भारत हेवी इलेक्ट्रिकल्स लिमिटेड
(भारत सरकार का उपक्रम)
BHARAT HEAVY ELECTRICALS LIMITED
(A Govt. of India Undertaking)

TCN – 01

Ref: PSER:SCT:VRM-C1897:TCN-01 Date: 23-05-2018

Sub	Tender Change Notice (TCN) - 01.	
Job	Civil works comprising of Cast-in-Situ RCC bored Socket piles and below ground Civil Works, etc. all complete for 1x75 MW Combined Cycle Captive Power Plant for Visakh Refinery Modernization Project at HPCL Visakhapatnam, Andhra Pradesh.	
Ref	1.0	Tender no PSER:SCT:VRM-C1897:18.
	2.0	BHEL's NIT, vide reference no PSER:SCT-VRM-C1897:6767, Date: 09-05-2018.
	3.0	Other References, if any.

With reference to above, following points/ documents, relevant to tender, may please be noted and complied with while submitting offer.

1) Clarification of bidder's queries attached vide Annexure-A to TCN-01.

2) Soil Investigation Report is attached for reference and tender purpose only.

3) Revised Volume-IF-TCC-CML-Rev-01 is attached herewith, superseding Volume-IF-TCC-CML-Rev-00 issued earlier along with NIT (revision in cl. no. 11.3 & 12.0). However, bidder shall go through entire volume before submitting their bid.

4) Revised `No deviation certificate' as per enclosed Annexure-2. Bidder shall submit no deviation certificate as per enclosed format only.

5) All other terms & conditions shall remain unchanged.

Thanking you,

Yours faithfully,
for BHARAT HEAVY ELECTRICALS LTD

Sr. Engineer (SCT)

Encl: As Above.

पावर सेक्टर पूर्वी क्षेत्र (मुख्यालय)
POWER SECTOR EASTERN REGION, DJ-9/1, SECTOR-II, SALT LAKE CITY, KOLKATA - 700 091
फैक्स/Fax : (033) 23211960 फोन/Phone : बोर्ड/EPABX : (033) 2339-8000/ 2339 8236

ANNEXURE-A TO TCN-01

JOB: Civil works comprising of Cast-in-Situ RCC bored Socket piles and below ground Civil Works, etc. all complete for 1x75 MW Combined Cycle Captive Power Plant for Visakh Refinery Modernization Project at HPCL Visakhapatnam, Andhra Pradesh.

TENDER NO - PSER:SCT:VRM-C1897:18

CLARIFICATION OF BIDDER'S QUERIES

Sl. No.	Reference clause of Tender Document	Existing Provision	Bidder's Query	BHEL's clarification
1	NOTICE INVITING TENDER, PSER:SCT:VRM-C1897:18 Date:09-05-2018 1.0, Cl. (v)	Extension of due date of offer submission from 30-05-2018 to 13-06-2018 (15:00 Hrs).	Request you for the extension of the submission date for the tender Ref: PSER:SCT:VRM-C1897:18 to 13-06-2018. Highly appreciate your understanding on this.	Extension of submission date is not envisaged now. Please arrange to submit your offer within due date.
2	TCC: VOLUME-IF-CML, PAGE 16 OF 28, Cl. 18.1	The entire work under the scope of work shall be successfully completed in all respect within 18 (Eighteen) months from date of start of work, as certified by Construction Manager, BHEL.	Based on the time scheduled provided in Clause No. 18.1 at TCC, the completion of major mile stones seems to be unrealistic. Kindly clarify.	The schedule for completion of Milestones are based on the project requirement. These are to be achieved for successful completion of project.
3	NOTICE INVITING TENDER, PSER:SCT:VRM-C1897:18 Date:09-05-2018	AVAILABLE SUB-SOIL DATA – "detailed soil investigation report shall be made available for reference of the Bidder"	Soil Investigation Report is required to understand the Sub-Soil conditions and will enable us to prepare quote. Kindly provide before tender submission.	Soil Investigation Report (conducted by Customer) is being attached with this TCN for reference/ tender purpose only.
4	FILE-2.9-SCT-VRM-C1897-VOL-IF-TCC-DWG-PILE DETAIL	Levels Not Available	The difference of Estimated ground level and Cut-off level is required to understand the depth of free bore which is required for preparing precise quote. We request you to provide sectional details, layout drawings, pedestal sizes, etc.	The Cut off level shall vary from 1.0m to 3.0m from existing ground level.
5	NOTICE INVITING TENDER, PSER:SCT:VRM-C1897:18 Date:09-05-2018 Page 14, Cl. 1.0	BIDDERS SHOULD HAVE AVERAGE ANUAL TURNOVER OF MINIMUM RS. 7.33 CR. DURING LAST 3 (THREE) FINANCIAL YEARS, ENDING ON 31-03-2017 AND SHOULD HAVE POSITIVE NET WORTH AS ON 31-03-2017.	Positive Net worth as on Latest Audit Account means Positive Net worth as on 2015-2016 or any of the last three years? Kindly clarify	Latest Audit Account means Positive Net worth as on 2016-2017
6	TCC -VOLUME-IF-CML, Clause no. 32.4.27	Deployment Schedule Within 50 days from start of work	"Start of work" is mentioned at many clauses and need clarification of how to identify start of work. If any specific date/reference to letters/specific activity. Kindly confirm.	Start of work shall be after Mobilization period of 20 days from date of written intimation from BHEL after issue of LOI.
7	Others		Is the successful bidder / contractor authorized to subcontract / transfer the complete/part of the awarded project?	Please refer Clause no. 1.15.9 of Vol-IB-GCC and clause no. 2.7.2.1 (v) under sl. no. 14 of Annexure-A (Amendment to GCC/SCC) of NIT.
8	VOLUME-III PRICE SCHEDULE, REV-0;		Please clarify materials to be supplied by BHEL & the scope of contractor in detail.	Only Reinforcement Steel shall be supplied by BHEL. Please refer TCC for details.
9	Others		Muck shall be disposed within the site premises at a location provided by BHEL at free of cost. Please confirm.	Use of polymer in place of conventional bentonite to be done so that muck can be minimised.
10	Others		If any shoring arrangement required to reach the pile cut off level for pile cap works, the shoring system supply and installation shall be under BHEL scope? Kindly Clarify.	Shoring & Strutting including sheet piling for protection of earth / adjoining existing structure at any time during the contract period including extension if any, is in contractor scope and included in excavation item. No separate payment shall be made for the same.
11	Others		Work shall be carried out round the clock and necessary permits for the same shall be provided by BHEL. Please confirm.	Shall be arranged by BHEL from Customer / Consultant to customer.
12	VOLUME-III PRICE SCHEDULE, REV-0; ST No. 2511	Conducting Routine Load test	The Test levels are not provided. However, The contractor is requesting to allow, to conduct the tests at Existing Ground Level. Kindly confirm.	Testing to be done at Cut off level or as mentioned in the drawing.
13	VOLUME-IF-TCC_CML, Clause no. 32.4.11.2	1 No. stationary automatic batching plant with printing facility (approx. 15 Cum/Hr.) – to be commissioned at site.	Bidder understood that one batching plant is sufficient to produce the required quantity of concrete. So requesting you to reduce the total no of batching plant to one from two.	We have kept additional 15 Cum Batching Plant as stand by arrangement.
14	General		Extension of submission date to 11.06.18	Extension of submission date is not envisaged now. Please arrange to submit your offer within due date.
15	TCC-VOLUME-IF-CML, Clause no 12	No mobilization advance / IBRA will be paid to the contractor	Availability of Mobilisation advance	IBRA/ Mobilisation Advance is applicable. Please refer attached revised TCC-CML.
16	TCC-VOLUME-IF-CML, Clause no 32.4.1	Hydraulic Pile Rig Crawler mounted	Allowable for DMC bored piling rig for initial load test pile	Minimum 3 Nos. hydraulic rotary crawler mounted rig or equivalent capacity of Tire Mounted hydraulic rotary rig may be deployed suitable for 400mm & 500mm dia pile. Additional conventional DMC rig may be deployed on approval of BHEL / Customer.
17	Others		Supply item payment limited final measurement of respective works item	Yes, Payment of supply Items limited to final measurement of respective items of Service Schedule of Vol-III-Price Schedule.
18	-	-	On going through the document we find that, only 11250 cum of Concreting work (out of which 6800 cum is reportedly for pile cap & 4450 cum for pile) is involved for the above captioned job - for which 2 nos. of batching Plant [l no each of 30 cum/hr & 15 cum/ hr. is stipulated in tender enquiry. In our opinion the provision will unnecessary escalate the price to a great extent and one no.15 cum/hr capacity batching plant is adequate to cater for the peak workload.	Please refer our reply to sl. no. 13 above.
19	-	-	Soil Investigation Report including bore log data & Safe load capacity of piles are required.	Soil Investigation Report (conducted by Customer) is being attached with this TCN for reference/ tender purpose only.
20	TCC-VOLUME-IF-CML, Clause no 32.4.1	Hydraulic Pile Rig Crawler mounted	For installation of 1500.nos. of 500 mm dia. Bored piles 2 nos. of Hydraulic Rig are sufficient & for installation of 400 mm dia. bored piles Conventional type tripod Rig will be more efficient, economic & time saving - for which we shall deploy Conventional type Tripod Rig.	Please refer our reply to sl. no. 16 above.
21	TCC-VOLUME-IF-CML, Clause no 32.4	TOOLS & PLANTS (To be provided by contractor)	We would request you to kindly review the total Tools & Plant List as stipulated in Cl. No. 32 of TCC (Pg no. 24 of 28) vis-a-vis as per Capacity/Output Calculation for issue necessary corrigendum of the tender.	Shall be as tender provision. Please refer clause no. 32.5 of TCC-CML.
22	General		We would request you to kindly extend the date of submission of the above tender by at least two weeks' time i.e. up to 15th June, 2018.	Extension of submission date is not envisaged now. Please arrange to submit your offer within due date.
23	TCC-VOLUME-IF-CML, Clause no 5.8	PROCUREMENT & HANDLING OF CEMENT	Supply of Cement by the BHEL (or) Contractor Scope.	Procurement of cement is in the scope of vendor.
24	Others		Site Visiting Procedures.	Please contact Sh. Sunil Pandit, M-77300 05222 for Site visit.
25	General		Kindly extend the Tender submission date until 15th June 2018 from the existing date.	Extension of submission date is not envisaged now. Please arrange to submit your offer within due date.

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This section of Technical conditions of contract (TCC) is applicable for the contract. The conditions mentioned inscribed hereunder shall be read along with other volumes of tender, i.e. general conditions of contract (GCC, Volume-IB), Volume-II, Volume-III etc and in case of any conflict or inconsistency, the provision of the TCC, Volume- IF shall prevail.

1.0	PROJECT SYNOPSIS AND GENERAL INFORMATION
1.1	LOCATION AND APPROACH The site of Work is located within the premises of the existing Visakh Refinery, Visakhapatnam in the state of Andhra Pradesh. Nearest Railway Station- Visakhapatnam (15 Km), Nearest Town/ City Visakhapatnam (15 Km), Nearest Airport Visakhapatnam (10 Km), Nearest Sea Port Visakhapatnam (16 Km), Nearest National Highway- NH5 Rainy season: June, July during S/W monsoon. Also rain occurs in Nov./Dec. at the time of N/E monsoon. Source of Water: Fresh Water Visakh Municipal Corporation Cooling Water Sea Water from Bay of Bengal. Maximum wind velocity is for cyclone prone region. Wind pressure shall be based on IS: 875 Ambient temperature – Maximum 45°C and minimum 12.5°C Relative humidity - Maximum 60% and minimum 95% Rainfall data for 1-hour period - 80 -100 mm Maximum Rainfall in 24-hour period - 293 mm Wind Velocity - Maximum 185 km/hr and minimum 1-5 km/hr
2.0	SCOPE OF THE CONTRACT
2.1	The scope of works covers Pile, Pile Cap & Pedestal along with associated Civil works for 1X75 MW Captive Power Plant for Visakh Refinery Modernization Project at HPCL Visakhapatnam, Andra Pradesh. The scope covers providing labour, supervision, materials, T&Ps etc. for entire work as per specification and tender terms & conditions. The scope of work is indicative but not limited to the given below. Pile, Pile Cap & Pedestal along with associated Civil and other works as detailed below: • GTG Foundation, STG foundation, HRSG Foundation, Stack foundation & other foundation work. • Foundation for STG Hall, SWGR cum Cellar Building, GIS Building, DG shed, BFP Building & BFP Foundation. • AUX Foundations, Pipe Racks, Dearator structure Foundations. • Foundation for GTG Hall, IA shed, SWAS room etc. • Air Filter, Gas control skid, FD Fan etc. Foundations. • Other misc. Foundations required for 1X75 MW Captive Power Plant
2.2	Mix design (M 25, M 30, M 35) for all concreting shall be carried out either at site or from a reputed institute, contractor has to ensure adding of admixture and minimizing of cement content in line with IS 456 as advised by BHEL time to time without any additional cost.
2.3	The works to be performed under this contract consist of providing all labour, supervision, material, scaffolding, construction equipment, tools and plants, temporary works, supplies including POL, 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, concrete, earthwork other allied works, preparation of bar bending schedules on the basis of construction drawings, preparation of fabrication drawings etc. are included on the rates of items of work.
2.4	The scope shall also include setting up by the bidder a testing laboratory (one AC lab size 4mtr x 4mtr and 1 non AC lab 4 mtr x 4 mtr.) in the field to carry out all relevant tests. Detail of laboratory equipment as per Annexure-A is to be arranged by the contractor within quoted rate. For conducting day to day one Qualified quality engineer to be deployed.
2.5	All quality standards, tolerances, welding standards & other technical requirements shall be strictly adhered to. The Bidder shall fully apprise himself of the prevailing conditions at the proposed site, climatic

	conditions including monsoon pattern, soil conditions, local conditions and site specific parameters and shall include for all such conditions and contingent measures in the bid, including those which may not have been specifically brought out in the specifications.
2.6	The area of work shall be cleared of all vegetation, rubbish and other objectionable matter and materials remove, 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 rendered for the different items under bill of quantities.
2.7	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.
2.8	The unit rates 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.
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.
2.10	PROMOTION AND DEVELOPMENT OF MICRO AND SMALL ENTERPRISES
	For facilitating promotion and development of micro and small enterprises, EIL / HPCL is committed to promote the procurement of supplies / services from MSEs in Orders / contracts awarded by EIL / HPCL. Accordingly, bidders are also encouraged to promote the same by considering MSE sub-suppliers / sub-contractors to the extent possible under the Orders/Contracts awarded on them by EIL / HPCL. After award of work, supplier / contractor shall furnish statement along with copies of orders / FOAs placed by them on their sub-suppliers / sub-contractors who are MSEs, to EIL Project Manager / RCM, as applicable.
3.0	SITE VISIT
3.1	Contractor should visit site and acquire full knowledge & information about site conditions prevailing at site regarding entry to site, safety regulations etc. and surroundings of plant premises together with all the statutory, obligatory, mandatory requirements of various authorities before submission of the bid. In line with the above, site visit confirmation will be required to be submitted by the bidder with the technical bid.
3.1	OPEN SPACE FOR OFFICE & STORAGE
3.1.1	Open spaces for temporary site office (1 no. Porta Cabin Type) may be allocated inside the plant only. Contractor has to make his own arrangements for material storage yard, construction of temporary site office & labour colony including Electricity and water for the labour colony nearby outside the plant.
3.1.2	Construction of necessary stores and storage of materials shall be in contractor's scope. Security of stores & work place shall be in Contractor's scope.
3.1.3	REMOVAL OF TEMPORARY FACILITIES
	When the Work is completed all temporary structures and facilities built by the contractor during progress of work shall be removed from the Site and the area shall be finished as per drawing / restored to its original condition.
3.2	WATER
3.2.1	No water is available inside the plant. Contractor has to bring construction & drinking water required for their work from outside. BHEL shall not be responsible for any inconvenience or delay caused due to any interruption of water supply. Contractor may make standby arrangement for water for which no separate payment shall be made by BHEL.
3.2.2	Contractor will have to arrange for storage of water to meet the day-to-day requirement. Bidder will ensure adequate supply of construction water to meet the requirement.

3.2.3	To reduce the water requirement, vendor may use approve curing compound instead of traditional water curing in concrete & other work involving cement and maintain a joint register as a proof.
3.3	ELECTRICITY
3.3.1	BHEL will not Provide Construction Power. Contractor has to make arrangement of adequate Diesel Generator for which no separate payment shall be made by BHEL On receipt of construction power from customer, chargeable 415V construction Power shall be provided at one point within 100 M from his work place, bidder has to make his own distribution arrangement to draw electricity. BHEL shall not be responsible for any inconvenience or delay caused due to any interruption of power supply / variation in voltage level and no compensation for delay in work can be claimed by the contractor due to such non-supply on the grounds of idle labour, machinery or any other grounds. The bidder will have to procure & install adequate area illumination system during construction right from start of his work. This system will include temporary pole lighting, portable lighting towers with sufficient DG back-up for area lighting at different working areas for execution of the work & safety of workmen within the quoted rate. The illumination should be such that minimum illumination requirement as specified in specification or any-where for general illumination is maintained.
3.3.2	The contractor should ensure that the work in critical areas is not held up in the event of power breakdown. In the event of breakdown in the electric supply, if the progress of work is hampered, it will be the responsibility of the contractor to step up the progress of work after restoration of electric supply so that overall progress of work is not affected.
3.3.3	The bidder shall have to provide earth leakage circuit breaker at each point wherever human operated electrical drives / T&Ps are deployed.
4.0	TOOLS & PLANTS
4.1	All the tools and plants required for execution of the above work shall have to be provided by the contractor.
5.0	MATERIAL HANDLING & BHEL ISSUED MATERIAL
5.1.1	Reinforcement (TMT bar) earthing MS rod, only will be issued free of cost by BHEL for use in the work covered in this contract. All other materials required for proper completion of job shall be provided by contractor and quoted rates shall be inclusive of this.
5.1.2	Consignment of steel will be directly issued to the contractor as received by BHEL, on weighment basis from its supplier, as per delivery challan of supplier.
5.1.3	Handling of steel will be in vendor's scope for which no separate payment will be given by BHEL.
5.1.4	It would be the responsibility of the contractor to keep in constant contact with BHEL/ site to find out the delivery status, arrival of the consignments and arrange for escort to accompany the truck/ trailer for transportation of above materials by BHEL'S supplier, as necessary. The lorry, truck way bill for the consignment as shall be received by BHEL would be handed over to the contractor immediately for unloading of materials including all arrangement for necessary gate passes etc. All arrangement for necessary gate passes etc. shall be the responsibility of contractor.
5.1.5	Payment of all demurrages that may result due to contractor's fault/ delay would be the responsibility of the contractor. If BHEL have to make payment of demurrage together with freight, the amount so paid as demurrages for the reasons stated above, shall be recovered from the bills of the contractor. The decision of BHEL's engineer in this regard will be final and binding on the contractor. However the contractor has to clear all such charges, if any in this regard and complete the job without waiting for BHEL's decision.
5.1.6	It would be the responsibility of the contractor to sign on the delivery book acknowledgement slip of supplier/ transport authorities etc.

5.1.7	Consignments coming on Sundays and holidays are also required to be handled/ unloaded by the contractor. Since the offices and stores will probably remain closed on such days, it will be the responsibility of the contractor to contact BHEL engineers at their residence and obtain instructions.
5.1.8	Since the consignments are expected to arrive during any time of the day or night, contractor shall have, his workmen round the clock at site as well as other places as required to unload the materials immediately on arrival.
5.1.9	Unloading of materials at the storage yard or at places designated by BHEL, stacking & restacking, shifting & re-shifting, using contractor's own cranes, trailers and other equipment with the valid road permit for their operation, unloading and stacking etc. shall be responsibility of the contractor under this contract. All materials/equipment shall be stacked, stored above ground level by use of concrete or wooden sleepers. No materials shall remain on ground at any time. All concrete sleepers required for stacking the materials shall be arranged by contractor (successful bidder of this package). All other material handling equipment like winches, d-shackles, slings of various sizes, max puller, pulley blocks, jacks, trucks, tailors etc. required for such material handling of steel. shall be arranged by contractor within quoted/accepted rates.
5.1.10	It will be the responsibility of the contractor to submit computerized account of all such consignments of materials received by them, daily to BHEL.
5.1.11	BHEL reserve the right to recover from the contractor any loss arising out of damage/ theft or any other causes of the materials issued to him at any point.
5.1.12	Open land for storage shall have to be arranged by the bidder at their cost. You shall maintain one centralized fenced store cum bar bending yard. Hard surfacing of this yard and all round drain shall be carried out by you at your own cost within the accepted rate. Batching plant area shall be arranged by you and you shall make use of the area for installation and operation of the Batching Plant at your own cost. You shall make complete arrangement of necessary security personnel, to safeguard all such materials in your custody. Materials issued will be used only for construction of permanent work. You shall take care of material issued by BHEL and shall protect the same from theft, damage and weathering. Barbed wire fencing of the steel storage yard, batching plant area, reinforcement bending yard area etc. are to be done by the contractor at his own cost. Contractor shall also remove grass, bushes, trees etc. wherever required off the land provided to him and shall make proper continuous up-keep-ment of the open yard / land by removing grass, bushes trees etc. and same is included under the scope of his work & no extra payment shall be made to the contractor in this regard.
5.1.13	No material shall be issued to the contractor except as those indicated above, i.e. steel unless otherwise expressly provided for in the contract. Contractor will have to make his own arrangement at his own cost for procurement of any other material as required for the works and of such quality as acceptable to BHEL.
5.1.14	The contractor shall maintain proper store account for all the BHEL issued materials and shall give three copies of monthly computerised reconciliation statement of such account to the BHEL.
5.1.15	Contractor shall carry out in complete association with BHEL, material management functions and execution like day to day update of materials, issued to contractor, accounting for surplus/ scrap material returned etc. These functions shall also be carried out through computerised system utilizing suitable software. Contractor shall provide experienced software personnel to associate on dedicated basis for efficient discharge of the same.
5.1.16	The contractor shall solely be responsible for the safety & quality of material after it is handed over and issued to contractor by BHEL.
5.1.17	BHEL issued materials shall not under any circumstances be taken out of the project site unless otherwise permitted by BHEL.

5.1.18	All the necessary lifting tackles, cranes, tools & plants including tractors, trailers, trucks, pulley blocks, jacks, winches, wire ropes etc, of suitable capacities and other equipment incidental to carry out this work shall have to be arranged by the contractor including calibration / fitness certificate from approved agency of BHEL /customer at his cost. BHEL engineer reserves the right to inspect lifting tackles and equipment before allowing their use. Such approval however shall not relieve the responsibility of the contractor to ensure safe handling of equipment taking the precautions to avoid any accident and damage to other equipment and personnel.
5.1.19	No separate rate will be applicable for the above job. The contractor will quote the rate for the items inclusive of all charges for the above job.
5.1.20	Bidder's scope of handling of steel under the scope of this tender includes stacking/ storing of materials over concrete sleepers. Bidder scope shall include provision of concrete sleepers for this purpose and no separate payment against the same will be made by BHEL. After completion of the job bidder shall take back the sleepers. Bidder's quoted rate/ price shall be in consideration to this.
5.2	ISSUE OF MATERIALS
5.2.1	ISSUE OF STEEL
5.2.2	The steel shall be issued to the contractor free of cost on the following basis.
5.2.2.1	Reinforcement steel (TMT) and earthing rod (MS round) – Weighment basis (unit – MT).
5.2.2.2	Fabricated embedment (form BHEL Units) - Weighment basis (unit – MT). Embedment will be issued free of cost by BHEL for use in the work covered in this contract. All other materials required for proper completion of job shall be provided by contractor and quoted rates shall be inclusive of this. Reconciliation shall have to be done and no wastage is allowed for the fabricated embedment issued by BHEL. In case of excess, all materials are to be returned to BHEL Store. In case of any missing items, recovery shall be made @ actual cost + 30%.
5.2.3.1	All the steel (reinforcement, earthing MS rod) issued by BHEL shall be properly accounted for. The total quantity of steel required for the work will be calculated from the approved Bar Bending schedule, fabrication drawings, approved laps, chairs and lugs. The measurement for payment as well as for accounting shall be based on the sectional weights as indicated in the following IS specifications. Reinforcements - Fe-500 confirming to IS: 1786. or grade-1 of IS:432 (part-I)
5.2.3.2	In case any such sectional weights are not available in the above documents, the manufacturer recommendation shall be binding.
5.2.3.3	The steel issued to the contractor shall be mainly in standard length and sections as received from the supplier. However, the contractor shall be bound to accept the steel in length as available in the project stores no claims for extra payment because of issue of non-standard length will be entertained.
5.2.3.4	In case MS flats as required in the fabrication of structures are not available, you shall cut such width out of the available MS plates to make flats at no extra cost till such material is available and procured by BHEL.
5.2.3.5	The contractor shall satisfy himself of the quality and quantity of the materials at the time of taking delivery from BHEL stores. No claims whatsoever will be entertained by BHEL because of quality or quantity after the materials are taken by contractor from BHEL stores.
5.2.4	Quarterly requirement of steel must be positively submitted by the contractor 45 days before the last next quarter, However, the contractor shall submit to the engineer, a statement indicating estimated quantity of steel required at least two months in advance. In addition, the contractor shall also furnish the estimated requirement of cement and steel during a month by the third week of the previous month indicating his requirement.
5.2.5	Bidders to ensure that no lamination materials are taken over by them from BHEL. Fabrication wastage, if any due to above, shall not be compensated by BHEL

5.2.6	Bidder to note that steel required for his enabling job like store/ site office etc. shall be arranged at his own cost. All TG staging material shall be arranged by contractor at his own cost. Bidder shall do the design for its structure immediately after receipt of TG deck drawing and obtain approval from BHEL.		
5.3	RETURN OF STEEL MATERIALS		
5.3.1	All surplus serviceable or unserviceable materials that may be left over after the completion of the contract or at its termination for any reason whatsoever, the Contractor shall deliver the said product to the Owner without any demur. The surplus (serviceable) and unserviceable products shall be determined by joint measurement. In case where joint measurement has failed to take place, the Owner may measure the same and determine the quantity.		
5.3.2	All surplus steel and all wastage materials will be taken back on weighment basis.		
5.3.3	Surplus, unused and un-tampered steel shall be sorted section-wise and returned separately for a place directed by BHEL / engineer within the project area. Return of such materials will not be entitled to any handling and incidental charges.		
5.3.4	All wastage / scrap (including wastage, unusable scrap) shall be returned to the stores on weighment basis and a receipt obtained for material accounting purposes. Return of such material will not be entitled to any additional cost due to handling and transportation and incidental charge.		
5.4	REINFORCEMENT STEEL & EARTHING MS ROUND CONSUMPTION AND WASTAGE		
5.4.1	The theoretical consumption of various diameters of reinforcement and earthing MS round shall be based on approved construction drawing and bar bending schedule. Weight shall be calculated considering the sectional weights as per Indian standards. No extra cost shall be payable to the contractor for any deviation in weights for the different procedures adopted for issue and calculation of the theoretical consumption including rolling tolerances.		
5.4.1.1	Actual consumption = Issue – Surplus.		
5.4.1.2	Surplus = Un-tampered and unused quantity of steel returned by the contractor to BHEL store along-with relevant documents.		
5.4.1.3	Wastage = Actual consumption – Theoretical consumption.		
5.5	REINFORCEMENT STEEL & EARTHING MS ROUND WASTAGE		
5.5.1	Allowable wastage – Three Percent (+3%) of the theoretical consumption shall be considered as allowable wastage.		
5.5.2	Wastage and scrap shall be as per actual weighment basis.		
5.5.3	Sl. no	Reinforcement steel & earthing rod 40 mm MS round	Basis of issue & penal recovery
	R-1	Theoretical consumption (without considering wastage and scrap or loss)	Free
	R-2	Wastage limited to plus three percent (+3%) of aforesaid theoretical consumption (R-1) towards allowable wastage (to be return to BHEL Store)	Free
	R-3	Wastage beyond three percent (+3%) of the theoretical consumption above (R-1).	Penal rate
	R-4	Wastage material of R-2 & R-3, not returned to BHEL Store	Penal rate
5.6	RECONCILIATION OF BHEL ISSUED MATERIALS		
5.6.1	The contractor shall submit a reconciliation statement of cement and steel issued to him once in two months. The same may be submitted along with each RA bill.		
5.6.2	At the time of submission of bills, the contractor shall properly account for the material issued to him as specified herein to the satisfaction of BHEL certifying that the balance material are available with contractor's custody at site.		
5.6.3	If it is noticed by BHEL that the wastage is high and calls recovery at the penal rate, then BHEL will proceed for recovery for the excess wastage as per penal recovery rates as specified.		

5.6.4	The approved drawings/ bar bending schedules are to be considered for the purpose of reconciliation of materials.	
5.7	RECOVERY OF MATERIAL	
5.7.1	If wastage exceeds the specified limit, the recovery of excess wastage shall be made from monthly RA bill at the penal rate stipulated below.	
5.7.2	PENAL RATE OF MATERIALS	
	Item	Penal rate (Rs)
5.7.2.1	Reinforcement steel and earthing rod etc.	60,000/- per MT.
5.8	PROCUREMENT & HANDLING OF CEMENT	
5.8.1	Acceptance of Cement manufacturer shall be subject to compliance of following	
5.8.1.1	Cement manufacturers having valid BIS certificate and listed in the BIS website as on the date of procurement of cement shall be allowed for supply of cement and contractor shall procure cement from them with prior intimation to Engineer-in-charge.	
5.8.1.2	Tests after receipt of cement at site: Each batch of cement (week wise as mentioned on cement bags) supplied by the contractor after delivery at site shall be subject to the tests and analysis required by the relevant Indian Standard codes. The contractor shall carry out and bear the COST.	
5.8.1.3	The contractor shall construct waterproof cement store (capacity minimum 300 MT) for storing and stacking of cement, CGI / asbestos roofing (slope) with brick masonry wall, PCC flooring. Materials required for the same shall be provided by contractor at his own cost. Cement has to be kept over wooden raised platform. Stacking of cement is to be done as per IS codes with proper illumination and locking arrangements.	
6.0	INSPECTION, TESTING AND INSPECTION CERTIFICATES	
6.1	The engineer, his authorized representative and / or an outside inspection agency acting on behalf of BHEL / owner shall have access at all reasonable times to inspect & examine the materials & workmanship of the works during its manufacture and if part of the works is being manufactured or assembled on other premises or works, the vendor shall obtain permission for the engineer and for their authorized representative to inspect the works where manufactured or assembled. Necessary arrangement for carrying out inspection including supply of labour, IMTEs, area illumination and scaffolding, if required will be vendor's responsibility and same has to be carried out within the quoted price.	
6.2	To facilitate advance planning of inspection in addition to giving inspection notice the vendor shall furnish quarterly inspection program indicating schedule dates of inspection at customer hold point and final inspection stages. Updated quarterly inspection plans shall be made for each 3 consecutive months and to be furnished before beginning of each calendar month.	
6.3	Before any plant / equipment leaves the place of manufacture, BHEL shall be given the option of witnessing inspections & tests for compliance with specifications & related standards. The vendor shall give the engineer / inspector 15 days written notice of any material being ready for testing. Such test shall be to the vendor's account except for the expenses of the inspector. The engineer / inspector, unless the inspection is waived will attend such tests within 15 days of the date on which the equipment is notified as being ready for test / inspection, failing which the vendor may proceed with test which shall be deemed to have been made in the inspector's presence and he shall forthwith forward to the Inspector duly certified copies of test reports.	
6.4	The engineer or inspector shall within 15 days from the date of inspection as defined herein give notice to the vendor of any objection w.r.t. drawing / equipment / workmanship which in his opinion not in accordance with the specification / contract. The vendor shall either make modification as may be necessary to meet the said objection or explain to the engineer/ inspector giving reasons that no modifications are necessary to comply with the contract.	
6.5	When the factory tests have been completed at the vendor's or sub-vendor's works, the engineer or inspector shall issue a certificate to this effect within reasonable time after completion of tests but if the	

	tests are not witnessed by the engineer or Inspector the certificate shall be issued within 15 days of the receipt of vendor's test certificate by the engineer inspector. Completion of these tests or the issue of the certificates shall not bind BHEL to accept the equipment should it on further tests after erection be found not to comply with the contract.
6.6	In all cases where the vendor provides the tests at the premises of the vendor or any sub-vendor, the vendor except where otherwise specified shall provide free of charge such items as labour, materials, electricity, fuel, water, stores, apparatus and instruments as may be reasonably demanded by the engineer/ inspector to carry out effectively such tests on the equipment in accordance with the contract and shall give facilities to the engineer/ inspector to accomplish testing.
6.7	The Engineer-in-Charge/Site-in-Charge and Officers from Central or State Government will have full power and authority to inspect the works at any time wherever in progress, either on the site or at the Contractor's premises/workshops of any person, firm or corporation where work in connection with the contract may be in hand or where the materials are being or are to be supplied, and the Contractor shall afford or procure for the Engineer-in-Charge/Site-in-Charge every facility and assistance to carry out such inspection. The Contractor shall, at all times during the usual working hours and at all other times at which reasonable notice of the intention of the Engineer-in-Charge/Site-in-Charge or his representative to visit the works shall have been given to the Contractor, either himself be present to receive orders and instructions, or have a responsible agent, duly accredited in writing, present for the purpose. Orders given to the Contractor's agent shall be considered to have the same force as if they had been given to the Contractor himself. The Contractor shall give not less than seven days notice in writing to the Engineer-in-Charge/Site-in-Charge before covering up or otherwise placing beyond reach of inspection and measurement any work in order that the same may be inspected and measured. In the event of breach of above, the same shall be uncovered at Contractor's expense for carrying out such measurement and/or inspection.
6.8	No material shall be removed and dispatched by the Contractor from the site without the prior approval in writing of the Engineer-in-charge. The contractor is to provide at all times during the progress of the work and the maintenance period proper means of access with ladders, gangways, etc. and the necessary attendance to move and adapt as directed for inspection or measurements of the works by the Engineer-in-Charge/Site-in-Charge.
7.0	INSURANCE
7.1	BHEL shall arrange comprehensive MCE (marine cum erection) Insurance Policy for total project supply & services including balance of plant package covering transit risks & loss, destruction or damage during handling at Site, Storage, civil works ,erection, testing and commissioning up to trial operation completion of unit including theft, sabotage, fire, lightning and other natural calamities.
7.2	Contractor shall report to BHEL in writing any damages to equipment/components on receipt, storing, and during withdrawal of the materials from stores, in transit to site and unloading at place of work and during erection and commissioning till trial operation completion including handing over. The above report shall be as prescribed by BHEL site management. Any consequential loss arising out of non-compliance of this stipulation will be borne by contractor.
7.3	The contractor will take necessary precautions/ due care to protect the material at Project site, while in his custody from any damage/ loss till the same is handed over to BHEL/ customer at Project site. For lodging/ processing of insurance claim the contractor will submit necessary documents. BHEL will reserve the right to recover the loss from the contractor as detailed below in case the damage/loss is due to negligence/ carelessness on the part of the contractor. In case of theft of material under contractor's custody, the same shall be reported to police by the contractor immediately and copy of FIR and subsequently police investigation report shall be submitted to BHEL/ customer for taking up with insurance. However, this will not relieve the contractor of his contractual obligation for the materials in his custody.
7.4	In case the damage/loss/theft of materials are attributable to negligence/failure in discharging the duties and obligations of the contractor, the expenses incurred for repair/replacement of such components in

	excess of the amount realized from the underwriters, limited to Normal Excess (Deductible Franchise) shall be recovered from the contractor.
7.5	Other conditions of Insurance shall be as per relevant clause of GCC/SCC.
8.0	DEVIATIONS/ CLARIFICATIONS
8.1	Normally no deviation with respect to tender is acceptable to BHEL. However, in case of unavoidable circumstances, the bidder may submit their query for seeking clarifications of BHEL as per modality stipulated in NIT or may submit the same along with his offer as per prescribed schedule/ format without any ambiguity. Any assumptions, presumptions, deviations etc. indicated or implied anywhere by the bidder except those indicated in the deviation schedule/ format will not be recognized and will not form a part of consideration/ offer. In the absence of such filled-up schedule/ format it will be understood and agreed that the bidder's offer is based on strict conformance to the specification and no negotiation would be allowed in this regard. BHEL reserve the right not to recognize any/ all deviations submitted after opening of the bid.
9.0	DEWATERING
9.1	Contractor shall ensure at all times that ground of 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.
10.0	TIME SCHEDULE/ COMPLETION PERIOD
10.1	The entire work under the scope of work shall be successfully completed in all respect within 18 (eighteen) months from date of start of work, as certified by Construction Manager, BHEL. Mobilization at site shall be done within 20 days from date of written intimation from BHEL. The exact date of start of work shall be reckoned based on certificate of Construction Manager, BHEL.
11.0	TERMS OF PAYMENT
11.1	For all items of work as per Volume-III, Price Schedule, interim payment shall be limited to 95% of the gross value of interim bill on item rate basis. All admissible recovered/ adjustments etc. shall be made from the interim payable amount. The balance 5% shall be payable along with final bill subject to confirmation of full GST Credit to BHEL. Any Interest if levied thereon, for reasons elaborated in tax & duties clause of the tender and attributable to you, will be recovered from the Final Payment/ Retention amount. However, this 5%, retained from each RA bill, may be released against submission of a separate bank guarantee as per Performance Bank Guarantee format, to be kept valid till final bill & guarantee period, subject to (i) Receipt of certificate that all works are completed in all respects; (ii) Reconciliation of materials/ T&P/ MMD; (iii) Completion of final bill formalities and (iv) Handing over to BHEL/ customer.
11.2	Out of above mentioned 95 %, 1.5 % of gross bill amount shall be paid in the following manner on certification by BHEL engineer after compliance of each of following activity in each month. In case of non-fulfilment of respective activity by vendor in each month, no payment shall be made by BHEL against corresponding activity and no claim of bidder at a later date, whatsoever, in this regard shall be entertained by BHEL.
11.2.1	0.7 % shall be paid on compliance of housekeeping of vendor's working area and store/ office areas.
11.2.2	0.3 % shall be paid on compliance of general illumination of vendor's working area and stores, office area.
11.2.3	0.2 % shall be paid on compliance of applicable OHSAS requirement as per guidelines of BHEL/ PSER and as specified in the tender.
11.2.4	0.3 % shall be paid on compliance of applicable safety requirement as per guidelines of BHEL/ PSER and as specified in the tender.

11.3	Contractor's RA bill, complete & correct in all respects, certified by BHEL engineer, shall be released within 60 days from the date of receipt of complete invoice along with all necessary documents including Engineering Certificate.
11.4	BHEL site at its discretion may further split up the above percentages of break up and effect payment to suit the site condition, cash flow requirement, according to the progress of work.
11.5	Such payment as above shall be effected only on certification by BHEL against completion of each stage.
11.6	No bills including RA bills will be paid to individual consortium partners in case of consortium arrangement.
11.7	Applicable GST, which can be claimed at any point, shall be released to the successful bidder upon compliance of following:
11.7.1	Vendor declaring such Invoice in his GSTR-1
11.7.2	Receipt of Goods/ services and Tax Invoice by BHEL
11.7.3	Confirmation of payment of GST thereon by you on GSTN Portal
11.7.4	Above is subject to receipt of goods/ service and tax invoice thereof alongwith vendor declaring invoice in their return and paying GST within timeline prescribed for availing ITC by BHEL.
12.0	MOBILISATION ADVANCE / IBRA
12.1	Interest bearing recoverable advance of 5 (five) % of the contract price in stages is admissible in the following manner. Interest rate shall be the base rate of SBI (on the date of release of advance) plus 6% (compound interest shall be calculated as per monthly rest).
12.2	One and a half (1.5) % to be released on submission of following.
12.2.1	Unqualified acceptance to LOI.
12.2.2	Requisite security deposit.
12.2.3	Bank guarantee (BG) equivalent to 1.1 times the advance amount valid for a period initially for one year subsequently to be extended till the advance is adjusted.
12.2.4	Detailed L-2 network submission & approval by BHEL.
12.3	One and a half (1.5) % to be released on following.
12.3.1	Submission of bank guarantee (BG) equivalent to 1.1 times the advance amount valid for a period initially for one year subsequently to be extended till the advance is adjusted.
12.3.2	Mobilization of Batching plant on certification of the same by BHEL site.
12.3.3	Utilisation certificate of 1st instalment of IBRA with documentary evidence
12.4	Two (2) % to be released as per following.
12.4.1	Submission of bank guarantee (BG) equivalent to 1.1 times advance amount valid for a period initially for one year subsequently to be extended till the advance is adjusted.
12.4.2	Opening of site office & Laboratory on certification of the same by BHEL site.
12.4.3	Utilisation certificate of 2nd instalment of IBRA with documentary evidence
12.5	Recovery of mobilization advance along with interest shall be made at the rate of 10% of the Gross Bill Value from 1st applicable RA bill, till the amount paid along with the interest is fully recovered by the time the contractor reaches 90% billing of total value of works to be executed.
12.6	The bank guarantee shall be kept valid till the entire advance amount is recovered.
12.7	Invoice for advance against individual stage as per above to be raised immediately & prior to accomplishment of activities/ event, associated with subsequent stage advance.
12.8	All other terms and conditions of IBRA not mentioned above shall be governed by the pertinent provisions of GCC of tender.
13.0	TAXES, DUTIES ETC
13.1	All taxes excluding GST & BOCW Cess (as specified elsewhere in the tender) but including, Charges, Royalties, any State or Central Levy and other taxes for materials if any obtained for the work and for execution of the contract shall be borne by successful bidder and shall not be payable extra by BHEL. Any increase of above at any stage during execution of contract, including extension of the contract,

	shall have to be borne by successful bidder contractor. Bidder's quoted/ accepted rates/ price shall be inclusive of all such requirements.
13.2	GST along with Cess (as applicable) legally leviable & payable by successful bidder as per GST Law shall be paid by BHEL, extra. Hence, bidder shall not include GST along with Cess (as applicable) in their quoted rates/ price.
13.3	Successful bidder shall furnish proof of GST registration with GSTN Portal covering the services under this contract. Registration should also bear endorsement for the premises from where the billing shall be done by successful bidder on BHEL for this project / work.
13.4	Since GST on output will be paid by BHEL separately as enumerated above, bidder's your quoted rates / price should be after considering the Input Credit under GST law at bidder's end.
13.5	TDS under Income Tax shall be deducted at prevailing rates on gross invoice value from the running bills (RA bills) unless exemption certificate from the appropriate authority / authorities is furnished.
13.6	TDS under GST (if / as & when applicable later) shall be deducted at applicable rates on gross invoice value from the running bills (RA bills). However, as on date no TDS under GST is applicable.
13.7	Bidder shall note that GST Tax Invoice complying with GST Invoice Rules (Section 31 of GST Act & Rules referred thereunder) wherein the 'Bill To' details shall encompass following. BHEL GSTN – Refer attached GSTN code table of BHEL. Name - BHARAT HEAVY ELECTRICALS LIMITED Address - Shall be intimated later. Specific details of BHEL GSTN, Name and Address as stated above, have been specified elsewhere in the tender.
13.8	Successful bidder to intimate immediately on the day of removal of goods (in case of any supply of goods) to BHEL along with all relevant details and send a scanned copy of Tax Invoice to BHEL through following communication mode for enabling BHEL to meet its GST related compliances. Portal address. and Email address – Shall be intimated later. Specific details of above shall be intimated to successful bidder by BHEL at appropriate juncture.
13.9	In case of delay in submission of above mentioned documents on the date of despatch, BHEL may incur penalty / interest for not adhering to Invoicing Rules under GST Law. The same will be liable to be recovered from successful bidder, in case such delay is not attributable to BHEL.
13.10	In case of raising any Supplementary Tax Invoice (Debit / Credit Note), successful bidder shall issue the same containing all the details as referred to in Section 34 read with Section 31 of GST Act & Rules referred there under.
13.11	Successful bidder shall comply with the Time Limit prescribed under the GST Law and rules thereof for raising of the Tax Invoice. If any supply of goods is applicable, successful bidder shall also ensure prompt delivery of goods after despatch.
13.12	Bidder shall note that in case GST credit is delayed / denied to BHEL due to delayed / non receipt of goods and / or Tax Invoice or expiry of the timeline prescribed in GST Law for availing such ITC, or any other reasons, not attributable to BHEL, GST amount shall be recoverable from successful bidder along with interest levied/ leviable on BHEL, as the case may be.
13.13	Successful bidder shall upload the invoices raised on BHEL in GSTR-1 within the prescribed time as given in the GST Act. Bidder shall note that in case of delay in declaring such invoice in your return and GST credit availed by BHEL is denied or reversed subsequently as per GST Law, GST amount paid by BHEL towards such ITC reversal as per GST law shall be recoverable from the successful bidder along with interest levied / leviable on BHEL.
13.14	Way Bill: Successful bidder to arrange for way bill / e-waybill for any transfer of goods for the execution of the contract. Successful bidder has to make their own arrangement at their cost for completing the formalities, if required, with Issuing Authorities, for bringing materials, plants & machinery at site for execution of the works under this contract, Road Permit / Way Bill, if required, shall be arranged by successful bidder and BHEL will not supply any Road Permit/ Way Bill for this purpose.

13.15	Any new taxes & duties, if imposed subsequent to due date of offer submission as per NIT & TCN, by statutory authority during contract period (including extension, if the same is not attributable to you), shall be reimbursed by BHEL on production of relevant supporting document to the satisfaction of BHEL. However, you shall obtain prior approval from BHEL before depositing new taxes and duties.
13.16	Benefits and / or abolition of all existing taxes must be passed on to BHEL against new taxes, if any, proposed to be introduced at a later date.
14.0	IDLE CHARGES
14.1	Not applicable.
15.0	PRICE VARIATION CLAUSE
15.1	The price shall remain firm throughout the contract period including extension period, if any.
16.0	OVER RUN CHARGES / RATE REVISION
16.1	No overrun charges/ rate revision will be admissible/ applicable for this contract.
17.0	PROJECT MANAGEMENT/ CONSTRUCTION MANAGEMENT
17.1	To meet the need of construction management at site, contractor shall provide the following services within quoted/ accepted rates: The bidder will have to supply & install of 2 Nos. PCs (multimedia PC work station Pentium- Core-i5 / i7, 3.2 GHZ or above, 1000 GB HDD, 8 GB RAM, 100 /1000 MBPS LAN card) of HP / HCL / COMPAQ or equivalent make with window 10 or higher, 64 bit O/S and required software like MS Office 2010 or higher, AutoCAD 2014 or higher, ADOBE PDF CREATOR with one no laser jet printer compatible for A3 size printing (ink/ cartridge for which to be supplied as and when required), one no. laser jet printer compatible for A4 size printing (ink / cartridge for which to be supplied as and when required) with power backup at places, as per instruction of BHEL for exclusive use of BHEL. These computers / printers shall remain contractor's property and they will be allowed to take out the same after completion of contract period. The contractor shall provide data / information etc. in prescribed formats for periodical updating of the progress reports, material management reports, updating of network pertaining to the contractor's scope of work etc. The contractor shall also provide 1 (one) Nos. computer operators and 2 (Two) numbers service staff for miscellaneous service for BHEL's use at site / Kolkata for reconciliation, progress review & day-to-day planning purpose, documentation etc. These facilities are to be provided within 30 days from LOI date till completion of scheduled contract period.
17.2	If contractor fails to provide computer / printer / personnel as per requirement, for a continuous period of fifteen days or more, BHEL shall have the right to deduct the amount as per following rates on prorate basis, from contractor's RA bill or any other dues at rate given below:
17.2.1	Rs. 18000 / month for each computer operator.
17.2.2	Rs. 14000 / month for each service staff.
17.2.3	Rs. 10000 / month for each set of computer & printer.
17.2.4	In the event of the contract period getting extended beyond the stipulated time for reasons not attributable to you, above services may either be withdrawn or retained as per instruction of BHEL. If services are retained, you will be reimbursed at the above 70% of the mentioned rate or (actual +15%), whichever is lower, if the services of operator / service staff are being used by BHEL.
17.3	The contractor's site office must have facilities of communications like E-mail, and telephone with STD facility within a month from LOI.
17.4	HOUSEKEEPING
17.4.1	Contractor is required to adopt the Concept of "Built Clean" throughout the project execution which shall include cleanliness of the Equipment's/ bulk material during storage, handling and erection at site. Contractor shall also be responsible for the total disposal of construction waste materials (on daily basis inside refinery) and final site clearance including removal of temporary facilities in compliance with local regulations and as per directions of OWNER/ PMC. As regards to left over useable material including bulk material, Contractor shall duly codify the same as per the OWNER's guidelines and return to the OWNER without any extra cost to OWNER.

17.4.2	It is the responsibility of the Package Contractor to maintain general cleanliness and proper housekeeping at work site. Package Contractor shall organize disposal of excavated earth /garbage/ rubbish/scrap, etc. on day to day basis to identified disposal areas/safe areas and forward daily report for the same indicating the details of men and machinery deployed for the purpose.
17.4.3	Wastage and unserviceable scrap generated during dismantling and regular works shall be segregated and dumped in designated locations. Earth and land fill materials shall be dumped outside the refinery and the required fees charged by the local authorities shall be borne by the PACKAGE Contractor. Steel scrap serviceable and non-serviceable shall be segregated and stacked in " HPCL stock yard" within the refinery premises.
17.4.4	All dismantled piping items, & equipments (after stripping of insulation & cladding) with its internals shall be disposed off at safe area provided by HPCL in their premises which included their APT area.
17.4.5	All concrete material which is having reinforcement imbedded into it, shall be made free of its steel reinforcement and then disposed off. Steel thus recovered shall be disposed off at HPCL stock yard inside the refinery.
17.4.6	Metallic scrap to be disposed by contractor as advised by EIC at designated place inside the Refinery/ATP.
17.4.7	Surplus Earth, Cable sheet, Insulation, Empty painting drums ,packing material, garbage and wooden material to be disposed by Contractor to outside the Refinery.
17.4.8	All the loose items of instrumentation and electrical items (serviceable items) shall be tagged and packed in boxes and delivered in the covered storage of the Owner. Electrical and instrumentation panels and the transformer shall be transported and stacked in the HPCL Stock yard. For hazardous waste like asbestos, suitable methodology shall be devised and the same shall be disposed of in the area designated by the HPCL. For this, non-pilferage containment by chain link fencing shall be constructed by the PACKAGE Contractor if so required.
17.5	BARRICADING
17.5.1	Since the faculties defined in the tender needs to be developed adjacent to the running refinery, Contractor is required to properly barricade the area for ensuring safety during execution. For designing of the barricading for area segregation safety analysis needs to be carried out by the contractor and height of the barricading to be decided by carrying out thorough safety analysis, Results of the safety analysis will be reviewed by OWNER / PMC and height of the barricades shall be decided accordingly. As per the requirement total area is required to be barricaded from minimum three sides, however details shall be firmed up only after safety study as required to be carried out by the contractor during the performance of the contract.
17.6	ROYALTY
17.6.1	Unless otherwise specified, the Contractor shall pay all tonnage and other royalties, rents and other payments or compensation (if any) for getting stone, sand, gravel, clay, bricks or other materials required for the works or any temporary works and the price quoted shall be deemed to be inclusive of such payment. The Contract Price shall include the royalty on different applicable items as per the prevailing State Government rates. In case OWNER is able to obtain the exemption of royalty from the State Government, the Contractor shall pass on the same to the OWNER for all the items involving royalty. Any increase in prevailing rates of royalty shall be borne by the Contractor at no extra cost to the OWNER
17.7	MONSOON WORK
17.7.1	Contractor shall submit within 15 days of award of work, to the Engineer-in Charge / OWNER, his contingency plan for work during monsoon clearly stating their methodology/ strategy to progress uninterruptedly during monsoon mentioning the deployment of resources viz, numbers, capacity, category of equipment and manpower on a weekly basis for approval. During monsoon and other periods, it shall be the responsibility of the Contractor to keep the construction work site free from water at his own cost by deploying suitable dewatering pumps. The Contractor shall adhere to the Special Conditions. The detailed procedure / precautions to be followed during Monsoon season is explained in Annexure-1 to TCC.

17.8	PLANNING & MONITORING
17.8.1	The bidder shall prepare detail construction schedule (L-3) as per completion dates given in this document. This schedule must include all milestone and key activities for each subsystem / components in the areas of engineering (wherever applicable), procurement, manufacture (wherever applicable), excavation / construction / erection. This network must conform to the overall project schedule. The bidder should also ensure monitoring of these activities at least weekly basis to start with and on daily basis whenever required by BHEL.
17.8.2	The bidder shall also prepare progress report indicating progress on key activities, management summary for critical activities and list of actions requiring attention of BHEL. This schedule is to be preferably made in PRIMAVERA / MS PROJECTS, so that the same is compatible with BHEL's project management software.
17.9	CONSTRUCTION CAMPS
	The location of work places, camps, areas of storage and installation of works, compression, regulation and communication stations shall be located on levelled land, avoiding areas with non-cohesive soils to avoid erosive processes. Health conditions in the camp shall be controlled in order to prevent contamination of adjacent groundwater or surface water resources. Domestic sewage generated at the construction sites shall be eliminated by two systems of septic/absorption tanks or chemical toilets located on the sites. Solid combustible garbage shall be collected and secured daily, until disposal, to prevent the attraction of livestock, vermins and wild animals. Residue shall be disposed of, along with non-combustible garbage, in a disposal location approved by the Authorities. Upon abandonment, the camp site area shall be cleared of all trailers, piping, cable, insulation, lumber, blockage, metal wastes, etc., and re-graded according to the landscaping concept. These guidelines and procedures for the management of domestic and other waste shall be specified in a plan.
17.10	PROGRESS REPORTING
17.10.1	The bidder shall submit daily, weekly and monthly progress reports for work force, materials reports, consumables (cement / steel / gases / electrodes) report and other reports as per pro-forma considered necessary by BHEL. In case of any failure on contractor's part to comply with this, BHEL may at its discretion, consider to withhold part payment against their RA bills.
17.10.2	The progress report shall indicate the progress achieved against planned with reasons indicating delays, if any, and shall give the remedial actions which the contractor intends to take to make good the slippage or lost time, so that further works again proceed as per the original program and the slippages do not accumulate and effect the overall program.
17.10.3	The daily work force reports shall clearly indicate the work force deployed, category-wise specifying also the activities in which they are engaged.
17.10.4	Weekly progress review meetings will be held at site during which actual progress during the week vis-à-vis scheduled program shall be discussed or actions to be taken for achieving targets. For discussions, the contractor shall present program of subsequent week. The contractor shall constantly update/revise his work program to meet the overall requirement.
17.10.5	Periodic progress reviews on the entire activities of execution in respect of supply and works in scope of bidder will be held once in a month at Kolkata / site. These meetings will be attended by reasonably higher officials of the contractor and will be used as a forum for discussing all areas where progress needs to be speeded up. The contractor shall be further responsible for ensuring that suitable steps are taken to meet various targets decided upon such meetings.
17.10.6	During construction contractor shall take an average twenty colour digital photograph / slides each month (not less than four per week) of the works during progress. In case of failure in providing such photograph in each month, an amount of Rs. 10000 per month shall be deducted from contractor's RA bill.
17.10.7	Successful bidder has to provide for electronic/ computerized storing and re-production / printing / plotting of various data, log sheets, protocols, measurements etc. These may be stored in CD (as per requirement) and handed over to BHEL as per requirement.

17.11	PHOTOGRAPHS
17.11.1	The Contractor shall furnish to the Employer one (1) hard copies (and two (2) soft copies in .jpeg or .pdf format on separate CDs/DVDs) of each photograph taken to show shop assembly of equipment and the monthly stages of equipment installation. Each photograph shall show upon its face, the date, the Contractor's name, and description of the view taken. Photographs shall be taken of each assembly or sub- assembly to indicate the progress of the Work. Additional photographs shall be taken when and where required as directed by Employer and/or the Engineer. Shop photograph shall be not smaller than 120 mm by 150 mm in size.
17.12	SITE ORGANIZATION
17.12.1	The contractor shall maintain a site organization of adequate strength in respect of manpower, construction machinery and other implements at all time for smooth execution of the contract headed by a competent construction manager for site operations with sufficient level of authority to take site decisions. The vendor will submit organization chart (showing the name of SITE-IN-CHARGE) with individual bio-data indicating various levels of experts to be posted for supervision in the fields of supervision and execution, quality, material management, planning, safety, etc. The organization shall be reinforced from time to time, as required to make up slippage (if any) from the schedule without any commercial implication to BHEL. The organization chart is to be submitted within 10 days from the date from start of work.
17.12.2	Apart from the qualified and competent Site-in-charge, following (minimum) engineering manpower with power plant construction background to be deployed at site by the successful vendor for their day to day supervision etc.
17.12.2.1	Qualified safety officers with assistants (exclusive for safety supervision for project jobs).
17.12.2.2	Engineer & Supervisors for quality inspection.
17.12.2.3	Site supervising engineer and supervisors for civil works
17.12.2.5	Quality engineer for Civil Laboratory
17.12.2.6	Planning Engineer (exclusively for planning)
17.12.3	Deputation of above man-power shall be jointly decided at site in line with construction schedule.
17.12.4	Engineer / supervisor for other functions like store & purchase, material management, fin, administration etc. are to be provided as per site requirement and not considered above.
17.12.5	In the event of non-deputation of engineer/ supervisor by the bidder as per above agreed schedule, BHEL shall reserve the right to deduct Rs. 50000/- per month for engineer, Rs. 40000/- per month for the supervisor / safety officer / safety supervisor from RA bills. Further induction of manpower regarding site supervisor & site engineer will be decided at site as per requirement without any financial implication.
17.12.6	BHEL reserves the right to reject or approve the list of personnel proposed by the contractor. The persons whose bio-data have been approved by BHEL will have to be posted at site and deviation in this regard will not be permitted unless specific & reasonable justification is made.
17.12.7	In addition to above, a well experienced qualified engineer to be designated, as 'Project Co-coordinator', shall be deployed by the contractor. Such engineer shall have adequate exposure on the job and shall remain fully involved in all planning activities, guidance etc. to contractor's own team during the complete execution period of contract.
17.12.8	The contractor should also submit to BHEL for approval a list of T&Ps along with their fitness certificates. The tools & tackles shall not be removed from site without written permission of BHEL.
17.12.9	The contractor should also submit network programs for the erection of various items. These networks shall show the Customer / BHEL hold points, which have to be cleared by Customer / BHEL, or their authorized representatives before further erection can take place. These programs for the erection would clearly identify responsibilities of the contractor and Customer / BHEL. It is the responsibility of the contractor to get the Networks approved by BHEL within four weeks of the date of finalization of award of work/ placement from start of work.

17.13	DAMAGE TO PROPERTY	
17.13.1	Contractor shall be responsible for making good to the satisfaction of the Owner any loss of and any damage to all structures and properties belonging to the Owner or being executed or procured by the Owner or of other agencies within the premises of the work of the Owner, if such loss or damage is due to fault and/or the negligence or willful acts or omission of the Contractor, his employees, agents, representatives or sub-contractors.	
17.13.2	The Contractors shall indemnify and keep the Owner harmless of all claims for damage to Owner's property arising under or by reason of this contract.	
18.0	CONSTRUCTION SCHEDULE	
18.1	Entire work shall be carried out in accordance with the broad construction schedule given below, within the stipulated completion period. Within 30 days from start of work, the contractor shall discuss with BHEL site engineer & furnish detail construction schedule (L-3/ L-4) indicating all milestones on the basis of major activities and get it approved from BHEL engineer. This schedule will undergo review and based on progress vis-à-vis project requirement, contractor shall have to submit revised schedule for approval of BHEL. Major Milestones given below	
	Description	Completion period from date of start of work
18.1.1	GIS Building Piling, Pile cap & column up to Plinth level	5 months
18.1.2	HRSG Foundation, Stack foundation & other foundation work.	7 months
18.1.3	GTG Foundation, Foundation for GTG Hall, IA shed SWAS room etc. AUX Foundations, Air Filter, Gas control skid, FD Fan etc. Foundations, STG foundation, Foundation for STG Hall, SWGR cum Cellar Building, DG shed, BFP Building & BFP Foundation	10 months
18.1.4	Pipe Racks, Dearator structure Foundations.	14 months
18.1.5	Other misc. Foundations required for 1X75 MW Captive Power Plant	18 months
18.2	Contractor shall establish mix design for all concreting from a reputed institution approved by BHEL / Customer.	
18.3	The contractor shall plan his work in such a manner so as to meet the overall project schedule, in consultation with BHEL / Customer engineer.	
18.4	Contractor shall submit daily work program based on construction schedule. Deferment of above schedule is not acceptable. Contractor will adhere to schedule and resource planning to be augmented to ensure completion as per schedule.	
18.5	Periodic progress reviews on the entire activities of execution in respect of supply & works in scope of contractor will be held once in a month at Kolkata / site. These meetings will be attended by reasonably higher officials of the contractor and will be used as a forum for discussing all areas where progress needs to be speeded up. The contractor shall be further responsible for ensuring that suitable steps are taken to meet various targets decided upon such meetings.	
19.0	GUARANTEE / WARRANTY	
19.1	The contractor will be responsible for the quality of workmanship, quality of materials / items and design for which the contractor is responsible.	
19.2	Guarantee period shall be 12 months from the date start of guarantee period as per relevant clause of GCC. Commencement of guarantee period shall be from the date completion of work under the contract as certified by BHEL	
20.0	EMPLOYMENT LIABILITY TOWARDS WORKERS EMPLOYED BY THE CONTRACTOR	
20.1	The Contractor shall be solely and exclusively responsible for engaging or employing persons for the execution of work. All persons engaged by the contractor shall be on Contractor's pay roll and paid by Contractor. All disputes or differences between the Contractor and his / their employees shall be settled by Contractor.	

20.2	Owner has absolutely no liability whatsoever concerning the employees of the Contractor. The Contractor shall indemnify Owner against any loss or damage or liability arising out of or in the course of his / their employing persons or relation with his / their employees. The Contractor shall make regular and full payment of wages and on any complaint by any employee of the Contractor or his sub-contractor regarding non-payment of wages, salaries or other dues, Owner reserves the right to make payments directly to such employees or subcontractor of the Contractor and recover the amount in full from the bills of the Contractor and the contractor shall not claim any compensation or reimbursement thereof. The Contractor shall comply with the Minimum Wages Act applicable to the area of work site with regard to payment of wages to his employees and also to employees of his sub-contractor.
20.3	The Contractor shall advise in writing or in such appropriate way to all of his employees and employees of sub-contractors and any other person engaged by him that their appointment/employment is not by the Owner but by the Contractor and that their present appointment is only in connection with the construction contract with Owner and that therefore, such an employment/appointment would not enable or make them eligible for any employment/appointment with the Owner either temporarily or/and permanent basis.
21.0	CONTRACT PRICE
21.1	Bidder shall quote their rates strictly in accordance with prescribed Price Schedule, Volume-III (latest revision).
21.2	The quantities of various items mentioned in the price schedule, Volume-III are approximate, based on very preliminary information and may vary to any extent or to be deleted altogether. The quoted rates of each item will remain firm throughout the period of execution including extension, for reasons whatsoever, as long as variation in the total value of the work executed under any part of the this contract including extra items, if any, but excluding any price variation remains, if any, remains within (+/-) 15% (plus / minus fifteen percent) of the awarded price of LOI.
22.0	QUALITY CONTROL & QUALITY ASSURANCE
22.1	Contractor's engineers & supervisors shall be adequately qualified and also inclined to do a quality job. The quality assurance engineer shall co-ordinate all aspects of quality control, inspection, implementation of quality assurance procedures laid down in Quality Plan and technical specification by BHEL. He shall fill up quality assurance log sheets / formats and submit to BHEL for joint inspection and acceptance. The contractor shall fill up, maintain & preserve the quality records in computerized media. BHEL's authorized representative shall be given free access at all time to such quality related records etc. for inspection, review etc.
23.0	QUALITY ASSURANCE PROGRAMME
23.1	The contractor shall arrange for suitable quality assurance programme to control all activities pertaining to the scope of work, as necessary. Such programs shall be outlined by the contractor & shall be finally accepted by BHEL. A quality assurance programme of the contractor shall generally cover the following
23.2	Organization structure and qualification data for key personnel of the contractor for the management and implementation of proposed quality assurance programme
23.3	The procedure for source inspection, incoming raw material inspection, verification of material purchased etc.
23.4	System for maintenance of records.
24.0	GENERAL REQUIREMENTS – QUALITY ASSURANCE
24.1	All materials, components and equipment covered under the specification shall be procured, manufactured, erected, commissioned and tested, as applicable, at all stages as per comprehensive quality assurance program. An indicative program for inspection / test, to be carried out by the contractor, for some of the major items is given in the respective technical specification.
24.2	Field quality plan will detail out the quality practices and procedures etc. to be followed by the contractor's site quality control organization, during various stages of site activities from receipt of material / equipment at site.

24.3	BHEL reserves the right to carry out quality audit and quality surveillance of the systems and procedures of contractor's quality management. Contractor shall provide all necessary assistance to enable BHEL to carry out such audit.
24.4	Quality audit / approval of the results of test & inspection will not prejudice the right of BHEL to reject an equipment service not giving desired performance and shall not in any way limit the liabilities and responsibilities of the contractor in earning satisfactory performances of equipment/ service as per specification.
24.5	Repair / rectification procedure to be adopted to make any job acceptable shall be subject to the approval of BHEL.
24.6	All the latest relevant codes as per technical specification should be available with the contractor at site within 15 days from the date of placement from start of work or otherwise specified by Construction Manager/ Project Manager, BHEL.
24.7	TESTS FOR QUALITY OF WORK
24.7.1	All workmanship shall be of the respective kinds described in the contract documents and in accordance with the instructions of the Engineer-in-Charge / Site-in- Charge and shall be subjected from time to time to such tests at Contractor's cost as the Engineer-in-Charge/Site-in-Charge may direct at the place of manufacture or fabrication or on the site or at all or any such places. The Contractor shall provide assistance, instruments, labour and materials as are normally required for examining, measuring and testing any workmanship as may be selected and required by the Engineer-in-Charge/Site-in-Charge.
24.7.2	All the tests that will be necessary in connection with the execution of the work as decided by the Engineer-in- charge/Site-in-Charge shall be carried out at the contractors cost and expenses.
24.7.3	If any tests are required to be carried out in connection with the work or materials or workmanship to be supplied by the owner, such tests shall be carried out by the Contractor as per instructions of Engineer-in-Charge/Site-in-Charge and expenses for such tests, if any, incurred by the contractor shall be reimbursed by the Owner. The contractor should file his claim with the owner within 15 (fifteen) days of inspection/test and any claim made beyond that period shall lapse and be not payable.
25.0	WORK & SAFETY REGULATIONS
25.1	FIRST AID AND INDUSTRIAL INJURIES
25.1.1	Contractor shall maintain first aid facility for his employees and those of his sub-contractors.
25.1.2	Contractor shall make arrangements for ambulance service and for the treatment of all types of injuries. Names and telephone numbers of those providing such services shall be furnished to Owner prior to start of construction and their name board shall be prominently displayed in Contractor's field office.
25.1.3	All industrial injuries shall be reported promptly to owner and a copy of contractor's report covering each personal injury requiring the attention of a physician shall be furnished to the Owner.
25.2	SAFETY CODE
25.2.1	The Contractor shall at his own expenses arrange for the Safety provisions as may be necessary for the execution of the work or as required by the Engineer-in-Charge in respect of all labours directly or indirectly employed for performance of the works and shall provide all facilities in connections therewith. In case the contractor fails to make arrangements and provide necessary facilities as aforesaid, the Owner shall be entitled to do so and recover the cost thereof from the Contractor.
25.2.2	From the commencement to the completion of the works, the contractor shall take full responsibility for the care thereof and of all the temporary works (defined as meaning all temporary works of every kind required in or for the execution, completion or maintenance of the works). In case damage, loss or injury shall happen to the works or to any part thereof or to temporary works or to any cause whatsoever repair at his (Contractor's) own cost and make good the same so that at the time of completion, the works shall be in good order and condition and in conformity in every respect with the requirement of the contract and Engineer-in-Charge's instructions.
25.2.3	In respect of all labour, directly or indirectly employed in the work for the performance of the Contractor's part of this agreement, the contractor shall at his own expense arrange for all the safety provisions as

	per relevant Safety Codes of C.P.W.D Bureau of Indian Standards, the Electricity Act/I.E. Rules. The Mines Act and such other Acts as applicable.
25.2.4	The Contractor shall observe and abide by all fire and safety regulations of the Owner. Before starting construction work, the Contractor shall consult with Owner's Safety Engineer or Engineer-in-Charge/Site-in-Charge and must make good to the satisfaction of the Owner any loss or damage due to fire to any portion of the work done or to be done under this agreement or to any of the Owner's existing property.
25.2.5	The Contractor will be fully responsible for complying with all relevant provisions of the Contract Labour Act and shall pay rates of Wages and observe hours of work/conditions of employment according to the rules in force from time to time.
25.2.6	The Contractor will be fully responsible for complying with the provision including documentation and submission of reports on the above to the concerned authorities and shall indemnify the Corporation from any such lapse for which the Government will be taking action against them.
25.2.7	Owner shall on a report having been made by an inspecting Office as defined in the Contract Labour Regulations have the power to deduct from the money due to the Contractor any sum required or estimated to be required for making good the loss suffered by a worker(s) by reasons of non-fulfillment of conditions of contract for the benefit of workers no-payment of wages or of deductions made from his or their wages which are not justified by the terms of contract or non observance of the said contractor's labour Regulation.
25.3	INSURANCE AND LABOUR
25.3.1	Contractor shall at his own expense obtain and maintain an insurance policy with a Nationalized Insurance Company to the satisfaction of the Owner as provided Hereunder
25.4	EMPLOYEES STATE INSURANCE ACT
25.4.1	The Contractor agrees to and does hereby accept full and exclusive liability for the compliance with all obligations imposed by Employees State Insurance Act, 1948, and the Contractor further agrees to defend indemnify and hold Owner harmless from any liability or penalty which may be imposed by the Central, State or local authority by reason of any asserted violation by Contractor, or sub-contractor of the Employees' State Insurance Act, 1948 and also from all claims, suits or proceedings that may be brought against the Owner arising under, growing out of or by reason of the work provided for by this contract whether brought by employees of the Contractor, by third parties or by Central or State Government authority or any political sub-division thereof.
25.4.2	The Contractor agrees to file with the Employees State Insurance Corporation, the Declaration forms and all forms which may be required in respect of the Contractor's or sub-contractor's employee whose aggregate emuneration is within the specified limit and who are employed in the work provided or those covered by ESI Act under any amendment to the Act from time to time.
25.4.3	The Contractor shall deduct and secure the agreement of the sub-contractorto deduct the employee's contribution as per the first schedule of the Employee's State Insurance Act from wages and affix the employee's contribution cards at wages payment intervals. The Contractor shall remit and secure the agreement of the sub-contractor to remit to the State Bank of India, Employee's State Insurance Corporation Account, the Employee's contribution as required by the Act ii. The Contractor agrees to maintain all records as required under the Act in respect of employees and payments and the Contractor shall secure the agreement of the sub- contractor to maintain such records. Any expenses incurred for the contributions, making contribution or maintaining records shall be to the Contractor's or sub-contractor's account.
25.4.4	The Owner shall retain such sum as may be necessary from the total contract value until the Contractor shall furnish satisfactory proof that all contributions as required by the Employees State Insurance Act, 1948, have been paid.
25.5	WORKMAN'S COMPENSATION AND EMPLOYEE'S LIABILITY INSURANCE
25.5.1	Provide Insurance for all the Contractor's employees engaged in the performance of this contract. If any of the work is sublet, the Contractor shall ensure that the sub- contractor provides workmen's

	compensation and Employer's Liability Insurance for the latter's employees who are not covered under the Contractor's insurance.
25.6	AUTOMOBILE LIABILITY INSURANCE
25.6.1	Contractor shall take out an Insurance to cover all risks to Owner for each of his vehicles plying on works of this contract and these insurances shall be valid for the total contract period. No extra payment will be made for this insurance. Owner shall not be liable for any damage or loss not made good by the Insurance Company, should such damage or loss result from unauthorised use of the vehicle. The provisions of the Motor Vehicle Act would apply.
25.7	FIRE INSURANCE
25.7.1	Contractor shall within two weeks after award of contract insure the Works, Plant and Equipment and keep them insured until the final completion of the Contract against loss or damage by accident, fire or any other cause with an insurance company to be approved by the Employer/Consultant in the joint names of the Employer and the Contractor (name of the former being placed first in the Policy). Such Policy shall cover the property of the Employer only
25.8	ANY OTHER INSURANCE REQUIRED UNDER LAW OR REGULATION OR BY OWNER
25.8.1	Contractor shall also provide and maintain any and all other insurance which, may be required under any law or regulations from time to time. He shall also carry and maintain any other insurance which may be required by the Owner.
25.8.2	The aforesaid insurance policy/policies shall provide that they shall not be cancelled till the Engineer-in-Charge has agreed to their cancellation.
25.8.3	The Contractor shall satisfy to the Engineer-in-Charge/Site-in-Charge from time to time that he has taken out all insurance policies referred to above and has paid the necessary premium for keeping the policies alive till the expiry of the defects liability period.
25.8.4	The contractor shall ensure that similar insurance policies are taken out by his sub-contractor (if any) and shall be responsible for any claims or losses to the Owner resulting from their failure to obtain adequate insurance protections in connection thereof. The contractor shall produce or cause to be proceed by his sub-contractor (if any) as the case may be, the relevant policy or policies and premium receipts as and when required by the Engineer-in-Charge/Site-in-Charge.
	Contractor shall at his own expense cover all the workmen engaged under him under "Pradhan Mantri Surksha Bima Yojana (PMSBY)" and submit proof of the same to HPCL.
25.9	LABOUR AND LABOUR LAWS
25.9.1	The contractor shall at his own cost employ persons during the period of contract and the persons so appointed shall not be construed under any circumstances to be in the employment of the Owner.
25.9.2	All payments shall be made by the contractor to the labour employed by him in accordance with the various rules and regulations stated above. The contractor shall keep the Owner indemnified from any claims whatsoever inclusive of damages/costs or otherwise arising from injuries or alleged injuries to or death of a person employed by the contractor or damages or alleged damages to the property.
25.9.3	No labour below the age of eighteen years shall be employed on the work. The Contractor shall not pay less than what is provided under the provisions of the contract labour (Regulations and Abolition) Act, 1970 and the rules made thereunder and as may be amended from time to time. He shall pay the required deposit under the Act appropriate to the number of workman to be employed by him or through sub-contractor and get himself registered under the Act. He shall produce the required Certificates to the Owner before commencement of the work. The Owner recognises only the Contractor and not his sub-contractor under the provisions of the Act. The Contractor will have to submit daily a list of his workforce. He will also keep he wage register at the work site or/and produce the same to the Owner, whenever desired. A deposit may be taken by the Owner from the Contractor to be refunded only after the Owner is satisfied that all workmen employed by the Contractor have been fully paid for the period of work in Owner's premises at rates equal to or better than wages provided for under the Minimum Wages Act. The contractor shall be responsible and liable for any complaints that may arise in this regard and the consequences thereto.

25.9.4	The Contractor will comply with the provisions of the Employee's Provident Fund Act and the Family Pension Act as may be applicable and as amended from time to time.
25.9.5	The Contractor will comply with the provisions of the payment of Gratuity Act, 1972, as may be applicable and as amended from time to time.
25.10	IMPLEMENTATION OF APPRENTICES ACT, 1961
25.10.1	The Contractor shall comply with the provisions of the Apprentices Act, 1961 and the Rules and Orders issued thereunder from time to time. If he fails to do so, his failure will be a breach of the contract and the Engineer-in- Charge may, at his discretion, cancel the contract. The Contractor shall also be liable for any pecuniary liability arising on account of any violation by him of the provision of the Act.
25.11	MODEL RULES FOR LABOUR WELFARE
25.11.1	The Contractor shall at his own expenses comply with or cause be complied with Model rules for Labour Welfare as appended to those conditions or rules framed by the Government from time to time for the protection of health and for making sanitary arrangements for worker employed directly or indirectly on the works. In case the contractor fails to make arrangements as aforesaid the Engineer-in-Charge/Site-in-Charge shall be entitled to do so and recover the cost thereof from the contractor.
25.12	TRAINING OF APPRENTICES
25.12.1	The CONTRACTOR shall if so required by law, himself engage and/or procure engagement by his subcontractor(s) of such number of apprentices and for such period as may be required in this behalf in accordance with the provisions of the Apprentices Act, 1961 and any other act, rule and/or regulation having the force of law, regulating upon the employment of apprentices, and the CONTRACTOR shall be responsible at his own cost and initiative and without entitlement to any extra compensation or remuneration from the OWNER in this behalf, to fulfill all obligations of the employer under the said Act, including liability for payment to apprentices as required thereunder
25.13	HEALTH, SAFETY AND ENVIRONMENT (HSE) MANAGEMENT / SAFETY NORMS
25.13.1	In addition to the, OISD Guidelines-192, OISD Guideline-207(enclosed as Annexure-XIV), EIL specifications on Health, Safety and Environment (HSE) Management included in Technical specification and OWNER prescribed work permit system and job safety analysis procedure shall be followed before under taking any work inside OWNER's premises.
	Considering the above, the CONTRACTOR shall establish, document and maintain an effective Health, Safety and Environment (HSE) management system.
25.13.2	The Engineer-in Charge is responsible for ensuring that contractor conforms to the safety requirements as set forth in the Contract documents at all times. In the event of contractor violations of the safety requirements, and violations that result in physical injury or fatality, OWNER has the right to deduct from any payment due to contractor.
25.13.3	In the event of violation by the contractor of any stipulation mentioned in the above documents or violation of any statutory provisions related to HSE, EIL shall impose immediate stoppage of work without any time or cost implication to the OWNER, till the contractor takes remedial action to the satisfaction of up to Engineer in charge. The decision for stoppage of work shall be final and binding on the contractor.
25.13.4	The contractor may take suitable Insurance Policy with a view to cover themselves against the above penalties and submit a copy of the said policy to the Engineer-in-charge.
25.13.5	In case of conflict between the requirements of the various specifications and/or the requirements specified in the bidding document including penalties, the more stringent requirement shall be followed.
25.14	HEALTH, SAFETY AND ENVIRONMENT PLAN FOR SITE SUB-CONTRACTORS HPCL-VISAKHAPATNAM, R0 DATED: 31.03.2018 (Attached with tender document) to be strictly followed at site.
26.0	LIQUIDATED DAMAGE / PENALTY
26.1	Intermediate Milestones

26.1.1	In case delay in achieving the Milestone as mentioned in Clause 18.1.1 & 18.1.2 above, is solely attributable to the contractor, 0.5% per week of executable contact value*, limited to maximum 2% of executable contact value, will be withheld.
26.1.2	In case delay in achieving the Milestone as mentioned in Clause 18.1.3 & 18.1.4 above, is solely attributable to the contractor, 0.5% per week of executable contact value*, limited to maximum 3% of executable contact value, will be withheld.
26.1.3	Amount already withheld, if any against slippage of clause 18.1.1, 18.1.2, 18.1.3 & 18.1.4 above, shall be released only if there is no delay attributable to contractor in achievement of Milestone as mentioned in clause 18.1.5 above.
26.1.4	Amount 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.
26.1.5	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 identified intermediate milestone(s) shall be adjusted against LD or released as the case may be.
26.1.6	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 into 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.*
26.2	Overall Completion
26.2.1	Apart from the LD specified at clause no 26.1 above and other recoveries specified elsewhere in the tender, If the completion of work is delayed beyond the overall completion period as referred in cl. no. 18.1 above due to reasons attributable to the contractor, they shall pay to BHEL as penalty a sum @ 0.5 % of contract price per week of delay or part thereof subject to a maximum of 10 % of total contract price.
26.2.2	The liability shall not in any case exceed 10% (Ten Percent) of the contract value.
26.3	In case of LD recovery, the applicable GST shall also be recovered from you.
26.4	All other terms & conditions shall be as per GCC.
27.0	PERFORMANCE BOND
27.1	Performance bond is not applicable.
28.0	CERTIFICATE TOWARDS COMPLETION
28.1	The work under the scope of the contractor shall be deemed to have been completed in all respects only when so certified by BHEL / owner. The decision of BHEL in this regard shall be final and binding on the contractor.
29.0	CIVIL LABORATORY
29.1	Most of the civil construction materials like cement, reinforcement bars, aggregates, bricks, structural steel are available locally. The CONTRACTOR shall establish and maintain a civil material testing laboratory with necessary equipment (as per Annexure-A) for carrying on field tests during execution of contracts at no extra cost to BHEL / OWNER. All the test equipment deployed shall have valid test /calibration certificates traceable to international reference standards. Any testing required to be carried out at site as per joint discussion at site and technical specification have to be arranged by you for all the works at your own cost.
30.0	EXTENSION OF TIME FOR COMPLETION
30.1	If the completion of work as detailed in the scope of work gets delayed beyond the contract/ completion period due to reasons not attributable to contractor, the contractor shall make request for an extension of the contract and BHEL at its discretion may extend the contract. However such extension shall not entitle the vendor for price revision or price compensation as this being FIRM price contract.
30.2	Based on review of agreed & jointly signed L-2 / construction schedule (as enumerated in the tender), the balance work at the end of original contract period less the backlog attributable to the contractor

	shall be quantified, and the number of months of 'Time extension' required for completion of the same shall be jointly worked out. Within this period of 'Time extension', the contractor is bound to complete the portion of backlog attributable to contractor. Further 'Time extension' or 'Time extensions' at the end of previous extension shall be worked out similarly.	
30.3	However if any 'Time extension' is granted to the contractor to facilitate continuation of work and completion of contract, due to backlog attributable to the contractor alone, then it shall be without prejudice to the rights of BHEL to impose penalty / LD for the delays attributable to the contractor, in addition to any other actions BHEL may wish to take at the risk and cost of contractor.	
30.4	A joint program shall be drawn for the balance amount of work to be completed during the period of 'Time Extension', along with matching resources to be deployed by the contractor as per specified format. Review of the programme and record of shortfall shall be done.	
30.5	During the period of 'Time extension', contractor shall maintain their resources as per mutually agreed program	
30.6	At the end of total work completion as certified by BHEL engineer, and upon analysis of the total delay, the portion of time extensions attributable to (i) Contractor, (ii) Force majeure conditions, and (iii) BHEL, shall be worked out and shall be considered to be exhausted in the same order. The total period of time extensions shall be the sum of (i), (ii) and (iii) above and shall be equal to period between the scheduled date of completion and the actual date of completion of contract. LD shall be imposed/ levied for the portion of time extensions attributable solely to contractor after adjusting delay attributable to BHEL& Force majeure and recoverable from the dues payable to the contractor.	
31.0	PAYMENT FOR ADDITIONAL/EXTRA ITEMS FOR WORKS	
31.1	It shall be as per relevant clause of the GCC. However, "CPWD Schedule of Rates 2016" as mentioned in the price schedule will be considered.	
32.0	TOOLS & PLANTS (TO BE PROVIDED BY CONTRACTOR)	
32.1	Tentative list of T&P to be deployed by contractor for successful completion of work is detailed below. No T&P shall be provided by BHEL. Vendor has to submit the details of T & P to be mobilized at site before actual mobilization and get the approval from BHEL / Customer. Further calibration / fitness certificate to be submitted before actual use at site.	
32.2	It may be noted that the list is not exhaustive and is only for general guidance. The contractor is required to provide all necessary T&P (other than those specified to be provided by BHEL, if any) measuring (calibrated) instruments & handing equipment to maintain work progress for timely completion of total work as per contract. In case of project requirement, some activities may have to pre-pone. In such cases the contractor may have to deploy additional T&P. Quoted rate shall be inclusive of such emerging requirements. However, contractor shall submit deployment plan of all T&P along with tender bid.	
32.3	In the event of any failure on the part of the contractor to deploy T & P to sustain desired work progress, BHEL may at his discretion also terminate the contract on this ground and take out any or whole amount of the contract from the scope of the contractor. In the event of failure of contractor to deploy necessary and sufficient T&P/ IMTEs to maintain work progress, BHEL will be at liberty to arrange the same at the risk & cost of contractor including transportation cost of same from any of BHEL site/ other agency & charges as applicable shall be deducted from contractor's RA bill. Decision of BHEL in this regard will be final & binding on contractor.	
32.4	Following Major T&Ps to be arranged by contractor within the indicated time	
	Major T&P items	Deployment Schedule from LOI date
32.4.1	3 Nos. Hydraulic Pile Rig Crawler mounted	2 Nos. Within 30 days , 3rd within 45 days
32.4.2	Two Sets of Pile Load Test arrangement	1 Set. within 30 days balance 1 No. within 60 days
32.4.3	1 Nos. Hydraulic Excavator / Poclain	within 45 days

32.4.4	1 no. dozer	Within 60 days
32.4.5	5 Nos. dumper	3 Nos. within 45 days balance 2 Nos. as per requirement
32.4.6	1 no. vibromax /earth compactor	Within 90 days
32.4.7	1 No. Jack Hammer with Compressor	Within 60 days
32.4.8	2 no 18/20 T crawler crane	1st Within 30 days, 2nd within 45 days
32.4.9	1 no hydra (10 / 12 T capacity) or equivalent	Within 40 days
32.4.10	Welding rectifier (as per requirement)	Within 30 days
32.4.11.1	1 No. stationary automatic batching plant with printing facility (approx. 30 Cum/Hr.) – to be commissioned at site.	Within 30 days
32.4.11.2	1 No. stationary automatic batching plant with printing facility (approx. 15 Cum/Hr.) – to be commissioned at site.	Within 60 days
32.4.12	6 Nos. transit mixer (4.5/5/6 M3 capacity)	3 Nos. Within 30 days balance 3 Nos. within 60 days
32.4.13	1 no concrete pump (20 cum/ hr. min capacity)	Within 60 days
32.4.14	2 Nos. self-priming dewatering pump 5 HP (diesel/ electric)	1 no. Within 40 days balance 1 no. within 75 days
32.4.15	2 Nos. self-priming dewatering pump 3 HP or higher(diesel/ electric)	1 no. Within 30 days balance 1 no. within 75 days
32.4.16	2 Nos. reinforcement bending machine	1 no. Within 30 days balance 1 no. within 60 days
32.4.17	2 Nos. reinforcement cutting machine	1 no. Within 30 days balance 1 no. within 60 days
32.4.18	1 no compression testing machine (200 T cap)	Within 45 days
32.4.19	7 Nos. Concrete vibrator with adequate needle (3 Nos. diesel driven + 4 Nos. electric driven)	4 Nos. Within 45 days & 2 Nos. within 75 days
32.4.20	1 No. total station	Within 20 days
32.4.21	2 Nos. auto level & staff	Within 20 days
32.4.22	2 Nos. DG set 125KVA	Within 30 days
32.4.23	Concrete compressive strength testing moulds – 50 Nos.	Within 30 days
32.4.24	1 no trailer – 20T,	Within 50 days
32.4.25	4Nos. Water Tanker – 3000 Ltr. Capcity	2 nos. Within 30 days balance within 60 days
32.4.26	1 no drinking water tank – 2000 lit.	Within 20 days
32.4.27	Scaffolding Pipe 2m, 3m, 4m & 6m (Total – 6000m)	Within 45 days
32.4.26	Steel Shuttering Material 3000 Sqm	2000 Sqm. Within 45 days balance within 75 days
32.4.27	Portable fire extinguishers as below: Soda acid – 3 sets. Dry chemical powder – 3 sets CO2 – 3 sets. Water & sand bucket (4 buckets in one stand) – 3 sets. Fire hose with nozzle (50 M length) – 3 sets	Within 50 days from start of work
32.5	T&P shown in the above mentioned list are tentative based on planned progress requirement. Actual Mobilization schedule, based on front availability, drawings, construction schedule and material availability at site is to be reviewed and mutually agreed with CM, BHEL site periodically from time to time for mobilization of major T&Ps, and the same have to be adhered to. No change will be permitted without written approval of Construction Manager, BHEL site.	

	Further requirement will be reviewed time to time at site and contractor will provide additional T&P / equipment to ensure completion of entire work within schedule time without any financial implication to BHEL. All other T&Ps shall be provided by the contractor without any extra cost to BHEL. Vendor will give advance intimation & certification regarding capacity etc. prior to dispatch of heavy equipment.	
32.6	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. All T&P and IMTE shall be checked & certified by the appropriate authority for fitness of use. Contractor has to submit the relevant papers of each T&P and IMTE before entry in the project premises for clearance by BHEL / Customer.	
32.7	In the event of non mobilsation of any T&P by the successful bidder and as a result progress of work suffered, BHEL reserves the right to deduct suitable amount from the dues of the bidder, with assigning reasons thereof at the following rates:	
	Major T&P items	Recovery rates
32.7.1	Hydraulic Pile Rig Crawler mounted	Rs. 50000/- per week or part thereof
32.7.2	Pile Load Test arrangement	Rs. 10000/- per week or part thereof
32.7.3	Hydraulic Excavator / Poclain	Rs. 15000/- per week or part thereof
32.7.4	Dozer	Rs. 20000/- per week or part thereof
32.7.5	Dumper	Rs. 10000/- per week or part thereof
32.7.6	Vibromax / Earth compactor	Rs. 15000/- per week or part thereof
32.7.7	Jack Hammer with Compressor	Rs. 1000/- per week or part thereof
32.7.8	18/20 T crawler crane	Rs. 2000/- per week or part thereof
32.7.9	Hydra (10 / 12 T capacity) or equivalent	Rs. 3000/- per week or part thereof
32.7.10	Welding rectifier (as per requirement)	Rs. 700/- per week or part thereof
32.7.11.1	Stationary automatic batching plant	Rs. 50000/- per week or part thereof
32.7.11.2	Transit mixer (4.5/5/6 M3 capacity)	Rs. 50000/- per week or part thereof
32.7.12	Concrete pump (20 cum/ hr. min capacity) or Truck mounted concrete mixer cum pump along with placing boom minimum 36 m Length	Rs. 10000/- per week or part thereof
32.7.13	Self-priming dewatering pump 10 HP (diesel/ electric)	Rs. 200/- per week or part thereof
32.7.14	Self-priming dewatering pump 5 HP (diesel/ electric)	Rs. 300/- per week or part thereof
32.7.15	Reinforcement bending machine	Rs. 1000/- per week or part thereof
32.7.16	Reinforcement cutting machine	Rs. 1000/- per week or part thereof
32.7.17	Compression testing machine (200 T capacity)	Rs. 2000/- per week or part thereof
32.7.18	Concrete vibrator with adequate needle	Rs. 500/- per week or part thereof
32.7.19	Total station	Rs. 500/- per week or part thereof
32.7.20	Auto level & staff	Rs. 300/- per week or part thereof
32.7.21	DG set 125 KVA	Rs. 15000/- per week or part thereof
32.7.22	Concrete compressive strength testing moulds	Rs. 100/- per week or part thereof
32.7.23	Trailer – 20T,	Rs. 5000/- per week or part thereof
32.7.24	Water Tanker – 3000 Ltr. Capcity	Rs. 5000/- per week or part thereof
32.7.25	Drinking water tank – 2000 lit.	Rs. 500/- per week or part thereof
32.7.26	Portable fire extinguishers as below: Soda acid – 3 sets. Dry chemical powder – 3 sets CO2 – 3 sets. Water & sand bucket (4 buckets in one stand) – 3 sets. Fire hose with nozzle (50 M length) – 3 sets	Rs. 1000/- per week or part thereof
32.7.27	Any other instrument	As per discretion of the engineer

33.0	OTHER TERMS
33.1	The above TCC shall be read in conjunction with annexure – 1, 2.
32.2	Annexure - 3 to be filled up and submitted along with tender.
33.3	Safety norms to be followed as per clause 25.0 above & Annexure -1. In case of any ambiguity between clauses, most stringent clause to be followed.
33.4	All other term & conditions of this specification shall be governed by the pertinent provisions of GCC and other volumes of this tender, as applicable.

ANNEXURE- A

LIST OF EQUIPMENTS FOR CIVIL SITE LABORATORY

	CONCRETE TESTING EQUIPMENT			
SL NO.	NAME OF TEST	NAME OF EQUIPMENT	SIZE OF EQIPMENT	IS REF.
1	Initial & final setting time, Consistency of cement	Vicat Apparatus with desk pot	Standard	IS 5513
2	Aggregate crushing value test	Crushing value apparatus	Standard	IS 2386
3	Flakiness index	Thickness gauge for measuring flakiness index	Standard	IS 2386
4	Elongation Index	Elongation gauge	Standard	IS 2386
5	Bulk density, voids and bulking apparatus	Measuring cylinders	3, 5,10 & 15 liters cylinders	
6	Concrete Compressive test	Digital / analog Compressive Testing Machine with 2000 KN capacity.	2000 KN capacity	IS 2505
7	Cement motor cube casting	Mortar Cube mould	70.6 x 70.6 x 70.6 mm, minimum 10 sets desired.	IS 10086
8	Concrete Cube casting	Concrete Cube Mould	150x150x150mm, minimum 75 sets desired considering major concreting activity.	IS 10086
9	Workability of concrete	Slump cone	Standard, at least 04 nos.	IS 456
10	Specific gravity of aggregates	Pycnometer	Standard, at least 02 nos.	IS 383
11	Cement mortar cube vibrating	Motorised vibration machine for cement testing	Standard	IS 4031
12	Course aggregate Sieve analysis (Concrete & Road Works)	Sieve set	450mm dia. GI Frames Size: 125 mm, 90 mm, 75 mm, 63 mm, 53 mm, 40 mm, 20 mm, 16 mm, 12.5 mm, 10 mm, 4.75 mm, Pan and cover	IS 383
13	Fine aggregate sieve analysis	Sieve set	200 mm dia. Brass sieves; Size 4.75 mm, 2.36 mm, 1.18 mm 600 micron, 300 micron, 150 micron, 75 micron, 75 micron, Pan and cover	IS 383
14	Silt content check	Sand silt content beaker	Standard	

SL NO.	NAME OF TEST	NAME OF EQUIPMENT	SIZE OF EQIPMENT	IS REF.
	Soil Testing Equipment (Levelling & Grading)			
1	Core Cutter test	core cutter apparatus	Rammer, 6 nos. of std. core cutter mould, dolly	IS 2720
2	Proctor density test	Std. proctor Compaction apparatus	Standard	IS 2720
3	Moisture Content	Rapid moisture meter	Standard, atleast 04 nos.	IS 2720

	Process Control Accessories			
1	Hot air oven	Temperature range 50° C to 300° C	600x600x600mm (min. .size)	
2	Electronic balance	3 nos.	600gx0.01g, 10 Kg and 50 kg	
3	Physical balance	5 kg capacity	Weights upto 5 kg	
4	Thermometer 3 Nos.	Temperature range 0° C to 150° C	Digital	
5	Measuring jars	2 nos. set of each size	100ml, 200ml, 500ml & 1000 ml	
6	Gauging trowel	4 nos.	100mm & 200 mm with wooden handle	
7	Spatula	2 nos. each size	100mm & 200 mm with long blade wooden handle	
8	Stainless steel scoop	2 nos. each	2 kg and 5 kg	
9	Vernier calipers	2 nos. each	12" and 6" Sizes	
10	Digital pH meter	01 nos.	.01 mm least count	
11	Digital micrometer	01 nos.	0.01 mm least count	
12	GI tray	02 nos. each	600x450x50mm, 450x300x40mm, 300x250x40mm	
13	Screw Gauge	02 nos.	0.1 mm-10mm, Least count 0.05	

GEOTECHNICAL DATA

OF

CAPTIVE POWER PLANT (CPP) PACKAGE

TENDER NO. B016-606-02-43-PG-T-7810

PROJECT : VISAKH REFINERY MODERNISATION PROJECT

UNIT : 606

OWNER : HPCL VISAKHAPATNAM

PMC : EIL

JOB NO. : B016

Rev. No	Date	Purpose	Prepared by	Checked by	Approved by
0	17.05.17	ISSUED FOR BID	SR	GK	VKP

1.0 GENERAL

M/s. Hindustan Petroleum Corporation Limited-Visakhapatnam Refinery proposes to construct various facilities under Captive Power Plant Package to cater the requirements of Visakhapatnam Refinery, Vizag.

Area earmarked for proposed unit was cleared by dismantling/demolishing of various structures/facilities viz switch yard, ware house etc. excluding the piles.

Subsoil data and foundation recommendations included herein are based on soil investigations carried out in and around the proposed area by M/s. J.J.A. Infra Projects Ltd during November 2015 to April 2016. Borehole logs available for the proposed area are enclosed for reference. **Bidder shall carry out confirmatory soil investigations to check and confirm the soil conditions and/or to develop additional soil data for foundation design purposes and submit the report to PMC/Owner for review.** However, the recommended bearing capacities included herein shall not be exceeded in any case. Notwithstanding the information given herein, no extra claim on time and/or cost shall be entertained by owner in case of change in any data due to subsoil variations.

2.0 SCOPE OF WORK

2.1 The Bidder shall carry out confirmatory Geotechnical investigation consisting of minimum 5 nos. boreholes of 20m deep, 2 Nos. electrical resistivity tests & any other necessary tests as per relevant IS codes. Bidder shall submit Geotechnical investigation specification and scheme to Owner/PMC for their review.

2.2 A ***Foundation Design Basis/Comprehensive Geotechnical Recommendation Document*** shall be prepared by the bidder based on the available information and findings of confirmatory soil investigation **duly considering prevailing site conditions**, clearly stating type of foundations for all structures/facilities covered under Proposed package giving all back-up calculations and the same shall be submitted to PMC/Owner for their review/approval before execution.

2.3 It is incumbent upon the bidder to seek all technical clarifications concerning the job prior to the bid preparation. No such clarifications shall be entertained after the award of job. Notwithstanding this, the decision of Engineer-in-Charge, in case of any disputes shall be final. However, it must be clearly understood by the contractor that any extra claim and/or time extension shall not be granted under any circumstances.

3.0 GROUND TOPOGRAPHY

For details regarding finished ground level and depth of cut/fill, reference may be made to civil documents/drawings attached elsewhere.

4.0 SUB-SOIL PROFILE

Available borehole logs of DBH-3, DBH-4, DBH-5, DBH-7, SBH-1, SBH-2 & Cross hole test result of CHT-1 carried out in and around the proposed areas are enclosed for reference in Annexure-I.

5.0 GROUND WATER TABLE

The ground water table is encountered to vary from 0.25 m to 1.30 m below existing ground level (EGL[1]). However, design ground water table shall be considered at finished ground level (FGL).

6.0 FOUNDATION RECOMMENDATIONS

6.1 Major Structures

Considering the prevailing sub soil conditions in the proposed areas, all major foundations shall be supported on **Bored cast-in-situ pile socketed into rock**.

Foundation design basis/comprehensive Geotechnical recommendation document shall include details of piles such as diameter of pile, length of pile below cut-off level, safe load carrying capacities in all the three modes (i.e., axial compression, lateral and uplift) and pile reinforcement etc. with all back up calculations. Pile capacities shall be established at site by conducting initial pile load tests on test piles as per IS 2911 Part-IV before commencement of job piling works. Routine pile load tests shall be conducted on job piles as per IS 2911 Part-IV.

6.2 Minor/ Lightly Loaded Structures Not Sensitive To Settlement

A foundation pit of 1.25m deep shall be excavated having size more than 250mm (all round) than the foundation dimensions. Base of the foundation pit shall be compacted to 95% of maximum laboratory density as per IS 2720 Part-VIII before filling the pit for 500mm thick Sand-Gravel mix (1:1) laid in layers of 200mm thickness and compacted to 85% relative density as per IS:2720 Part-XIV. On this compacted fill, Foundation for these structures may be placed at a depth of 750mm from FGL for foundation width up to 2.50m and for pressure not exceeding 5.0 T/m^2.

However, if any loose/soft soil is encountered at the foundation depth, the same shall be completely removed and replaced with PCC.

Minimum width of foundation shall be 1.0m. Back filling after casting of foundations shall be done as per the clause no. 11.0

7.0 UNDER GROUND PIPING

The following parameters are given for design of underground piping:

1.	Modulus of Elasticity (E)	:	50~65 kg/cm^2
2.	Density of moist soil (γ_b)	:	1700 kg/m^3
3.	Kμ factor	:	0.16

8.0 DEEP EXCAVATIONS

In case of deep excavation and during execution of shallow foundations, special measures like side supports/proper slope and appropriate dewatering system (i.e. well point, deep tube well etc.) may have to be resorted to. It shall be contractor's

[1] EGL - Ground levels as existed during soil investigation works.

responsibility to mobilize necessary equipment to carryout deep excavations wherever required without any extra cost and time implication to the owner.

9.0 ROAD AND PAVEMENT

For laying road and pavement crust, formation shall be prepared as per IRC-37. Design CBR shall be established by contractor by confirmatory soil investigation. Proper cambering and top sealing of the road and pavement shall be provided to restrict the ingress of rain-water in sub-grade

10.0 AGGRESSIVENESS OF SOIL AND GROUND WATER TO FOUNDATION CONCRETE

As per the available information, ground water and soil samples shows maximum Sulphate content are within permissible limits while chloride content are very high. To counteract the harmful effects of chloride, Portland slag cement may be used for all sub-structure concreting work with minimum cement content of 370 kg/m^3. Minimum grade of concrete shall be M-35. However, for piling works minimum cement content shall not be less than 400 kg/m^3. The external treatment for protection of shallow concrete foundation shall be done by painting the sides & bottom (on lean concrete) of the foundations with protective Coal Tar Epoxy coating. Minimum concrete cover shall be 15mm over and above the normal cover.

11.0 BACK FILLING

Soil available in this plant area “except marine clay” is suitable for back filling. The back filling in foundations may be done with suitable excavated soil as per direction of Engineer-in-charge. This shall be compacted in layers not exceeding 200mm thickness to 90% Standard Proctor Density.

ANNEXURE – I
Field & Laboratory test Results

J.J.A.INFRA PROJECTS (P) LTD

PLOT NO. 21, GROUND FLOOR, DASAPALLA HILLS, VISAKHAPATNAM-3.

Project : Geo-Technical Survey for Proposed Construction of Visakh Refinery modernization project in Visakh Refinery, Visakhapatnam, Andhra Pradesh.
Location : Proposed Integrated ETP in lieu of existing ETP presently falling in open area.
Borehole : DBH-3
Ground Water Table : 1.00m below existing Ground level.

Date of Commencement : 31.12.2015
Date of Completion : 1.1 .2015
Ground R.L. : +4.113
Coordinates : N 1098
E 578

BORELOG

Ground R.L		Depth Below G.L (m)		Visual Description of strata	Thickness of Strata (m)	Type of sample	Depth at which sample collected		Depth at which SPT conducted		SPT			N-Value	Core recovery %	RQD %	Remarks
From	To	From	To				GRL	GL (m)	GRL	GL (m)	15 cm	30 cm	45 cm				
+4.113	+3.113	0.00	1.00	Filled up soil	1.00	SPT			+3.613	0.50	2	3	4	7			
+3.113	+2.113	1.00	2.00	Blackish / Brownish clay with pebbles	1.00	SPT			+2.113	2.00	3	4	4	8			
+2.113	+0.613	2.00	3.50	Brownish clay with silt & sand	1.50	UDS SPT	+1.113	3.00	+0.613	3.50	1	1	1	2			
+0.613	+0.113	3.50	4.00	Blackish soft clay	0.50												

UDS – Undisturbed Sample DS – Disturbed Sample SPT – Standard Penetration Test pen – Penetration

J.J.A.INFRA PROJECTS (P) LTD

PLOT NO. 21, GROUND FLOOR, DASAPALLA HILLS, VISAKHAPATNAM-3.

Project : Geo-Technical Survey for Proposed Construction of Visakh Refinery modernization project in Visakh Refinery, Visakhapatnam, Andhra Pradesh.
Date of Commencement : 31.12.2015
Date of Completion : 1.1.2015
Location : Proposed Integrated ETP in lieu of existing ETP presently falling in open area.
Ground R.L. : +4.113
Borehole : DBH-3
Coordinates : N 1098, E 578
Ground Water Table : 1.00m below existing Ground level.

Ground R.L		Depth Below G.L (m)		Visual Description of strata	Thickness of Strata (m)	Type of sample	Depth at which sample collected		Depth at which SPT conducted		SPT			N-Value	Core recovery %	RQD %	Remarks
From	To	From	To				GRL	GL (m)	GRL	GL (m)	15 cm	30 cm	45 cm				
+0.113	-2.387	4.00	6.50	Blackish stiff clay	2.50	UDS SPT SPT	-0.387	4.50	-0.887 -2.387	5.00 6.50	5 9	10 11	15 22	25 33			
-2.387	-3.887	6.50	8.00	Brownish clay with soft disintegrated rock	1.50	SPT			-3.887	8.00	6	10	24	34			
-3.887	-4.887	8.00	9.00	Soft disintegrated rock with clay binder	1.00	SPT			-4.887	9.00	100(1cm pen)			>100			
-4.887	-6.037	9.00	10.15	Weathered rock	1.15	SPT			-6.037	10.15	100(no pen)			>100	10	NIL	

UDS – Undisturbed Sample DS – Disturbed Sample SPT – Standard Penetration Test pen. – Penetration

J.J.A.INFRA PROJECTS (P) LTD

PLOT NO. 21, GROUND FLOOR, DASAPALLA HILLS, VISAKHAPATNAM-3.

Project : Geo-Technical Survey for Proposed Construction of Visakh Refinery modernization project in Visakh Refinery , Visakhapatnam , Andhra Pradesh .
Location : Proposed Integrated ETP in lieu of existing ETP presently falling in open area.
Borehole : DBH-3
Ground Water Table : 1.00m below existing Ground level.

Date of Commencement : 31.12.2015
Date of Completion : 1.1 .2015
Ground R.L. : +4.113
Coordinates : N 1098
E 578

Ground R.L		Depth Below G.L (m)		Visual Description of strata	Thickness of Strata (m)	Type of sample	Depth at which sample collected		Depth at which SPT conducted		SPT			N-Value	Core recovery %	RQD %	Remarks
From	To	From	To				GRL	GL (m)	GRL	GL (m)	15 cm	30 cm	45 cm				
-6.037	-7.887	10.15	12.00	Hard weathered rock	3.35	SPT			-7.887	12.00	100(no pen)			>100	46	12	
-7.887	-9.387	12.00	13.50			SPT			-9.387	13.50	100(no pen)			>100	35.6	11	

Borehole terminated at 13.50m below G.L. (i.e.) at R.L.-9.387

UDS – Undisturbed Sample DS – Disturbed Sample SPT – Standard Penetration Test pen. – Penetration

Project : Geo-Technical Survey for Proposed Construction of Visakh Refinery modernization project in Visakh Refinery , Visakhapatnam , Andhra Pradesh .

Location : Proposed Integrated ETP in lieu of existing ETP presently falling in open area.

DRAWING REF NO. – 1)A-758-000-81-41-0001 REV1.
2)A-758-00081-41-3002 REV 2.

IDENTIFICATION & ENGINEERING PROPERTIES OF SOIL

Sl No.	BH No	Type of sample	RL at which sample collected	Depth at which sample collected (m)	Natural moisture content (%)	Bulk Density (g/cc)	Dry Density (g/cc)	Gradation Analysis				Consistency Limits			Box Shear Test		Triaxial Test			UCC (kg/cm²)	ISC
								Gravel (%)	Sand (%)	FINES		Liquid Limit (%)	Plastic Limit (%)	Plasticity Index (%)	C (kg/cm²)	ϕ degree	C (kg/cm²)	ϕ degree			
										Silt (%)	Clay (%)										
1	DBH-3	UDS	+1.113	3.00	22.75	2.06	1.68	5	23	42	30	47	26	21	-	-	0.13	7		0.25	CI
2	DBH-3	UDS	-0.387	4.50	17.30	1.98	1.69	3	27	41	29	41	22	19	-	-	0.21	15		0.43	CI
3	DBH-3	SPT	-3.887	8.00	6.55	-	-	29	49	22		15	8	7	-	-	-	-		-	SM of SDR

UDS – Undisturbed Sample DS – Disturbed Sample SPT – Standard Penetration Test SDR – Soft Disintegrated Rock

J.J.A.INFRA PROJECTS (P) LTD

PLOT NO. 21, GROUND FLOOR , DASAPALLA HILLS, VISAKHAPATNAM-3.

Project : Geo-Technical Survey for Proposed Construction of Visakh Refinery modernization project in Visakh Refinery , Visakhapatnam , Andhra Pradesh .
Location : Proposed Boiler house at existing project ware house area
Borehole : DBH -4
Ground Water Table : 0.25m below existing Ground level.

Date of Commencement : 25.12.2015
Date of Completion : 28.12.2015
Ground R.L. : +2.870
Coordinates : N 1120
E 642 (Shifted 10m North)

BORELOG

Ground R.L.		Depth Below G.L. (m)		Visual Description of strata	Thickness of Strata (m)	Type of sample	Depth at which sample collected		Depth at which SPT conducted		SPT			N-Value	Core recovery %	RQD %	Remarks
From	To	From	To				GRL	GL (m)	GRL	GL (m)	15 cm	30 cm	45 cm				
+2.870	+1.920	0.00	0.95	Debris & Boulders with soil (Filled up soil)	0.95	SPT/ DS			+2.370	0.50	11	10	7	17			
+1.920	+0.720	0.95	2.15	Brownish clay with silt & sand	1.20	SPT / DS			+0.870	2.00	4	3	3	6			
+0.720	-0.030	2.15	2.90	Blackish clay with fine sand	0.75	UDS	+0.370	2.50									

UDS – Undisturbed Sample DS – Disturbed Sample SPT – Standard Penetration Test pen. – Penetration

DRAWING REF NO. – 1)A-758-000-81-41-0001 REV1.
2)A-758-00081-41-3002 REV 2.

J.J.A.INFRA PROJECTS (P) LTD

PLOT NO. 21, GROUND FLOOR , DASAPALLA HILLS, VISAKHAPATNAM-3.

Project : Geo-Technical Survey for Proposed Construction of Visakh Refinery modernization project in Visakh Refinery , Visakhapatnam , Andhra Pradesh .
Location : Proposed Boiler house at existing project ware house area
Borehole : DBH -4
Ground Water Table : 0.25m below existing Ground level.

Date of Commencement : 25.12.2015
Date of Completion : 28.12.2015
Ground R.L. : +2.870
Coordinates : N 1120
E 642 (Shifted 10m North)

Ground R.L. From	Ground R.L. To	Depth Below G.L. (m) From	Depth Below G.L. (m) To	Visual Description of strata	Thickness of Strata (m)	Type of sample	Depth at which sample collected GRL	Depth at which sample collected GL (m)	Depth at which SPT conducted GRL	Depth at which SPT conducted GL (m)	SPT 15 cm	SPT 30 cm	SPT 45 cm	N-Value	Core recovery %	RQD %	Remarks
-0.030		2.90				SPT/ DS			-0.630	3.50	1	1	1	2			
						UDS	-1.630	4.50									
				Blackish soft clay (Marine clay)	4.60	SPT/ DS			-2.130	5.00	2	1	2	3			
	-4.630		7.50			SPT/ DS			-4.130	7.00	1	2	2	4			
-4.630		7.50				SPT/ DS			-4.630	7.50	1	3	8	11			
				Blackish / Grayish stiff clay	1.55	SPT/ DS			-5.630	8.50	2	4	10	14			
	-6.180		9.05			SPT/ DS			-6.180	9.05	25	32	100(5cm pen)	>100			

UDS – Undisturbed Sample DS – Disturbed Sample SPT – Standard Penetration Test pen. – Penetration

DRAWING REF NO. – 1)A-758-000-81-41-0001 REV1.
2)A-758-00081-41-3002 REV 2.

J.J.A.INFRA PROJECTS (P) LTD

PLOT NO. 21, GROUND FLOOR , DASAPALLA HILLS, VISAKHAPATNAM-3.

Project : Geo-Technical Survey for Proposed Construction of Visakh Refinery modernization project in Visakh Refinery , Visakhapatnam , Andhra Pradesh .
Location : Proposed Boiler house at existing project ware house area
Borehole : DBH -4
Ground Water Table : 0.25m below existing Ground level.

Date of Commencement : 25.12.2015
Date of Completion : 28.12.2015
Ground R.L. : +2.870
Coordinates : N 1120
E 642 (Shifted 10m North)

Ground R.L.		Depth Below G.L. (m)		Visual Description of strata	Thickness of Strata (m)	Type of sample	Depth at which sample collected		Depth at which SPT conducted		SPT			N-Value	Core recovery %	RQD %	Remarks
From	To	From	To				GRL	GL (m)	GRL	GL (m)	15 cm	30 cm	45 cm				
-6.180	-8.480	9.05	11.35	Clay with gravel & cobbles	2.30												
-8.480	-9.080	11.35	11.95	Soft disintegrated rock with lime nodules	0.60	SPT/ DS			-9.080	11.95	100(10cm pen)			>100			
-9.080	-10.430	11.95	13.30	Weathered rock	1.35	SPT			-10.430	13.30	100(8cm pen)			>100	28	Nil	
-10.430	-11.130	13.30	14.00	Highly weathered rock	0.70	SPT			-11.130	14.00	100(no pen)			>100	6	Nil	

UDS – Undisturbed Sample DS – Disturbed Sample SPT – Standard Penetration Test pen. – Penetration

DRAWING REF NO. – 1)A-758-000-81-41-0001 REV1.
2)A-758-00081-41-3002 REV 2.

J.J.A.INFRA PROJECTS (P) LTD

PLOT NO. 21, GROUND FLOOR , DASAPALLA HILLS, VISAKHAPATNAM-3.

Project : Geo-Technical Survey for Proposed Construction of Visakh Refinery modernization project in Visakh Refinery , Visakhapatnam , Andhra Pradesh .
Location : Proposed Boiler house at existing project ware house area
Borehole : DBH -4
Ground Water Table : 0.25m below existing Ground level.

Date of Commencement : 25.12.2015
Date of Completion : 28.12.2015
Ground R.L. : +2.870
Coordinates : N 1120
E 642 (Shifted 10m North)

Ground R.L.		Depth Below G.L. (m)		Visual Description of strata	Thickness of Strata (m)	Type of sample	Depth at which sample collected		Depth at which SPT conducted		SPT			N-Value	Core recovery %	RQD %	Remarks
From	To	From	To				GRL	GL (m)	GRL	GL (m)	15 cm	30 cm	45 cm				
-11.130	-13.080	14.00	15.95	Weathered rock	1.95	SPT			-13.080	15.95	100(no pen)			>100	35	12	

Borehole terminated at 15.95m below G.L. (i.e.) at R.L.-13.080

UDS – Undisturbed Sample DS – Disturbed Sample SPT – Standard Penetration Test pen. – Penetration

DRAWING REF NO. – 1)A-758-000-81-41-0001 REV1.
2)A-758-00081-41-3002 REV 2.

Project : Geo-Technical Survey for Proposed Construction of Visakh Refinery modernization project in Visakh Refinery , Visakhapatnam , Andhra Pradesh .

location : Proposed BOILER HOUSE in lieu of existing project WARE HOUSE (DBH- 4)

DRAWING REF NO. – 1)A-758-000-81-41-0001 REV1.
2)A-758-00081-41-3002 REV 2.

IDENTIFICATION & ENGINEERING PROPERTIES OF SOIL

Sl No.	BH No	Type of sample	RL at which sample collected	Depth at which sample collected (m)	Natural moisture content (%)	Bulk Density (g/cc)	Dry Density (g/cc)	Gradation Analysis				Consistency Limits			Box Shear Test		Triaxial Test		UCC (kg/cm²)	ISC
								Gravel (%)	Sand (%)	FINES		Liquid Limit (%)	Plastic Limit (%)	Plasticity Index (%)	C (kg/cm²)	ϕ degree	C (kg/cm²)	ϕ degree		
										Silt (%)	Clay (%)									
1	DBH-4	UDS	+0.370	2.50	18.95	-	-	0	63	37		33	17	16	-	-	0.15	8	-	CL
2	DBH-4	DS/SPT	-0.630	3.50	38.7	2.15	1.55	1	4	95		58	31	27	-	-	-	-	--	CH
3	DBH-4	UDS	-1.630	4.50	29.25	2.05	1.58	2	29	69		52	29	23	-	-	0.11	6	-	CH
4	DBH-4	DS/SPT	-5.630	8.50	12.45	-	-	7	38	55		43	22	21	-	-	-	-	-	Cl

UDS – Undisturbed Sample DS – Disturbed Sample SPT – Standard Penetration Test SDR – Soft Disintegrated Rock

J.J.A.INFRA PROJECTS (P) LTD

PLOT NO. 21, GROUND FLOOR , DASAPALLA HILLS, VISAKHAPATNAM-3.

Project : Geo-Technical Survey for Proposed Construction of Visakh Refinery modernization project in Visakh Refinery , Visakhapatnam , Andhra Pradesh .
Location : Near existing sub-Station (Opposite to Fire & Safety vehicles parking area)
Borehole : DBH-5
Ground Water Table : 1.05m below existing Ground level.

Date of Commencement : 26.3.2016
Date of Completion : 29.3.2016
Ground R.L. : +3.160
Coordinates : N +1165
E +744

BORELOG

Ground R.L.		Depth Below G.L. (m)		Visual Description of strata	Thickness of Strata (m)	Type of sample	Depth at which sample collected		Depth at which SPT conducted		SPT			N-Value	Core recovery %	RQD %	Remarks
From	To	From	To				GRL	GL (m)	GRL	GL (m)	15 cm	30 cm	45 cm				
+3.160	+1.160	0.00	2.00	Reddish soil with pebbles (Filled up soil)	2.00	DS/SPT DS/SPT			+2.60 +1.160	0.50 2.00	100(6cm pen) 2	3	3	>100 6			
+1.160	-1.590	2.00	4.75	Brownish / Blackish clay (Marine clay)	2.75	DS/SPT UDS	-1.090	4.25	-0.440	3.60	1	0	1	1			
-1.590	-2.840	4.75	6.00	Blackish stiff clay	1.25	DS/SPT DS/SPT			-1.840 -2.840	5.00 6.00	4 6	5 5	8 6	13 11			
-2.840	-5.540	6.00	8.70	Blackish clay with pebbles	3.70	DS/SPT DS/SPT			-4.340 -5.540	7.50 8.70	5 7	9 10	12 14	21 24			

UDS – Undisturbed Sample DS – Disturbed Sample SPT – Standard Penetration Test pen. – Penetration

DRAWING REF NO. – 1)A-758-000-81-41-0001 REV1.
2)A-758-00081-41-3002 REV 2.

J.J.A.INFRA PROJECTS (P) LTD

PLOT NO. 21, GROUND FLOOR , DASAPALLA HILLS, VISAKHAPATNAM-3.

Project : Geo-Technical Survey for Proposed Construction of Visakh Refinery modernization project in Visakh Refinery , Visakhapatnam , Andhra Pradesh .
Location : Near existing sub-Station (Opposite to Fire & Safety vehicles parking area)
Borehole : DBH-5
Ground Water Table : 1.05m below existing Ground level.

Date of Commencement : 26.3.2016
Date of Completion : 29.3.2016
Ground R.L. : +3.160
Coordinates : N +1165
E +744

Ground R.L.		Depth Below G.L. (m)		Visual Description of strata	Thickness of Strata (m)	Type of sample	Depth at which sample collected		Depth at which SPT conducted		SPT			N-Value	Core recovery %	RQD %	Remarks
From	To	From	To				GRL	GL (m)	GRL	GL (m)	15 cm	30 cm	45 cm				
-5.540	-7.340	8.70	10.50	Blackish clay with cobbles	1.80	DS/SPT			-7.340	10.50	19	41	50(2cm pen)	>50			
-7.340	-7.840	10.50	11.00	Soft disintegrated rock with lime nodules	0.50	DS/SPT			-7.840	11.00	50(5cm pen)			>50	8	Nil	
-7.840	-9.340	11.00	12.50	Weathered rock	3.95	DS/SPT			-9.340	12.50	50(3cm pen)			>50	28	Nil	
-9.340	-11.140	12.50	14.30			DS/SPT			-11.140	14.30	50(2cm pen)			>50	39	15	
-11.140	-11.790	14.30	14.95			DS/SPT			-11.790	14.95	50(no pen)			>50	30	Nil	

Borehole terminated at 14.95m below G.L. (i.e.) at R.L.-11.790

UDS – Undisturbed Sample DS – Disturbed Sample SPT – Standard Penetration Test pen. – Penetration

DRAWING REF NO. – 1)A-758-000-81-41-0001 REV1.
2)A-758-00081-41-3002 REV 2.

Project : Geo-Technical Survey for Proposed Construction of Visakh Refinery modernization project in Visakh Refinery , Visakhapatnam , Andhra Pradesh .

Location : Near existing sub-Station (Opposite to Fire & Safety vehicles parking area)

DRAWING REF NO. – 1)A-758-000-81-41-0001 REV1.
2)A-758-00081-41-3002 REV 2.

IDENTIFICATION & ENGINEERING PROPERTIES OF SOIL

Sl No.	BH No	Type of sample	RL at which sample collected	Depth at which sample collected (m)	Natural moisture content (%)	Bulk Density (g/cc)	Dry Density (g/cc)	Gradation Analysis			Consistency Limits			Box Shear Test		Triaxial Test			ISC
								Gravel (%)	Sand (%)	FINES		Liquid Limit (%)	Plastic Limit (%)	Plasticity Index (%)	C (kg/cm²)	ϕ degree	C (kg/cm²)	ϕ degree	
										Silt (%)	Clay (%)								
1	DBH-5	DS/SPT	+1.160	2.00	30.45	-	-	0	26	74		41	23	18	-	-	-	-	CI
2	DBH-5	UDS	-1.090	4.25	41.20	2.23	1.58	0	11	53	36	52	27	25	-	-	0.11	5	CH
3	DBH-5	DS/SPT	-4.340	7.50	18.65	-	-	8	32	36	24	43	24	19	-	-	-	-	CI

UDS – Undisturbed Sample DS – Disturbed Sample SPT – Standard Penetration Test SDR – Soft Disintegrated Rock

J.J.A.INFRA PROJECTS (P) LTD

PLOT NO. 21, GROUND FLOOR , DASAPALLA HILLS, VISAKHAPATNAM-3.

Project : Geo-Technical Survey for Proposed Construction of Visakh Refinery modernization project in Visakh Refinery , Visakhapatnam , Andhra Pradesh .

Location : North side of CPP/GTG-2 Area.

Borehole : DBH-7

Ground Water Table : 1.25m below existing Ground level.

Date of Commencement : 5.4.2016
Date of Completion : 7.4.2016
Ground R.L. : +3.117
Coordinates : N +1152
E +881

BORELOG

Ground R.L. From	Ground R.L. To	Depth Below G.L. (m) From	Depth Below G.L. (m) To	Visual Description of strata	Thickness of Strata (m)	Type of sample	Depth at which sample collected GRL	Depth at which sample collected GL (m)	Depth at which SPT conducted GRL	Depth at which SPT conducted GL (m)	SPT 15 cm	SPT 30 cm	SPT 45 cm	N-Value	Core recovery %	RQD %	Remarks
+3.117	+2.317	0.00	0.80	Filled up soil with boulders & cobbles	0.80	SPT			+2.617	0.50	50(2cm pen)			>50			
+2.317	+1.117	0.80	2.00	Fine grained sand	1.20	SPT			+1.117	2.00	3	4	10	14			
+1.117	-0.383	2.00	3.50	Blackish / Brownish medium stiff clay (marine clay)	1.50	SPT			-0.383	3.50	2	2	5	7			

UDS – Undisturbed Sample DS – Disturbed Sample SPT – Standard Penetration Test pen. – Penetration

J.J.A.INFRA PROJECTS (P) LTD

PLOT NO. 21, GROUND FLOOR , DASAPALLA HILLS, VISAKHAPATNAM-3.

Project : Geo-Technical Survey for Proposed Construction of Visakh Refinery modernization project in Visakh Refinery , Visakhapatnam , Andhra Pradesh .
Location : North side of CPP/GTG-2 Area.
Borehole : DBH-7
Ground Water Table : 1.25m below existing Ground level.

Date of Commencement : 5.4.2016
Date of Completion : 7.4.2016
Ground R.L. : +3.117
Coordinates : N +1152
E +881

Ground R.L.		Depth Below G.L. (m)		Visual Description of strata	Thickness of Strata (m)	Type of sample	Depth at which sample collected		Depth at which SPT conducted		SPT			N-Value	Core recovery %	RQD %	Remarks
From	To	From	To				GRL	GL (m)	GRL	GL (m)	15 cm	30 cm	45 cm				
-0.383		3.50		Blackish soft clay (marine clay)	5.40	UDS	-1.383	4.50									
						SPT			-1.983	5.10	1	0	1	1			
						SPT			-3.383	6.50	1	1	1	2			
	-5.783		8.90			SPT			-5.383	8.50	4	7	9	16			
-5.783		8.90		Soft disintegrated rock with clay binder	2.60	SPT			-6.883	10.00	15	31	50(10cm pen)	>50			
						SPT			-8.383	11.50	100(10cm pen)			>100			
	-8.383		11.50														
-8.383		11.50		Highly weathered rock	1.00	SPT			-9.383	12.50	100(7cm pen)			>100	7	Nil	
	-9.383		12.50														

UDS – Undisturbed Sample DS – Disturbed Sample SPT – Standard Penetration Test pen. – Penetration

J.J.A.INFRA PROJECTS (P) LTD

PLOT NO. 21, GROUND FLOOR , DASAPALLA HILLS, VISAKHAPATNAM-3.

Project : Geo-Technical Survey for Proposed Construction of Visakh Refinery modernization project in Visakh Refinery , Visakhapatnam , Andhra Pradesh .

Location : North side of CPP/GTG-2 Area.

Borehole : DBH-7

Ground Water Table : 1.25m below existing Ground level.

Date of Commencement : 5.4.2016
Date of Completion : 7.4.2016
Ground R.L. : +3.117
Coordinates : N +1152
E +881

Ground R.L. From	Ground R.L. To	Depth Below G.L. (m) From	Depth Below G.L. (m) To	Visual Description of strata	Thickness of Strata (m)	Type of sample	Depth at which sample collected GRL	Depth at which sample collected GL (m)	Depth at which SPT conducted GRL	Depth at which SPT conducted GL (m)	SPT 15 cm	SPT 30 cm	SPT 45 cm	N-Value	Core recovery %	RQD %	Remarks
-9.383	-10.383	12.50	13.50	Weathered rock	3.20	SPT					100(2cm pen)			>100	29	Nil	In between due to block of core barrel removed & SPT conducted at 14.00m
-10.383	-11.383	13.50	14.50						-10.883	14.00							
-11.383	-12.583	14.50	15.70			SPT			-12.583	15.70	100(no pen)			>100	32	Nil	

Borehole terminated at 15.70m below G.L. (i.e.) at R.L.-12.583

UDS – Undisturbed Sample DS – Disturbed Sample SPT – Standard Penetration Test pen. – Penetration

Project : Geo-Technical Survey for Proposed Construction of Visakh Refinery modernization project in Visakh Refinery , Visakhapatnam , Andhra Pradesh .

Location : North side of CPP/GTG-1 area.

DRAWING REF NO. – 1)A-758-000-81-41-0001 REV1.
2)A-758-00081-41-3002 REV 2.

IDENTIFICATION & ENGINEERING PROPERTIES OF SOIL

Sl No.	BH No	Type of sample	RL at which sample collected	Depth at which sample collected (m)	Natural moisture content (%)	Bulk Density (g/cc)	Dry Density (g/cc)	Gradation Analysis				Consistency Limits			Box Shear Test		Triaxial Test			ISC
								Gravel (%)	Sand (%)	FINES		Liquid Limit (%)	Plastic Limit (%)	Plasticity Index (%)	C (kg/cm²)	ϕ degree	C (kg/cm²)	ϕ degree		
										Silt (%)	Clay (%)									
1	DBH-7	SPT	+1.117	2.00	27.82	-	-	0	58	42		41	26	15	-	-	-	-		CI
2	DBH-7	SPT	-0.383	3.50	34.50	-	-	0	13	51	36	53	31	22	-	-	-	-		CH
3	DBH-7	UDS	-1.383	4.50	36.25	2.13	1.56	0	9	48	43	58	37	21	-	-	0.09	3		CH
4	DBH-7	SPT	-3.383	6.50	32	-	-	0	15	48	37	51	28	23	-	-	-	-		CH
5	DBH-7	SPT	-6.883	10.00	13.15	-	-	0	61	28	11	29	18	11	-	-	-	-		SC of SDR

UDS – Undisturbed Sample DS – Disturbed Sample SPT – Standard Penetration Test SDR – Soft Disintegrated Rock

J.J.A.INFRA PROJECTS (P) LTD

PLOT NO. 21, GROUND FLOOR, DASAPALLA HILLS, VISAKHAPATNAM-3.

Project : Geo-Technical Survey for Proposed Construction of Visakh Refinery modernization project in Visakh Refinery, Visakhapatnam, Andhra Pradesh.
Location : Proposed Integrated ETP in lieu of existing ETP presently falling in open area.
Borehole : SBH -1
Ground Water Table : 1.20m below existing Ground level.

Date of Commencement : 28.12.2015
Date of Completion : 30.12.2015
Ground R.L. : +3.986
Coordinates : N 1055
E 582

BORELOG

Ground R.L. From	Ground R.L. To	Depth Below G.L. (m) From	Depth Below G.L. (m) To	Visual Description of strata	Thickness of Strata (m)	Type of sample	Depth at which sample collected GRL	Depth at which sample collected GL (m)	Depth at which SPT conducted GRL	Depth at which SPT conducted GL (m)	SPT 15 cm	SPT 30 cm	SPT 45 cm	N-Value	Core recovery %	RQD %	Remarks
+3.986	+3.386	0.00	0.60	Clay with silt, sand & pebbles (Filled up soil)	0.60	SPT			+3.386	0.60	5	7	7	14			
+3.386	+1.686	0.60	2.30	Gravel with clay & sand (Filled up soil)	1.70	SPT			+1.986	2.00	2	7	10	17			
+1.686	-0.364	2.30	4.35	Blackish soft clay (Marine clay)	2.05	UDS SPT	+1.486	2.50	+0.486	3.50	2	2	3	5			

UDS – Undisturbed Sample DS – Disturbed Sample SPT – Standard Penetration Test pen. – Penetration

J.J.A.INFRA PROJECTS (P) LTD

PLOT NO. 21, GROUND FLOOR , DASAPALLA HILLS, VISAKHAPATNAM-3.

Project : Geo-Technical Survey for Proposed Construction of Visakh Refinery modernization project in Visakh Refinery , Visakhapatnam , Andhra Pradesh .
Location : Proposed Integrated ETP in lieu of existing ETP presently falling in open area.
Borehole : SBH -1
Ground Water Table : 1.20m below existing Ground level.

Date of Commencement : 28.12.2015
Date of Completion : 30.12.2015
Ground R.L. : +3.986
Coordinates : N 1055 E 582

Ground R.L. From	Ground R.L. To	Depth Below G.L. (m) From	Depth Below G.L. (m) To	Visual Description of strata	Thickness of Strata (m)	Type of sample	Depth at which sample collected GRL	Depth at which sample collected GL (m)	Depth at which SPT conducted GRL	Depth at which SPT conducted GL (m)	SPT 15 cm	SPT 30 cm	SPT 45 cm	N-Value	Core recovery %	RQD %	Remarks
-0.364		4.35		Blackish stiff clay with pebbles	3.75	SPT	-2.014	6.00	-1.214	5.20	4	8	13	21			
	-4.114		8.10			UDS											
						SPT			-4.014	8.00	16	100(5cm pen)		>100			
-4.114	-5.264	8.10	9.25	Weathered rock	1.15	SPT			-5.264	9.25	100(10cm pen)			>100	41	Nil	
-5.264	-6.764	9.25	10.75	Highly weathered rock	4.90	SPT			-6.764	10.75	100(8cm pen)			>100	Nil	Nil	
-6.764	-8.614	10.75	12.60			SPT			-8.614	12.60	100(10cm pen)			>100	Nil	Nil	
-8.614	-10.164	12.60	14.15			SPT			-10.164	14.15	100(1cm pen)			>100	Nil	Nil	
-10.164	-11.664	14.15	15.65	Weathered rock	3.00	SPT			-11.664	15.65	100(6cm pen)			>100	29	Nil	
-11.664	-13.164	15.65	17.15			SPT			-13.164	17.15	100(no pen)			>100	36	Nil	

Borehole terminated at 17.15m below G.L. (i.e.) at R.L.-13.164

UDS – Undisturbed Sample DS – Disturbed Sample SPT – Standard Penetration Test pen. – Penetration

Project : Geo-Technical Survey for Proposed Construction of Visakh Refinery modernization project in Visakh Refinery, Visakhapatnam, Andhra Pradesh.

Location : Proposed Integrated ETP in lieu of existing ETP presently falling in open area.

DRAWING REF NO. – 1)A-758-000-81-41-0001 REV1.
2)A-758-00081-41-3002 REV 2.

IDENTIFICATION & ENGINEERING PROPERTIES OF SOIL

Sl No.	BH No	Type of sample	RL at which sample collected	Depth at which sample collected (m)	Natural moisture content (%)	Bulk Density (g/cc)	Dry Density (g/cc)	Gradation Analysis				Consistency Limits			Box Shear Test		Triaxial Test		UCC (kg/cm²)	ISC
								Gravel (%)	Sand (%)	FINES		Liquid Limit (%)	Plastic Limit (%)	Plasticity Index (%)	C (kg/cm²)	ϕ degree	C (kg/cm²)	ϕ degree		
										Silt (%)	Clay (%)									
1	SBH -1	UDS	+1.486	2.50	23.25	1.96	1.59	2	13	85		58	31	27	-	-	0.14	6	-	CH
2	SBH -1	UDS	-2.014	6.00	17.20	1.99	1.70	9	57	34		31	17	14	-	-	0.28	17	-	CI

UDS – Undisturbed Sample DS – Disturbed Sample SPT – Standard Penetration Test SDR – Soft Disintegrated Rock

J.J.A.INFRA PROJECTS (P) LTD

PLOT NO. 21, GROUND FLOOR , DASAPALLA HILLS, VISAKHAPATNAM-3.

Project : Geo-Technical Survey for Proposed Construction of Visakh Refinery modernization project in Visakh Refinery , Visakhapatnam , Andhra Pradesh .

Location : Adjacent to North Boundary compound wall of Visakha Refinery falling in Coromandel area.

Borehole : SBH -2

Ground Water Table : 1.30m below existing Ground level.

Date of Commencement : 18.4.2016
Date of Completion : 21.4.2016
Ground R.L. : + 2.985

Coordinates : N 1241
E 713

BORELOG

Ground R.L		Depth Below G.L. (m)		Visual Description of strata	Thickness of Strata (m)	Type of sample	Depth at which sample collected		Depth at which SPT conducted		SPT			N-Value	Core recovery %	RQD %	Remarks
From	To	From	To				GRL	GL (m)	GRL	GL (m)	15 cm	30 cm	45 cm				
+2.985	-0.515	0.00	3.50	Boulders & debris with clay & sand (Filled up soil)	3.50	DS/ SPT			+2.485	0.50	50(1cm pen)			>50			
						DS / SPT			+0.985	2.00	12	28	50(5cm pen)	>50			
-0.515	-1.715	3.50	4.70	Boulder (Filled up soil)	1.20	SPT			-0.515	3.50	15	50(no pen)		>50	53	45	
-1.715	-6.015	4.70	9.00	Blackish soft clay(marine clay)	4.30	SPT	-2.515	5.50	-2.015	5.00	1	1	1	2			
						UDS											
						SPT			-3.515	6.50	1	0	0	-			At 6.50m SPT penetrated due to self weight of hammer
						SPT			-5.015	8.00	1	0	1	1			
						UDS	-6.015	9.00									

UDS – Undisturbed Sample DS – Disturbed Sample SPT – Standard Penetration Test pen. – Penetration

J.J.A.INFRA PROJECTS (P) LTD

PLOT NO. 21, GROUND FLOOR , DASAPALLA HILLS, VISAKHAPATNAM-3.

Project : Geo-Technical Survey for Proposed Construction of Visakh Refinery modernization project in Visakh Refinery , Visakhapatnam , Andhra Pradesh .

Location : Adjacent to North Boundary compound wall of Visakha Refinery falling in Coromandel area.

Borehole : SBH -2

Ground Water Table : 1.30m below existing Ground level.

Date of Commencement : 18.4.2016
Date of Completion : 21.4.2016
Ground R.L. : + 2.985

Coordinates : N 1241
E 713

Ground R.L		Depth Below G.L. (m)		Visual Description of strata	Thickness of Strata (m)	Type of sample	Depth at which sample collected		Depth at which SPT conducted		SPT			N-Value	Core recovery %	RQD %	Remarks
From	To	From	To				GRL	GL (m)	GRL	GL (m)	15 cm	30 cm	45 cm				
-6.015	-7.515	9.00	10.50	Brownish soft clay (marine clay)	1.50	SPT			-6.515	9.50	0	1	1	2			
-7.515	-12.215	10.50	15.20	Medium to fine grained sand	4.70	SPT SPT SPT			-7.515 -9.015 -11.015	10.50 12.00 14.00	15 17 22	18 19 23	21 24 35	39 43 58			
-12.215	-12.715	15.20	15.70	Soft disintegrated rock with lime	0.50	SPT			-12.215	15.20	32	35	41	76			
-12.715	-13.565	15.70	16.55	Highly weathered rock	0.85	SPT			-12.715	15.70	50(6cm pen)			>50	15	Nil	

UDS – Undisturbed Sample DS – Disturbed Sample SPT – Standard Penetration Test pen. – Penetration

J.J.A.INFRA PROJECTS (P) LTD

PLOT NO. 21, GROUND FLOOR , DASAPALLA HILLS, VISAKHAPATNAM-3.

Project : Geo-Technical Survey for Proposed Construction of Visakh Refinery modernization project in Visakh Refinery , Visakhapatnam , Andhra Pradesh . **Date of Commencement** : 18.4.2016

Location : Adjacent to North Boundary compound wall of Visakha Refinery falling in Coromandel area. **Date of Completion** : 21.4.2016 **Ground R.L.** : +2.985

Borehole : SBH -2 **Coordinates :** N 1241 E 713

Ground Water Table : 1.30m below existing Ground level.

Ground R.L.		Depth Below G.L. (m)		Visual Description of strata	Thickness of Strata (m)	Type of sample	Depth at which sample collected		Depth at which SPT conducted		SPT			N-Value	Core recovery %	RQD %	Remarks
From	To	From	To				GRL	GL (m)	GRL	GL (m)	15 cm	30 cm	45 cm				
-13.565	-15.515	16.55	18.50	Weathered rock	3.05	SPT			-13.565	16.55	100(3cm pen)			>100	30	Nil	
-15.515	-16.615	18.50	19.60			SPT			-15.515	18.50	100(5cm pen)			>100	33	10	
						SPT			-16.615	19.60	100(no pen.)			>100			

Borehole terminated at 19.60m below G.L. (i.e.) at R.L.- 16.615

UDS – Undisturbed Sample DS – Disturbed Sample SPT – Standard Penetration Test pen. – Penetration

Project : Geo-Technical Survey for Proposed Construction of Visakh Refinery modernization project in Visakh Refinery , Visakhapatnam , Andhra Pradesh .

Location : Adjacent to North Boundary compound wall of Visakha Refinery falling in Coromandel area.

DRAWING REF NO. – 1)A-758-000-81-41-0001 REV1.
2)A-758-00081-41-3002 REV 2.

IDENTIFICATION & ENGINEERING PROPERTIES OF SOIL

Sl No.	BH No	Type of sample	RL at which sample collected	Depth at which sample collected (m)	Natural moisture content (%)	Bulk Density (g/cc)	Dry Density (g/cc)	Gradation Analysis			Consistency Limits			Box Shear Test		Triaxial Test		UCC (kg/cm²)	ISC
								Gravel (%)	Sand (%)	FINES	Liquid Limit (%)	Plastic Limit (%)	Plasticity Index (%)	C (kg/cm²)	ϕ degree	C (kg/cm²)	ϕ degree		
										Silt (%) / Clay (%)									
1	SBH-2	UDS	-2.515	5.50	41.50	2.23	1.58	0	12	42 / 46	62	39	23	-	-	0.08	3	0.15	CH
2	SBH-2	UDS	-6.015	9.00	35.20	2.12	1.56	0	18	47 / 35	53	31	22	-	-	0.12	5	0.21	CH

UDS – Undisturbed Sample DS – Disturbed Sample SPT – Standard Penetration Test SDR – Soft Disintegrated Rock

5.Table – Dynamic Shear Parameters from P&S Wave Velocity Measurements at CHT-1

Depth (m) E.G.L	Wave Velocity (m/s)		m = V_P / V_S	Density (kN/m^3)	Dynamic Poisson Ratio	Dynamic Modulus of Rigidity (G_d) (mpa)	Dynamic Youngs Modulus (E_d) (mpa)	Dynamic Bulk Modulus (K_d) (mpa)
	V_P (m/s)	V_S (m/s)						
1.5	165	70	2.3571	19	0.39	9.31	25.89	39.3
3	315	125	2.5200	15	0.41	23.44	65.93	117.6
6	475	175	2.7143	16	0.42	49	139.30	295.7
7.5	565	225	2.5111	18	0.41	91.13	256.20	453.1
9	825	325	2.5385	18	0.41	190.13	535.45	971.6
10.5	1145	475	2.4105	20	0.40	451.25	1259.95	2020.4
12	1365	685	1.9927	21	0.33	985.37	2624.44	2598.9
13.5	1525	865	1.7630	22	0.26	1646.10	4157.48	2921.6
15	1685	985	1.7107	23	0.24	2231.52	5536.14	3554.9
16.5	2055	1225	1.6776	24	0.22	3601.50	8819.30	5333.3

Depth (m) E.G.L	Wave Velocity (m/s)		m = V_P / V_S	Density (kN/m^3)	Dynamic Poisson Ratio	Dynamic Modulus of Rigidity (G_d) (mpa)	Dynamic Youngs Modulus (E_d) (mpa)	Dynamic Bulk Modulus (K_d) (mpa)
	V_P (m/s)	V_S (m/s)						
18	2165	1295	1.6718	24	0.22	4024.86	9832.27	5882.9
20	2285	1365	1.6740	24	0.22	4471.74	10934.02	6568.6

ANNEXURE-2

FORMAT FOR NO DEVIATION CERTIFICATE
(To be submitted in the bidder's letter head)

BHARAT HEAVY ELECTRICALS LIMITED,
Power Sector - Eastern Region,
Plot no 9/1, DJ Block, Sector – II, Salt Lake City,
Kolkata – 700 091

Sub	No Deviation Certificate.	
Job	Civil works comprising of Cast-in-Situ RCC bored Socket piles and below ground Civil Works, etc. all complete for 1x75 MW Combined Cycle Captive Power Plant for Visakh Refinery Modernization Project at HPCL Visakhapatnam, Andhra Pradesh.	
Ref	1.0	Tender no PSER:SCT:VRM-C1897:18.
	2.0	BHEL's NIT, vide reference no PSER:SCT-VRM-C1897:6767, Date: 09-05-2018.
	3.0	BHEL's TCN-01, vide reference no PSER:SCT:VRM-C1897:TCN-01, Date: 23-05-2018.
	4.0	All other pertinent issues till date.

Dear Sirs,

With reference to above, this is to confirm that as per tender conditions, we have visited site before submission of our offer and noted the job content & site conditions etc. We also confirm that we have not changed/ modified the tender documents as appeared in the website/ issued by you and in case of such observance at any stage, it shall be treated as null and void.

We hereby confirm that we have not taken any deviation from tender clauses together with other references as enumerated in the above referred NIT. We hereby confirm our unqualified acceptance to all terms & conditions, unqualified compliance to technical specification, integrity pact (if applicable) and acceptance to reverse auctioning process.

In the event of observance of any deviation in any part of our offer at a later date whether implicit or explicit, the deviations shall stand null & void.

We confirm to have submitted/uploaded offer/documents in accordance with tender instructions with acceptance of the terms & conditions of the tender by us and as per aforesaid references.

Thanking you,

Yours faithfully,

(Signature, date & seal of authorized representative of the bidder)