
Water Struck At :
Standing Water Level : 0.45 m.

DESCRIPTION	SYMBOL	N-VALUE (EACH DIVN. = 15cm.)				SAMPLES	
						Ref. No	Depth (m)
0.00m							
Filled up soil consists of light grey, fly ash.		0	0	0	0	DS-1	0.50
						SPT-1	1.00-1.45
						UDS-1	2.00-2.45
2.50m					1		
Very loose to loose, light brownish grey to deep grey, clayey silty sand.		0	0	1		SPT-2	3.00-3.45
						UDS-2	4.00-4.45
		1	1	1	2	SPT-3	5.00-5.45
						UDS-3	6.00-6.45
		2	4	4	8	SPT-4	7.00-7.45
						UDS-4	8.00-8.45
9.00m					13		
Medium dense, light grey, clayey silty sand. Obs. brownish patches.		4	5	8		SPT-5	9.00-9.45
						UDS-5	10.00-10.45
						DS-2	11.00
		6	9	10	19	SPT-6	11.50-11.95
12.50m						DS-3	12.50
						UDS-6	13.00-13.45
						DS-4	14.00
Dense, light greenish grey, clayey silty sand.		12	13	22	35	SPT-7	14.50-14.95
						DS-5	15.50
						UDS-7	16.00-16.45
						DS-6	17.00
17.50m					42		
Dense, light yellowish grey, clayey silty sand.		13	19	23		SPT-8	17.50-17.95
						DS-7	18.50
						UDS-8	19.00-19.45
						DS-8	20.00
20.50m					68		
Very dense, light yellowish grey, silty coarse sand. 21.00m		21	32	36		SPT-9	20.50-20.95

BH-33/Sheet-1

141886/2020/PS-SR-PM

Project : Geotech. Inv. Work for 2x660MW Coal Based STPP at Ash Dyke of NCTPS, Chennai. CETEST

Job No : 3388 | Created by : Chandrani | Created on : 28/01/2015 | Sheet No:

BORE LOG DATA SHEET

BORE HOLE NO.33

Co-ordinates E=(-)2917.000 N=4176.000

Field Test	Nos	Samples	Nos
Penetrometer (SPT)	22	Undisturbed (UDS)	8
Cone (Pc)		Penetrometer (SPT)	22
Vane (V)		Disturbed (DS)	21
		Water Sample (WS)	0

Commencement Date : 16/01/15
Completion Date : 18/01/15
Bore Hole Diameter : 150 mm.
Level Of Ground : 8.746 m.
Water Struck At :
Standing Water Level : 0.45 m.

DESCRIPTION	SYMBOL	N-VALUE (EACH DIVN. = 15cm.)				SAMPLES Ref. No	SAMPLES Depth (m)
						DS-9	21.50
		24	32	39	71	SPT-10	22.00-22.45
						DS-10	23.00
		26	30	42	72	SPT-11	23.50-23.95
						DS-11	24.50
		29	39	46	85	SPT-12	25.00-25.45
						DS-12	26.00
		13	28	35	63	SPT-13	26.50-26.95
						DS-13	27.50
		12	26	32	58	SPT-14	28.00-28.45
						DS-14	29.00
		21	27	34	61	SPT-15	29.50-29.95
						DS-15	30.50
		25	31	37	68	SPT-16	31.00-31.45
						DS-16	32.00
		26	34	41	75	SPT-17	32.50-32.95
						DS-17	33.50
		28	38	48	86	SPT-18	34.00-34.45
						DS-18	35.00
		32	42	51	93	SPT-19	35.50-35.95
						DS-19	36.50
		27	39	49	88	SPT-20	37.00-37.45
						DS-20	38.00
		25	41	56	97	SPT-21	38.50-38.95
						DS-21	39.50
		35	53	50	>100	SPT-22	40.00-40.40

21.00m

Very dense, light yellowish grey, silty coarse sand.

26.50m

Hard, light brownish grey, silty clay.

30.50m

Very dense, light brownish grey, silty sand.

40.45m

10.0 cm Penth.

BH-33/Sheet-2

141886/2020/PS-SR-PM

Project : Geotech. Inv. Work for 2x660MW Coal Based STPP at Ash Dyke of NCTPS, Chennai. CETEST

Job No : 3388 | Created by : Chandrani | Created on : 13/01/2015 | Sheet No:

BORE LOG DATA SHEET

BORE HOLE NO.34

Co-ordinates E=(-)3065.000 N=4073.000

Field Test	Nos	Samples	Nos
Penetrometer (SPT)	22	Undisturbed (UDS)	8
Cone (Pc)		Penetrometer (SPT)	22
Vane (V)		Disturbed (DS)	21
		Water Sample (WS)	1

Commencement Date : 17/02/14
Completion Date : 19/12/14
Bore Hole Diameter : 150 mm.
Level Of Ground : 9.222 m.
Water Struck At :
Standing Water Level : 0.55 m.

DESCRIPTION	SYMBOL	N-VALUE (EACH DIVN. = 15cm.)				SAMPLES Ref. No	SAMPLES Depth (m)
0.00m							
Filled up soil consists of light grey, fly ash.		0	0	1	1	DS-1	0.50
						WS-1	0.55
						SPT-1	1.00-1.45
						*UDS-1	2.00-2.45
3.00m							
Very soft, deep grey, sandy silty clay.		0	0	0	0	SPT-2	3.00-3.45
						*UDS-2	4.00-4.45
		0	0	1	1	SPT-3	5.00-5.45
						*UDS-3	6.00-6.45
		0	2	2	4	SPT-4	7.00-7.45
						UDS-4	8.00-8.45
8.45m							
Medium dense, deep grey to light grey, clayey silty sand.		2	5	8	13	SPT-5	9.00-9.45
						UDS-5	10.00-10.45
						DS-2	11.00
		5	7	12	19	SPT-6	11.50-11.95
						DS-3	12.50
13.00m							
Medium dense to dense, light greenish grey, silty fine sand.						UDS-6	13.00-13.45
						DS-4	14.00
		7	11	15	26	SPT-7	14.50-14.95
						DS-5	15.50
						UDS-7	16.00-16.45
17.00m						DS-6	17.00
Dense, light yellowish grey, silty sand. Obs. traces of clay.		7	13	18	31	SPT-8	17.50-17.95
						DS-7	18.50
						UDS-8	19.00-19.45
						DS-8	20.00
21.00m		9	16	21	37	SPT-9	20.50-20.95

BH-34/Sheet-1

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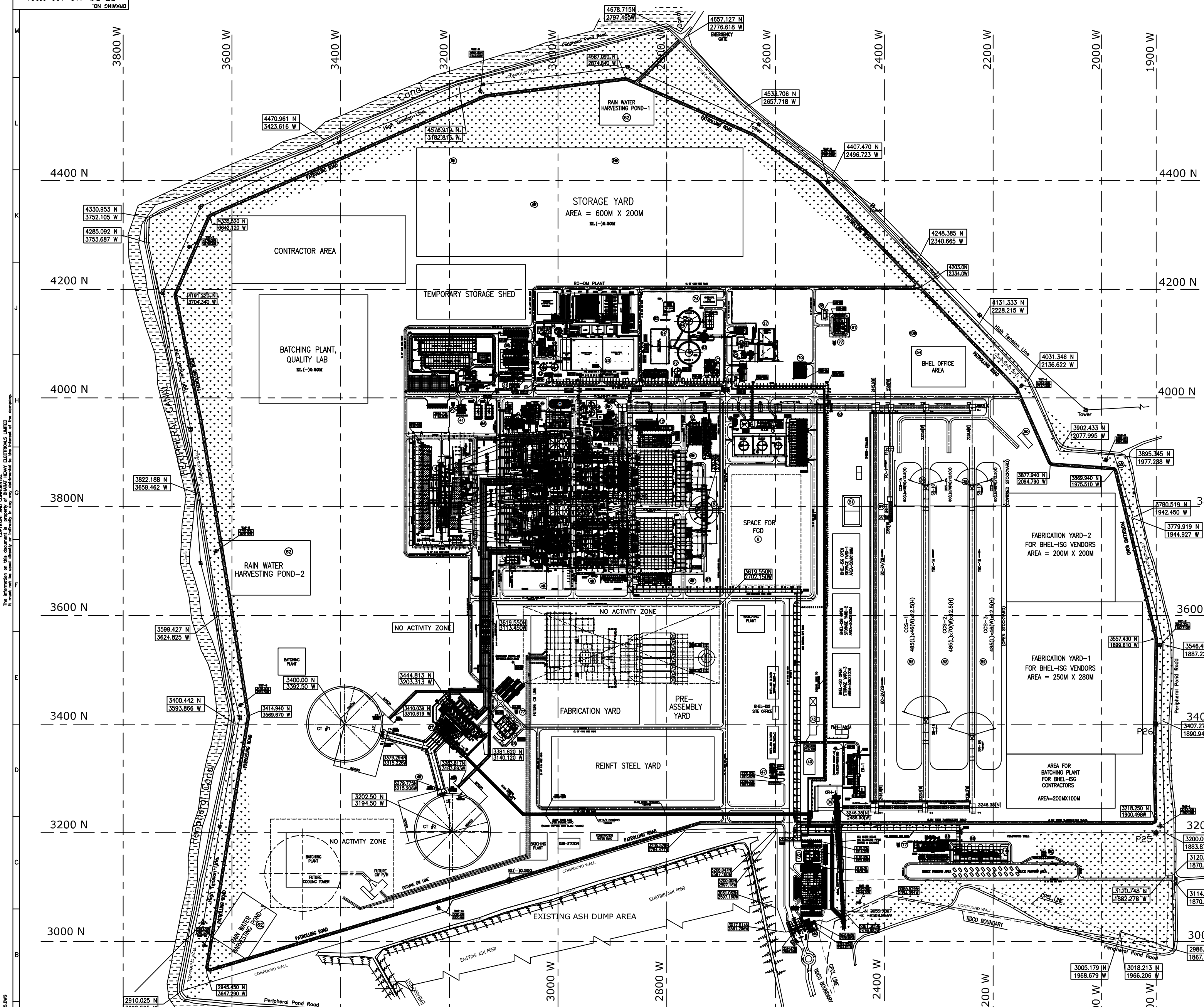
ELECTRONIC FILE NAME: 412_100_M001_R05.DWG

FIRST ANGLE PROJECTION

ALL DIMENSIONS ARE IN MM

DRAWING NO. PE-DG-412-100-M001



LEGEND:

- GREEN BELT
- COMPOUND WALL
- HIGH MAST LIGHT FDN.
- PLANT ROADS
- PIPE RACK
- WATCH TOWERS
- COAL CONVEYOR
- INTERNAL COMPOUND WALL
- GATES
- HIGH TENSION LINE
- SEWAGE COLLECTION PIT
- TIDCO BOUNDARY
- CPCL LINE

IDENTIFICATION NUMBER	DESCRIPTION
1	TG BUILDING
2	SWITCH GEAR ROOM, CONTROL ROOM, AC PLANT ROOM
3	STEAM GENERATOR
4	ESP
5	CHIMNEY
6	SPACE FOR FGD PLANT
7	TRANSFORMER YARD
8	400KV GIS SWITCHYARD
9a	DG SET
9b	COMPRESSOR HOUSE
10	VACUUM PUMP HOUSE (UNIT-1) & COMPRESSOR HOUSE
11	BOTTOM ASH SLURRY PUMP HOUSE
12	ASH WATER PUMP HOUSE
13	BUFFER HOPPER TOWER
14	FLY ASH SILOS
15	HFO/LDO UNLOADING AREA
16	HFO/LDO STORAGE TANK DYKE AREA
17	HFO/LDO FORWARDING PUMP HOUSE
18	ELECTRO CHLORINATION BUILDING
19	SEA WATER INTAKE PUMP HOUSE (OUTSIDE PLANT BOUNDARY)
20	FILTERED WATER AND FIRE WATER STORAGE TANK AND PUMP HOUSE
21	MILL REJECT SILO
22	RO-DM CUM DESALINATION PLANT(150MX80M)
23	DM STORAGE TANKS & PUMP HOUSE
24	STORAGE YARD (WITH COMPOUND WALL, COVERED STORES & OFFICE)
25	ETP
26	CENTRAL MONITORING BASIN
27	GUARD POND
28	GAS CYLINDER SHED
29	CPU REGENERATION BUILDING
30	NEUTRALISING PIT
31	WORKSHOP
32	SWITCH YARD CONTROL ROOM
33	CONVEYOR
34	ADMINISTRATION BUILDING
35	CANTEEN
36	NDCT
37	COOLING WATER PUMP HOUSE
38	STACKER CUM RECLAIMER
39	CRUSHER HOUSE
40	CHP CONTROL ROOM
41	DISPENSARY AND FIRST AID CENTER
42	ADDITIONAL CANTEEN
43	SERVICE BUILDING
44	DELETED
45	ESP CONTROL ROOMS
46	CONDENSATE STORAGE TANK
47	FIRE STATION
48	ROAD WEIGH BRIDGE BUILDING
49	MAIN GATE & TIME OFFICE CUM SECURITY COMPLEX
50	DOZER SHED & REPAIR SHOP
51	COAL PILE RUN OFF PIT
52	COAL STOCK PILE
53	AIR WASHER ROOM
54	BHEL SITE OFFICE
55	WATCH TOWERS
56	FIRE WATER BOOSTER PUMP HOUSE
57	EMERGENCY RECLAIM HOPPER
58	DELETED
59	DELETED
60	WEIGH BRIDGE BUILDING ASH SILO AREA
61	H_2 PLANT
62	RAIN WATER HARVESTING POND
63	CLARIFIER
64	CLARIFIED WATER STORAGE TANK(62.5MX33.0M)
65	SLUDGE SUMP
66	FIELD MAINTENANCE BUILDINGS(3 NOs.)
67	VACUUM PUMP HOUSE (UNIT-2)
68	FA SLURRY PUMP HOUSE
69	SILO UTILITY BUILDING
70	STP
71	AUX. BOILER
72	SERVICE WATER OVERHEAD TANK
73	CUSTOMER'S SITE OFFICE
74	CHEMICAL LAB(30MX20M)
75	MRS CONTROL ROOM
76	FOAM PUMP HOUSE
77	AIR AMBIENT QUALITY MONITORING SYSTEM (AAQMS),5MX4M

NOTES:

1. PLANT FINISHED GRADED LEVEL (FGL) SHALL BE RL (+)9.50M.
   POWER HOUSE (TG BUILDING) FINISHED GROUND FLOOR LEVEL IS EL(+)0.00M, WHICH CORR. TO RL(+)10.0M.
   BOILER PAVED LEVEL IS EL(-)0.20M & TRANSFORMER YARD PAVED LEVEL IS EL(-)0.10M.
2. ALL DIMENSIONS ARE IN MM & LEVELS ARE IN METER UNLESS OTHERWISE STATED.
3. THE FACILITIES/ BUILDINGS SHOWN IN THE TABLE ABOVE ARE TENTATIVE & SHALL BE PROVIDED AS PER CONTRACT. DIMENSIONS AND LOCATION SHOWN ARE ALSO TENTATIVE & SHALL BE FINALIZED DURING DETAILED ENGINEERING.
4. CO-ORDINATES GIVEN IN THE PLOT PLAN ARE WITH RESPECT TO PILLAR No. 25 AND PILLAR No. 26. CO-ORDINATES OF P-25 (PLANT CO-ORDINATE W:1900.000M., N:3200.107M.) AND P-26 (PLANT CO-ORDINATE W:1900.000M., N:3400.000M.) ARE MARKED IN THE PLOT PLAN DRAWING.

REV.	DATE	ALTD	CHD	APPD	DESCRIPTION
05	26.06.2019	GKM	SK	SPV	01 ISG FACILITIES UPDATED. 02 EAST SIDE BOUNDARY GATE SHOWN FOR ISG SILO UTILITY BLDG./FA SLURRY P/H & ISG WEIGH BRIDGE. 03 DRAWING GENERALLY UPDATED.
04	18.08.2018	GKM	SK	JJ	01 DRAWING REVISED BASED ON CUSTOMER COMMENTS DATED 04.04.2018. REF: Lr.No.:SE/E/THP/EE-7/M/AEE-1/M/F.EnSEZSTPP/D.457/18 dt.04.04.2018. 02 SWITCH YARD LAYOUT UPDATED. 03 TRANSFORMER YARD LAYOUT UPDATED. 04 MAIN GATE & TIME OFFICE CUM SECURITY COMPLEX UPDATED. 05 DRAWING GENERALLY UPDATED.
03	04.10.2017	GKM	SK	JJ	01 DRAWING REVISED BASED ON CUSTOMER COMMENTS DATED 04.05.2017. REF: Lr.No.:SE/E/THP/EE-7/M/AEE-1/M/F.EnSEZ STPP/D.180/2017. 02 CHP, AHP & FUEL OIL AREA UPDATED. 03 DRAWING GENERALLY UPDATED.
02	07.03.17	GKM/SD	SK	JJ	01 DRAWING GENERALLY REVISED BASED ON CUSTOMER'S COMMENTS RECEIVED VIA MAIL 22.02.2017. 02 BOILER KEY PLAN UPDATED. 03 ASH HANDLING FACILITIES UPDATED. 04 SWITCH YARD UPDATED.
01	20.02.15	SD	SK	JJ	01 DRAWING GENERALLY REVISED BASED ON CUSTOMER'S COMMENTS.

PROJECT	2x660MW ENNORE SEZ SUPERCRITICAL THERMAL POWER PROJECT AT ASH DYKE OF NCTPS, CHENNAI
OWNER	TAMILNADU GENERATION & DISTRIBUTION CORPORATION LIMITED
OWNER'S CONSULTANT:-	DESEIN PRIVATE LIMITED, DESEIN HOUSE, NEW DELHI
EPC CONTRACTOR:-	BHARAT HEAVY ELECTRICALS LTD.

JOB NO. 412
STATUS CONTRACT
DISTRIBUTION

BHARAT HEAVY ELECTRICALS LTD
POWER SECTOR
PROJECT ENGINEERING MANAGEMENT
NOIDA

DEPT CODE		NAME	SIGN	DATE
M	DRN	SD	sd/-	29.10.2014
	DESN	SD	sd/-	29.10.2014
	CHD	SK	sd/-	29.10.2014
	APPD	JJ	sd/-	29.10.2014

TITLE: PLOT PLAN

SCALE: 1:2500
DRAWING NO. PE-DG-412-100-M001
SHEET 1 OF 1
REV. 05
FORMAT SIZE A0

Procedure-2.3

PROCEDURE FOR CONDUCT OF CONCILIATION PROCEEDINGS

1. The proceedings of Conciliation shall broadly be governed by Part-III of the Arbitration and Conciliation Act 1996 or any statutory modification thereof and as provided herein:

2. The party desirous of resorting to Conciliation shall send an invitation/notice in writing to the other party to conciliate specifying all points of Disputes with details of the amount claimed. The party concerned shall not raise any new issue thereafter. Parties shall also not claim any interest on claims/counter-claims from the date of notice invoking Conciliation till the conclusion of the Conciliation proceedings. If BHEL is to initiate Conciliation, then, the invitation to Conciliate shall be extended to the concerned Stakeholder in **Format 7** hereto. Where the stakeholder is to initiate the Conciliation, the notice for initiation of Conciliation shall be sent in **Format-8** hereto.

3. The party receiving the invitation/notice for Conciliation shall within 30 days of receipt of the notice of Conciliation intimate its consent for Conciliation along with its counter-claims, if any.

4. The Conciliation in a matter involving claim or counter-claim (whichever is higher) up to Rs 5 crores shall be carried out by sole Conciliator nominated by BHEL while in a matter involving claim or counter-claim (whichever is higher) of more than Rs 5 crores Conciliation shall be carried out by 3 Conciliators nominated by BHEL. The appointment of Conciliator(s) shall be completed and communicated by the concerned Department/Group of BHEL Unit/Division/Region/Business Group to the other party and the Conciliator(s) within 30 days from the date of acceptance of the invitation to conciliate by the concerned party in the **Format-9**. The details of the Claim, and counter-claim, if any, shall be intimated to the Conciliator(s) simultaneously in **Format-5**.

5. The Parties shall be represented by only their duly authorized in-house executives/officers and neither Party shall be represented by a Lawyer.

6. The first meeting of the IEC shall be convened by the IEC by sending appropriate communication/notice to both the parties as soon as possible but not later than 30 days from the date of his/their appointment. The hearings in the Conciliation proceeding shall ordinarily be concluded within two (2) months and, in exceptional cases where parties have expressed willingness to settle the matter or there exists possibility of settlement in the matter, the proceedings may be extended by the IEC by a maximum of further 2 months with the consent of the Parties subject to cogent reasons being recorded in writing.

7. The IEC shall thereafter formulate recommendations for settlement of the Disputes supported by reasons at the earliest but in any case within 15 days from the date of conclusion of the last hearing. The recommendations so formulated along with the reasons shall be furnished by the IEC to both the Parties at the earliest but in any case within 1 month from the date of conclusion of the last hearing.

8. Response/modifications/suggestions of the Parties on the recommendations of the IEC are to be submitted to the IEC within time limit stipulated by the IEC but not more than 15 days from the date of receipt of the recommendations from the IEC.

9. In the event, upon consideration, further review of the recommendations is considered necessary, whether by BHEL or by the other Party, then, the matter can be remitted back to the IEC with request to reconsider the same in light of the issues projected by either/both the Parties and to submit its recommendations thereon within the following 15 days from the date of remitting of the case by either of the Parties.

10. Upon the recommendations by the Parties, with or without modifications, as considered necessary, the IEC shall be called upon to draw up the Draft Settlement Agreement in terms of the recommendations.

11. When a consensus can be arrived at between the parties only in regard to any one or some of the issues referred for Conciliation the draft Settlement Agreement shall be accordingly formulated in regard to the said Issue(s), and the said Settlement Agreement, if signed, by the parties, shall be valid only for the said issues. As regards the balance issues not settled, the parties may seek to resolve them further as per terms and conditions provided in the contract.

12. In case no settlement can be reached between the parties, the IEC shall by a written declaration, pronounce that the Conciliation between the parties has failed and is accordingly terminated.

13. Unless the Conciliation proceedings are terminated in terms of para 22 (b), (c) & (d) herein below, the IEC shall forward his/its recommendations as to possible terms of settlement within one (1) month from the date of last hearing. The date of first hearing of Conciliation shall be the starting date for calculating the period of 2 months.

14. In case of 3 members IEC, 2 members of IEC present will constitute a valid quorum for IEC and meeting can take place to proceed in the matter after

seeking consent from the member who is not available. If necessary, videoconferencing may be arranged for facilitating participation of the members. However, the IEC recommendations will be signed by all members. Where there is more than one (1) Conciliator, as a general rule they shall act jointly. In the event of differences between the Members of IEC, the decision/recommendations of the majority of the Members of IEC shall prevail and be construed as the recommendation of the IEC.

15. The Draft Settlement Agreement prepared by the IEC in terms of the consensus arrived at during the Conciliation proceedings between the Parties shall be given by the IEC to both the parties for putting up for approval of their respective Competent Authority.

16. Before submitting the draft settlement agreement to BHEL's Competent Authority viz. the Board Level Committee on Alternative Dispute Resolution (BLCADR) for approval, concurrence of the other party's Competent Authority to the draft settlement agreement shall be obtained by the other party and informed to BHEL within 15 days of receipt of the final draft settlement agreement by it. Upon approval by the Competent Authority, the Settlement Agreement would thereafter be signed by the authorized representatives of both the Parties and authenticated by the members of the IEC.

17. In case the Draft Settlement Agreement is rejected by the Competent Authority of BHEL or the other Party, the Conciliation proceedings would stand terminated.

18. A Settlement Agreement shall contain a statement to the effect that each of the person(s) signing thereto (i) is fully authorized by the respective Party(ies) he/she represents, (ii) has fully understood the contents of the same and (iii) is signing on the same out of complete freewill and consent, without any pressure, undue influence.

19. The Settlement Agreement shall thereafter have the same legal status and effect as an arbitration award on agreed terms on the substance of the dispute rendered by an arbitral tribunal passed under section 30 of the Arbitration and Conciliation Act, 1996.

20. Acceptance of the Draft Settlement Agreement/recommendations of the Conciliator and/or signing of the Settlement Agreement by BHEL shall however, be subject to withdrawal/closure of any arbitral and/or judicial proceedings initiated by the concerned Party in regard to such settled issues.

21. Unless otherwise provided for in the agreement, contract or the Memorandum of Understanding, as the case may be, in the event of likelihood of prolonged

absence of the Conciliator or any member of IEC, for any reason/incapacity, the Competent Authority/Head of Unit/Division/Region/Business Group of BHEL may substitute the Conciliator or such member at any stage of the proceedings. Upon appointment of the substitute Conciliator(s), such reconstituted IEC may, with the consent of the Parties, proceed with further Conciliation into the matter either de-novo or from the stage already reached by the previous IEC before the substitution.

22. The proceedings of Conciliation under this Scheme may be terminated as follows:

a. On the date of signing of the Settlement agreement by the Parties; or,

b. By a written declaration of the IEC, after consultation with the parties, to the effect that further efforts at conciliation are no longer justified, on the date of the declaration; or,

c. By a written declaration of the Parties addressed to the IEC to the effect that the Conciliation proceedings are terminated, on the date of the declaration; or,

d. By a written declaration of a Party to the other Party and the IEC, if appointed, to the effect that the Conciliation proceedings are terminated, on the date of the declaration; or,

e. On rejection of the Draft Settlement Agreement by the Competent Authority of BHEL or the other Party.

23. The Conciliator(s) shall be entitled to following fees and facilities:

Sl No	**Particulars**	**Amount**
1	Sitting fees	Each Member shall be paid a Lump Sum fee of Rs 75,000/- for the whole case payable in terms of paragraph No. 27 herein below.
2	Towards drafting of settlement agreement	In cases involving claim and/or counter-claim of up to Rs 5crores. Rs 50,000/- (Sole Conciliator) In cases involving claim and/or counter-claim of exceeding Rs 5 crores but less than Rs 10 crores. Rs 75,000 (per Conciliator)

Sl No	Particulars	Amount
		In cases involving claim and/or counter-claim of more than Rs 10 crores. Rs 1,00,000/- (per Conciliator) Note: The aforesaid fees for the drafting of the Settlement Agreement shall be paid on the, Signing of the Settlement Agreement after approval of the Competent Authority or Rejection of the proposed Settlement Agreement by the Competent Authority of BHEL.
3	Secretarial expenses	Rs 10,000/- (one time) for the whole case for Conciliation by a Sole Member IEC. Where Conciliation is by multi member Conciliators –Rs 30,000/- (one time)- to be paid to the IEC
4	Travel and transportation and stay at outstation Retired Senior Officials of other Public Sector Undertakings (pay scale wise equivalent to or more than E-8 level of BHEL)	As per entitlement of the equivalent officer (pay scale wise) in BHEL.
	Others	As per the extant entitlement of whole time Functional Directors in BHEL. Ordinarily, the IEC Member(s) would be entitled to travel by air Economy Class.
5	Venue for meeting	Unless otherwise agreed in the agreement, contract or the Memorandum of Understanding, as the case may be, the venue/seat of proceedings shall be the location of the concerned Unit / Division / Region /

Sl No	Particulars	Amount
		Business Group of BHEL. Without prejudice to the seat/venue of the Conciliation being at the location of concerned BHEL Unit / Division / Region / Business Group, the IEC after consulting the Parties may decide to hold the proceedings at any other place/venue to facilitate the proceedings. Unless, Parties agree to conduct Conciliation at BHEL premises, the venue is to be arranged by either Party alternately.

24. The parties will bear their own costs including cost of presenting their cases/evidence/witness(es)/expert(s) on their behalf. The parties agree to rely upon documentary evidence in support of their claims and not to bring any oral evidence in IEC proceedings.

25. If any witness(es) or expert(s) is/are, with the consent of the parties, called upon to appear at the instance of the IEC in connection with the matter, then, the costs towards such witness(es)/expert(s) shall be determined by the IEC with the consent of the Parties and the cost so determined shall be borne equally by the Parties.

26. The other expenditures/costs in connection with the Conciliation proceedings as well as the IEC's fees and expenses shall be shared by the Parties equally.

27. Out of the lump sum fees of Rs 75,000/- for Sitting Fees, 50% shall be payable after the first meeting of the IEC and the remaining 50% of the Sitting Fees shall be payable only after termination of the conciliation proceedings in terms of para 22 hereinabove.

28. The travelling, transportation and stay at outstation shall be arranged by concerned Unit as per entitlements as per Serial No. 4 of the Table at para 23 above, and in case such arrangements are not made by the BHEL Unit, the same shall be reimbursed to the IEC on actuals limited to their entitlement as per Serial No. 4 of the Table at Para 23 above against supporting documents. The IEC Member(s) shall submit necessary invoice for claiming the fees/reimbursements.

29. The Parties shall keep confidential all matters relating to the conciliation proceedings. Confidentiality shall extend also to the settlement agreement,

except where its disclosure is necessary for purposes of its implementation and enforcement or as required by or under a law or as per directions of a Court/Governmental authority/ regulatory body, as the case may be.

30. The Parties shall not rely upon or introduce as evidence in any further arbitral or judicial proceedings, whether or not such proceedings relate to the Disputes that is the subject of the Conciliation proceedings:

a. Views expressed or suggestions made by the other party in respect of a possible settlement of the Disputes;

b. admissions made by the other party in the course of the Conciliator proceedings;

c. proposals made by the Conciliator;

d. The fact that the other Party had indicated his willingness to accept a proposal for settlement made by the Conciliator.

31. The Parties shall not present the Conciliator(s) as witness in any Alternative Dispute Resolution or Judicial proceedings in respect of a Disputes that is/was the subject of that particular Conciliation proceeding.

32. None of the Conciliators shall act as an arbitrator or as a representative or counsel of a Party in any arbitral or judicial proceeding in respect of a Disputes that is/was the subject of that particular Conciliation proceeding.

33. The Parties shall not initiate, during the Conciliation proceedings, any arbitral or judicial proceedings in respect of a Disputes that is the subject matter of the Conciliation proceedings except that a Party may initiate arbitral or judicial proceedings where, in his opinion, such proceedings are necessary for preserving his rights including for preventing expiry of period of limitation. Unless terminated as per the provisions of this Scheme, the Conciliation proceedings shall continue notwithstanding the commencement of the arbitral or judicial proceedings and the arbitral or judicial proceedings shall be primarily for the purpose of preserving rights including preventing expiry of period of limitation.

34. The official language of Conciliation proceedings under this Scheme shall be English unless the Parties agree to some other language.

FORMAT-5

STATEMENT OF CLAIMS/COUNTER CLAIMS TO BE SUBMITTED TO THE IEC BY BOTH THE PARTIES

1. Chronology of the Disputes

2. Brief of the Contract/MoU/Agreement/LOI/LOA

3. Brief history of the Disputes:

4. Issues:

5. Details of Clam(s)/Counter Claim(s):

SI. No.	**Description of claim(s)/Counter Claim**	**Amount (in INR)Or currency applicable in the contract**	**Relevant contract clause**

6. Basis/Ground of claim(s)/counter claim(s) (along with relevant clause of contract)

Note– *The Statement of Claims/ Counter Claims may ideally be restricted to maximum limit of 20 pages. Relevant documents may be compiled and submitted along with the statement of Claims/ Counter Claims. The statement of Claims/ Counter Claims is to be submitted to all IEC members and to the other party by post as well as by email.*

FORMAT-7

FORMAT FOR NOTICE INVOKING CONCILIATION CLAUSE BY BHEL FOR REFERRING THE DISPUTES TO CONCILIATION THROUGH IEC

To,

M/s. (Stakeholder's name)

Subject: **NOTICE FOR INVOCATION OF THE CONCILIATION CLAUSE OF THE CONTRACT BY BHEL**

Ref: Contract No/MoU/Agreement/LOI/LOA& date _____.

Dear Sir/Madam,

As you are aware, with reference to above referred Contract/MoU/Agreement/LOI/LOA, certain disputes have arisen, which, in-spite of several rounds of mutual discussions and various correspondences have remained unresolved. The brief particulars of our claims which arise out of the above- referred Contract/MoU/Agreement/LOI/LOA are reproduced hereunder:

Sl. No.	Claim description	Amount involved

As you are aware, there is a provision in the captioned Contract/MoU/Agreement/LOI/ LOA for referring disputes to conciliation.

In terms of Clause ---------of Procedure i.e., Annexure ------ to the Contract/MoU /Agreement / LOI / LOA, we hereby seek your consent to refer the matter to Conciliation by Independent Experts Committee to be appointed by BHEL. You are invited to provide your consent in writing to proceed with conciliation into the above mentioned disputes within a period of 30 days from the date of this letter along with details of counter-claims, if any, which you might have with regard to the subject Contract/ MoU/ Agreement/ LOI/ LOA.

Please note that upon receipt of your consent in writing within 30 days of the date of receipt of this letter by you, BHEL shall appoint suitable person(s) from the BHEL Panel of Conciliators.

This letter is being issued without prejudice to our rights and contentions available under the contract and law.

Thanking you
Yours faithfully

Representative of BHEL

Note: The Format may be suitably modified, as required, based on facts and circumstances of the case.

FORMAT-8

FORMAT FOR NOTICE INVOKING CONCILIATION CLAUSE BY A STAKEHOLDER FOR REFERRING THE DISPUTES TO CONCILIATION THROUGH IEC

To,
BHEL (Head of the Unit/Division/Region/Business Group)

Subject: **NOTICE FOR INVOCATION OF THE CONCILIATION CLAUSE OF THE CONTRACT BY A STAKEHOLDER**

Ref: Contract No/MoU/Agreement/LOI/LOA& date _____.

Dear Sir/Madam,

As you are aware, with reference to above referred Contract/MoU/Agreement/LOI/LOA, certain disputes have arisen, which, in-spite of several rounds of mutual discussions and various correspondences have remained unresolved. The brief particulars of our claims which have arisen out of the above-referred Contract/MoU/Agreement/LOI/LOA are enumerated hereunder:

Sl. No.	Claim description	Amount involved

As you are aware, there is a provision in the captioned Contract/MoU/Agreement/LOI/ LOA for referring inter-se disputes of the Parties to conciliation.

We wish to refer the above-said disputes to Conciliation as per the said Clause of the captioned Contract/MoU/Agreement/LOI/ LOA. In terms of Clause ---------of Procedure i.e., Annexure ------ to the Contract/MoU /Agreement / LOI / LOA, we hereby invite BHEL to provide its consent in writing to proceed with conciliation into the above mentioned disputes within a period of 30 days from the date of this letter along with details of counter-claims, if any, which it might have with regard to the subject Contract/ MoU/ Agreement/ LOI/ LOA and to appoint suitable person(s) as Conciliator(s) from the BHEL Panel of Conciliators.

This letter is being issued without prejudice to our rights and contentions available under the contract and law.

Thanking you
Yours faithfully

Representative of the Stakeholder

Note: The Format may be suitably modified, as required, based on facts and circumstances of the case.

FORMAT-9

FORMAT FOR INTIMATION TO THE STAKEHOLDER ABOUT APPOINTMENT OF CONCILIATOR/IEC

To,

M/s. (Stakeholder's name)

Subject: **INTIMATION BY BHEL TO THE STAKEHOLDER AND CONCILIATOR(S) ABOUT APPOINTMENT OF CONCILIATOR/IEC**

Ref: Contract No/MoU/Agreement/LOI/LOA& date _____.

Sir,

This is with reference to letter dated ---------- regarding reference of the disputes arising in connection with the subject Contract No /MoU/Agreement/LOI/LOA to conciliation and appointment of Conciliator(s).

In pursuance of the said letter, the said disputes are assigned to conciliation and the following persons are nominated as Conciliator(s) for conciliating and assisting the Parties to amicably resolve the disputes in terms of the Arbitration & Conciliation Act, 1996 and the Procedure ---- to the subject Contract ...../MoU/Agreement/LOI/LOA, if possible.

Name and contact details of Conciliator(s)

a) .....

b) .....

c) .....

You are requested to submit the Statement of Claims or Counter-Claims (strike off whichever is inapplicable) before the Conciliator(s) in Format 5 (enclosed herewith) as per the time limit as prescribed by the Conciliator(s).

Yours faithfully,

Representative of BHEL

CC: To Conciliator(s)… for Kind Information please.
Encl: As above

Note: The Format may be suitably modified, as required, based on facts and circumstances of the case.

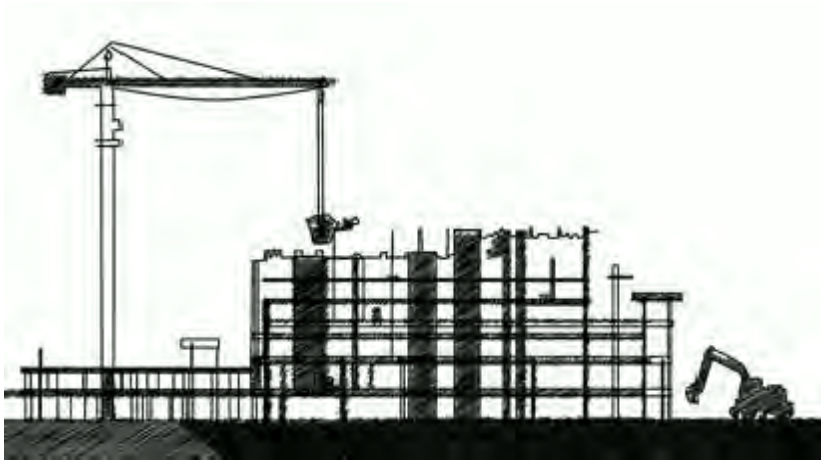
HEALTH, SAFETY and ENVIRONMENT PLAN

for

SITE OPERATIONS

by

SUB-CONTRACTORS



POWER SECTOR

HSE PLAN FOR SITE OPRATIONS BY BHEL'S SUBCONTRACTORS

AT A GLANCE

BEFORE START

SIGNING OF MOU
Agree to comply to HSE requirement- Statutory and BHEL's

PLAN

HSE ORGANISATION	
Manpower • 1 (one) safety officer for every 500 workers or part thereof • 1(one) safety-steward/ supervisor for every 100 workers **Qualification** As per Cl. 7.1	**HSE Roles and responsibilities** • Site In-charge- As per clause 7.2.1 • Safety officer- As per clause 7.2.2

HSE Planning
for Man, Machinery/Equipment/Tools & Tackles

PROVIDE

HSE INFRASTUCTURE	
• PPEs • Drinking Water • Washing Facilities • Latrines and Urinals • Provision of shelter for rest • Medical facilities	• Canteen facilities • Labour Colony • Emergency Vehicle • Pest Control • Scrapyard • Illumination

TRAIN

HSE TRAINING , AWARENESS & PROMOTION	
Training • Induction training • Height work and other critical areas • Tool Box talk & Pep Talk	**Awareness & Promotion** • Signage • Poster • Banner • Competition • Awards

COMMUNICATE

HSE COMMUNICATION	
Incident Reporting • Accident- Fatal & Major • Property damage • Near Miss	**Event Reporting** • Celebrations • Training • Medical camp

EXECUTE SAFELY

OPERATIONAL CONTROL PROCEDURES

PERMIT TO WORK

Height work (above 2 metres), Hot Work, Heavy Lifting, Confined Space, Radiography, excavation (More than 4 metres)

SAFETY DURING WORK EXECUTION	
• Welding • Rigging • Cylinder- storage & Movement • Demolition work • T&Ps • Chemical Handling • Electrical works	• Fire • Scaffolding • Height work • Working Platform • Excavation • Ladder • Lifting • Hoisting appliance
HOUSE KEEPING	
WASTE MANGEMENT	
TRAFFIC MANAGEMENT	
ENVIRONMENTAL CONTROL	
EMERGENCY PREPAREDNESS AND RESPONSE PLAN	

CHECKS

HSE AUDITS & INSPECTION	
• Daily Checks • Inspection of PPEs • Inspection of T& Ps • Inspection of Cranes & Winches	• Inspection of Height work • Inspection of Welding and Gas cutting • Inspection of elevators etc.

HSE PERFORMANCE EVALUATION PARAMETERS

NON CONFORMANCE

PENALTY for NON CONFORMANCE

Refer Clause 16

Incremental penalty

For repeated violation by the same person, the penalty would be double of the previous penalty

For repeated fatal incident in the same Unit incremental penalty to be imposed. The subcontractor will pay 2 times the penalty compared to previously paid in case there are repeated cases of fatal incidents under the same subcontractor for the same package in the same unit.

REVISION HISTORY SHEET

Date	Revision No.	Details of Changes	Reason	Prepared	Reviewed	Approved
12.08.2014	00	First Issue	First Issue	S. B. Jayant, Dy Manager-FQA & Safety	A. K. Sinha, GM-FQA & Safety	Anuj Bhatnagar, ED-FQA & Safety
20.01.2020	01	Formats added: **HSEP:14-F30 – Monthly HSE Planning & Review** (Page 11, Clause 8.0 - updated) HSEP:14-F13E-Excavation Inspection Format (part of F30)) HSEP:14-F32B – Job Safety Analysis Format (part of F30) **HSEP:14-F31A – Daily HSE Reporting** (Page 18, Clause 10.3 – added) **HSEP:14-F33 – HSE Performance Evaluation** (Page 31, Clause 13 – revised)	IOM No. **PSHQHSE/MONREP/02** Dated 08-Jan-2020	Rohit Kumar	Santosh Nair, GM (MSX & HSE)	

1.0 PURPOSE

1.1 The purpose of this HSE Plan is to provide for the systematic identification, evaluation, prevention and control of general workplace hazards, specific job hazards, potential hazards and environmental impacts that may arise from foreseeable conditions during installation and servicing of industrial projects and power plants.

1.2 This document shall be followed by BHEL's subcontractors at all installation and servicing sites. In case customer specific documents are to be implemented, this document will be followed in conjunction with customer specific documents.

1.3 Although every effort has been made to make the procedures and guidelines in line with statutory requirements, in case of any discrepancy relevant statutory guidelines must be followed.

1.4 In case the customer has any specific requirement, the same is to be fulfilled.

2.0 SCOPE

The document is applicable for BHEL's Subcontractors at all installation / servicing activities of BHEL Power Sector as per the relevant contractual obligations.

3.0 OBJECTIVES AND TARGETS

The HSE Plan reflects that BHEL places high priority upon the Occupational Health, Safety and Environment at workplaces.

- Ensure the Health and Safety of all persons at work site is not adversely affected by the work.
- Ensure protection of environment of the work site.
- Comply at all times with the relevant statutory and contractual HSE requirements.
- Provide trained, experienced and competent personnel. Ensure medically fit personnel only are engaged at work.
- Provide and maintain plant, places and systems of work that are safe and without risk to health and the environment.
- Provide all personnel with adequate information, instruction, training and supervision on the safety aspect of their work.
- Effectively control, co-ordinate and monitor the activities of all personnel on the Project sites including subcontractors in respects of HSE.
- Establish effective communication on HSE matters with all relevant parties involved in the Project works.
- Ensure that all work planning takes into account all persons that may be affected by the work.
- Ensure fitness testing of all T&Ps/Lifting appliances like cranes, chain pulley blocks etc. are to be certified by competent person.
- Ensure timely provision of resources to facilitate effective implementation of HSE requirements.
- Ensure continual improvements in HSE performance
- Ensure conservation of resources and reduction of wastage.
- Capture the data of all incidents including near misses, process deviation etc. Investigate and analyze the same to find out the root cause.
- Ensure timely implementation of correction, corrective action and preventive action.

HSE TARGETS

EXPLOSION	**ZERO**
FATALITY	**ZERO**
LOST TIME INJURY	**ZERO**
FIRE	**ZERO**
VEHICLE INCIDENTS	**ZERO**
ENVIRONMENTAL INCIDENTS	**ZERO**

4.0 BHEL POWER SECTOR HEALTH, SAFETY & ENVIRONMENT POLICY

Health, Safety & Environment Policy of BHEL

In BHEL, Health, Safety and Environment (HSE) responsibilities are driven by our commitment to protect our employees and people we work with, community and environment. BHEL believes in zero tolerance for unsafe work/non-conformance to safety and in minimizing environmental footprint associated with all its business activities. We commit to continually improve our HSE performance by:

- Developing safety and sustainability culture through active leadership and by ensuring availability of required resources.
- Ensuring compliance with applicable legislation, regulations and BHEL systems.
- Taking up activities for conservation of resources and adopting sound waste management by following Reduce/Recycle/Reuse approach.
- Continually identifying, assessing and managing environmental impacts and Occupational Health & Safety risks of all activities, products and services adopting approach based on elimination/ substitution/reduction/control.
- Incorporating appropriate Occupational Health, Safety and Environment criteria into business decisions, design of products & systems and for selection of plants, technologies and services.
- Imparting appropriate structured training to all persons at workplace and promoting awareness amongst customers, contractors and suppliers on HSE issues.
- Reviewing periodically this policy and HSE Management Systems to ensure its relevance, appropriateness and effectiveness.
- Communicating this policy within BHEL and making it available to interested parties.

sd/-

CMD, BHEL

5.0 MEMORANDUM OF UNDERSTANDING:

After award of work, subcontractors are required to enter into a memorandum of understanding as given below:

Memorandum of Understanding

BHEL, Power Sector_____Region is committed to Health, Safety and Environment Policy (HSE Policy).

M/s_____do hereby also commit to comply with the same HSE Policy while executing the Contract Number _____

M/s_____shall ensure that safe work practices as per the HSE plan. Spirit and content therein shall be reached to all workers and supervisors for compliance.

In addition to this, M/S_____shall comply to all applicable statutory and regulatory requirements which are in force in the place of project and any special requirement specified in the contract document of the principal customer.

M/s_____shall co-operate in HSE audits/inspections conducted by BHEL /customer/ third party and ensure to close any non-conformity observed/reported within prescribed time limit.

Signed by authorized representative of M/s ----------

Name :

Place & Date:

6.0 TERMS AND DEFINITIONS

6.1 DEFINITIONS

6.1.1 INCIDENT

Work- related or natural event(s) in which an injury, or ill health (regardless of severity), damage to property or fatality occurred, or could have occurred.

6.1.2 NEAR MISS

An incident where no ill health, injury, damage or other loss occurs, but it had a potential to cause, is referred to as "Near-Miss".

6.1.3 MAN-HOURS WORKED

The total number of man hours worked by all employees including subcontractors working in the premises. It includes managerial, supervisory, professional, technical, clerical and other workers including contract labours. Man-hours worked shall be calculated from the payroll or time clock recorded including overtime. When this is not feasible, the same shall be estimated by multiplying the total man-days worked for the period covered by the number of hours worked per day. The total number of workdays for a period is the sum of the number of men at work on each day of period. If the daily hours vary from department to department separate estimate shall be made for each department and the result added together.

6.1.4 FIRST AID CASES

First aids are not essentially all reportable cases, where the injured person is given medical treatment and discharged immediately for reporting on duty, without counting any lost time.

6.1.5 LOST TIME INJURY

Any work injury which renders the injured person unable to perform his regular job or an alternative restricted work assignment on the next scheduled work day after the day on which the injury occurred.

6.1.6 MEDICAL CASES

Medical cases come under non-reportable cases, where owing to illness or other reason the employee was absent from work and seeks Medical treatment.

6.1.7 TYPE OF INCIDENTS & THEIR REPORTING:

The three categories of Incident are as follows:

Non-Reportable Cases:
An incident, where the injured person is given medical help and discharged for work without counting any lost time.

Reportable Cases:
In this case the injured person is disable for 48 hours or more and is not able to perform his duty.

Injury Cases:
These are covered under the heading of non-reportable cases. In these cases the incident caused injury to the person, but he still continues his duty.

6.1.8 TOTAL REPORTABLE FREQUENCY RATE

Frequency rate is the number of Reportable Lost Time Injury (LTI) per one Million Man hours worked. Mathematically, the formula read as:

$$\frac{\text{Number of Reportable LTI}}{\text{Total Man Hours Worked}} \times 1{,}000{,}000$$

6.1.9 SEVERITY RATE

Severity rate is the Number of days lost due to Lost Time Injury (LTI) per one Million Man hours worked. Mathematically, the formula reads as:

$$\frac{\text{Days lost due to LTI}}{\text{Total Man Hours Worked}} \times 1{,}000{,}000$$

6.1.10 INCIDENCE RATE

Incidence Rate is the Number of LTI per one thousand manpower deployed. Mathematically, the formula reads as:

$$\frac{\text{Number of LTI}}{\text{Average number of manpower deployed}} \times 1000$$

7.0 HSE ORGANISATION

Number of safety officers:
The subcontractor must deploy one safety officer for every 500 workers or part thereof in each package. In addition, there must be one safety-steward/safety-supervisor for every 100 workers.

Deployment: The subcontractor should deploy sufficient safety officers and safety-steward/Safety-supervisor, as per requirement given above, since initial stage and add more in proportion to the added strength in work force. Any delay in deployment will attract a penalty of Rs.30,000/- per man month for the delayed period.

7.1 QUALIFICATION FOR HSE PERSONNEL

Sl.no	Designation	Qualification	Experience
1	Safety officer (Construction Agency)	Degree or Diploma in Engineering with full time diploma in Industrial Safety with construction safety as one of the subjects	Minimum two years for degree holder and five years for diploma holder in the field of Construction of power plant/ major industries

2	Safety-Steward/ Safety-Supervisor	Degree or diploma in any discipline with full time diploma in Industrial Safety with construction safety as one of the subjects	Minimum two years

7.2 RESPONSIBILITIES

7.2.1 SITE IN -CHARGE OF SUBCONTRACTOR

- Shall sign Memorandum of Understanding (MoU) for compliance to BHEL's HSE Plan for Site Operations as per clause 5.0
- Shall engage qualified safety officer(s) and steward (s) as per clause 7.0
- Shall adhere to the rules and regulations mentioned in this code, practice very strictly in his area of work in consultation with his concerned engineer and the safety coordinator.
- Shall screen all workmen for health and competence requirement before engaging for the job and periodically thereafter as required.
- Shall not engage any employee below 18 years.
- Shall arrange for all necessary PPEs like safety helmets, belts, full body harness, shoes, face shield, hand gloves etc. before starting the job. Shall ensure that no working men/women carry excessive weight more than stipulated in Factory Rule Regulation R57.
- Shall ensure that all T&Ps engaged are tested for fitness and have valid certificates from competent person.
- Shall ensure that provisions stipulated in contract Labour Regulation Act 1970, Chapter V C.9, canteen, rest rooms/washing facilities to contracted employees at site.
- Shall adhere to the instructions laid down in Operation Control Procedures (OCPs) available with the site management.
- Shall ensure that person working above 2.0 meter should use Safety Harness tied to a life line/stable structure.
- Shall ensure that materials are not thrown from height. Cautions to be exercised to prevent fall of material from height.
- Shall report all incidents (Fatal/Major/Minor/Near Miss) to the Site engineer /HSE officer of BHEL.
- Shall ensure that Horseplay is strictly forbidden.
- Shall ensure that adequate illumination is arranged during night work.
- Shall ensure that all personnel working under subcontractor are working safely and do not create any Hazard to self and to others.
- Shall ensure display of adequate signage/posters on HSE.
- Shall ensure that mobile phone is not used by workers while working.
- Shall ensure conductance of HSE audit, mockdrill, medical camps, induction training and training on HSE at site.
- Shall ensure full co-operation during HQ/External /Customer HSE audits.

- Shall ensure submission of look-ahead plan for procurement of HSE equipment's and PPEs as per work schedule.
- Shall ensure good housekeeping.
- Shall ensure adequate valid fire extinguishers are provided at the work site.
- Shall ensure availability of sufficient number of toilets /restrooms and adequate drinking water at work site and labour colony.
- Shall ensure adequate emergency preparedness.
- Shall be member of site HSE committee and attend all meetings of the committee
- Power source for hand lamps shall be maximum of 24 v.
- Temporary fencing should be done for open edges if Hand – railings and Toe-guards are not available.

7.2.2 HEALTH, SAFETY AND ENVIRONMENT OFFICER OF SUBCONTRACTOR

- Carry out safety inspection of Work Area, Work Method, Men, Machine & Material, P&M and other tools and tackles.
- Facilitate inclusion of safety elements into Work Method Statement.
- Highlight the requirements of safety through Tool-box / other meetings.
- Help concerned HOS to prepare Job Specific instructions for critical jobs.
- Conduct investigation of all incident/dangerous occurrences & recommend appropriate safety measures.
- Advice & co-ordinate for implementation of HSE permit systems, OCPs & MPs.
- Convene HSE meeting & minute the proceeding for circulation & follow-up action.
- Plan procurement of PPE & Safety devices and inspect their healthiness.
- Report to PS Region/HQ on all matters pertaining to status of safety and promotional program at site level.
- Facilitate administration of First Aid
- Facilitate screening of workmen and safety induction.
- Conduct fire Drill and facilitate emergency preparedness
- Design campaigns, competitions & other special emphasis programs to promote safety in the workplace.
- Apprise PS– Region on safety related problems.
- Notify site personnel non-conformance to safety norms observed during site visits / site inspections.
- Recommend to Site In charge, immediate discontinuance of work until rectification, of such situations warranting immediate action in view of imminent danger to life or property or environment.
- To decline acceptance of such PPE / safety equipment that do not conform to specified requirements.
- Encourage raising Near Miss Report on safety along with, improvement initiatives on safety.
- Shall work as interface between various agencies such customer, package-in-charges, subcontractors on HSE matters

8.0 PLANNING BY SUBCONTRACTOR

Monthly planning and review of HSE activities shall be carried out by subcontractor as per format No. HSEP:14-F30 jointly along with BHEL.

8.1 MOBILISATION OF MACHINERY/EQUIPMENT/TOOLS BY SUBCONTRACTOR

- As a measure to ensure that machinery, equipment and tools being mobilized to the construction site are fit for purpose and are maintained in safe operating condition and complies with legislative and owner requirement, inspection shall be arranged by in-house competent authority for acceptance as applicable.

- The machinery and equipment to be embraced for this purpose shall include but not limited to the following:

  - Mobile cranes.
  - Side Booms.
  - Forklifts.
  - Grinding machine.
  - Drilling machine.
  - Air compressors.
  - Welding machine.
  - Generator sets.
  - Dump Trucks.
  - Excavators.
  - Dozers
  - Grit Blasting Equipment.
  - Hand tools.

- Subcontractor shall notify the engineer, of his intention to bring on to site any equipment or any container, with liquid or gaseous fuel or other substance which may create a hazard. The Engineer shall have the right to prescribe the condition under which such equipment or container may be handled and used during the performance of the works and the subcontractor shall strictly adhere to such instructions. The Engineer shall have the right to inspect any construction tool and to forbid its use, if in his opinion it is unsafe. No claim due to such prohibition will be entertained.

8.2 MOBILISATION OF MANPOWER BY SUBCONTRACTOR

- The subcontractor shall arrange induction and regular health check of their employees as per schedule VII of BOCW rules by a registered medical practitioner.
- The subcontractor shall take special care of the employees affected with occupational diseases under rule 230 and schedule II of BOCW Rules. The employees not meeting the fitness requirement should not be engaged for such job.
- Ensure that the regulatory requirements of excessive weight limit (to carry/lift/ move weights beyond prescribed limits) for male and female workers are complied with.
- Appropriate accommodation to be arranged for all workmen in hygienic condition.

8.3 PROVISION OF PPEs

- Personnel Protective Equipment (PPEs), in adequate numbers, will be made available at site & their regular use by all concerned will be ensured
- The following matrix recommends usage of minimum PPEs against the respective job.

Sl. No	Type of work	PPEs
1	Concrete and asphalt mixing	Nose mask, hand glove, apron and gum boot
2	Welders/Grinders/ Gas cutters	Welding/face screen, apron, hand gloves, nose mask and ear muffs if noise level exceeds 90dB. Helmet fitted with welding shield is preferred for welders
3	Stone/ concrete breakers	Ear muffs, safety goggles, hand gloves
4	Electrical Work	Rubber hand glove, Electrical Resistance shoes
5	Insulation Work	Respiratory mask, Hand gloves, safety goggles
6	Work at height	Double lanyard full body harness, Fall arrestor (specific cases)
7	Grit/Sand blasting	Blast suit, blast helmet, respirator, leather gloves
8	Painting	Plastic gloves, Respirators (particularly for spray painting)
9	Radiography	As per BARC guidelines

- The PPEs shall conform to the relevant standards as below and bear ISI mark.

Relevant is-codes for personal protection

IS: 2925 – 1984	Industrial Safety Helmets.
IS: 4770 – 1968	Rubber gloves for electrical purposes.
IS: 6994 – 1973 (Part-I)	Industrial Safety Gloves (Leather &Cotton Gloves).
IS: 1989 – 1986 (Part-I-II)	Leather safety boots and shoes.
IS: 5557 – 1969	Industrial and Safety rubber knee boots.
IS: 6519 – 1971	Code of practice for selections care and repair of Safety footwear.
IS: 11226 – 1985	Leather Safety footwear having direct molding sole.
IS: 5983 – 1978	Eye protectors.
IS: 9167 – 1979	Ear protectors.
IS: 1179-1967	Eye & Face protection during welding
IS: 3521 – 1983	Industrial Safety Belts and Harness
IS:8519 -1977	Guide for selection of industrial Safety equipment for body protection
IS:9473-2002,14166-1994,14746-1999	Respiratory Protective Devices

The list is not exhaustive. The safety officer may demand additional PPEs based on specific requirement.

- Where workers are employed in sewers and manholes, which are in use, the subcontractor shall ensure that the manhole covers are opened and ventilated at least for an hour before the workers are allowed to get into manhole, and the manholes so opened shall be cordoned off with suitable railing and provided with warning signals or boards to prevent incident to the public
- Besides the PPEs mentioned above, the persons shall use helmet and safety shoe. The visitors shall use Helmet and any other PPEs as deemed appropriate for the area of work.

Colour scheme for Helmets:

1. Workmen: Yellow
2. Safety staff: Green or white with green band
3. Electrician: Red
4. Others including visitors: White

- All the PPEs shall be checked for its quality before issue and the same shall be periodically checked. The users shall be advised to check the PPEs themselves for any defect before putting on. The defective ones shall be repaired/ replaced.
- The issuing agency shall maintain register for issue and receipt of PPEs.
- The Helmets shall have logo or name (abbreviation of agency name permitted) affixed or printed on the front.
- The body harnesses shall be serial numbered.

8.4 ARRANGEMENT OF INFRASTRUCTURE

8.4.1 DRINKING WATER

- Drinking water shall be provided and maintained at suitable places at different elevations.
- Container should be labeled as " Drinking Water"
- Cleaning of the storage tank shall be ensured atleast once in 3 months indicating date of cleaning and next due date.
- Potability of water should be tested as per IS10500 at least once in a year.

8.4.2 WASHING FACILITIES

- In every workplace, adequate and suitable facilities for washing shall be provided and maintained.
- Separate and adequate cleaning facilities shall be provided for the use of male and female workers. Such facilities shall be conveniently accessible and shall be kept in clean and hygienic condition and dully illuminated for night use.
- Overalls shall be supplied by the subcontractor to the workmen and adequate facilities shall be provided to enable the painters and other workers to wash during the cessation of work.

8.4.3 LATRINES AND URINALS

- Latrines and urinals shall be provided in every work place.
- Urinals shall also be provided at different elevations.
- They shall be adequately lighted and shall be maintained in a clean and sanitary condition at all times, by appointing designated person.
- Separate facilities shall be provided for the use of male and female worker if any.

8.4.4 PROVISION OF SHELTER DURING REST

Proper Shed & Shelter shall be provided for rest during break

8.4.5 MEDICAL FACILITIES

8.4.5.1 MEDICAL CENTRE (As per Schedule V, X and XI of BOCW central Rules, 1998)

- A medical centre shall be ensured/identified at site with basic facilities for handling medical emergencies. The medical center can be jointly developed on proportionate sharing basis with permission from BHEL
- A qualified medical professional, not less than MBBS, shall be deployed at the medical centre
- The medical centre shall be equipped with one ambulance, with trained driver and oxygen cylinder.
- Medical waste shall be disposed as per prevailing legislation (Bio-Medical Waste –Management and Handling Rules, 1998)

8.4.5.2 FIRST AIDER

- Ensure availability of Qualified First-aider throughout the working hours.
- Every injury shall be treated, recorded and reported.
- Refresher course on first aid shall be conducted as necessary.
- List of Qualified first aiders and their contact numbers should be displayed at conspicuous places.

8.4.5.3 FIRST AID BOX (as per schedule III of BOCW)

- The subcontractor shall provide necessary first aid facilities as per schedule III of BOCW. At every work place first aid facilities shall be provided and maintained.
- The first aid box shall be kept by first aider who shall always be readily available during the working hours of the work place. His name and contact no to be displayed on the box.
- The first aid boxes should be placed at various elevations so as to make them available within the reach and at the quickest possible time.
- The first aid box shall be distinctly marked with a Green Cross on white background.
- Details of contents of first aid box is given in Annexure No. 01
- Monthly inspection of First Aid Box shall be carried out by the owner as per format no. HSEP:14-F01
- The subcontractor should conduct periodical first –aid classes to keep his supervisor and Engineers properly trained for attending to any emergency.

8.4.5.4 HEALTH CHECK UP (As per schedule VII and Form XI)

The persons engaged at the site shall undergo health checkup as per the format no. HSEP:14-F02 before induction. The persons engaged in the following works shall undergo health checkup at least once in a year:

a. Height workers
b. Drivers/crane operators/riggers

c. Confined space workers
d. Shot/sand blaster
e. Welding and NDE personnel

8.4.6 PROVISION OF CANTEEN FACILITY

- Canteen facilities shall be provided for the workmen of the project inside the project site.
- Proper cleaning and hygienic condition shall be maintained.
- Proper care should be taken to prevent biological contamination.
- Adequate drinking water should be available at canteen.
- Fire extinguisher shall be provided inside canteen.
- Regular health check-up and medication to the canteen workers shall be ensured.

8.4.7 PROVISION OF ACCOMODATION/LABOUR COLONY

- The subcontractor shall arrange for the accommodation of workmen at nearby localities or by making a labour colony.
- Regular housekeeping of the labour colony shall be ensured.
- Proper sanitation and hygienic conditions to be maintained.
- Drinking water and electricity to be provided at the labour colony.
- Bathing/ washing bay
- Room ventilation and electrification.

8.4.8 PROVISION OF EMERGENCY VEHICLE

- Dedicated emergency vehicle shall be made available at workplace by each subcontractor to handle any emergency

8.4.9 PEST CONTROL

Regular pest control should be carried out at all offices, mainly laboratories, canteen, labour colony and stores.

8.4.10 SCRAPYARD

- In consultation with customer, scrapyard shall be developed to store metal scrap, wooden scrap, waste, hazardous waste.
- Scrap/Waste shall be segregated as Bio-degradable and non-bio-degradable and stored separately.

8.4.11 ILLUMINATION

- The subcontractor shall arrange at his cost adequate lighting facilities e.g. flood lighting, hand lamps, area lighting etc. at various levels for safe and proper working operations at dark places and during night hours at the work spot as well as at the pre-assembly area.

- Adequate and suitable light shall be provided at all work places & their approaches including passage ways as per IS: 3646 (Part-II). Some recommended values are given below:

S. No.	Location	Illumination (Lux)
A.	**Construction Area**	
1.	Outdoor areas like store yards, entrance and exit roads	20
2.	Platforms	50
3.	Entrances, corridors and stairs	100
4.	General illumination of work area	150
5.	Rough work like fabrication, assembly of major items	150
6.	Medium work like assembly of small machined parts rough measurements etc.	300
7.	Fine work like precision assembly, precision measurements etc.	700
8.	Sheet metal works	200
9.	Electrical and instrument labs	450
B.	**Office**	
1.	Outdoor area like entrance and exit roads	20
2.	Entrance halls	150
3.	Corridors and lift cars	70
4.	Lift landing	150
5.	Stairs	100
6.	Office rooms, conference rooms, library reading tables	300
7.	Drawing table	450
8.	Manual telephone exchange	200

- Lamp (hand held) shall not be powered by mains supply but either by 24V or dry cells.
- Lamps shall be protected by suitable guards where necessary to prevent danger, in case of breakage of lamp.
- Emergency lighting provision for night work shall be made to minimise danger in case of main supply failure.

If the subcontractor fails to take appropriate safety precautions or to provide necessary safety devices and equipment or to carry out instructions issued by the authorized BHEL official, BHEL shall have the right to take corrective steps at the risk and cost of the subcontractor

9.0 HSE TRAINING& AWARENESS

9.1 HSE INDUCTION TRAINING

All persons entering into project site shall be given HSE induction training by the HSE officer of BHEL /subcontractor before being assigned to work.

In-house induction training subjects shall include but not limited to:

- Briefing of the Project details.
- Safety objectives and targets.
- Site HSE rules.
- Site HSE hazards and aspects.
- First aid facility.
- Emergency Contact No.
- Incident reporting.
- Fire prevention and emergency response.
- Rules to be followed in the labour colony (if applicable)

- Proper safety wear & gear must be issued to all the workers being registered for the induction (i.e., Shoes/Helmets/Goggles/Leg guard/Apron etc.)
- They must arrive fully dressed in safety wear & gear to attend the induction.
- Any one failing to conform to this safety wear& gear requirement shall not qualify to attend.
- On completing attending subcontractor's in-house HSE induction, each employee shall sign an induction training form (format no. HSEP:14-F03) to declare that he had understood the content and shall abide to follow and comply with safe work practices. They may only then be qualified to be issued with a personal I.D. card, for access to the work site.

9.2 HSE TOOLBOX TALK

- HSE tool Box talk shall be conducted by frontline foreman/supervisor of subcontractor to specific work groups prior to the start of work. The agenda shall consist of the followings:
    - Details of the job being intended for immediate execution.
    - The relevant hazards and risks involved in executing the job and their control and mitigating measures.
    - Specific site condition to be considered while executing the job like high temperature, humidity, unfavorable weather etc.
    - Recent non-compliances observed.
    - Appreciation of good work done by any person.
    - Any doubt clearing session at the end.
- Record of Tool box talk shall be maintained as per format no. HSEP:14-F04
- Tool box talk to be conducted at least once a week for the specific work.

9.3 TRAINING ON HEIGHT WORK

Training on height work shall be imparted to all workers working at height by in-house/external faculty at least twice in a year. The training shall include following topics:

- Use of PPEs
- Use of fall arrester, retractable fall arrester, life line, safety nets etc.
- Safe climbing through monkey ladders.
- Inspection of PPEs.
- Medical fitness requirements.
- Mock drill on rescue at height.
- Dos & Don'ts during height work.

9.4 HSE TRAINING DURING PROJECT EXECUTION

- Other HSE training shall be arranged by BHEL/ subcontractor as per the need of the project execution and recommendation of HSE committee of site.
- The topics of the HSE training shall be as follows but not limited to:
    - Hazards identification and risk analysis (HIRA)
    - Work Permit System
    - Incident investigation and reporting
    - Fire fighting
    - First aid
    - Fire-warden training
    - EMS and OHSMS
    - T & Ps fitness and operation

- Electrical safety
- Welding, NDE & Radiological safety
- Storage, preservation & material handling.

- A matrix shall be maintained to keep an up-to-date record of attendance of training sessions carried out.

9.5 HSE PROMOTION-SIGNAGE, POSTERS, COMPETITION, AWARDS ETC

9.5.1 Display of HSE posters and banners

- Site shall arrange appropriate posters, banners, slogans in local/Hindi/English languages at work place

9.5.2 Display of HSE signage

- Appropriate HSE signage shall be displayed at the work area to aware workmen and passersby about the work going on and do's and don'ts to be followed

9.5.3 Competition on HSE and award

- Site will arrange different competition (slogan, poster, essay etc.) on HSE time to time (Safety day, BHEL day, World Environment Day etc.) and winners will be suitably awarded.

9.5.4 HSE awareness programme

- Subcontractor shall arrange HSE awareness programme periodically on different topics including medical awareness for all personnel working at site

10.0 HSE COMMUNICATION

10.1 INCIDENT REPORTING

- The subcontractor shall submit report of all incidents, fires and property damage etc to the Engineer immediately after such occurrence, but in any case not later than 24 hours of the occurrence. Such reports shall be furnished in the manner prescribed by BHEL. (Refer HSE procedure for incident investigation, analysis and reporting for details)
- In addition, periodic reports on safety shall also be submitted by the subcontractor to BHEL from time to time as prescribed by the Engineer. Compiled monthly reports of all kinds of incidents, fire and property damage to be submitted to BHEL safety officer as per prescribed formats.
- HSE incidents of site shall be reported to BHEL site Management as per Procedure for Incident Investigation and Reporting in format no. HSEP:14-F15. Corrective action shall be immediately implemented at the work place and compliance shall be verified by BHEL HSE officer and until then, work shall be put on hold by Construction Manager.

10.2 HSE EVENT REPORTING

- Important HSE events like HSE training, Medical camp etc. organized at site shall be reported to BHEL site management in detail with photographs for publication in different in-house magazines
- Celebration of important days like National Safety Day, World Environment Day etc. shall also be reported as mentioned above.

10.3 DAILY HSE ACTIVITY REPORTING

Daily HSE activities shall be reported by subcontractor to BHEL as per Format No. HSEP:14-F31A

11.0 OPERATIONAL CONTROL

All applicable OCPs (Operational control procedures) will be followed by subcontractor as per BHEL instructions. This will be done as part of normal scope of work. List of such OCPs is given below. In case any other OCP is found to be applicable during the execution of work at site, then subcontractor will follow this as well, within quoted rate. These OCPs (applicable ones) will be made available to subcontractor during work execution at site. However for reference purpose, these are kept with Safety Officer of BHEL at the Power Sector Regional HQ, or available in downloadable format in the website, which may be refereed by subcontractor, if they so desire.

LIST OF OCPs

Safe handling of chemicals	Safety in use of cranes	Hydraulic test
Electrical safety	Storage and handling of gas cylinders	Spray insulation
Energy conservation	Manual arc welding	Trial run of rotary equipment
Safe welding and gas cutting operation	Safe use of helmets	Stress relieving
Fire safety	Good house keeping	Material preservation
Safety in use of hand tools	Working at height	Cable laying/tray work
First aid	Safe excavation	Transformer charging
Food safety at canteen	Safe filling of hydrogen in cylinder	Electrical maintenance
Illumination	Vehicle maintenance	Safe handling of battery system
Handling and erection of heavy metals	Safe radiography	Computer operation
Safe acid cleaning	Waste disposal	Storage in open yard
Safe alkali boil out	Working at night	For sanitary maintenance
Safe oil flushing	Blasting	Batching
Steam blowing	DG set	Piling rig operation
Safe working in confined area	Handling & storage of mineral wool	Gas distribution test
Safe operation of passenger lift, material hoists & cages	Drilling, reaming and grinding(machining)	Cleaning of hotwell / deaerator
Electro-resistance heating	Compressor operation	O&M of control of AC plant & system
Air compressor	Passivation	Safe Loading of Unit
Safe EDTA Cleaning	Safe Chemical cleaning of Pre boiler system	Safe Boiler Light up
Safe Rolling and Synchronization		

11.1 HSE ACTIVITIES

HSE activities shall be conducted at site based on the HSEMSM developed by Power Sector and issued to site by Regions.
While planning for any activity the following documents shall be referred for infrastructural requirements to establish control measures:

1) HSE Procedure for Register of OHS Hazards and Risks
2) HSE Procedure for Register of Environmental Aspects and Impacts
3) HSE Procedure for Register of Regulations

4) Operational Control Procedures
5) HSE Procedure for Emergency Preparedness and Response Plan
6) Contract documents

11.2 WORK PERMIT SYSTEM

- The following activities shall come under Work Permit System
  a. Height working above 2 metres
  b. Hot working at height
  c. Confined space
  d. Radiography
  e. Excavation more than 4 meter depth
  f. Heavy lifting above 50 ton
  Refer Annexure 05 for Work permit formats.
- "HSE Procedure for Work Permit System" shall be followed while implementing permit system. Where customer is having separate Work Permit System the same shall be followed.
- Permit applicant shall apply for work permit of particular work activity at particular location before starting of the work with Job Hazard Analysis.
- Permit signatory shall check that all the control measures necessary for the activity are in place and issue the permit to the permit holder.
- Permit holder shall implement and maintain all control measures during the period of permit .He will close the permit after completion of the work. The closed permit shall be archived in HSE Department of site.

11.3 SAFETY DURING WORK EXECUTION

Respective OCPS are to be followed and adherence to the same would be contractually binding

11.3.1 WELDING SAFETY

All safety precautions shall be taken for welding and cutting operations as per IS-818. All safety precautions shall be taken for foundation and other excavation marks as per IS-3764.

11.3.2 RIGGING

Rigging equipment shall not be loaded in excess of its recommended safe working load. Rigging equipment, when not in use, shall be removed from the original work area so as not to present a hazard to employees.

11.3.3 CYLINDERS STORAGE AND MOVEMENT

All gas cylinders shall be stored in upright position. Suitable trolley shall be used. There shall be flash-back arrestors conforming to IS-11006 at both cylinder and burner ends. Damaged tube and regulators must be immediately replaced. No of cylinders shall not exceed the specified quantity as per OCP
Cylinders shall be moved by tilting and rolling them on their bottom edges. They shall not be intentionally dragged, struck or permitted to strike each other violently.

When cylinders are transported by powered vehicle they shall be secured in a vertical position.

11.3.4 DEMOLITION WORK

Before any demolition work is commenced and also during the process of the work the following shall be ensured:

- All roads and open areas adjacent to the work site shall either be closed or suitably protected.
- No electric cable or apparatus which is liable to be a source of danger nor a cable or an apparatus used by the operator shall remain electrically charged.
- All practical steps shall be taken to prevent danger to persons employed from the risks of fire or explosion or flooding. No floor, roof or other part of the building shall be so overloaded with debris or materials as to render them unsafe.

11.3.5 T&Ps

All T&Ps/ MMEs should be of reputed brand/appropriate quality & must have valid test/calibration certificates bearing endorsement from competent authority of BHEL..Subcontractor to also submit monthly reports of T&Ps deployed and validity test certificates to BHEL safety Officer as per the format/procedure of BHEL.

11.3.6 CHEMICAL HANDLING

Displaying safe handling procedures for all chemicals such as lube oil, acid, alkali, sealing compounds etc , at work place.Where it is necessary to provide and/or store petroleum products or petroleum mixture & explosives, the subcontractor shall be responsible for carrying out such provision / storage in accordance with the rules & regulations laid down in the relevant petroleum act, explosive act and petroleum and carbide of calcium manual, published by the chief inspector of explosives of India. All such storage shall have prior approval if necessary from the chief inspector of explosives or any other statutory authority. The subcontractor shall be responsible for obtaining the same.

11.3.7 ELECTRICAL SAFETY

- Providing adequate no. of 24 V sources and ensure that no hand lamps are operating at voltage level above 24 Volts.
- Fulfilling safety requirements at all power tapping points.
- High/ Low pressure welders to be identified with separate colour clothings. No welders will be deployed without passing appropriate tests and holding valid welding certificates. Approved welding procedure should be displayed at work place.
- The subcontractor shall not use any hand lamp energized by Electric power with supply voltage of more than 24 volts in confined spaces like inside water boxes, turbine casings, condensers etc.
- All portable electric tools used by the subcontractor shall have safe plugging system to source of power and be appropriately earthed. Only electricians licensed by appropriate statutory authority shall be employed by the subcontractor to carry out all types of electrical works. Details of earth resource ad their test date to be given to BHEL safety officer as per the prescribed formats of BHEL
- The subcontractor shall use only properly insulated and armored cables which conform to the requirement of Indian Electricity Act and Rules for all wiring, electrical applications at site.

- BHEL reserves the right to replace any unsafe electrical installations, wiring, cabling etc. at the cost of the subcontractor.
- All electrical appliances used in the work shall be in good working condition and shall be properly earthed.
- No maintenance work shall be carried out on live equipment.
- The subcontractor shall maintain adequate number of qualified electricians to maintain his temporary electrical installations.
- Area wise Electrical safety inspection is to be carried out on monthly basis as per "Electrical Safety Inspection checklist' and the report is to be submitted to BHEL safety officer
- Adequate precautions shall be taken to prevent danger for electrical equipment. No materials on any of the sites of work shall be so stacked or placed as to cause danger or inconvenience to any person or the public
- The subcontractor shall carefully follow the safety requirement of BHEL/ the purchaser with the regard to voltages used in critical areas.

11.3.8 FIRE SAFETY

- Providing appropriate fire fighting equipment at designated work place and nominate a fire officer/warden adequately trained for his job.
- Subcontractor shall provide enough fire protecting equipment of the types and numbers at his office, stores, temporary structure in labor colony etc. Such fire protection equipment shall be easy and kept open at all times.
- The fire extinguishers shall be properly refilled and kept ready which should be certified at periodic intervals. The date of changing should be marked on the Cylinders.
- All other fire safety measures as laid down in the "codes for fire safety at construction site" issued by safety coordinator of BHEL shall be followed.
- Non-compliance of the above requirement under fire protection shall in no way relieve the subcontractor of any of his responsibility and liabilities to fire incident occurring either to his materials or equipment or those of others.
- Emergency contacts nos must be displayed at prominent locations
- Tarpaulin being inflammable should not be used (instead, only non-infusible covering materials shall be used) as protective cover while preheating, welding, stress relieving etc. at site.

11.3.9 SCAFFOLDING

- Suitable scaffolds shall be provided for workman for all works that cannot safely be done from the ground, or from solid construction except in the case of short duration of work which can be done safely from ladders.
- When a ladder is used, it shall be of rigid construction made of steel. The steps shall have a minimum width of 45 cm and a maximum rise of 30 cm. Suitable handholds of good quality wood or steel shall be provided and the ladder shall be given an inclination not steeper then ¼ horizontal and 1 vertical.
- Scaffolding or staging more than 3.6 m above the ground floor, swung or suspended from an overhead support or erected with stationery support shall have a guard rail properly bolted, braced or otherwise secured, at least 90 cm above the floor or platform of such scaffolding or staging and extending along the entire length of the outside and ends thereof with only such openings as may be necessary for the delivery of materials. Such scaffolding or staging shall be so fastened as to prevent it from saver, from swaying, from the building or structure.

11.3.10 **WORK AT HEIGHT**:

- Guardrails and toe-board/barricades and sound platform conforming to IS:4912-1978 should be provided.

- Wherever necessary, life-line (pp or metallic) and fall arrestor along with Polyamide rope or Retractable lifeline should be provided.
- Safety Net as per IS:11057:1984 should be used extensively for prevention/ arrest of men and materials falling from height. The safety nets shall be fire resistant, duly tested and shall be of ISI marked and the nets shall be located as per site requirements to arrest or to reduce the consequences of a possible fall of persons working at different heights.
- Reaching beyond barricaded area without lifeline support, moving with support of bracings, walking on beams without support, jumping from one level to another, throwing objects and taking shortcut must be discouraged.
- Use of Rebar steel for making Jhoola and monkey-ladder (Rods welded to vertical or inclined structural members), temporary platform etc. must be avoided.
- Monkey Ladder should be properly made and fitted with cages.
- Jhoola should be made with angles and flats and tested like any lifting tools before use.
- Lanyard must be anchored always and in case of double lanyard, each should be anchored separately.
- In case of pipe-rack, persons should not walk on pipes and walk on platforms only.
- In case of roof work, walking ladder/ platform should be provided along with lifeline and/ or fall arrestor.
- Empty drums must not be used.
- For chimney or structure painting, both hanging platform and men should be anchored separately to a firm structure along with separate fall arrestor. Rope ladder should be discouraged.

11.3.11 WORKING PLATFORM

Working platforms, gangways and stairways shall be so constructed that they do not sag unduly or unequally and if the height of the platform gangways provided is more than 3.6 m above ground level or floor level, they shall be closely boarded and shall have adequate width which shall not be less than 750 mm and be suitably fenced as described above. Every opening in the floor or a building or in a working platform shall be provided with suitable means to prevent the fall of persons or materials by providing suitable fencing or railing whose minimum height shall be 90 cm.

11.3.12 EXCAVATION

Wherever there are open excavation in ground, they shall be fenced off by suitable railing and danger signals installed at night so as to prevent persons slipping into the excavations.

11.3.13 LADDER SAFETY

Safe means of access shall be provided to all working places. Every ladder shall be securely fixed. No portable single ladder shall be over 9 m in the length while the width between side rails in rung ladder shall in no case be less than app. 29.2 cm for ladder upto and including 3 m in length. For longer ladders this width shall be increased at least ¼'' for each additional foot of length.

A sketch of the ladders and scaffolds proposed to be used shall be prepared and approval of the Engineer obtained prior to Construction.

11.3.14 LIFTING SAFETY

- It will be the responsibility of the subcontractor to ensure safe lifting of the equipment, taking due precaution to avoid any incident and damage to other equipment and personnel.

- All requisite tests and inspection of handling equipment, tools & tackle shall be periodically done by the subcontractor by engaging only the Competent Persons as per law.
- Defective equipment or uncertified shall be removed from service.
- Any equipment shall not be loaded in excess of its recommended safe working load.

11.3.15 HOISTING APPLIANCE

- Motors, gearing, transmission, electric wiring and other dangerous parts of hoisting appliances should be provided with efficient safe guards.
- Hoisting appliance should be provided with such means as will reduce to the minimum the risk of any part of a suspended load becoming incidentally displaced.
- When workers employed on electrical installations which are already energized, insulating mats, wearing apparel, such as gloves, sleeves and boots as may be necessary should be provided.
- The worker should not wear any rings, watches and carry keys or other materials which are good conductor of electricity.

11.4 ENVIRONMENTAL CONTROL

Environment protection has always been given prime importance by BHEL. Environmental damage is a major concern of the principal subcontractor and every effort shall be made, to have effective control measures in place to avoid pollution of Air, Water and Land and associated life. Chlorofluorocarbons such as carbon tetrachloride and trichloroethylene shall not be used. Waste disposal shall be done in accordance with the guidelines laid down in the project specification.

Any chemical including solvents and paints, required for construction shall be stored in designated bonded areas around the site as per Material Safety Data Sheet (MSDS).

In the event of any spillage, the principle is to recover as much material as possible before it enters drainage system and to take all possible action to prevent spilled materials from running off the site. The subcontractor shall use appropriate MSDS for clean-up technique

All subcontractors shall be responsible for the cleanliness of their own areas.

The subcontractors shall ensure that noise levels generated by plant or machinery are as low as reasonably practicable. Where the subcontractor anticipates the generation of excessive noise levels from his operations the subcontractor shall inform to Construction Manager of BHEL accordingly so that reasonable &practicable precautions can be taken to protect other persons who may be affected.
It is imperative on the part of the subcontractor to join and effectively contribute in joint measures such as tree plantation, environment protection, contributing towards social upliftment, conversion of packing woods to school furniture, keeping good relation with local populace etc.
The subcontractor shall carry out periodic air and water quality check and illumination level checking in his area of work place and take suitable control measure.

11.5 HOUSEKEEPING

- Keeping the work area clean/ free from debris, removed scaffoldings, scraps, insulation/sheeting wastage /cut pieces, temporary structures, packing woods etc. will be in the scope of the subcontractor. Such cleanings has to be done by

subcontractor within quoted rate, on daily basis by an identified group. If such activity is not carried out by subcontractor / BHEL is not satisfied, then BHEL may get it done by other agency and actual cost along with BHEL overheads will be deducted from contractor's bill. Such decisions of BHEL shall be binding on the subcontractor

- Proper housekeeping to be maintained at work place and the following are to be taken care of on daily basis.
- All surplus earth and debris are removed/disposed off from the working areas to identified locations.
- Unused/Surplus cables, steel items and steel scrap lying scattered at different places/elevation within the working areas are removed to identified locations.
- All wooden scrap, empty wooden cable drums and other combustible packing materials, shall be removed from workplace to identified locations. Sufficient waste bins shall be provided at
- Different work places for easy collection of scrap/waste. Scrap chute shall be installed to remove scrap from high location.
- Access and egress (stair case, gangways, ladders etc.) path should be free from all scrap and other hindrances.
- Workmen shall be educated through tool box talk about the importance of housekeeping and encourage not to litter.
- Labour camp area shall be kept clear and materials like pipes, steel, sand, concrete, chips and bricks, etc. shall not be allowed in the camp to obstruct free movement of men and machineries.
- Fabricated steel structures, pipes & piping materials shall be stacked properly.
- No parking of trucks/trolleys, cranes and trailers etc. shall be allowed in the camp, which may obstruct the traffic movement as well as below LT/HT power line.
- Utmost care shall be taken to ensure over all cleanliness and proper upkeep of the working areas

11.6 WASTE MANAGEMENT

Take suitable measures for waste management and environment related laws/legislation as a part of normal construction activities. Compliance with the legal requirements on storage/ disposal of paint drums (including the empty ones), Lubricant containers, Chemical Containers, and transportation and storage of hazardous chemicals will be strictly maintained.

11.6.1 BINS AT WORK PLACE

- Sufficient rubbish bins shall be provided close to workplaces.
- Bins should be painted yellow and numbered.
- Sufficient nos. of drip trays shall be provided to collect oil and grease.
- Sufficient qty. of broomsticks with handle shall be provided.
- Adequate strength of employees should be deployed to ensure daily monitoring and service for waste management.

11.6.2 STORAGE AND COLLECTION

- Different types of rubbish/waste should be collected and stored separately.
- Paper, oily rags, smoking material, flammable, metal pieces should be collected in separate bins with close fitting lids.
- Rubbish should not be left or allowed to accumulate on construction and other work places.
- Do not burn construction rubbish near working site.

11.6.3 SEGREGATION

- Earmark the scrap area for different types of waste.
- Store wastes away from building.
- Oil spill absorbed by non-combustible absorbent should be kept in separate bin.
- Clinical and first aid waste stored and incinerated separately.

11.6.4 DISPOSAL

- Sufficient containers and scrap disposal area should be allocated.
- All scrap bin and containers should be conveniently located.
- Provide self-closing containers for flammable/spontaneously combustible material.
- Keep drainage channels free from choking.
- Make schedule for collection and disposal of waste.

11.6.5 WARNING AND SIGNS

- Appropriate sign to be displayed at scrap storage area
- No toxic, corrosive or flammable substance to be discarded into public sewage system.
- Waste disposal shall be in accordance with best practice.
- Comply with all the requirements of Pollution Control Board (PCB) for storage and disposal of hazardous waste.

11.7 TRAFFIC MANAGEMENT SYSTEM

11.7.1 SAFE WORKPLACE TRANSPORT SYSTEM

- Traffic routes in a work place shall be suitable for the persons or vehicles using them. This shall be sufficient in number and of sufficient size. This shall reflect the suitability of traffic routes for vehicles and pedestrians.
- Where vehicles and pedestrians use the same traffic routes there shall be sufficient space between them. Where necessary all traffic routes must be suitably indicated. Pedestrians or vehicles must be able to use traffic routes without endangering those at work. There must be sufficient separation of traffic routes from doors, gates and pedestrian traffic routes.
- For internal traffic, lines marked on roads / access routes and between buildings shall clearly indicate where vehicles are to pass.
- Temporary obstacles shall be brought to the attention of drivers by warning signs or hazard cones.
- Speed limits shall be clearly displayed. Speed ramps preceded by a warning signs or marker are necessary.
- The traffic route should be wide enough to allow vehicles to pass and re-pass oncoming or parked traffic and it may be advisable to introduce on-way system or parking restrictions.
- Safest route shall be provided between places where vehicles have to call or deliver.
- Avoid vulnerable areas/items such as fuel or chemicals tanks or pipes, open or unprotected edges and structures likely to collapse

- Safe areas shall be provided for loading and unloading.
- Avoid sharp or blind bends. If this is not possible hazards should be indicated e.g. blind corner.
- Ensure road crossings are minimum and clearly signed.
- Entrance and gateways shall be wide enough to accommodate a second vehicle without causing obstruction.
- Set sensible speed limits which are clearly sign posted.
- Where necessary ramps should be used to retard speed. This shall be preceded by a warning sign or mark on the road.
- Forklift trucks shall not pass over road hump unless of a type capable of doing so.
- Overhead electric cable, pipes containing flammable hazardous chemical shall be shielded by using goal posts height gauge posts or barriers.
- Road traffic signs shall be provided on prominent locations for prevention of incidents and hazards and for quick guidance and warning to employees and public. Safety signs shall be displayed as per the project working requirement and guideline of the state in which project is done. Vehicles hired or used shall not be parked within the 15m radius of any working area. Any vehicle, that is required to be at the immediate/near the vicinity, shall be approved by the person in-charge of the site.

11.7.2 TRAFFIC ROUTE FOR PEDESTRIANS

- Where traffic routes are used by both pedestrians and vehicles road shall be wide enough to allow vehicles and pedestrians safely.
- Separate routes shall be provided for pedestrians to keep them away from vehicles. Provide suitable barriers/guard at entrances/exit and the corners or buildings.
- Where pedestrian and vehicle routes cross, appropriate crossing shall be provided.
- Where crowd is likely to use roadway e.g. at the end of shift, stop vehicles from using them at such times.
- Provide high visibility clothing for people permitted in delivery area.

11.7.3 WORK VEHICLE

Work vehicle shall be as safe stable efficient and roadworthy as private vehicles on public roads. Site management shall ensure that drivers are suitably trained. All vehicle e.g. heavy motor vehicle forklift trucks dump trucks mobile cranes shall ensure that the work equipment conforms to the following:

- A high level of stability.
- A safe means of access/egress.
- Suitable and effective service and parking brakes.
- Windscreens with wipers and external mirrors giving optimum all round visibility.
- Provision of horn, vehicle lights, reflectors, reversing lights, reversing alarms.
- Provision of seat belts.
- Guards on dangerous parts.
- Driver protection - to prevent injury from overturning and from falling objects/materials.
- Driver protection from adverse weather.
- No vehicle shall be parked below HT/LT power lines.
- Valid Pollution Under Control certification for all vehicles

11.7.4 DAILY CHECK BY DRIVER

- There should also be daily safety checks containing below mentioned points by the driver before the vehicle is used.
  - Brakes.
  - Tires.
  - Steering.
  - Mirrors.
  - Windscreen waters.
  - Wipers.
  - Warning signals.
  - Specific safety system i.e. control interlocks
- Management should ensure that drivers carry out these checks.

11.7.5 TRANSPORTATION OF PERSONNEL AND MATERIALS BY VEHICLES

- All drivers shall hold a valid driving License for the class of vehicle to be driven and be registered as an authorized BHEL driver with the Administration Department.
- Securing of the load shall be by established and approved methods, i.e. chains with patented tightening equipment for steel/heavy loads. Sharp corners on loads shall be avoided when employing ropes for securing.
- All overhangs shall be made clearly visible and restricted to acceptable limits
- Load shall be checked before moving off and after traveling a suitable distance.
- On no account is construction site to be blocked by parked vehicles Drivers of vehicles shall only stop or park in the areas designate by the stringing foreman.
- Warning signs shall be displayed during transportation of material.
  All vehicles used by BHEL shall be in worthy condition and in conformance to the Land Transport requirement.

11.7.6 MAINTENANCE

All Vehicles used for transportation of man and material shall undergo scheduled inspections on frequent intervals to secure safe operation. Such inspections shall be conducted in particular for steering, brakes, lights, horn, doors etc. Site management shall ensure that work equipment is maintained in an efficient, working order and in good repair. Inspections and services carried out at regular intervals of time and or mileage. No maintenance shall be carried below HT/LT power lines.

11.8 EMERGENCY PREPAREDNESS AND RESPONSE

- Emergency preparedness and response capability of site shall be developed as per Emergency Preparedness and Response plan issued by Regional HQ
- Availability of adequate number of first aiders and fire warden shall be ensured with BHEL and its subcontractors
- All the subcontractor's supervisory personnel and sufficient number of workers shall be trained for fire protection systems. Enough number of such trained personnel must be available during the tenure of contract. Subcontractor should nominate his supervisor to coordinate and implement the safety measures.
- Assembly point shall be earmarked and access to the same from different location shall be shown
- Fire exit shall be identified and pathway shall be clear for emergency escape.

- Appropriate type and number of fire extinguisher shall be deployed as per Fire extinguisher deployment plan and validity shall be ensured periodically through inspection
- Adequate number of first aid boxes shall be strategically placed at different work places to cater emergency need. Holder of the first aid box shall be identified on the box itself who will have the responsibility to maintain the same.
- First aid center shall be developed at site with trained medical personnel and ambulance
- Emergency contact numbers (format given in EPRP) of the site shall be displayed at prominent locations.
- Tie up with fire brigade shall be done in case customer is not having fire station.
- Tie up with hospital shall be done in case customer is not having hospital.
- Disaster Management group shall be formed at site
- Mock drill shall be arranged at regular intervals. Monthly report of the above to be given to BHEL safety Officer as per prescribed BHEL formats
- Mock drill shall be conducted on different emergencies periodically to find out gaps in emergency preparedness and taking necessary corrective action

12.0 HSE INSPECTION

Inspection on HSE for different activities being carried out at site shall be done to ensure compliance to HSEMS requirements. The subcontractor shall maintain and ensure necessary safety measures as required for inspection and tests HV test, Pneumatic test, Hydraulic test, Spring test, Bend test etc. as applicable, to enable inspection agency for performing Inspection. If any test equipment is found not complying with proper safety requirements then the Inspection Agency may withhold inspection, till such time the desired safety requirements are met.

12.1 DAILY HSE CHECKS

Both the Site Supervisors and safety officer of Subcontractor are to conduct daily site Safety inspection around work activities and premises to ensure that work methods and the sites are maintained to an acceptable standard. The following are to form the common subjects of a daily safety inspection:

- Personal Safety wears & gear compliance.
- Complying with site safety rules and permit-to-work (PTW).
- Positions and postures of workers.
- Use of tools and equipment etc. by the workers.

The inspection should be carried out just when work starts in beginning of the day, during peak activities period of the day and just before the day's work ends.

12.2 INSPECTION OF PPE

- PPEs shall be inspected by HSE officer at random once in a week as per format no. HSEP:14-F06 for its compliance to standard and compliance to use and any adverse observation shall be recorded in the PPE register.
- The applicable PPEs for carrying out particular activities are listed below.

12.3 INSPECTION OF T&Ps

- A master list of T&Ps shall be maintained by each subcontractor.
- All T&Ps being used at site shall be inspected by HSE officer once in a month as per format no. HSEP:14-F07 for its healthiness and maintenance.
- The T&Ps which require third party inspection shall be checked for its validity during inspection. The third party test certificate should be accompanied with a copy of the concerned competent person's valid qualification record.
- The validity of T&P shall be monitored as per "Status of T&Ps" format no. HSEP:14-F08

12.4 INSPECTION OF CRANES AND WINCHES

- Cranes and winches shall be inspected by the operator through a daily checklist for its safe condition (as provided by the equipment manufacturer) before first use of the day.
- Cranes and Winches shall be inspected by HSE officer once in a month as per format no. HSEP:14-F09 for healthiness, maintenance and validity of third party inspection.
- The date of third party inspection and next due date shall be painted on cranes and winches.
- The operators/drivers shall be authorized by sub-contractor based on their competency and experience and shall carry the I-card.
- The operator should be above 18 years of age and should be in possession of driving license of HMV man & goods), vision test certificate and should have minimum qualification so that he can read the instructions and check list.

12.5 INSPECTION ON HEIGHT WORKING

- Inspection on height working shall be conducted daily by supervisors before start of work to ensure safe working condition including provision of
    - Fall arrestor
    - Lifelines
    - Safety nets
    - Fencing and barricading
    - Warning signage
    - Covering of opening
    - Proper scaffolding with access and egress.
    - Illumination
- Inspection on height working shall be conducted once in a week by HSE officer as per format no. HSEP:14-F10.
- Medical fitness of height worker shall be ensured.
- Height working shall not be allowed during adverse weather.

12.6 INSPECTION ON WELDING AND GAS CUTTING OPERATION

- Supervisor shall ensure that no flammable items are available in near vicinity during welding and gas cutting activity.
- Gas cylinders shall be kept upright.
- Use of Flash back arrestor shall be ensured at both ends.

- Inspection during welding and gas cutting operations shall be carried out by HSE officer once a month as per format no. HSEP:14-F11.
- Use of fire blanket to be ensured to avoid falling of splatters during welding or gas cutting operation at height.
- Availability of fire extinguisher at vicinity shall be ensured.

12.7 INSPECTION ON ELECTRICAL INSTALLATION / APPLIANCES

- Ensure proper earthing in electrical installation
- Use ELCB at electrical booth
- Electrical installation shall be properly covered at top where required
- Use appropriate PPEs while working
- Use portable electrical light < 24 V in confined space and potentially wet area.
- Monthly inspection shall be carried out as per format no. HSEP:14-F12.

12.8 INSPECTION OF ELEVATOR

- Elevators shall be inspected by concerned supervisors once in a week as per format no. HSEP:14-F13.
- All elevators shall be inspected by competent person and validity shall be ensured.
- The date of third party inspection and next due date shall be painted on elevator.

12.9 INSPECTION OF EXCAVATION

Excavation activities shall be inspected as per Format HSEP:14-F13A

13.0 HSE PERFORMANCE

- Contractor shall be assessed on monthly basis for HSE Compliance by BHEL Safety In-charge at site.
  The HSE compliance shall be based on Online HSE Evaluation System of BHEL as per Format No. HSEP:14-F33.
- BHEL shall reserve the right to use this assessment for evaluating bidder's capacity for future tenders
- Suitable HSE reward system shall be developed at site level to promote HSE compliance amongst workmen by the subcontractor.
  To decide HSE reward, performance towards HSE shall be evaluated for workmen and it shall be awarded regularly in public gathering.
- If safety record of the subcontractor in execution of the awarded job is to the satisfaction of safety department of BHEL, issue of an appropriate certificate to recognize the safety performance of the subcontractor may be considered by BHEL after completion of the job.

14.0 HSE PENALTIES

- As per contractual provision HSE penalties shall be imposed on subcontractors for non- compliance on HSE requirement as per format no. HSEP:14-F14. The list in the format is only indicative. For any other violation, not listed in the format, the minimum penalty amount is to be decided as per BOCW act.
- If principal customer/statutory and regulatory bodies impose some penalty on HSE due to the non-compliance of the subcontractor the same shall be passed on to them.
- The penalty amount shall be recovered by Site Finance department from subcontractors from the RA/Final bill.

15.0 OTHER REQUIREMENTS

- In case of any delay in completion of a job due to mishaps attributable to lapses by the subcontractor, BHEL shall have the right to recover cost of such delay from the payments due to the subcontractor, after notifying the subcontractor suitably.
- If the subcontractor fails to improve the standards of safety in its operation to the satisfaction of BHEL after being given reasonable opportunity to do so and/or if the subcontractor fails to take appropriate safety precautions or to provide necessary safety devices and equipment or to carry out instruction regarding safety issued by BHEL, BHEL shall have the right to take corrective steps at the risk and cost of the subcontractor after giving a notice of not less than 7 days indicating the steps that would be taken by BHEL.
- If the subcontractor succeeds in carrying out its job in time without any fatal or disabling injury incident and without any damage to property BHEL may, at its sole discretion, favorably consider to reward the subcontractor suitably for the performance.
- In case of any damage to property due to lapses by the subcontractor, BHEL shall have the right to recover the cost of such damages from the subcontractor after holding an appropriate enquiry.
- The subcontractor shall take all measures at the sites of the work to protect all persons from incidents and shall be bound to bear the expenses of defense of every suit, action or other proceeding of law that may be brought by any persons for injury sustained or death owing to neglect of the above precautions and to pay any such persons such compensation or which may with the consent of the subcontractor be paid to compromise any claim by any such person, should such claim proceeding be filed against BHEL, the subcontractor hereby agrees to indemnify BHEL against the same.
- The subcontractor shall not employ men below the age of 18 years and women on the work of painting with products containing lead in any form. Wherever men above the age of 18 are employed on the work of lead painting, overalls shall be supplied by the subcontractor to the workmen and adequate facilities shall be provided to enable the working painters to wash during the cessation of work.
- The subcontractor shall notify BHEL of his intention to bring to site any equipment or material which may create hazard.
- BHEL shall have the right to prescribe the conditions under which such equipment or materials may be handled and the subcontractor shall adhere to such instructions.

- BHEL may prohibit the use of any construction machinery, which according to the organization is unsafe. No claim for compensation due to such prohibition will be entertained by BHEL.

16. NON COMPLIANCE

NONCONFORMITY OF SAFETY RULES AND SAFETY APPLIANCES WILL BE VIEWED SERIOUSLY AND BHEL HAS RIGHT TO IMPOSE FINES ON THE SUBCONTRACTOR AS UNDER FOR EVERY INSTANCE OF VIOLATION NOTICED:

SN	Violation of Safety Norms	Fine (in Rs)
01	Not Wearing Safety Helmet	200/- *
02.	Not wearing Safety Belt or not anchoring life line	500/-*
03	Not wearing safety shoe	200/-*
04	Not keeping gas cylinders vertically	200/-
05	Not using flash back arrestors	100/-
06	Not wearing gloves	50/- *
07.	Grinding Without Goggles	50/- *
08.	Not using 24 V Supply For Internal Work	500/-
09.	Electrical Plugs Not used for hand Machine	100/-
10.	Not Slinging properly	200/-
11.	Using Damaged Sling	200/-
12.	Lifting Cylinders Without Cage	500/-
13.	Not Using Proper Welding Cable With Lot of Joints And Not Insulated Property.	200/-
14.	Not Removing Small Scrap From Platforms	500/-
15.	Gas Cutting Without Taking Proper Precaution or Not Using Sheet Below Gas Cutting	500/-
16.	Not Maintaining Electric Winches Which are Operated Dangerously	500/-
17.	Improper Earthing Of Electrical T&P	500/-
18	No or improper barricading	500/-
19.	Activity carried out without Safety work permit (Height work, Lifting activity, Hot work-each person/case)	1000/-
20.	Incident Resulting in Partial Loss in Earning Capacity	25,000/- per victim
21.	Fatal Incident Resulting in total loss in Earning Capacity	1,00,000/- per victim for first instance #

- Legend:-

  *: per head. For repeated violation by the same person, the penalty would be double of the previous penalty. Date of "Repeated violation" will be counted from subsequent days.

  #: or as deducted by customer, whichever is higher. For repeated fatal incident in the same Unit incremental penalty to be imposed. The subcontractor will pay 2 times the penalty compared to previously paid in case there are repeated cases of fatal incidents under the same subcontractor for the same package in the same unit.

Any other non-conformity noticed not listed above will also be fined as deemed fit by BHEL. The decision of BHEL engineer is final on the above. The amount will be deducted from running bills of the subcontractor. The amount collected above will be utilized for giving award to the employees who could avoid incident by following safety rules. Also the amount will be spent for purchasing the safety appliances and supporting the safety activity at site.

17.0 HSE AUDIT/INSPECTION

- Regular HSE Audit/inspection shall be carried out by Subcontractor as per Site HSE audit calendar.
- HSE checklist **(Annexure 02)** shall be used for carrying out audit/inspection and report shall be submitted to BHEL site management
- All non-conformities and observations on HSE identified during internal or external HSE audit shall be disposed off by site in a time bound manner and reported back the implementation status
- Corrective action and Preventive action on HSE issues raised by certification body issued by Regional HQs shall be implemented by site and reported to Site management.

18.0 MONTHLY HSE REVIEW MEETING

- Site shall hold HSE review meeting every month to discuss and resolve HSE issues of site and improve HSE performance. It will also discuss the incidents occurred since previous meeting,its root cause and Corrective action and Preventive action. The agenda is given below:
  - Implementation of earlier MOM
  - HSE performance
  - HSE inspection
  - HSE audit and CAPA
  - HSE training
  - Health check-up camp
  - HSE planning for the erection and commissioning and installation activities in the coming month
  - HSE reward and promotional activities
- The meeting shall be chaired by Construction Manager, convened by HSE coordinator and attended by all HOS, Site Incharge of Subcontractors and HSE officer of Subcontractors.
- MOM on the discussion will be circulated to the concerned for implementation.

19.0 FORMATS USED (Details available in Annexure-04)

SL. No.	Format Name	Format No.	Rev No.
01	Inspection of First Aid Box	HSEP:14-F01	00
02	Health Check Up	HSEP:14-F02	00
03	HSE Induction Training	HSEP:14-F03	00
04	Tool Box Talk	HSEP:14-F04	00
05	Monthly Site HSE Report	As specified by BHEL	00
06	Inspection of PPE	HSEP:14-F06	00

07	Inspection of T&Ps	HSEP:14-F07	00
08	Status of T&Ps	HSEP:14-F08	00
09	Inspection of Cranes and Winches	HSEP:14-F09	00
10	Inspection on Height Working	HSEP:14-F10	00
11	Inspection on Welding & Gas Cutting	HSEP:14-F11	00
12	Inspection on Electrical Installation	HSEP:14-F12	00
13	Inspection on Elevator	HSEP:14-F13	00
14	HSE Penalty	HSEP:14-F14	00
15	Accident /incident / property damage /fire incident report	HSEP:14-F15	00

20.0 ANNEXURES

ANNEXURE 01

As per Contract Labour (Regulation & Abolition Act), Central Rules, 1971,

(1) The first-aid box shall be distinctively marked with a Red Cross on a white background and shall contain the following items, namely:

(a) For establishments in which the number of contract labour employed does not exceed fifty, each first aid box shall contain the following equipment:

(i)	6 small sterilized dressings
(ii)	3 medium size sterilized dressings
(iii)	3 large size sterilized dressings
(iv)	6 pieces of sterilized eye pads in separate sealed packets.
(v)	6 roller bandages 10 cm wide.
(vi)	6 roller bandages 5 cm wide.
(vii)	One tourniquet
(viii)	A supply of suitable splints
(ix)	Three packets of safety pins.
(x)	Kidney tray.
(xi)	3 large sterilized burn dressings.
(xii)	1 (30ml) bottle containing a two percent alcoholic solution of iodine
(xiii)	1 (30 ml) bottle containing Sal volatile having the dose and mode of administration indicated on the label
(xiv)	1 snake bite lancet
(xv)	1 (30gms) bottle of potassium permanganate crystals.
(xvi)	1 pair scissors
(xvii)	1 copy of the First-Aid leaflet issued by the Director General, Factory Advice Service and Labour Institutes, Government of India.
(xviii)	A bottle containing 100 tablets (each of 5 grains) of aspirin
(xix)	Ointment for burns
(xx)	A bottle of suitable surgical anti-septic solution

(b) For establishment in which the number of contract labour exceeds fifty each first-aid box shall contain the following equipment:

(i)	12 small sterilized dressings
(ii)	6 medium size sterilized dressings
(iii)	6 large size sterilized dressings.
(iv)	6 large size sterilized burn dressings
(v)	6 (15 grams) packets sterilized cotton wool
(vi)	12 pieces of sterilized eye pads in separate sealed packets.

(vii)	12 roller bandages 10 cm wide.
(viii)	12 roller bandages 5 cm wide.
(ix)	One tourniquet.
(x)	A supply of suitable splints.
(xi)	Three packets of safety pins.
(xii)	Kidney tray.
(xiii)	Sufficient number of eye washes bottles filled with distilled water or suitable liquid clearly indicated by a distinctive sign which shall be visible at all times.
(xiv)	4 per cent Xylocaine eye drops, and boric acid eye drops and soda by carbonate eye drops.
(xv)	1 (60ml) bottle containing a two percent alcoholic solution of iodine
(xvi)	One (two hundred ml) bottle of mercurochrome (2 per cent) solution in water.
(xvii)	1 (120ml) bottle containing Sal volatile having the dose and mode of administration indicated on the label.
(xviii)	1 roll of adhesive plaster (6 cmX1 meter)
(xix)	2 rolls of adhesive plaster (2 cmX1 meter)
(xx)	A snake bite lancet.
(xxi)	1 (30 grams) bottle of potassium permanganate crystals.
(xxii)	1 pair scissors
(xxiii)	1 copy of the First-Aid leaflet issued by the Director-General, Factory Advice service and labour Institutes, Government of India.
(xxiv)	a bottle containing 100 tablets (each of 5 grains) of aspirin
(xxv)	Ointment for burns
(xxvi)	A bottle of a suitable surgical anti septic solution.

(2) Adequate arrangement shall be made for immediate recoupment of the equipment when necessary.

ANNEXURE 02

HSE AUDIT/INSPECTION CHECKLIST CUM COMPLIANCE REPORT

PROJECT:_____ SUBCONTRACTOR:_____

DATE : _____ OWNER :_____

INSPECTION BY:_____

Note : write 'NA' wherever the items is not applicable

Item	Yes	No	Remarks	Action
HOUSEKEEPING				
Waste containers provided and used				
Passageways and walkways clear				
General neatness of working area				
Other				
PERSONNELPROTECTIVEEQUIPTMENTS				
Goggles; shields				
Face protection				
Hearing protection				
Respiratory masks etc.				
Safety belts				
Other				
EXCAVATIONS / OPENINGS				
Openings properly covered or barricaded				
Excavations shored				
Excavations barricaded				
Overnight lighting provided				
Other				
WELDING, CUTTING				
Gas cylinders chained upright				
Cable and hoses not obstructing				
Fire extinguisher (s) accessible				
Others				
SCAFFOLDING				
Fully decked platforms				
Guard and intermediate rails in place				
Toe boards in place				
Adequate shoring				
Adequate access				
Others				
LADDER				
Extension side rails 1 m above				
Top of landing				
Properly secured				

Angle + 70^0 from horizontal				
Other				
HOISTS, CRANES AND DERRICKS				
Condition of cables and sheaf OK				
Condition of slings, chains, hooks OK				
Inspection & maintenance log maintained				
Outriggers used				
Signals observed and understood				
Qualified operators				
Others				
MACHINERY, TOOLS & EQUIPMENT				
Proper instruction				
Safety devices				
Proper cords				
Inspection and maintenance				
Other				
VEHICLE AND TRAFFIC				
Rules and regulations observed				
Inspection and maintenance				
Licensed drivers				
Other				
TEMPORARY FACILITIES				
Emergency instructions posted				
Fire extinguishers provided				
Fire-aid equipment available				
General neatness				
Others				
FIRE PREVENTION				
Personnel instructed				
Fire extinguishers checked				
No smoking in prohibited areas.				
Hydrants				
Clearance				
Others				
ELECTRICAL				
Proper wiring				
ELCB's provided				
Ground fault circuit interrupters				
Protection against damage				
Prevention of tripping hazards				
Other				
HANDLING & STORAGE OF MATERIALS				
Properly stored or stacked				
Passageways clear				
Other				
FLAMMABLE GASES AND LIQUIDS				
Containers clearly identified				
Proper storage				
Fire extinguisher nearby				

Other				
WORKING AT HEIGHT				
Safety nets				
Safety belts				
Safety helmets				
Anchoring of safety belt to the life line rope				
ENVIRONMENT				
Lubricant waste/engine oils properly dispose.				
Waste from Canteen, offices, sanitation etc. disposed properly.				
Disposal of surplus earth, stripping materials, expired batteries, oily rags and combustible materials done properly.				
HEALTH CHECKS				
Hygienic conditions at labor camps O.K.				
Availability of first-aid facilities				
Proper sanitation at site, office & labor camps.				
Arrangement of medical facilities.				
Measures for dealing with illness.				
Availability of potable drinking water for workmen & staff.				
Provision of crèches for children.				

ANNEXURE 03

REFERENCES

- Contract documents
- Relevant legislations
- HSEMSM
- Relevant Indian standards as listed below (illustrative only):

SL NO	CODE NAME	TITLE
(1)	IS : 818-1888 (Reaffirmed 2003)	Code of Practice for safety and health requirements in Electric and Gas Welding and Cutting operations.
(2)	IS: 1179-1967 (Reaffirmed 2003)	Specification for Equipment for Eye & Face protection during welding.
(3)	IS : 1989 (Part 2):1986 (Reaffirmed 1997)	Specification for Leather Safety Boots & Shoes
(4)	IS:2925 – 1984 (Reaffirmed 2010)	Specification for Industrial Safety Helmets
(5)	IS:3521 : 1999 (Reaffirmed 2002)	Industrial Safety Belts & Harnesses-Specification
(6)	IS:3646(Part II) – 1966 (Reaffirmed 2003)	Code of Practice for Interior Illumination
(7)	IS:3696 (Part I) – 1987 (Reaffirmed 2002)	Safety Code for Scaffolds and Ladders
(8)	IS: 3696(Part 2) : 1991 (Reaffirmed 2002)	Scaffolds and Ladders-Code of Safety
(9)	IS:3786 – 1983 (Reaffirmed 2002)	Method for Computation of Frequency and Severity Rates for Industrial Injuries and Classification of Industrial Incidents
(10)	IS:4770 : 1991 (Reaffirmed 2006)	Rubber Gloves – Electricals purposes-Specification
(11)	IS:4912 : 1978 (Reaffirmed 2002)	Safety Requirements for Floor and Wall Openings, Railings and Toe Boards
(12)	IS: 5983 – 1980 (Reaffirmed 2002)	Specification for Eye-Protectors
(13)	IS:6519 – 1971 (Reaffirmed 1997)	Code of Practice for Selection, Care and Repair of Safety Footwear
(14)	IS:9167:1979	Specification for Ear-Protectors
(15)	IS:6994(Part I)-1973 (Re affirmed 1996)	Specification for Industrial Safety Gloves Leather and Cotton Gloves
(16)	IS:8519 – 1977 (Reaffirmed 1983)	Guide for Selection of Industrial Safety Equipment for Body Protection.
(17)	IS 11006 : 2011	Flash Back(Flame Arrestor) Specification

(18)	IS:8520 – 1977 (Reaffirmed 2002)	Guide for Selection of Industrial Safety Equipment for Eye, Face and Ear Protection.
(19)	IS:9473:2002	Respiratory Protective Devices-Filtering Half Masks to protect against Particles-Specification.
(20)	IS:9944:1992 (Reaffirmed 2003)	Natural and Man-made Fiber Rope Slings-Recommendations on Safe working loads.
(21)	IS:11057 – 1884 (Reaffirmed 2001)	Specification for Industrial Safety Nets
(22)	IS:12254:1993 (Reaffirmed 2002)	Polyvinyl Chloride (PVC) Industrial Boots-Specification
(23)	IS:13367(Part 1):1992 (Reaffirmed 20030	Safe Use of Cranes-Code of Practice
(24)	IS:14166:1994 (Reaffirmed 2002)	Respiratory Protective Devices-Full Face Masks Specification
(25)	IS:14746 : 1999 (Reaffirmed 2003)	Respiratory Protective Devices-Half Masks and Quarter Masks - Specification
(26)	IS : 15397 :2003 (Reaffirmed 2008)	Portable Extinguisher Mechanical Foam Type(Stored Pressure)-Specification
(27)	IS: 19011:2002	Guidelines for Quality and/or Environmental Management Systems Auditing

ANNEXURE 04 : SAFETY FORMATS
&
ANNEXURE 05 : WORK PERMIT FORMATS

	POWER SECTOR	FORMAT NO: HSEP:14-F01 REV NO.: 00 PAGE NO. 01 OF 02
	INSPECTION OF FIRST AID BOX	

Name of Site :	
Name of Sub-Contractor :	
Inspected by :	
Date of Inspection :	

Number of employees on the site: -_____

Sl.No.	**Item**	**No. Available**	**Remarks**
1	No. of small sterilized dressings		
2	No of medium sized sterilized dressings		
3	No of large sized sterilized dressings.		
4	No of large sized sterilized burn dressings		
5	No of (15 grams) packets sterilized cotton wool		
6	No of pieces of sterilized eye pads in separate sealed packets.		
7	No of roller bandages 10 cm wide.		
8	No of roller bandages 5 cm wide.		
9	Whether tourniquet available		
10	Whether supply of Suitable splints available.		
11	No of packets of safety pins.		
12	Whether kidney tray available		
13	Whether sufficient number of eye wash bottles, filled with distilled water or suitable liquid, clearly indicated by a distinctive sign which shall be visible at all times, available.		
14	Whether 4%-xylocaine eye drops, and boric acid eye drops and soda by carbonate eye drops available.		
15	Whether (60ml) bottle containing a two percent alcoholic solution of iodine available		
16	Whether (two hundred ml) bottle of mercurochrome (2 per cent) solution in water available.		

Sl.No.	Item	No. Available	Remarks
17	Whether 120ml bottle containing Sal volatile having the dose and mode of administration indicated on the label, available.		
18	Whether roll of adhesive plaster (6 cmX1 meter) available		
19	No of rolls of adhesive plaster (2 cmX1 meter)		
20	Whether snake bite lancet available.		
21	Whether (30 grams) bottle of potassium permanganate crystals available.		
22	Whether a pair scissors available		
23	Whether copy of the First-Aid leaflet issued by the Director-General, Factory Advice service and labour Institutes, Government of India available.		
24	Whether bottle containing 100 tablets (each of 5 grains) of aspirin available		
25	Whether Ointment for burns available		
26	Whether bottle of a suitable surgical anti-septic solution available		

Signature of Subcontractor's Site I/C:

	POWER SECTOR	FORMAT NO: HSEP:14-F02 REV NO.: 00 PAGE NO. 1 OF 02
	HEALTH CHECK UP	

Name of Site :	
Name of Sub-Contractor :	
Name of Employee :	

NAME:

History Of Past Illness	H/O Epilepsy
	H/O Drug Allergy
	H/O Diabetics/ Hypertension
	H/O Unconsciousness
Personal History	

EXAMINATION		**OBSERVATION**	
General Physical Examination			
Height	:		
Weight	:		
BMI	:		
Built And nourishment	:		
Pallor	:		
Temperature	:		
Chest Expansion	:	Inspiration	Expansion
Lymph Node Enlargement	:		
Ear, Nose, Throat	:		
Ear	:		
Nose	:		
Throat	:		

EXAMINATION		OBSERVATION	
Cardiovascular System Examination :			
Inspection	:		
Palpation	:	Pulse	BP
Auscultation (Heart Sounds)	:		
Respiratory System	:		
Inspection	:	Respiratory Rate	
Palpation:	:		
Percussion	:		
Auscultation (Breath Sounds)	:		
Examination of Abdomen	:		
Inspection	:		
Palpation	:		
Auscultation (Bowel Sounds)	:		
Any Other	:		
Clinical Impression			

Signature of the examining doctor

	POWER SECTOR **HSE INDUCTION TRAINING**	FORMAT NO: HSEP:14-F03 REV NO.: 00 PAGE NO. 01 OF 01

Name of Site :	
Name of Sub-Contractor :	
Date :	
Name of Training Co-ordinator	

Sl No.	**Name**	**Designation**	**Organisation**	**Signature**

Signature of Training co-ordinator :

	POWER SECTOR	FORMAT NO: HSEP:14-F04 REV NO.: 00 PAGE NO. 01 OF 01
	TOOL-BOX TALK	

Name of Site :	
Sub-Contractors Name :	
Date :	

Topic	**Name of person delivered Tool Box Talk**	**No. of Participants attended**	**Remarks**

Signature of Site I/C of Subcontractor :

	POWER SECTOR **PERSONAL PROTECTIVE EQUIPMENTS**	FORMAT NO: HSEP:14-F06 REV NO.: 00 PAGE NO. 01 OF 01

Name of Site :	
Name of Sub-Contractor :	
Inspected by :	
Date of Inspection :	

Item	**Issued this Month**	**Nos. Issued up to the Month**	**Percentage of usage at site**
Safety Helmet			
Safety Shoes			
Full Body Harness			
Fall Arrestor			
Safety Nets			
Other PPEs.			

Signature of Site I/C of Subcontractor :

	POWER SECTOR **INSPECTION OF T&Ps**	FORMAT NO: HSEP:14-F07 REV NO.: 00 PAGE NO. 01 OF 01

Name of Site :	
Name of Sub-Contractor :	
Date of Inspection :	

Sl.No.	Description	Remarks	
1.0	Name of equipment		
2.0	Basic Information of equipment		
2.1	Specification		
2.2	Sr. No. of equipment		
2.3	Make		
2.4	Year of manufacture		
3.0	Major repairs / overhauls(Furnish details of work carried out)		Date(s) of major repair/overhaul
3.1			
3.2			
3.3	Repairs carried out at site		
4.0	Any performance test conducted	Yes/No	
5.0	Document Submitted	Yes/No	
6.0	Manufacturer's test / guarantee certificate	Available/ Not available	
7.0	Performance test	Done/ Not Done	
8.0	Acceptance Norms		
9.0	Committee Observations		
10.0	Date of next review (if accepted)		

Signature-Site Safety Officer (BHEL)	**Signature-Subcontractor/ Subcontractor's Safety Officer**

	POWER SECTOR **STATUS OF T&Ps**	FORMAT NO: HSEP:14-F08 REV NO.: 00 PAGE NO. 01 OF 01

Name of Site	
Name of Sub-Contractor	
Date of Inspection	

Item	**Nos. Deployed**	**Identification No.**	**Nos. Tested by competent person**	**Validity of Test Certificate**
Winches				
Chain Blocks				
Wire Rope Slings				
Man Cages				
D-Shackles				
Air Compressors				
Crawler Cranes				
Mobile Cranes				
Hydra Cranes				
Others				

Signature of Site I/C of subcontractor:

	POWER SECTOR **INSPECTION OF CRANES AND WINCHES**	FORMAT NO: HSEP:14-F09 REV NO.: 00 PAGE NO. 01 OF 03

Name of Site :	
Name of Sub-Contractor :	
Inspected by :	
Date of Inspection:	

Crane Reg. No (Make/Model) _____

Name of Driver/Operator _____

Sl.no.	Description	Observation	Measures
1	Valid Driving license		
2	Hook & Hook Latch		
3	Over Hoist limit switch		
4	Boom limit switch		
5	Boom Angle Indicator		
6	Boom limit cutoff switch		
7	Condition of Boom		
8	Condition of ropes		
9	Number of load lines		
10	Size and condition of the slings		
11	Stability of the cranes		
12	Soil Condition		
13	Swing Break And Lock		
14	Proper Break And Lock		
15	Hoist Break And Lock		
16	Boom Break And Lock		
17	Main Clutch		
18	Leakage in Hydraulic Cylinders		
19	Out riggers filly extendable		
20	Tyre pressure		
21	Condition of Battery And Lamps		

Sl.no.	Description	Observation	Measures
22	Guards of moving and rotating parts		
23	Load chart provided		
24	Number and position of pedant ropes		
25	Reverse Horn		
26	Load Test Details		
27	Operator's fitness		
28	Pollution under control certificate		
29	Fire extinguisher of appropriate type.		
30	Training of the operator		

WINCH

Sl. No.	Description	YES	NO	NA	Remarks
1	Has the copy of Third Party Inspection certificate been provided in winch machine shed?				
2	Is winch machine operator experienced enough to operate the winch machine?				
3	Is the winch machine operated by someone other than the winch machine operator?				
4	Is there guard provided in all moving parts like wheel and motor's shaft?				
5	Will it protect against unforeseen operational contingencies?				
6	Are brakes, clutch and locking arrangement working properly?				
7	Has it been ensured that the guard does not constitute a hazard by itself?				
8	Are the cranks and the connecting rods protected by guardrails?				
9	Is there provision for fully covered shed with wooden plank roof?				

Sl. No.	Description	YES	NO	NA	Remarks
10	Is wire rope free from any kind of damage or wear and tear?				
11	Is split pin provided for the protection of clutch and brake locking arrangement?				
12	Is pulley inspected by competent person and certified before use?				
13	Is pulley free from any wear and tear visually?				
14	Is winch rope barricaded with clipsheet for the protection of rope and person?				
15	Is the wire rope lubricated by cardium oil?				
16	Is there any friction in wire rope which may damage the wire rope rather than the rolling parts?				
17	Is there any oil leakage in the hydraulic system of the winch machine?				
18	Has it been ensured that the guard will not cause discomfort or inconvenience to operator?				
	Total Number of NO:				
	Total Number of NA:				
	% Compliance :				

Signature of Site I/C of subcontractor :

	POWER SECTOR	FORMAT NO: HSEP:14-F10 REV NO.: 00 PAGE NO. 01 OF 02
	INSPECTION OF HEIGHT WORKING	

Name of Site :	
Name of Sub-Contractor :	
Inspected by :	
Date of Inspection:	

Sl. No.	**Descriptions**	**Observation (Yes/No)**	**Remarks**
1	All the workers have been explained safe work method?		
2	An established communication system has been established and explained to the workers.		
3	Adequate illumination has been ensured.		
4	Work area inspected prior to the start of the work.		
5	Area below the work place barricaded, particularly below hot work.		
6	Workers provided with bags /box to carry bolts, nuts and hand tools		
7	Arrangement for fastening hand tools made.		
8	All work platforms ensured to be of adequate strength and ergonomically suitable.		
9	Fabricated makeshift arrangements are checked for quality and type of material welding, anchoring etc.		
10.	Work at more than one elevation at the same segment is restricted.		
	ACCESS/EGRESS		
1	Walkways provided with handrail, mid-rail and toe guard?		
2	All checkered plates, gratings properly welded/ bolted?		
3	Are ladders inspected and they are in good condition?		
4	Are ladders spliced?		
5	Are ladders properly secured to prevent slipping, sliding or falling?		
6	Do side rails extend 36” above top landing?		
7	Are built up ladders constructed of sound materials?		

Sl. No.	Descriptions	Observation (Yes/No)	Remarks
8	Are rugs and cleats not over 12” on center?		
9	Metal ladders not used around electrical hazards.		
10	Proper maintenance and storage.		
11	Ladders placed at right slope.		
12	Ladders / staircases welded/ bolted properly.		
13	Any obstruction in the stairs.		
14	Are landing provided with handrails, knee rails, toe boards etc.?		
15	Whether ramp is provided with proper slope.		
16	Proper hand rails / guards provided in ramps.		
	Housekeeping		
1	Walkways, aisles & all overhead workplaces cleared of loose material.		
2	Flammable materials, if any, are cleared.		
3	All the de shuttering materials are removed after de shuttering is done.		
4	Platforms and walkways free from oil/grease or other slippery material.		
5	Collected scrap are brought down or lowered down and not dropped from height.		
	PPE And Safety Devices		
1	Use of safety helmet, safety belts ensured for all workers		
2	Anchoring points provided at all places of work.		
3	Common lifeline provided wherever linear movement at height is required.		
4	Safety nets are use wherever required.		
5	Proper fall arrest system is deployed at critical workplaces.		
6	Crawler boards/Safety system or works on fragile roof are used.		

Signature of Site I/C of subcontractor :

	POWER SECTOR **INSPECTION OF WELDING AND GAS CUTTING**	FORMAT NO: HSEP:14-F11 REV NO.: 00 PAGE NO. 1 OF 02

Name of Site	
Name of Sub-Contractor	
Inspected by	
Date of Inspection	

Welding				
Sl.no.	Description	Yes	No	Remarks
1	Is electric connection given through 30 mA ELCB/RCCB to welding m/c?			
2	Is electric cable fitted properly in junction box on m/c?			
3	Is electrical cable free from joints?			
4	Are the joints attached firmly & insulated with tape?			
5	Is double earthing given to body of m/c?			
6	Is the physical condition of the m/c good?			
7	Is ON/OFF switch connected to the m/c is working and in good condition?			
8	Are indication lamps on m/c working?			
9	Is the electrode holder in good condition?			
10	Are the cables of the welding m/c lugged & tight properly?			
11	Are return lead connected properly (Rod, Angle, Channels shall not be used)			
	Total No of NO			
	Total No of YES			

	POWER SECTOR **INSPECTION OF WELDING AND GAS CUTTING**	FORMAT NO: HSEP:14-F11 REV NO.: 00 PAGE NO. 2 OF 02

Gas Cutting				
Sl. no	Description	Yes	No	Remarks
1	Are Cylinders kept on trolleys?			
2	Physical condition of Gas cylinders Good?			
3	Is there Oil/Grease on valve of the cylinder?			
4	Are pressure regulators in good condition?			
5	Condition of hose pipe OK?			
6	Are hose pipe clamped with hose clip?			
7	Is flash back arrestor & NRV fitted on torch both for O2 and LPG cylinder?			
8	Is nozzle of the torch cleaned?			
	Total Number of NO			
	Total No of YES			
	% Compliance			

Signature of Site I/C of subcontractor :

	POWER SECTOR **INSPECTION OF ELECTRICAL INSTALLATION**	FORMAT NO: HSEP:14-F12 REV NO.: 00 PAGE NO. 01 OF 02

Name of Site	
Name of Sub-Contractor	
Inspected by	
Date of Inspection:	

Sr. No.	**Contents**	**Yes/No**	**Remarks**
A	**Cable**		
1.	Whether the condition of cable is checked?		
2.	Are cables received from other sites checked for insulation resistance before putting them into use?		
3.	Are all main cables taken either underground / overhead?		
4.	Are welding cables routed properly above the ground?		
5.	Are welding and electrical cables overlapping?		
6.	Is any improper joining of cables/wires prevailing at site?		
B	**DBs/SDBs**		
1.	Is earth conductor continued up to DB / SDB?		
2.	Whether DBs and extension boards are protected from rain / water?		
3.	Is there any overloading of DBs / SDBs?		
4.	Are correct / proper fuses & CBs provided at main boards and sub-boards?		
5.	Is energized wiring in junction boxes, CB panels & similar places covered all times?		
C	**ELCB**		
1.	Whether the connections are routed through ELCB?		
2.	Is ELCB sensitivity maintained at 30 mA?		

Sr. No.	Contents	Yes/No	Remarks
3.	Are the ELCB numbered and tested periodically & test results recorded in a logbook countersigned by a competent person?		
D	**Grounding**		
1.	Is natural earthing ensured at the source of power (main DB at Generator or Transformer)?		
2.	Whether the continuity and tightness of the earth conductor are checked?		
3.	Mention the gauge of the earth conductor used at the site.		
4.	Mention the value of Earth Resistance.		
E	**Electrically operated Machines or Accessories**.		
1.	Whether the plug top is provided everywhere.		
2.	Are all metal parts of electrical equipment and light fittings / accessories grounded?		
3.	Is there any shed or cover for welding machines?		
4.	Are halogen lamps fixed at proper places?		
5.	Are portable power tools maintained as per norms?		
6.	Any other information:		

Signature of Site I/C of subcontractor :

	POWER SECTOR **INSPECTION OF ELEVATOR**	FORMAT NO: HSEP:14-F13 REV NO.: 00 PAGE NO. 01 OF 01

Name of Site	
Name of Sub-Contractor	
Inspected by	
Date of Inspection	

Sr. No.	**Description**	**Remarks**	
1.0	Name of equipment		
2.0	Basic Information of equipment		
2.1	Specification		
2.2	Sr. No. of equipment		
2.3	Make		
2.4	Year of manufacture		
3.0	Major repairs/overhauls(Furnish details of work carried out)		Date(s) of major repair/overhaul
3.1			
3.2			
3.3	Repairs carried out at site		
4.0	Any performance test conducted	Yes/No	
5.0	Document Submitted	Yes/No	
6.0	Manufacturer's test / guarantee certificate	Available/ Not available	
7.0	Performance test	Done/ Not Done	
8.0	Acceptance Norms		
9.0	Committee Observations		
10.0	Date of next review (if accepted)		

Signature-Subcontractor/ Subcontractor's Safety Officer	**Signature-Site Safety Officer (BHEL)**

	POWER SECTOR **Inspection of Excavation**	FORMAT NO: **HSEP:14-F13E** REV NO.: 00 PAGE NO. 01 OF 01

Name of Site :	
Name of Sub-Contractor :	
Inspected by :	
Date of Inspection :	

Sl.no.	Description	Yes	No	Remarks
1	Precautions taken for Underground Electrical Cable			
2	Precautions taken for Under / Above ground sewer/ Drinking Water Line			
3	Precautions taken for Underground Telecommunication Line			
4	Precautions taken for Underground Product/Utility Line			
5	Precautions taken for Underground Fire Water Line			
6	Shoring / Shuttering / Sheet piling done to prevent collapse of excavation walls. Strength of Excavation wall ensured at all times			
7	Slope Cutting / Angle Maintained			
8	Hard Barricading & Edge Protection provided			
9	Separate Safe Access for Man and Vehicle			
10	Lighting arrangement			
11	Banksman Provided			
12	Required basic PPEs provided			
13	Excavated soil / Construction Material / equipment kept away from the edge.			
14	First aid in attendance.			
15	Other:			
	Total No of YES			

Signature-Subcontractor/ Subcontractor's Safety Officer **Signature-Site Safety Officer (BHEL)**

Sub: MEMO for Penalty for non-compliances in Safety

Following lapse (tick marked) was observed and penalty is imposed as stated at the bottom of this memo. It is requested that such occurrences be please avoided in future.

Safety Area

SN	Violation of Safety Norms	Fine (in Rs)
01	Not Wearing Safety Helmet	200/- *
02.	Not wearing Safety Belt or not anchoring life line	500/-*
03	Not wearing safety shoe	200/-*
04	Not keeping gas cylinders vertically	200/-
05	Not using flash back arrestors	100/-
06	Not wearing gloves	50/- *
07.	Grinding Without Goggles	50/- *
08.	Not using 24 V Supply For Internal Work	500/-
09.	Electrical Plugs Not used for hand Machine	100/-
10.	Not Slinging properly	200/-
11.	Using Damaged Sling	200/-
12.	Lifting Cylinders Without Cage	500/-
13.	Not Using Proper Welding Cable With Lot of Joints And Not Insulated Property.	200/-
14.	Not Removing Small Scrap From Platforms	500/-
15.	Gas Cutting Without Taking Proper Precaution or Not Using Sheet Below Gas Cutting	500/-
16.	Not Maintaining Electric Winches Which are Operated Dangerously	500/-
17.	Improper Earthing Of Electrical T&P	500/-
18	No or improper barricading	500/-
19.	Activity carried out without Safety work permit (Height work, Lifting activity, Hot work-each person/case)	1000/-
20.	Incident Resulting in Partial Loss in Earning Capacity	25,000/- per victim
21.	Fatal Incident Resulting in total loss in Earning Capacity	1,00,000/- per victim for first instance #

Legend: -

*: per head. For repeated violation by the same person, the penalty would be double of the previous penalty. Date of "Repeated violation" will be counted from subsequent days.

#: or as deducted by customer, whichever is higher. For repeated fatal incident in the same Unit incremental penalty to be imposed. The subcontractor will pay 2 times the penalty compared to previously paid in case there are repeated cases of fatal incidents under the same subcontractor for the same package in the same unit.

Details (if any) related to non- compliance (Name of persons, Nature of deficiency, etc.)

_____

Penalty imposed:

1, Rate as per above chart_____

2. No. of Persons/ machine/ event/ labour _____

3. Total Penalty= 1. X 2. =_____

Signature:

Witnessed by: (Sub- Contractor representative) (BHEL Personnel)

Name_____ Name_____

Distribution: 1 Copy: to Sub- contractor,
1 Copy to Site Construction Manager (BHEL)

बी एच ई एल BHEL	**POWER SECTOR- HQ** **Incident Report** (To be submitted within 24 hours of time of incident)	FORMAT NO: HSEP:14-F15 REV NO.: 00 PAGE NO. 01 OF 01

Type of incident: Fatal/Major/ Minor/Fire/Property Damage/Near-miss

1	NAME OF SITE		3	ACTIVITY AREA	
2	SCOPE OF WORK		4	NAME OF CONTRACTOR	
			5	NAME & DESIGNATION OF BHEL ACTIVITY I/C	
6	DATE & TIME OF ACCIDENT		7	DATE RESUMED	
8	NO. OF WORK-DAYS LOST BY VICTIM (If duty not resumed, give estimated figure)				
9	NO. OF MANHOURS LOST BY OTHERS				
10	PERSONAL DETAILS OF INJURED AND / OR DETAILS OF MATERIALS / EQUIPMENT / PROPERTY DAMAGED				

NAME				NAME OF MATERIAL / EQUIPMENT / PROPERTY	
PERIOD OF EMPLOYMENT					
AGE	YRS	SEX	MALE/ FEMALE	ESTIMATED COST	ACTUAL COST
MARITAL STATUS		SINGLE / MARRIED			
OCCUPATION				NATURE OF DAMAGE	
PART OF BODY INJURED					
NATURE OF INJURY					
AGENCY (OBJECT / EQUIPMENT / SUBSTANCE) MOST RESPONSIBLE FOR CAUSING ACCIDENT / INJURY / DAMAGE					
12	PERSON (NAME & DESIGNATION) WITH MOST CONTROL OVER AGENCY (OBJECT / EQUIPMENT / SUBSTANCE) CAUSING ACCIDENT INJURY / DAMAGE				
13	DESCRIBE CLEARLY HOW THE ACCIDENT OCCURRED (USE ADDITIONAL SHEET, IF REQUIRED				
ANALYSIS					
14	WHAT ACTS AND / OR CONDITIONS CONTRIBUTED MOST DIRECTLY TO THIS ACCIDENT				
15	WHAT ARE THE BASIC REASON FOR THE EXISTENCE OF THESE ACTS AND / OR CONDITION ?				
16	WHAT CORRECTIVE ACTIONS HAVE BEEN TAKEN TO PREVENT ACCIDENT RECURRENCE ?				
	DATE :			SIGNATURE OF SITE HSE COORDINATOR	
17	COMMENTS OF HEAD / SOX				
	DATE:			SIGNATURE OF HEAD/SOX	

	POWER SECTOR **Format for Monthly HSE Planning & Review**	FORMAT NO: **HSEP:14-F30** REV NO.: 00 PAGE NO. 01 OF 3

Note: This is a template and can be modified in consultation with BHEL			
Name of the Site		**Name of the Subcontractor**	
Scope of Work		**Date**	
PART- A: PLAN OF HSE ACTIVITIES FOR THE MONTH OF……			**PART-B: REVIEW ON ……**
SN.	**Description of HSE Activity & Formats**	**Plan & Targets for the month**	**Review**
1	Availability of First Aid Box at Required Places and Inspection thereof as per Format: F01	Areas 1. … …	
2	Health check-up as per Format: F02	Health check-up for Nos 1. New inductees 2. Drivers & Operators 3. Workers in following high risk areas: a. …	
3	Induction training of newly joined workers as per Format: F03	Minimum No. of workers:	
4	Toolbox talks (TBT) conducted before start of work as per Format: F04	Locations of TBTs & No. of workers **1.** …	
5	PPE usage and issue as per Format: F06		
6	Inspection of T&Ps as per Format: F07	List of T&Ps to be inspected 1.	
7	Identification & Inspection Status of T&Ps as per Format: F08		
8	Inspection of Cranes & Winches as per Format: F09	List of Cranes & Winches & Nos. 1. …	
9	Inspection of Height Working as per Format: F10	Areas: 1. …	
10	Inspection of Welding & Gas Cutting operations as per Format: F11	Areas: 1. …	
11	Inspection of Electrical Installations as per Format: F12	Locations: 1. …	
12	Inspection of Elevators (as applicable) as per Format: F13	Locations: 1. …	
13	Inspection of Excavation as per Format: F13E	**Locations:** **1. …**	

SN.	Description of HSE Activity & Formats	Plan & Targets for the month	Review
14	Job Safety Analysis as per Format F32B	**Activities:** **1. …**	
15	Regular Job Specific Training (Re-training) for workers involved in hazardous activities	Topics/ Hazards & No. of workers **1.** …	
16	Mass housekeeping (HK) drive in work areas	Areas **1.** …	
17	Vertigo Test of Height workers	Minimum No. of workers:	
18	Deployment of qualified HSE Officers as per contract	Location(s) & Nos. **1.** …	
19	Deployment of qualified HSE Stewards as per contract	Location(s) & Nos. **1.** …	
20	Deployment of Safety tools & Equipment (Safety Nets, Lifelines, Fall arrestors, Man-cages, flashback arrestors, scaffolding etc.)	Tool/ Equipment & Location **1.** …	
21	Safety Walks by site in charge of agency (4 -Weekly once)	Dates:	
22	Safety walks by departmental head (8-Weekly twice)	Dates:	
23	Availability/ deployment of Safety posters/ placards/ signage at strategic locations	Locations: Nos. **1.** …	
24	Provision of clean drinking water sources for workers	Locations: Nos. **1.** …	
25	Provision of toilets for workers (separate for male & female workers)	Locations: Nos. **1.** …	
26	Rest sheds for workers during lunchtime, rain, dust storm etc.	Locations: Nos. **1.** …	
27	Availability of following in Labor colony	**1. Clean drinking water** **2. Toilets** **3. Cleanliness & Hygiene** **4. Grass cutting,** **5. Fogging** **6. Electrical Inspection …**	

SN.	Description of HSE Activity & Formats	Plan & Targets for the month	Review
28	Availability of dust/ waste bins at various locations	Locations: **1.** …	
29	Availability of Ambulance (individual/ joint) in each shift	Ambulance No.	
30	Availability of emergency vehicle in each shift	Emergency vehicle	
31	Deployment/ Availability of tested Fire Extinguishers	Locations & Nos. **1.** …	
32	Tree plantation	Locations & Nos. **1.** …	
33	Waste disposal & Scrap Bins	Locations **1.** …	
34	Illumination checks	Locations **1.** …	
35	Safety award function: 1. Display of good practices Award presentation	Minimum 1 per month	
36	**Submission of Daily Reports as per Format No.F31A**	**Daily Reports (Night & Day Shifts)**	

PLAN		**REVIEW**	
Agency Name: Sign: Date:	**BHEL** Name: Sign: Date:	**Agency** Name: Sign: Date:	**BHEL** Name: Sign: Date:

	POWER SECTOR	FORMAT NO: **HSEP:14-F31** A REV NO.: 00 PAGE NO. 01 OF 1
	Format for Daily HSE Reporting	

Note: Following format to be submitted (preferably) in excel/ soft copy by subcontractor daily at the end of each shift. Any photographs/ records to be attached

Site									**Subcontractor**																		
Year							**Month**													**Day**							
SHIFT	Submitted By	Work Area(s)	Staff	Man-Power	Safety Officers	Safety Stewards	Tool Box (Topics and No. of Participants)	Induction Training (No. of Participants)	Vertigo Test (Numbers Tested)	On-the-Job Training (Topic & participants)	Work Permits	Job Safety Analyses conducted	Height Work Inspection	Other Hazardous Activities Inspection	T&P Inspection (Names & Nos. Inspected)	Safety Walk (Designation, Areas)	HSE Meeting	Safety Reward (Details)	Housekeeping/ Dust Suppression/ Tree Plantation Activities (Locations/Details)	Lost time Accident	Restricted Work Case	Medical Treatment Case	First Aid Case	Near miss	Property Damage/ Fire	Non-Compliances Submitted by BHEL	Complied by Agency	Any other Remarks/ Inputs
Day																											
Night															NA		NA	NA	NA								

	POWER SECTOR **Job Safety Analysis Format**	FORMAT NO: **HSEP:14-F32B** REV NO.: 00 PAGE NO. 01 OF 1

Name of the Site	
Name of the Subcontractor	
Activity, Area	

HAZARDS	**PRECAUTIONS**

(Name)	**Submitted By (Agency HSE)**		**Reviewed By (BHEL Execution)**		**Approved By (BHEL HSE)**	
(Sign)						
(Date)						

SL	Parameter for Measurement	M/ O	Wt	Supporting Documents
1a	Induction training for new workers conducted through audio-visual medium & documented ?	M	1	Induction Training Records
1b	Tool box talk conducted regularly as per plan, and documented?	M	1	Toolbox Talk Records
1c	Contractor in charge and safety in charge attended safety meetings?	M	2	Minutes of Meeting
1d	Whether observations in safety meetings are complied before next meeting?	M	2	-do-
1e	Preparation and submission of Monthly HSE report within stipulated time	M	1	Report submission date
1f	Preparation and submission of Incident/near-miss report and RCA Report (as applicable) within stipulated time	M	1	Incident/ Near Miss Records
1g	Carrying out Inspections and submission of Inspection reports within stipulated time	M	1	Inspection Records
1h	Regular Job Specific Training ensured for High Risk Workers (through audio-visual medium) as per plan	M	1	Training & Attendance Records
2a	Whether the contractor is registered under BOCW	M	2	BOCW Registration Certificate
2b	Availability of Qualified safety officer (1 for every 500 labour)	M	2	Safety Officer qualification & experience records
2c	Availability of Qualified safety supervisor (1 for every 100 labour)	M	2	Safety Officer qualification & experience records
2d	All the workers are provided and using safety helmets and safety shoes/gum boots	M	2	PPE Issue Records, Inspection/ non-conformity records
2e	Housekeeping done on regular basis and scrap removal at site	M	1	Housekeeping records, Inspection/ non-conformity records
2f	Usage of Goggles/Face shields and Hand gloves for gas cutter and grinders		1	PPE Issue Records, Inspection/ non-conformity records
2g	Wall openings & floor openings are guarded?		1	Inspection/ non-conformity records
2h	Adequate illumination provided in all working area?		1	Inspection/ non-conformity records
2i	Safety posters, sign boards and emergency contact numbers in all prominent location are displayed?		1	Inspection/ non-conformity records
2j	Availability of automatic reverse horns, Main horn, hook latches for Vehicles, mobile cranes, Hydras		1	Inspection/ non-conformity records
2k	Ban of carrying mobile phones to work place is implemented for workers		1	Inspection/ non-conformity records
2l	Availability of Tags & Inspection Certificates for Cranes of all capacities		1	Master T&P List with internal & external test details
2l.2	Availability of Tags & Inspection Certificates for Winches of all capacities		1	Master T&P List with internal & external test details
2l.3	Availability of Tags & Inspection Certificates, color coding for Chain pulley blocks		1	Master T&P List with internal & external test details
2l.4	Availability of Tags & Inspection Certificates for Vehicles - Trailers, Dozers, Dumpers, Excavators. Mixers etc.		1	Master T&P List with internal & external test details
2l.5	Availability of Tags & Inspection Certificates for Welding machines, grinders, Drilling machines, etc.		1	Master T&P List with internal & external test details
2l.6	Availability of Tags & Inspection Certificates, colour coding for Wire rope slings etc.		1	Master T&P List with internal & external test details
2l.7	Availability of Tags & Inspection Certificates for Batching plants		1	Master T&P List with internal & external test details

SL	Parameter for Measurement	M/ O	Wt	Supporting Documents
2m.1	Use of Lifting Permit as per requirement		1	Permit Records
2m.2	Use of Height Permit as per requirement		1	Permit Records
2m.3	Use of Hot Work Permit as per requirement		1	Permit Records
2m.4	Use of Excavation permit as per requirement		1	Permit Records
2m.5	Use of Confined space work permit as per requirement		1	Permit Records
2m.6	Use of Grating removal and safety net removal permit as per requirement		1	Permit Records
2m.7	Use of Lockout-Tag out permit as per requirement		1	Permit Records
2m.8	Use of Radiography permit as per requirement		1	Permit Records
2m.9	Use of Night/ Holiday Work Permit as per requirement		1	Permit Records
2m.10	Use of Any other Applicable Permit as per requirement		1	Permit Records
3a	Material safety data sheet(MSDS) available for all chemicals and displayed in usage and storage area?		1	Inspection/ non-conformity records
3b	Spillages of oil/concrete and other chemical is controlled and cleaned by proper method in case of spill?		1	Inspection/ non-conformity records
3c	Availability of adequate number of urinals in workplace and in elevations and maintained	M	1	
3d	Availability of rest rooms for workers at site	M	1	
3e	Availability of Drinking water facility at work spot		1	
3f	Hygienic Labour colony is provided for workers.		1	
4a	Is heavy/complex critical lifting permit obtained for heavy, complex materials before handling/erection activity?		1	Work Permit records
4b	Whether area below lifting activities barricaded		1	Inspection/ non-conformity records
4c	Availability of experienced rigging foreman		1	Experience details of rigging foreman
4d	Is agency is following proper storage and handling procedure as per manufacturer standard for all hazardous material?		1	Procedure for storage & handling
4e	Are oxygen and acetylene cylinders are transported to work place from storage area in trolleys		1	
5a	Whether all deep excavation has been protected by barrier		1	Inspection/ non-conformity records
5b	Sloping/benching & shoring provided for excavation as per requirement?		1	-do-
5c	Proper access and egress provided for excavations?		1	-do-
5d	Blasting is done in controlled manner?		2	-do-
6a	Whether Electrical booth is equipped with Co_2 fire extinguishers and fire buckets filled with sand?		2	Inspection/ non-conformity records
6b	Availability of Illumination lamp in electric booth?		1	-do-
6c	whether Caution Boards have been displayed?		1	-do-
6d	Usage of Metal Plug top for all hand power tools ?		1	-do-
6e	Usage of Insulated welding cables.		1	-do-
6f	Electrical Booth/Distribution Board to be covered by proper Canopy.		1	-do-
6g	Availability of functional & individual 30ma ELCB / RCCB and MCB for protection and conducting periodical check-up?		1	-do-
6h	Double earthing for panel boards and all machinery & proper earth pit with regular inspection available?		1	-do-
6i	Whether Electrician is qualified and experienced		1	Qualification & Experience records of electrician
6j	Availability and usage of Rubber hand gloves by electrician?		1	Inspection/ non-conformity records

SL	Parameter for Measurement	M/ O	Wt	Supporting Documents
7a	Whether Scaffolding pipes made with steel or aluminum, are being used and checked periodically by experienced/ certified scaffolder?		2	Inspection/ non-conformity records
7b	8mm Stainless Steel wire rope with plastic cladding is provided for life line (Vertical / Horizontal) during height work?		2	-do-
7c	Availability of emergency lighting in case of power failure		1	-do-
7d	Whether all the openings are covered with Safety Nets made of fire proof Nylon?		1	-do-
7e	Whether MS pipe rails around staircases & platforms in usage are provided with top, middle rails and toe guard ?		1	-do-
7f	Whether Ladder with vertical life line /Fall arrestor is available to climb?		1	-do-
7g	Whether all workers deployed for working at height have been issued height pass after undergoing vertigo test?		1	Height Pass records
7h	Whether all workers deployed for height work / climbing ladder are provided and using Double lanyard safety belt?		1	PPE Issue records, inspection/ non-conformity reports
7i	Is all hand tools/Small material used by height workers is tied firmly to prevent fall?		1	-do-
8a	Flash back arrestors for all gas cutting sets is available on Torch side and cylinder side		1	Inspection/ non-conformity records
8b	Oxygen/Acetylene/LPG cylinders not in use have caps in place and stored separately?		1	-do-
8c	Availability of Face screen, Hand gloves, and Apron, for welders		1	-do-
8d	Protection from falling hot molten metal during metal cutting / welding at height by providing GI sheet below the cutting area especially in fire prone areas		1	-do-
9a	Pre-employment medical check-up done for all workers and submitted?		1	Medical check records
9b	Availability of first aid center, with MBBS doctor(Own or Sharing basis)	**M**	2	Attendance records
9c	Availability of Ambulance facility 24 hours (Own or sharing basis)	**M**	2	-do-
9d	Is First aid trained personnel's are available and their names are displayed at site?	**M**	1	-do-
9e	Availability of Emergency vehicle at site		1	
9f	Periodical medical check-up is conducted for all the workers and submitted?		1	Medical check records
9g	Availability of sufficient number of first aid box as per standard list and maintaining record		1	Inspection records
10a	Availability of Fire extinguishers, buckets at all vulnerable points		2	Fire extinguisher records
10b	Periodic fire mock drill conducted?		1	Fire, Mock drill records
10c	Are all flammable materials are stored separately?		1	
10d	Periodic grass cutting is done in material storage area?		1	
10e	Availability of 24V DC lighting in confined space work area		1	
10f	Availability of exhaust fan in confined space work area		1	

Note:

- **M: Mandatory; O: Optional**. Points other than mandatory can be excluded with appropriate justification (scope etc.) by BHEL
- Additionally: 30 Marks for each Fatal Accident and 10 mark for each major accident shall be deducted.

SAFETY WORK CLEARANCE	Permit no.
Project:	Emergency Contact Nos:
Subcontractor:	

BURNING/WELDING /HOT WORK PERMIT

Area :_____ Date:_____ Time:_____

Name of Site Engineer (Permit Requesting Authority):_____ Sign:_____

Name of Work Performing Contractor: _____

Name of Package In charge:_____ Sign:_____ Date:_____

Description of Work: _____

_____

Work Execution Date:_____ Time Valid from:_____ to _____

The above signing person(s) will be responsible to ensure that the above described work will be done under all the safety precautions mentioned on the permit to work.

The following precautions are to be taken:

No.	Item	Yes	Not required
1.	Proper Access/Exit available		
2.	Proper ventilation and /or lighting provided.		
3.	Proper and safe scaffolding, platform, ladder provided.		
4.	Welding machine located in a clean and dry area.		
5.	Welding machine grounded at the equipment and proper leakage current protection device (ELCB) provided for welding machine.		
6.	Emergency STOP buttons are in working condition. Welder /Helper knows how to operate it.		
7.	Welding machine input/output cables, welding holder and weld return clamp (Holder) are insulated and in good condition.		
8.	Welder & Fitter trained to connect ground/work return clamps (Holder) to work place prior to energization of welding machine.		
9.	Gas cylinders are stacked vertically and not below the welding / cutting area. Regulator key is available with cylinder.		
10.	Pressure gauges/Flash back arrestor provided and in working condition.		
11.	Personal Protective equipment Minimum applicable: safety helmet, safety goggles, welding helmet, safety shoes, leather gloves, long sleeve and nose mask -provided		
12.	In case of pits, water removed from the pit and wood/rubber insulation provided.		
13.	Safety signboards are in place.		
14.	Adequate and Suitable nos. of fire fighting extinguisher provided.		
15.	Nearby combustible material removed. Housekeeping done.		
16.	Other		

Name of Contractor Safety Officer:_____ Sign:_____ Date:_____ Time: _____

Reviewed and approved by BHEL Site Engineer (Permit Issuing Authority):

Name:_____ Sign:_____ Date:_____ Time:_____

Name of BHEL Safety Representative:_____ Sign: _____

I understand the precaution to be taken as described above and as per project requirement and hereby confirm that work will be executed under my supervision by following all precaution and Safety Rules.

Name of Work Performing Authority:_____ Sign:_____ Date:_____ Time:_____

Permit Cancellation:

I hereby declare that the work is complete, all workers under my control have been withdrawn and the site restored to safe tidy condition.

Name of Work performing Authority:_____ Sign:_____ Date:_____ Time:_____

Name of Site Engr. (Permit Requesting Authority):_____ Sign:_____ Date:_____ Time:_____

Name of BHEL Site Engr. (Permit Issuing Authority):_____ Sign:_____ Date:_____ Time: _____

(This permit is valid only for the date it is issued)

Original at BHEL site **Second Copy – BHEL SAFETY** **Third Copy : Contractor**

SAFETY WORK CLEARANCE	Permit no.
Project:	Emergency Contact Nos:
Subcontractor:	

LIFTING ACTIVITY PERMIT

Area :_____ Date:_____ Time:_____

Name of Site Engineer (Permit Requesting Authority):_____ Sign: Name of Work

Performing Contractor: _____

Name of Package In charge:_____ Sign:_____ Date:_____

Description of Work: _____

_____

Work Execution Date:_____ Time Valid from:_____ to _____

The above signing person(s) will be responsible to ensure that the above described work will be done under all the safety precautions mentioned on the permit to work.

The following precautions are to be taken:

No.	Item	Yes	Not required
1.	Crane used for lifting activity tested, certified and approved for rated lifting		
2.	All lifting tackles, gears/appliances are tested and certified for lifting works.		
3.	Crane operator is trained and competent for lifting operation.		
4.	Lifting sling/ belt is protected against sharp edge of the jobs to be lifted.		
5.	Access and exit marked and without obstruction.		
6.	Lifting arrangement adequate.		
7.	Unwanted rubbish material removed from work platform.		
8.	Minimum 2 guidelines have been provided for balancing and guiding jobs to be lifted.		
9.	Periphery area of crane booms as well as lifting job is barricaded and unauthorized/no-entry sign board posted.		
10.	Rigger and signal man is trained and competent for lifting work.		
11.	No lifting activity to be carried out during lightening, heavy wind/rain.		
12.	If scaffolding to be used during lift, scaffolding with valid tag available for use.		
13.	Double lanyards safety harness/belt checked an in working condition.		
14.	Safety shoes (non-slip), helmet with chin strap available with employees.		
15.	Others.		

Name of Contractor Safety Officer:_____ Sign:_____ Date:_____ Time: _____

Reviewed and approved by BHEL Site Engineer (Permit Issuing Authority):

Name:_____ Sign:_____ Date:_____ Time:_____

Name of BHEL Safety Representative:_____ Sign: _____

I understand the precaution to be taken as described above and as per project requirement and hereby confirm that work will be executed under my supervision by following all precaution and Safety Rules.

Name of Work Performing Authority:_____ Sign:_____ Date:_____ Time:_____

Permit Cancellation:

I hereby declare that the work is complete, all workers under my control have been withdrawn and the site restored to safe tidy condition.

Name of Work performing Authority:_____ Sign:_____ Date:_____ Time:_____

Name of Site Engr. (Permit Requesting Authority):_____ Sign:_____ Date:_____ Time:_____

Name of BHEL Site Engr. (Permit Issuing Authority):_____ Sign:_____ Date:_____ Time: _____

(This permit is valid only for the date it is issued)

Original at BHEL site **Second Copy – BHEL SAFETY** **Third Copy : Contractor**

SAFETY WORK CLEARANCE	Permit no.
Project:	Emergency Contact Nos:
Subcontractor:	

WORKING AT HEIGHT PERMIT

Area :_____ Date:_____ Time:_____

Name of Site Engineer (Permit Requesting Authority):_____ Sign: Name of Work

Performing Contractor: _____

Name of Package In charge:_____ Sign:_____ Date:_____

Description of Work: _____

_____

Work Execution Date:_____ Time Valid from:_____ to _____

The above signing person(s) will be responsible to ensure that the above described work will be done under all the safety precautions mentioned on the permit to work.

The following precautions are to be taken:

No.	Item	Yes	Not required
1.	All workers on job are medically fit for working at height (Person should not have vertigo)		
2.	Scaffolding with valid tag available for use		
3.	Safety harness with life line support/ fall arrester are checked and in working condition		
4.	Safety shoes (non-slip), Helmet with chin strip available with employees		
5.	Safety nets are provided as per design and provided 25 ft. below working area & extending 8 ft beyond.		
6.	Horizontal life lines are provided to cater to design specification of 2300kg per person.		
7.	Ladders have been inspected and provided as per BHEL standard/contract.		
8.	All lifting / tightening tools, hand tools/equipment checked and in good condition		
9.	Access and exit marked and without obstruction.		
10.	Lighting arrangement adequate.		
11.	Unwanted and rubbish material removed from working platform.		
12.	Electrical cable, welding Hose/Compressed air hose properly secured and lay down without obstruction.		
13.	Signboards provided on working platforms		
14.	Hazards in the vicinity are identified and communicated to the worker.		
15.	Other		

Name of Contractor Safety Officer:_____ Sign:_____ Date:_____ Time: _____

Reviewed and approved by BHEL Site Engineer (Permit Issuing Authority):

Name:_____ Sign:_____ Date:_____ Time:_____

Name of BHEL Safety Representative:_____ Sign: _____

I understand the precaution to be taken as described above and as per project requirement and hereby confirm that work will be executed under my supervision by following all precaution and Safety Rules.

Name of Work Performing Authority:_____ Sign:_____ Date:_____ Time:_____

Permit Cancellation:

I hereby declare that the work is complete, all workers under my control have been withdrawn and the site restored to safe tidy condition.

Name of Work performing Authority:_____ Sign:_____ Date:_____ Time:_____

Name of Site Engr. (Permit Requesting Authority):_____ Sign:_____ Date:_____ Time:_____

Name of BHEL Site Engr. (Permit Issuing Authority):_____ Sign:_____ Date:_____ Time: _____

(This permit is valid only for the date it is issued)

Original at BHEL site **Second Copy – BHEL SAFETY** **Third Copy : Contractor**


बी एच ई एल
BHEL

Form WAM 23

PROFORMA OF BANK GUARANTEE (in lieu of EARNEST MONEY if permissible under Works Policy)

(On non-Judicial paper of appropriate value)
(Para 4.7.6 of Works Accounts Manual)

Bank Guarantee No……
Date……

To
(Employer's Name and Address)
……..

Dear Sirs,

In accordance with the terms and conditions of Invitation for Bids/Notice Inviting Tender No……[1] (Tender Conditions), M/s. ……[2] having its registered office at ……[3] (hereinafter referred to as the 'Tenderer'), is submitting its bid for the work of……[4] invited by Bharat Heavy Electricals Limited (hereinafter referred to as the 'Employer' which expression shall unless repugnant to the context or meaning thereof, include its successors and permitted assigns) incorporated under the Companies Act, 1956 and having its registered office at *BHEL House, Siri Fort, Asiad, New Delhi – 110049* through its unit at *Bharat Heavy Electricals Limited, Power Sector Southern Region, Tek Towers, No.11, Old Mahabalipuram Road, Okkiyam Thoraipakkam, Chennai – 600097.*

The Tender Conditions provide that the Tenderer shall pay a sum of Rs ……[5] as Earnest Money Deposit in the form therein mentioned. The form of payment of Earnest Money Deposit includes Bank Guarantee executed by a Scheduled Bank.

In lieu of the stipulations contained in the aforesaid Tender Conditions that an irrevocable and unconditional Bank Guarantee against Earnest Money Deposit for an amount of .....[6] is required to be submitted by the Tenderer as a condition precedent for participation in the said Tender and the Tenderer having approached us for giving the said Guarantee,

we, the .....(Name & address of the Bank) ..... having our Head Office at ……..(hereinafter referred to as the Bank) being the Guarantor under this Guarantee, hereby irrevocably and unconditionally undertake to forthwith and immediately pay to the Employer without any demur, merely on your first demand any sum or sums of Rs.....[6] (in words Rupees.....) without any reservation, protest, and recourse and without the beneficiary needing to prove or demonstrate reasons for its such demand.

Any such demand made on the Bank shall be conclusive as regards the amount due and payable by the Bank under this guarantee. However, our liability under this guarantee shall be restricted to an amount not exceeding Rs. _____.[6]

We undertake to pay to the Employer any money so demanded notwithstanding any dispute or disputes raised by the Tenderer in any suit or proceeding pending before any Court or Tribunal, Arbitrator or any other authority, our liability under this present being absolute and unequivocal.

The payment so made by us under this Guarantee shall be a valid discharge of our liability for payment hereunder and the Tenderer shall have no claim against us for making such payment.

We …….. Bank further agree that the Employer shall have the fullest liberty without our consent and without affecting in any manner our obligations hereunder to vary any of the terms and conditions of the said Tender or to extend the time of submission of from time to time or to postpone

for any time or from time to time any of the powers exercisable by the Employer against the said Tenderer and we shall not be relieved from our liability by reason of any such variation, or extension being granted to the said Tenderer or for any forbearance, act or omission on the part of the Employer or any indulgence by the Employer to the said Tenderer or by any such matter or thing whatsoever which under the law relating to sureties would but for this provision have effect of so relieving us.

The Bank also agrees that the Employer at its option shall be entitled to enforce this Guarantee against the Bank as a principal debtor, in the first instance without proceeding against the Tenderer and notwithstanding any security or other guarantee that the Employer may have in relation to the Tenderer's liabilities.

This Guarantee shall be irrevocable and shall remain in force upto and including…….[7] and shall be extended from time to time for such period as may be desired by the Employer.

This Guarantee shall not be determined or affected by liquidation or winding up, dissolution or change of constitution or insolvency of the Tenderer but shall in all respects and for all purposes be binding and operative until payment of all money payable to the Employer in terms hereof. However, unless a demand or claim under this Guarantee is made on us in writing on or before the ……[8] we shall be discharged from all liabilities under this Guarantee.

We, …… Bank lastly undertake not to revoke this guarantee during its currency except with the previous consent of the Employer in writing.
Notwithstanding anything to the contrary contained hereinabove:

a) The liability of the Bank under this Guarantee shall not exceed……[6]
b) This Guarantee shall be valid up to ……[7]
c) Unless the Bank is served a written claim or demand on or before _____[8] all rights under this guarantee shall be forfeited and the Bank shall be relieved and discharged from all liabilities under this guarantee irrespective of whether or not the original bank guarantee is returned to the Bank

We, _____ Bank, have power to issue this Guarantee under law and the undersigned as a duly authorized person has full powers to sign this Guarantee on behalf of the Bank.

For and on behalf of
(Name of the Bank)

(Signature of Authorised signatory)

Date…….
Place of Issue…….

[1] Details of the Invitation to Bid/Notice Inviting Tender (Tender Ref. No. Eg. - BHEL PSSR SCT XXXX)
[2] Name of Tenderer
[3] REGISTERED Office Address of the Tenderer
[4] Details of the Work i.e Tender Description
[5] EMD Amount as mentioned in Notice Inviting Tender
[6] BG Amount in words and Figures (BG Amount shall be Minimum of EMD amount less Rs. 2 Lakhs)
[7] Validity Date
[8] Date of Expiry of Claim Period (Claim Period shall be minimum of 3 Months after the validity date of Bank Guarantee)

Note:
1. The BG should be on Non-Judicial Stamp paper/e-stamp paper of appropriate value as per Stamp Act prevailing in the State(s) where the BG is submitted or is to be acted upon or the rate prevailing in the State where the BG was executed, whichever is higher. The Stamp Paper/e-stamp paper shall be purchased in the name of Vendor/Contractor/Supplier /Bank issuing the guarantee.

2. In Case of Bank Guarantees submitted by Foreign Vendors-
   a. From Nationalized/Public Sector / Private Sector/ Foreign Banks (BG issued by Branches in India) can be accepted subject to the condition that the Bank Guarantee should be enforceable in the town/city or at nearest branch where the Unit is located i.e. Demand can be presented at the Branch located in the town/city or at nearest branch where the Unit is located.
   b. From Foreign Banks (wherein Foreign Vendors intend to provide BG from local branch of the Vendor Country's Bank)
      b.1 In such cases, in the Tender Enquiry/ Contract itself, it may be clearly specified that Bank Guarantee issued by any of the Consortium Banks only will be accepted by BHEL. As such, Foreign Vendor needs to make necessary arrangements for issuance of Counter- Guarantee by Foreign Bank in favour of the Indian Bank's (BHEL's Consortium Bank) branch in India. It is advisable that all charges for issuance of Bank Guarantee/ counter- Guarantee should be borne by the Foreign Vendor. The tender stipulation should clearly specify these requirements.
      b.2 In case, Foreign Vendors intend to provide BG from Overseas Branch of our Consortium Bank (e.g. if a BG is to be issued by SBI Frankfurt), the same is acceptable. However, the procedure at sl.no. b.1 will required to be followed.
      b.3 The BG issued may preferably be subject to Uniform Rules for Demand Guarantees (URDG) 758 (as amended from time to time).

PROFORMA OF BANK GUARANTEE (in lieu of SECURITY DEPOSIT)
(On non-Judicial paper of appropriate value)
(Para 4.7.6 of Works Accounts Manual)

Bank Guarantee No……
Date……

To
(Employer's Name and Address)
……..

In consideration of Bharat Heavy Electricals Limited (hereinafter referred to as the 'Employer' which expression shall unless repugnant to the context or meaning thereof, include its successors and permitted assigns) incorporated under the Companies Act, 1956 and having its registered office at *BHEL House, Siri Fort, Asiad, New Delhi – 110049* through its unit at *Bharat Heavy Electricals Limited, Power Sector Southern Region, Tek Towers, No.11, Old Mahabalipuram Road, Okkiyam Thoraipakkam, Chennai - 600097* having agreed to exempt _____[1] (Name of the Vendor / Contractor / Supplier) with its registered office at_____[2] (hereinafter called the said "Contractor" which term includes supplier), from demand under the terms and conditions of the Contract arising vide Letter of Intent (LOI) reference No._____ dated _____[3] valued at Rs. _____[4] (Rupees _____ only)[4] (hereinafter called the said Contract), of Security Deposit for the due fulfilment by the said Contractor of the terms and conditions contained in the said Contract, on production of a Bank Guarantee for Rs. _____[5] (Rupees _____ only),

We, the .....(Name & address of the Bank) ..... having our Head Office at ……..(hereinafter referred to as the Bank), at the request of _____ [Contractor(s)], being the Guarantor under this Guarantee, do hereby irrevocably and unconditionally undertake to forthwith and immediately pay to the Employer, an amount not exceeding Rs._____ without any demur, immediately on demand from the Employer and without any reservation, protest, and recourse and without the Employer needing to prove or demonstrate reasons for its such demand

Any such demand made on the bank, shall be conclusive as regards the amount due and payable by the Bank under this guarantee. However, our liability under this guarantee shall be restricted to an amount not exceeding Rs. _____[5].

We undertake to pay to the Employer any money so demanded notwithstanding any dispute or disputes raised by the Contractor(s) in any suit or proceeding pending before any Court or Tribunal or Arbitrator or any other authority, our liability under this present being absolute and unequivocal.

The payment so made by us under this guarantee shall be a valid discharge of our liability for payment hereunder and the Contractor(s) shall have no claim against us for making such payment.

We, further agree that the guarantee herein contained shall remain in full force and effect during the period that would be taken for the performance of the said Contract and that it shall continue to be enforceable till all the dues of the Employer under or by virtue of the said Contract have been fully paid and its claims satisfied & the Employer certifies that the terms and conditions of the said Contract have been fully and properly carried out by the said contractor(s) or acceptance of the final bill or discharge of this guarantee by the Employer, whichever is earlier. This guarantee shall initially remain in force upto and including _____[6] and shall be extended from time to time for such period as may

be desired by the Employer. Unless a demand or claim under this guarantee is made on us in writing on or before the _____[7], we shall be discharged from all the liability under this guarantee thereafter.

We, _____(indicate the name of the Bank) further agree with the Employer that the Employer shall have the fullest liberty without our consent and without affecting in any manner our obligations hereunder to vary any of the terms and conditions of the said Contract or to extend time of performance by the said contractor(s) from time to time or to postpone for any time or from time to time any of the powers exercisable by the Employer against the said contractor(s) and to forbear or enforce any of the terms and conditions relating to the said Contract and we shall not be relieved from our liability by any reason of any such variation or extension being granted to the said contractor(s) or for any forbearance, act or omission on the part of the Employer or any indulgence by the Employer to the said contractor(s) or by any such matter or thing whatsoever which under the law relating to sureties would but for this provision have effect of so relieving us.

The Bank also agrees that the Employer at its option shall be entitled to enforce this Guarantee against the Bank as a principal debtor, in the first instance without proceeding against the Contractor and notwithstanding any security or other guarantee that the Employer may have in relation to the Contractor's liabilities.

This Guarantee shall not be determined or affected by liquidation or winding up, dissolution or change of constitution or insolvency of the Contractor but shall in all respects and for all purposes be binding and operative until payment of all money payable to the Employer in terms thereof. This guarantee will not be discharged due to the change in the constitution of the Bank or the Contractor(s).

We, ……. BANK lastly undertake not to revoke this guarantee during its currency except with the previous consent of the Employer in writing.
Notwithstanding anything to the contrary contained hereinabove:

a) The liability of the Bank under this Guarantee shall not exceed……[5]

b) This Guarantee shall be valid up to ……[6]

c) Unless the Bank is served a written claim or demand on or before _____[7] all rights under this guarantee shall be forfeited and the Bank shall be relieved and discharged from all liabilities under this guarantee irrespective of whether or not the original bank guarantee is returned to the Bank.

We, _____ Bank, have power to issue this Guarantee under law and the undersigned as a duly authorized person has full powers to sign this Guarantee on behalf of the Bank.

Date _____ Day of _____

for_____ (indicate the name of the Bank)

(Signature of Authorised signatory)

[1] NAME OF VENDOR /CONTRACTOR / SUPPLIER
[2] REGISTERED OFFICE ADDRESS OF THE VENDOR /CONTRACTOR / SUPPLIER.
[3] LETTER OF INTENT(LOI) REFERENCE NO. WITH DATE
[4] CONTRACT VALUE (AS MENTIONED IN LOI)
[5] BG AMOUNT IN FIGURES AND WORDS
[6] VALIDITY DATE
[7] DATE OF EXPIRY OF CLAIM PERIOD (CLAIM PERIOD SHALL BE MINIMUM OF 3 MONTHS AFTER VALIDITY DATE)

Note:

1. The BG should be on Non-Judicial Stamp paper/e-stamp paper of appropriate value as per Stamp Act prevailing in the State(s) where the BG is submitted or is to be acted upon or the rate prevailing in the State where the BG was executed, whichever is higher. The Stamp Paper/e-stamp paper shall be purchased in the name of Vendor/Contractor/Supplier /Bank issuing the guarantee.
2. In Case of Bank Guarantees submitted by Foreign Vendors-
   a. From Nationalized/Public Sector / Private Sector/ Foreign Banks (BG issued by Branches in India) can be accepted subject to the condition that the Bank Guarantee should be enforceable in the town/city or at nearest branch where the Unit is located i.e. Demand can be presented at the Branch located in the town/city or at nearest branch where the Unit is located.
   b. From Foreign Banks (wherein Foreign Vendors intend to provide BG from local branch of the Vendor Country's Bank)
      b.1 In such cases, in the Tender Enquiry/ Contract itself, it may be clearly specified that Bank Guarantee issued by any of the Consortium Banks only will be accepted by BHEL. As such, Foreign Vendor needs to make necessary arrangements for issuance of Counter- Guarantee by Foreign Bank in favour of the Indian Bank's (BHEL's Consortium Bank) branch in India. It is advisable that all charges for issuance of Bank Guarantee/ counter- Guarantee should be borne by the Foreign Vendor. The tender stipulation should clearly specify these requirements.

      b.2 In case, Foreign Vendors intend to provide BG from Overseas Branch of our Consortium Bank (e.g. if a BG is to be issued by SBI Frankfurt), the same is acceptable. However, the procedure at sl.no. b.1 will required to be followed.
      b.3 The BG issued may preferably be subject to Uniform Rules for Demand Guarantees (URDG) 758 (as amended from time to time).

PSSR	MONTHLY PLAN & REVIEW WITH CONTRACTOR	Page **1** of **6**

Name of Project		Contract No.	
Name of Work		Name of Contractor	

PART- A: PLAN/ REVIEW OF WORK FOR THE MONTH OF …….. Date of Plan/ Review……

SN.	Description of Work	Unit of Measur-ement	Unit Rate	Planned (QTY Planned for the month as per Part –C of last month)		Cumulative Shortfall attributable to contractor upto last month (Refer Note 1)		Achieved		Shortfall attributable to BHEL w.r.t Plan (as per Col. 3 of Part-D)		Cumulative Shortfall attributable to Contractor upto & including this month		REMARKS (Reasons for Shortfall attributable to Contractor. Supporting documents to be kept as record.)
(a)	(b)	(c)	(d)	A		B		C		D		E=A+B-C-D		
				Phy.	Financial	Phy	Financial	Phy.	Financial	Phy.	Financial	Phy.	Financial	
	Value of Other Items not mentioned above but planned to be executed in this month													
Total					ΣA		ΣB		ΣC		ΣD		ΣE	

BHEL
(Sign with name, designation and date)

CONTRACTOR
(Sign with name, designation and date)

Name of Project		Contract No.	
Name of Work		Name of Contractor	

PART- A: Contd…….

Note 1: **In addition to the work planned as per Col. 'A', Contractor shall also make full efforts to minimize the 'Cumulative shortfall attributable to contractor upto the month' as mentioned in Col. 'B' by enhancing its resources, so as to achieve the completion of activities as per agreed schedule. In case contractor is not able to execute the entire shortfall, then BHEL 'Engineer in-charge', shall decide the priority of work to be executed and it shall be binding on the contractor.**

Note 2: Percentage Shortfall attributable to contractor w.r.t. **"**Plan - Shortfall attributable to BHEL**"** for the month = [(ΣE-ΣB)/(ΣA-ΣD)]x100
In case, (ΣE-ΣB) is negative, then it shall be treated as zero percent."

Note 3: Form 14 should include all items being planned in the current month, and all items against which shortfall was attributable to contractor till previous month. However, for practical reason, if it is not possible to mention some of the items in Form-14 being planned to be executed in this month, then also value of such items shall necessarily be included in calculation of Total Value.

Note 4: In case reason for shortfall attributable to contractor is w.r.t. T&P and Manpower, it should be in conformity with Part B1 and B2.

BHEL
(Sign with name, designation and date)

CONTRACTOR
(Sign with name, designation and date)

Name of Project		Contract No.	
Name of Work		Name of Contractor	

PART – B-1: PLAN/REVIEW OF DEPLOYMENT OF MAJOR T&Ps FOR THE MONTH OF ……..…….. Date of Plan/ Review……

CONTRACTOR'S SCOPE: -

SN.	PLAN				DEPLOYMENT STATUS			
	Major T&P to be deployed as per work planned for the month	QTY	Deployment Period (in days)	Weightage assigned to planned T&P (in fraction such that ΣC =1)	Actual Deployed Quantity	Actual Deployment Period (in days)	Weighted T&P Deployed	REMARKS (Works affected due to non-deployment of T&Ps)
		A	B	C	D	E	F=(C x D x E) / (A x B)	

Note: In case, E>B, it shall be considered as E=B. Similarly, in case D>A, it shall be considered as D=A.
Percentage of T&P Deployed = ΣF x 100

BHEL SCOPE: -

SN.	PLAN			DEPLOYMENT STATUS		
	Major T&P to be deployed as per work planned for the month	QTY	Deployment Period (in days)	Actual Deployed Quantity	Actual Deployment Period (in days)	REMARKS (Works affected due to non-deployment of T&Ps)

BHEL
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CONTRACTOR
(Sign with name, designation and date)

Name of Project		Contract No.	
Name of Work		Name of Contractor	

PART – B-2: PLAN/ REVIEW OF DEPLOYMENT OF MANPOWER FOR THE MONTH OF ……..…….. Date of Plan/ Review……

CONTRACTOR'S SCOPE: -

SN.	Area of Work	Category of Labour	No. of Labour required as per category	Deployment Period (in days)	No. of Labour actually deployed	Actual Deployment Period (in days)	REMARKS (Works affected due to non-availability of labour)
			A	B	C	D	

Percentage of Manpower Deployed=100 x Σ(CxD)/Σ(AxB)

BHEL
(Sign with name, designation and date)

CONTRACTOR
(Sign with name, designation and date)

PSSR	MONTHLY PLAN & REVIEW WITH CONTRACTOR	Page **5** of **6**

Name of Project		Contract No.	
Name of Work		Name of Contractor	

PART – C: PLAN(PHYSICAL) FOR THE NEXT MONTH i.e. ……..…….. Date of Plan ……

SN.	Description of work	Original Planned Quantity	Planned Quantity (excluding shortfalls attributable to contractor till date)	Unit of Measu-rement	T&Ps Required				Manpower Required		REMARKS (Reasons for difference in Original Planned Quantity w.r.t. Planned quantity to be given)
					Contractor Scope		BHEL Scope		Category of Labour	No. of Labour required as per Category	
					Major T&P to be deployed as per work planned for the month	Quantity	Major T&P to be deployed as per work planned for the month	Quantity			

Note 1: Planned quantity should be based on available/ expected fronts/ inputs in the next month

Note 2: "Original Planned Quantity" shall be as per latest jointly agreed programme between BHEL and Contractor before commencement of work or at the time of latest Time Extension, as the case may be.

BHEL
(Sign with name, designation and date)

CONTRACTOR
(Sign with name, designation and date)

Name of Project		Contract No.	
Name of Work		Name of Contractor	

PART – D: REASONS FOR SHORTFALL ATTRIBUTABLE TO BHEL IN RESPECT OF PLAN FOR THE MONTH……

SN.	Description of Work (from Part-A)	Quantities Affected		Reasons for Shortfall attributable to BHEL	Agency responsible for reasons for Shortfall	Remarks (Supporting Documents in respect of agency responsible)
		(Physical Quantity)	Unit of Measu-rement			
1	2	3	4	5	6	7

Note1: Reasons for shortfall shall include non-availability of fronts/ drawings/ materials/ T&P (BHEL Scope)/ clearances etc. and other hindrances for which contractor is not responsible.

Note2: Agency responsible may be BHEL Site/ MUs/ Design Centre/ BHEL Customer/ other Contractors etc.

BHEL
(Sign with name, designation and date)

Project		**Vendor**			**Package/Unit**	
Sl. No.	Parameter for Measurement	Classification	Max Score	Score Obtained	Measurement Key/Scheduled date	Supporting Documents
#1.01	Cumulative number of days in the month, the nominated Quality Officer or his authorised nominee was not available	QUALITY	1.5		Quality Officer or his authorised nominee should be available for all the days of working at site	Daily Log Book entry/Incident Registers/letter references
#1.02	Number of instances of non- compliance wrt FQP, Standard Drawings, Specifications, E&C Manuals etc.	QUALITY	1.5		No deviation from FQP, Standard Drawings, Specifications, E&C Manuals etc. is allowed without BHEL Engineer's approval.	Daily Log Book entry/Incident Registers/letter references
#1.03	Percentage submission of test certificates for batches of welding electrodes, cement, sand, aggregate, consumable, Paints etc. as applicable for this month OR In case of MM & MH package, monthly checks for Storage/Preservation of material.	QUALITY	1		Submission of 100% Test certificates for materials as per FQP is mandatory. MM & MH package: Storage/Preservation as per manual/procedure.	Daily Log Book entry/Incident Registers/letter references
#1.04	Number of incidences of improper storage & preservation (not in accordance to the guidelines of BHEL MUs or approved FQP) of materials, consumables (viz. gases, welding electrodes & fluxes, fuel etc.) & bought-out items (paints, fasteners etc.) under the custody of the contractor	QUALITY	1		Total number of non-compliances	Daily Log Book entry/Incident Registers/letter references
#1.05	Rework/ Rejection instances in a month necessitated due to deviation from Standard Drawings /Specifications /Manuals /E&C procedures /FQPs or due to Poor Workmanship by contractor	QUALITY	2		Reworks/ Rejection should be as minimum as possible. Total number of reworks/ rejections due to reasons attributable to contractor.	Daily Log Book entry/Incident Registers/letter references
#1.06	Delay in preparation & submission of signed protocols / log sheets / site register / NDT test reports as per approved FQP/ Qualified Welder List along with photocopies of Welder ID cards / Welder Performance Evaluation records etc. in the month OR in case of MM / MH package reconciliation statement / verification report.	QUALITY	1		Within 2 days of measurements taken or within first 3 working days of next month, as advised by BHEL Engineer	Daily Log Book entry/Incident Registers/letter references
#1.07	Number of instances for Major equipment/product failure due to negligence/improper work/poor workmanship by contractor	QUALITY	1		No such event should happen	Daily Log Book entry/Incident Registers/letter references
#1.08	Total number of complaints received in the month on the quality of finish / aesthetics	QUALITY	1		Total number of non-compliances	Daily Log Book entry/Incident Registers/letter references

Name and Signature of BHEL Package In-charge

Name and Signature of Contractor

Project		**Vendor**			**Package/Unit**	
Sl. No.	Parameter for Measurement	Classification	Max Score	Score Obtained	Measurement Key/Scheduled date	Supporting Documents
#2.01	Cumulative number of days of delay in submission of Plan FOR THE MONTH supported by deployment plan of Major T&Ps and Manpower (as per Form F-14) and relevant construction/layout drawings - like A4 plan / elevation views of plan status for structures / pressure parts/Civil Works, Piping isometrics for piping, Layout / PID / System reference sketch, Unloading / storage plans etc.as applicable.	PERFORMANCE	5		Number of days delayed from second working day of the month	Daily Log Book entry/Incident Registers/letter references
#2.02	Percentage of timely submission of Daily Reports for Progress of work, Resources, Consumables etc.	PERFORMANCE	1.5		Percentage of timely submission of daily reports/ Scheduled date is successive next day for each day	Daily Log Book entry/Incident Registers/letter references
#2.03	Number of days delayed for submission of FQP log sheets / protocols / Monthly Progress Reports for the work executed during the month under measurement	PERFORMANCE	1.5		Number of days delayed/Scheduled date is first 2 working days of next month	Daily Log Book entry/Incident Registers/letter references
#2.04	Percentage Shortfall attributable to contractor w.r.t. “Plan - Shortfall attributable to BHEL” for the month as per Form-14	PERFORMANCE	35		As per Part-A of Form-14	Progress review formats
#2.05	Number of days delayed in submission of Running bills with complete supporting documents (including updated reconciliation statement of BHEL issued material) for the month	PERFORMANCE	2		Number of days delayed / Scheduled date is 7th day of next month	Daily Log Book entry/Incident Registers/letter references
#2.06	Number of times the Top Management of contractor did not respond to critical issues of site, for the month	PERFORMANCE	1		Total number of instances	Daily Log Book entry/Incident Registers/letter references
#2.07	Cumulative number of days in the month the works were stopped / refused on interpretation of contract clauses/scope due to tendency of taking undue advantage by interpreting contract clauses in their favour	PERFORMANCE	2		Cumulative number of days lost	Daily Log Book entry/Incident Registers/letter references
#2.08	Number of times rework was refused by contractor	PERFORMANCE	1		Total number of non-compliances	Daily Log Book entry/Incident Registers/letter references

Project		**Vendor**			**Package/Unit**	
Sl. No.	Parameter for Measurement	Classification	Max Score	Score Obtained	Measurement Key/Scheduled date	Supporting Documents
#2.09	Cumulative number of days in the month recording / logging was not done in daily log / history register / hindrance register / soft form in a PC maintained at BHEL Site Office	PERFORMANCE	1		Cumulative number of days recording or logging was not done / all days of the month	Daily Log Book entry/Incident Registers/letter references
#3.01	Percentage of Manpower Deployed w.r.t. Plan for the month as per Form-14.	RESOURCES	7		As per Part-B2 of Form-14	Daily Log Book entry/Incident Registers/letter references
#3.02	Percentage of T&P Deployed w.r.t. Plan for the month as per Form-14.	RESOURCES	7		As per Part-B1 of Form-14	Daily Log Book entry/Incident Registers/letter references
#3.03	Cumulative number of major instances in the month hampering / affecting progress of work due to breakdown or non-availability of major T&P and MME for the work, under the scope of Contractor	RESOURCES	3		Cumulative number of instances	Daily Log Book entry/Incident Registers/letter references
#3.04	Cumulative number of major instances in the month hampering / affecting progress of work due to non-availability of Consumables/ use of improper consumables under the scope of contractor	RESOURCES	3		Cumulative number of instances	Daily Log Book entry/Incident Registers/letter references
#4.01	Number of non-compliances during the month for Statutory requirements like validity of Labour Licence, Insurance Policy, Labour Insurance, PF, BOCW Compliance etc. and any other applicable laws/ Regulation, Electrical Licence, T&P fitness certificate, Contractors' All Risk Policy etc. as applicable	SITE INFRASTRUCTURE & SERVICE	1		Total number of non-compliances	Daily Log Book entry/Incident Registers/letter references
#4.02	Cumulative number of days in a month poor illumination is reported at storage area, erection area, pre-assembly area and other designated areas by BHEL site.	SITE INFRASTRUCTURE & SERVICE	0.5		Total number of non-compliances/random checks	Daily Log Book entry/Incident Registers/letter references
#4.03	Cumulative number of days of non-availability of well-maintained toilets facilities for workers (separate for men and women) and non-availability of potable drinking water stations for workers in specified areas.	SITE INFRASTRUCTURE & SERVICE	1		Total number of non-compliances/random checks	Daily Log Book entry/Incident Registers/letter references

Project		**Vendor**			**Package/Unit**	
Sl. No.	Parameter for Measurement	Classification	Max Score	Score Obtained	Measurement Key/Scheduled date	Supporting Documents
#4.04	Total number of instances in the month, Housekeeping NOT attended to in spite of instructions by BHEL -i.e. removal / disposal of surplus earth / debris / scrap / unused / surplus cable drums / other electrical items / surplus steel items / packing materials, thrown out scrap like weld butts, cotton waste etc. from the working area to identified locations	SITE INFRASTRUCTURE & SERVICE	2		Total number of non-compliances/random checks	Daily Log Book entry/Incident Registers/letter references
#4.05	Total number of instances in a month, Site Office with reasonably good facilities including enough nos. of computers and printers etc. for use by office and supporting staff was not made available/maintained.	SITE INFRASTRUCTURE & SERVICE	0.5		No discrepancy during regular or surprise visits	Photograph and report of the Engineer
#5.01	Number of days delayed in making labour payments for the last month	SITE FINANCE	2		Number of days delayed / Scheduled date is 7th day of next month	Daily Log Book entry/Incident Registers/letter references
#5.02	Number of complaints from labour/ sub supplier/ sub-contractor for non-receipt of payments from contractor	SITE FINANCE	1.5		Total number of complaints or reporting	Daily Log Book entry/Incident Registers/letter references
#5.03	Number of times the site operations were hampered for want of funds at the disposal of site-in-charge.	SITE FINANCE	1.5		Total number of non-compliances	Daily Log Book entry/Incident Registers/letter references
#6.01	Cumulative number of days in a month the nominated Safety Officer was not available	HSE & SA	1		Safety Officer should be available for all the days	Daily Log Book entry/Incident Registers/letter references
#6.02	Shortfall in number of weekly safety meetings in the month conducted or attended by the Safety Officer	HSE & SA	0.5		Safety meetings to be held every week	Copy of Minutes of meeting
#6.03	Level of compliance w.r.t decisions taken in previous Safety meetings	HSE & SA	0.5		Number of consolidated issues discussed in Safety meetings	Copy of Minutes of meeting, Non-compliance intimation documents from BHEL site
#6.04	Delay in submission of monthly report on safety (including electrical safety for equipment & personnel etc.) in the prescribed form	HSE & SA	1		Number of days delayed/Scheduled date is third working day of next month	Daily Log Book entry/Incident Registers/letter references
#6.05	Number of days taken for lodging FIRs from date of occurrence/notice of incident of theft / accident etc.	HSE & SA	0.5		Number of days delayed/Scheduled date is within 24 Hrs of occurrence/notice of incidence	Copy of FIR lodged by Contractor

Project		**Vendor**			**Package/Unit**	
Sl. No.	Parameter for Measurement	Classification	Max Score	Score Obtained	Measurement Key/Scheduled date	Supporting Documents
#6.06	Number of times written(email, letters etc.) warning issued for non-availability/ use of improper Fall protection and rescue arrangement as lifeline, fall arrestors, safety net, hand-railings, covered floors, man-basket, rescue basket & kit etc. by the contractor	HSE & SA	2		Total number of non-compliances	Daily Log Book entry/Incident Registers/letter references
#6.07	Number of times punitive fines imposed for unsafe practices as per contract like non-availability/use of PPEs as safety shoes, helmets, goggles, gloves, lifeline, safety belts etc.	HSE & SA	1		Total number of non-compliances	Non-compliance intimation documents from BHEL site
#6.08	Percentage compliance to Emergency preparedness and response plan: Portable Fire-extinguishers, Buckets, Fire-wardens, display of emergency numbers, mock-drills, Hazard Identification and Risk Assessment(HIRA) etc.	HSE & SA	1		Compliance should be 100% as per HSE Plan or as finalized in Safety Meetings	Non-compliance intimation documents from BHEL site
#6.09	Number of times the agency has defaulted on display of safety posters / safety slogans / safety barriers/emergency numbers etc. in identified areas	HSE & SA	0.5		Total number of instances	Non-compliance intimation documents from BHEL site
#6.10	Non compliances observed during HSE and Safety Audit	HSE & SA	0.5		Total number of non-compliances	Non-compliance intimation documents from BHEL site, Audit Reports
#6.11	Cumulative number of days in the month, non-availability of First Aid Kit, First Aider & Emergency Vehicles/Ambulance.	HSE & SA	0.5		Cumulative number of days	Non-compliance intimation documents from BHEL site
#6.12	Number of days taken for submission of Root Cause analysis (RCA) for the accident from the cut-off date intimated by BHEL for submission of RCA	HSE & SA	0.5		Number of days delayed/Scheduled date is cut-off date intimated by BHEL	Daily Log Book entry/Incident Registers/letter references
#6.13	Non conductance of training (induction, job specific, height work etc.), tool box meeting and health check-up as per Contract requirements	HSE & SA	0.5		Number of incidences of non-conductance during the month	Daily Log Book entry/Incident Registers/letter references
		Total	100			

Name and Signature of BHEL Package In-charge

Name and Signature of Contractor

Project		**Vendor**			**Package/Unit**	
Sl. No.	Parameter for Measurement	Classification	Max Score	Score Obtained	Measurement Key/Scheduled date	Supporting Documents
Less Deduction in Score Due to Major Accidents (Fatal, Permanent Disability or bodily injury by which person injured is prevented to resume to work within 48 hours or more after accident,, Major Damage to Equipment etc.) attributable to the contractor @ 3 points/ accident						
Less Deduction in Score Due to Minor Accidents attributable to the contractor @ 1 point/ accident						
Less Deduction in Score Due to not Maintaining of Labour Colony (if applicable) as per BHEL HSE policy @2 points in a month on verification any day						
				Final Score		

Performance Score Summary for the Month	Total Score	Score Obtained
QUALITY	10	
PERFORMANCE	50	
RESOURCES	20	
SITE INFRASTRUCTURE & SERVICE	5	
SITE FINANCE	5	
HSE & SA	10	
OTHERS (deductions if any)	0	
TOTAL	**100**	

Note:

1) It is only indicative and shall be as per the online format issued by BHEL time to time.
2) No request will be entertained after specified date of current month w.r.t. changes requested in the scores of immediate previous month.

Name and Signature of BHEL Package In-charge

Name and Signature of Contractor