

# TECHNICAL CONDITIONS OF CONTRACT (TCC)

HIRING OF RMC AGENCY FOR  
INSTALLATION OF BATCHING PLANT &  
PRODUCTION OF REQUIRED GRADE OF  
CONCRETE FOR 2X800 MW LARA STPS  
STAGE-II, RAIGARH, CHHATTISGARH  
STATE, INDIA



# TECHNICAL CONDITIONS OF CONTRACT (TCC)

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## Chapter - I: PROJECT INFORMATION

Sl. No.	Description	Details
1	Project Title	2X800MW Lara Super Thermal Power Station, Stage-II
2	Customer	National Thermal Power Corporation Limited (NTPC Limited)
3	Location	The project is located in Raigarh district of Chhattisgarh State. The project is located south-east of Raigarh town near village Lara, bounded by villages Lara, Chhapora & Lohakhan and on the western side of Odisha State boundary.
4	Nearest Airport	The nearest commercial airport, Jarsuguda is about 90 kms from the project site.
5	Access By Road/Major Cities	The project site is approachable from NH-200 (Raigarh–Sarangarh) via Kondatarai through State PWD Road..
6	Temperature	Mean of daily minimum temperature = 13.2°C Mean of daily maximum temperature = 41.8°C
7	Seismic Zone	The project site lies in zone III as defined in IS: 1893.
8	Wind Speed	Design wind speed is 39 m/sec as per IS: 875 Part III

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## Chapter - I: PROJECT INFORMATION

<b>1.0</b>	<b>INSTRUCTIONS TO BIDDERS</b>																
<b>1.1</b>	The Bidder shall visit project site and acquire full knowledge and information about conditions prevailing at site and in & around the plant premises, together with site conditions, transportation routes, various distances, all the statutory, obligatory, mandatory requirements of various authorities and all information that may be necessary for preparing the bid and entering into the Contract. All costs for and associated with site visits shall be borne by the bidder.																
<b>1.2</b>	Other contractors would be working in this area and their structures are to be protected. The material brought and stacked for construction should not make hindrance to other contractors																
<b>1.3</b>	Necessary precaution and arrangements including sprinkling of water during work as acceptable to BHEL for safety & security for the above have to be made by the contractor.																
<b>1.4</b>	The information given herein is for general guidance and shall not be contractually binding on BHEL/Owner. All relevant site data /information as may be necessary shall have to be obtained /collected by the Bidder. All costs for and associated with site visits shall be borne by the bidder.																
<b>1.5</b>	The contractor, in the event of this work awarded to him, shall establish an office at site and keep posted an authorized, responsible officer with valid Power of Attorney for the purpose of the contract. Any order or instructions of the 'Engineer' or his duly authorized representative, communicated to the contractor's representative at site office will be deemed to have been communicated to the contractor at his legal address.																
<b>1.6</b>	No claim will be entertained by BHEL on ground of lack of knowledge and the contractor's rates shall be deemed to have taken this into account.																
<b>1.7</b>	<p>Bidders may fix up their site visit in consultation with below mentioned contact person:</p> <table border="1"> <tr> <td>Name:</td><td>Sh. Abdul Munaf</td></tr> <tr> <td>Designation:</td><td>Sr. DGM</td></tr> <tr> <td>Email:</td><td><a href="mailto:munaf@bhel.in">munaf@bhel.in</a></td></tr> <tr> <td>Ph no:</td><td>8884711993</td></tr> <tr> <td>Name:</td><td>Sh. Mihir Sarkar</td></tr> <tr> <td>Designation:</td><td>Manager</td></tr> <tr> <td>Email:</td><td><a href="mailto:mihir.sarkar@bhel.in">mihir.sarkar@bhel.in</a></td></tr> <tr> <td>Ph no:</td><td>8331015820</td></tr> </table>	Name:	Sh. Abdul Munaf	Designation:	Sr. DGM	Email:	<a href="mailto:munaf@bhel.in">munaf@bhel.in</a>	Ph no:	8884711993	Name:	Sh. Mihir Sarkar	Designation:	Manager	Email:	<a href="mailto:mihir.sarkar@bhel.in">mihir.sarkar@bhel.in</a>	Ph no:	8331015820
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Ph no:	8331015820																

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## Chapter – II: SCOPE OF WORKS

<b>2.0</b>	<b>Scope of Works:</b>
<b>2.1</b>	<p>The scope of work includes the followings:</p> <ol style="list-style-type: none"> <li>Mobilization, Installation &amp; Commissioning of Batching Plants as stipulated in the tender for production of Ready Mix Concrete(RMC).</li> <li>Procurement, Supply, storing, of approved quality fine &amp; coarse aggregates, admixtures etc. for ready mix concrete of various grades as per details given in BOQ or elsewhere in the contract document.</li> <li>Production of ready mix concrete in computerized automatic batching plant of required capacity as per quality norms and as per Field Quality Plan (FQP) approved by Customer.</li> <li>Supply of ready mix concrete at batching plant in transit mixers placed by respective vendors of BHEL</li> <li>Setting up of Civil Laboratory as detailed in the tender and conducting various tests at site as per FQP.</li> <li>Establishment of Design mix of various grades as per IS-456 and IS-10262 or equivalent Standard</li> </ol>
<b>2.2</b>	<p>Mix design for all grades of concrete shall be carried out from a reputed &amp; approved laboratory of BHEL / NTPC. Contractor may add admixture for minimizing of cement content in line with relevant IS code as advised by BHEL time to time without any additional cost.</p> <p>Some of the design mixes are available at site. Vendor may adopt the existing design mixes or design may be carried out from listed approved laboratory as per the instruction of BHEL.</p>
<b>2.3</b>	<p>This specification covers all the requirements, described hereinafter for general use of Plain and Reinforced Cement Concrete work in Structures and locations, cast-in-situ or precast, and shall include all incidental items of work not shown or specified but reasonably implied or necessary for the completion of the work.</p> <p>IS: 4926 and IS: 456 shall form a part of this specification and shall be complied with unless permitted otherwise.</p> <p>All quality standards &amp; other technical requirements shall be strictly adhered by the bidder. All works under this specification, unless specified otherwise, shall conform to the latest revision of Indian Standard Specifications and Codes of Practice. In case any particular aspect of work is not covered specifically by customer Specification, any other IS standard practice as may be specified by the Engineer shall be followed.</p>
<b>2.4</b>	<p>The complete works shall be carried out as per BOQ cum Rate schedule. If any work covered in the scope of contract cannot be executed using items available in BOQ, additional / extra items shall be made and rates for such items shall be worked out on basis of mutual agreement. However, contractor shall be bound to execute all the works under the scope of the contract and decision whether an extra item is applicable or not, shall be taken by BHEL Engineer which will be binding on the contractor.</p>
<b>2.5</b>	<p>Minimum 3(three) month stock of raw material including admixture are to be maintained all time at batching plant considering on an average concrete of 3000 -4000 cum per month. The RMC requirement is expected to be maximum during initial period and would taper down towards end.</p>

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	Separate shed for storage of cement and admixture is to be made. Shed should be spacious and of good quality material having weather proof storage facilities. Proper marking and demarcation should be there for differentiating different storage sheds. Regular inspection of storage sheds will be done by BHEL/Customer for their adherence with the storage specification.
2.6	Monthly, Weekly and daily requirement of RMC shall be finalized with designated representative of BHEL suitably and production/supply to be made accordingly. Records of such requirements shall be properly maintained.
2.7	Giving all notices, paying all fees, taxes etc., in accordance with the general conditions of contract, that is required for all works including temporary works.
2.8	Batching plant area along with 6m wide approach road approx. 100m length shall have to be properly hard surfaced and maintained throughout the contract period. (Minimum 250thk GSB layer) with adequate drainage system. There should be separate area for parking of bulker and transit mixer.
2.9	The quoted price shall include all material equipment, fixtures, labor, construction plant, temporary works and everything whether of permanent or temporary nature necessary for the completion of job in all respects.
2.10	<p><b><u>Royalty &amp; other fees:</u></b></p> <p>Royalty challan and statutory documents shall be submitted along with RA Bills for processing of Bills. In the event of non-availability of royalty/statutory documents along with RA Bill, BHEL site at its discretion may opt to withhold relevant amount from the running RA Bills and process the bill further to maintain proper cash flow and continuity of work.</p> <p>The Contractor shall pay and indemnify the Employer against any default in payment of Royalties or Seignorage Fee or Cess or other charges by the Contractor or the agency from which the Contractor purchases soil/earth, sand, stone/aggregates, metals, minerals or minor minerals.</p> <p>In the event of there being a statutory increase in the rates of royalty charges/fresh levy of royalty on materials, the same shall be reimbursed to the Contractor upon submission of original challan by him of having made the payments at revised rates. In the event of there being a decrease in such rates, the same shall be recovered from the Contractor. The base date for calculating the increase or decrease shall be the rate as on seven (7) days prior to the date of Techno-commercial (Envelope-I) bid opening. The total reimbursement (positive or negative) as specified above, to be paid or recovered, shall however be calculated on the quantity of materials actually accepted for payment), whichever is less, and on the basis of documentary evidence of Govt. Notification. However, the Contractor will settle claims, if any, on account of over charge by the State Authorities.</p>
2.11	<p><b><u>Setting Up of Laboratory Works:</u></b></p> <p>The contractor shall set up laboratory in the close vicinity of the work site as per required field QA &amp; QC laboratory set up and as the directions of engineer-in-charge. The laboratory shall be equipped with latest testing equipment in sufficient number to carry</p>

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	<p>out all the tests as required under a contract. The contractor should ensure that the equipment is available well in advance of starting of the work to avoid stoppage of work on this account. All the tests shall be carried out by the contractor in the presence of the Engineer's representative and a joint record of all observations and results thereof shall be maintained, and available with the Engineer.</p> <p>The laboratory set-up should consist of one AC lab (Approx. size 4.5mtr x 6mtr) for temperature and humidity control as required during testing of cement and other materials and one non AC lab (Approx. Size 4.5 mtrx4.5 mtr.) in the field to carry out all relevant tests. Laboratory equipment as per requirement and as per Customer specification to be arranged by the contractor within quoted rate for conducting day to day tests.</p>
2.12	<p><b><u>QUALITY ASSURANCE &amp; QUALITY CONTROL</u></b></p> <p><b>INSPECTION &amp; FIELD QUALITY ASSURANCE</b></p> <ul style="list-style-type: none"><li>a) Supplier shall carry out all activities conforming to the approved Field Quality Plan (FQP) &amp; technical instructions as revised from time to time. 'Total Quality' shall be the watchword of the work and supplier shall strive to achieve the quality standards, procedures laid down by BHEL. He shall follow all the instructions as per BHEL drawings and quality standards as stated in technical specification attached at Section C or elsewhere in the contract. Supplier shall provide the services of quality assurance engineer as per the relevant clauses</li><li>b) Preparation of quality assurance log sheets and protocols with customer / consultants / statutory authority, NDE records, testing &amp; calibration records and other quality control and quality assurance documentation as per BHEL engineer's instructions, is within the scope of work / specification. These records shall be submitted to BHEL / customer for approval from time to time.</li><li>c) The protocols between supplier and customer / BHEL shall be made for correctness of procured materials, procedures, at each stage, generally as per the requirement of customer / BHEL. This is necessary to ensure elimination of errors and to avoid accumulation and multiplication of errors.</li><li>d) A daily log book (with proper indexing) should be maintained by every supervisor / engineer of supplier, for respective area of work and inspection details of various equipment, etc. This log book shall be always accessible to BHEL engineers.</li><li>e) Any re-laying or re-termination of cables / re-erection of instruments / recalibration of instruments etc. required due to supplier's mistake and found at any stage inspection, shall be carried out by the supplier at no extra cost. Repair / rectification procedure to be adopted to make any job acceptable shall be subject to the approval of BHEL.</li><li>f) Weekly Quality Review Meeting at site shall be organized by BHEL to discuss quality issues and next week's inspection plans. Site in-charge of the supplier along with QAEs of the supplier must be present in the meeting with closure report of the issues raised by BHEL in the previous meetings.</li></ul> <p>Arranging for joint checking (with BHEL / BHEL's Customer / Consultant) of all site construction activities Preparation of joint protocols for each &amp; every activity and maintaining quality records for audit/inspection as per approved FQP by BHEL.</p>



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2.13	<p><b><u>Field Quality Assurance:</u></b></p> <p>The contractor shall be responsible for day-to-day quality checks for civil, structural and architectural works including concrete and other building materials in line with approved Field Quality Plan (FQP) and Manufacturing Quality Plan (MQP) during the progress of work. All quality records and log sheets shall be maintained as per the requirement of BHEL/CUSTOMER and as per FQP/MQP approved by BHEL/CUSTOMER.</p>
2.14	<p><b><u>OPEN SPACE FOR OFFICE &amp; STORAGE: -</u></b></p> <ul style="list-style-type: none"> <li>a) Open spaces for material storage yard &amp; construction of temporary site office shall be allocated as made available by the customer / BHEL free of cost.</li> <li>b) Contractor has to make his own arrangements for labour colony including Electricity and water for the labour colony.</li> <li>c) Construction of necessary stores and storage of materials shall be in contractor's scope. BHEL shall provide available space as received from customer on mutually agreed basis. Security of stores &amp; work place shall be in Contractor's scope.</li> <li>d) When the Work is completed all such temporary structures and facilities shall be removed from the Site and the area shall be restored to its original condition.</li> </ul>
2.15	<p><b><u>DEWATERING</u></b></p> <p>Contractor shall ensure at all times that his work area &amp; approach / access roads are free from accumulation of water, so that the materials are safe and the operation of plant / progressive delivery 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.</p>
2.16	<p><b><u>SITE ORGANISATION: -</u></b></p> <p>The supplier 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 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 of LOI.</p> <p>Following (minimum) engineering manpower RMC Operation background to be deployed at site by the successful vendor for their day to day supervision etc.</p> <ul style="list-style-type: none"> <li>a) Qualified safety officer (exclusive for safety supervision in shift work) – 01 No.</li> <li>b) Quality Engineer &amp; Quality Assistant: - <ul style="list-style-type: none"> <li>➤ 01 no Graduate Engineer (Minimum 3 years' Experience)</li> </ul> </li> </ul>



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	<p>➤ 02 nos Quality assistants (min. Diploma in Civil Engineering)</p> <p>Deputation of above man-power shall be jointly decided at site in line with requirement.</p> <p>Engineer / supervisor for other functions like store &amp; purchase, material management, finance, administration etc. are to be provided as per site requirement and not considered above.</p> <p>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. 40000/- per man-month for Engineer, Rs. 30000/- per man-month for the supervisor / safety officer / Assistant from RA bills. Further induction of manpower regarding site supervisor &amp; site engineer will be decided at site as per requirement without any financial implication.</p> <p>BHEL reserves the right to reject or approve the list of personnel proposed by the supplier. 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 &amp; reasonable justification is made.</p> <p>The supplier should also submit to BHEL for approval a list of T&amp;Ps along with their fitness certificates. The tools &amp; tackles shall not be removed from site without written permission of BHEL. All the vehicles, TMs, T&amp;Ps bring to site shall have all valid documents as required in line with the statutory requirements and guidelines.</p> <p>Parallel working of all installed batching plants is envisaged. Hence every batching plant should have independent Batching Plant operator and adequate supporting staff shall be available round the clock to cater all the batching plants as per BHEL requirement. However, with prior intimation phase wise routine maintenance shall be allowed.</p>
2.17	<p><b><u>PLANNING, MONITORING &amp; PROGRESS REPORTING</u></b></p> <p>The supplier shall properly plan for supply of RMC as per BHEL requirement. Periodic progress reviews on the entire activities of execution in respect of supply of ready mix ready mix concrete will be held as per site requirement. These meetings will be attended by reasonably higher officials of the supplier and will be used as a forum for discussing all areas where progress needs to be speeded up. The supplier shall be further responsible for ensuring that suitable steps are taken to meet various targets decided upon such meetings.</p> <p>Proper reporting of RMC supplied on daily, weekly &amp; monthly basis shall be submitted to BHEL.</p> <p>Reporting of stock of materials shall be done on daily basis to BHEL site.</p> <p>The supplier's site office must have basic facilities of computer/printer/computer operators/communications like E-mail, and phone facility within a month from LOI.</p>
2.18	<p><b><u>Construction Power (Chargeable):</u></b></p> <ol style="list-style-type: none"> <li>Construction power shall be made available to the Contractor at 415 V feeders of LT substation located at single point near the site at a distance of approx. 500M. Further distribution shall be arranged by the contractor at his own cost</li> </ol>

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	<p>and services. Contractor shall be responsible for fulfilment of all requirements including statutory requirements in this regard.</p> <p><b>In case, BHEL is not able to provide construction power due to any reason whatsoever, contractor should make his own arrangement for the same without any cost and time implication to BHEL.</b></p> <ol style="list-style-type: none"><li>2. Contractor shall deploy and install required energy meter, cables, fuses, distribution boards, switchboards, bus bars, earthing arrangements, protection devices and any other installation as specified by statutory authority/act. Contractor shall also obtain approvals of appropriate authority and pay necessary fees, levies etc. towards the clearance of such installations, prior to use. Sufficient power factor compensation equipment like capacitor shall be provided by contractor for reactive loads like welding machines etc. In case of any fine/penalty on account of low power factor, same shall be shared by contractor proportionately according to power consumption.</li><li>3. Contractor shall make necessary arrangements for onward distribution of construction power taking due care of surrounding construction activities like movement of cranes &amp; vehicles, civil work, fabrication/construction/assembly/erection etc. and safety of personnel. It may become necessary to relocate some of the installations to facilitate work by other agencies or by him.</li><li>4. It shall be the responsibility of the Contractor to provide, maintain the complete installation on the load side of the supply with due regard to the safety requirements at site. All cabling and installations shall comply in all respects with the appropriate statutory requirements. The installation and maintenance of this shall be done by licensed and experienced electrician.</li><li>5. While reasonable efforts will be made to ensure continuous electric power supply, interruptions cannot be ruled out and no claim from the Contractor shall be entertained on this account such as idle labour, extension of time etc. The Contractor shall adjust his working shift accordingly and deploy additional manpower, if necessary, so as to achieve the target.</li><li>6. Contractor shall be well equipped with back-up power supply arrangement like DG set etc. to tackle situations arising due to failure of supplied power, so as to ensure continuity in Operation of Batching Plant etc. that are underway at the time of power failure or important activities planned in immediate future.</li><li>7. BHEL is not responsible for any loss or damage to the Contractor's equipment as a result of variations in voltage or frequency or interruptions in power supply.</li><li>8. <b>Contractor is advised to maintain the calibrated energy measuring instruments and use their system as efficiently as possible to maintain the HT side input energy meter reading and LT side outgoing energy meter reading to sub-contractors as equal.</b></li><li>9. The bidder will have to Procure &amp; install General mobile illumination system during construction right from start of his work. This system will include temporary pole lighting, portable lighting towers with DG back-up, within the quoted price. The illumination should be such that minimum illumination</li></ol>
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## Chapter – II: SCOPE OF WORKS

	<p>requirement as specified by Indian standards for general illumination is maintained.</p> <p>10. The charges for the actual energy consumed by contractor shall be recovered on relevant rate of Discom and as specified in specification.</p> <p>General:</p> <p>If any other voltage level (other than normally available) is required, the same shall be arranged by the contractor from power supply as above. Contractor will have to provide at his own cost necessary calibrated energy meters (tamper proof, suitably housed in a weather proof box with lock &amp; key arrangement) at point of power supply along with calibration certificate from authorized/ accredited agency for working out the power consumption. In case of recalibration required for any reason the necessary charges including replacement by calibrated meters is to be borne by the contractor. Supply of electricity shall be governed by Indian Electricity Act and Installation Rules and other Rules and Regulation as applicable. The contractor shall ensure usage of electricity in an efficient manner and the same may be audited by BHEL time to time. In case of any major deviation from normally accepted norms is observed, BHEL will reserve the right to impose penalty as deemed fit for such cases.</p> <p>Contractor to arrange calibrated energy meter (tamper proof, suitably housed in a weather proof box with lock &amp; key arrangement) for office and this construction power at office is chargeable as per applicable tariff rates.</p>
2.19	<p><b><u>Construction Water:</u></b></p> <p>Construction water shall be arranged by bidder. Bidder has to make arrangement of further distribution of water at his own cost. No extra payment shall be made under this account.</p> <p>The Contractor should make arrangements for storage of sufficient quantity of water required for work. The agency should also construct sumps (if required) of suitable size for storage of construction water as per their requirement for use in batching plant and construction purposes.</p> <p>However, contractor may opt to draw water from BHEL/Customer supply source (if available) under the following modality:- In case Customer provides construction water on chargeable basis at single point and bidder opts to draws water from BHEL water storage reservoir on chargeable basis which is approximately 1 Km – 2 Km from Main Power House / TG Foundation / Transformer Yard, then necessary cost of laying water pipe line from NTPC water point to BHEL storage reservoir and construction cost of water reservoir shall be proportionately recovered from bidder. It is also to be noted that further distribution line from BHEL water storage reservoir to bidder's batching plant / actual construction site shall be constructed by bidder at their own.</p> <p>Contractor to satisfy himself that the water drawn by him is fit for construction / consumption and adequately treat such water at his cost when it is not found fit for the said purposes.</p>
2.20	<b>MATERIAL</b>
2.20.1	<b><u>Material to be issued by BHEL (Free of Cost) as per BOQ cum Rate Schedule:</u></b>

# **TECHNICAL CONDITIONS OF CONTRACT (TCC)** **Chapter – II: SCOPE OF WORKS**

	<b>1) Cement</b>
<b>2.20.2</b>	During execution of work, all requisite approved quality materials viz. aggregates, sand, admixtures and consumables/materials required for the work shall be supplied by the supplier in timely manner and is deemed to be inclusive in the quoted price. BHEL shall not supply any materials for this work unless otherwise noted.
<b>2.20.3</b>	All the materials (including cement provided by BHEL) are to be handled by you and you will be solely responsible for safe custody of the same.
<b>2.20.4</b>	<p><b><u>Cement (Issued by BHEL free of Cost):</u></b></p> <ol style="list-style-type: none"> <li><b>Cement as received from the manufacturer/ stockiest will be issued free of cost to the contractor. Cement shall be issued normally through bulkers and emptied in cement silos of batching plant. Necessary assistance shall be provided by contractor.</b></li> <li>The contractor shall submit to the engineer, a statement indicating estimated quantity of cement required during a quarter, at least two months in advance of the quarter. In addition, the contractor shall also furnish the estimated requirement of cement during a month by the third week of the previous month indicating his requirement.</li> <li>In case cement is issued in bags by BHEL, the theoretical weight of each bag of cement for issued purposes will be considered as 50kg, the contractor shall be accountable for the cement issued to the contractor on this notional weight only. No claim whatsoever will be entertained because of difference between theoretical and actual weight of the bags of cement.</li> <li>The empty cement bags duly accounted for against issue shall be the contractor's property and the same shall be disposed as per statutory regulation prevailing in the project.</li> <li>The contractor shall satisfy himself of the quality and quantity of supplied cement 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 the contractor from BHEL stores.</li> <li>Contractor will be responsible for unloading the cement as soon as the arrival of cement in the Silos/ Weather proof cement storage sheds having dense impervious bituminous or concrete floors which shall be kept swept clean at all times. The storage arrangements shall be fully completed and approved by the owner before any cement is delivered to site. The construction of cement storage sheds as per the requirement of BHEL, unloading of cement bags, stacking properly in the storage sheds, removal of the sheds after the completion of the work are in the scope of bidder. Though the cement is unloaded directly at the contractor storage shed, it will be deemed to be considered that the cement was issued from BHEL stores. Necessary documents are to be submitted by the contractor to the BHEL stores for having received cement. Foundation work for silos to be constructed as per vetted drawing.</li> </ol>

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	<p>g) Contractor will be responsible for sampling and testing of cement as per Indian Standard / Specification / approved quality plan in the testing laboratory established by the contractor.</p>						
2.20.5	<p><b><u>Return of Cement issued by BHEL free of cost:</u></b></p> <p>Sealed cement bags remaining unused and in perfectly good condition at the time of completion or termination of the contract shall be returned promptly, (within 15 days from assessment) if BHEL/ engineer is satisfied of the physical condition of the cement. Return of such cement to the project stores / place as identified within the project area by engineer/ BHEL will not be entitled to handling and incidental charges. Surplus sealed and good conditioned cement bags will be taken back on Weighment basis.</p> <p>Cement that has been unloaded in silo will not be taken back by BHEL. Sweep cement will not be taken back by BHEL. However, balance cement available in silo at end of contract shall be considered for reconciliation purpose for the reasons not attributable to the contractor and the same shall not be charged to the contractor.</p>						
2.20.6	<p><b><u>Consumption and wastage of cement issued by BHEL free of cost:</u></b></p> <p><b><u>Cement Consumption:</u></b></p> <p>The theoretical consumption of cement shall be based on the following:</p> <p>For design mix concrete as per approved design mix.</p> <p>For nominal mix concrete work, as per minimum cement as specified or as approved by engineer-in-charge.</p> <p>For item of works, where volume mix is permitted in writing by the BHEL, for masonry works, plaster other miscellaneous items, the cement consumption shall be governed by the “Statement of cement consumption” attached to the Delhi Schedule of Rates CPWD DSR Latest Revision unless otherwise specified in the specifications or the drawing of contract or mutually agreed by engineer-in-charge and the contractor.</p> <p>Actual consumption = Issue – Surplus/ unused quantity of cement returned in good condition by the contractor to store.</p> <p><b><u>Cement Wastage:</u></b></p> <p>Allowable wastage: One and half percent (+1.5%) of theoretical consumption of cement unless specified otherwise in the technical specification.</p> <p>For cement issued by BHEL to the contractor free of cost, and which is not accounted for by the contractor to BHEL, then recovery for such material shall be affected at penal rates.</p> <table><tr><td>Sl. No.</td><td>Cement consumption</td><td>Basis of issue &amp; penal recovery</td></tr><tr><td>1</td><td>Theoretical consumption (without considering any wastage or loss).</td><td>Free</td></tr></table>	Sl. No.	Cement consumption	Basis of issue & penal recovery	1	Theoretical consumption (without considering any wastage or loss).	Free
Sl. No.	Cement consumption	Basis of issue & penal recovery					
1	Theoretical consumption (without considering any wastage or loss).	Free					

# TECHNICAL CONDITIONS OF CONTRACT (TCC)

## Chapter – II: SCOPE OF WORKS

	<table><tr><td>2</td><td>Actual consumption being Limited to one and half percent (+1.5%) of aforesaid theoretical consumption towards allowable wastage.</td><td>Free</td></tr><tr><td>3</td><td>Actual consumption beyond one and half percent (+1.5%) of Sl. No. (1) above.</td><td>Penal rate</td></tr></table>	2	Actual consumption being Limited to one and half percent (+1.5%) of aforesaid theoretical consumption towards allowable wastage.	Free	3	Actual consumption beyond one and half percent (+1.5%) of Sl. No. (1) above.	Penal rate				
2	Actual consumption being Limited to one and half percent (+1.5%) of aforesaid theoretical consumption towards allowable wastage.	Free									
3	Actual consumption beyond one and half percent (+1.5%) of Sl. No. (1) above.	Penal rate									
2.20.7	<p><b><u>Reconciliation of cement issued by BHEL free of cost:</u></b></p> <ol style="list-style-type: none"><li>1. The contractor shall submit and prepare a jointly signed reconciliation statement for cement issued to the contractor with each RA Bill.</li><li>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 is available in the contractor custody at site.</li><li>3. At the time of submission of bills, 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.</li></ol>										
2.20.8	<p><b><u>Recovery of Materials (Penal Rates):</u></b></p> <p>If wastage exceeds the specified limit, the recovery of excess wastage shall be made from monthly RA Bills as per following penal rates (excluding GST):</p> <table><tr><th>Sl. No.</th><th>Items</th><th>Penal Rates (Rs.)</th></tr><tr><td>P-1</td><td>Cement (PPC)</td><td>4500 per MT</td></tr><tr><td>P-2</td><td>Cement (OPC)</td><td>7000 per MT</td></tr></table>		Sl. No.	Items	Penal Rates (Rs.)	P-1	Cement (PPC)	4500 per MT	P-2	Cement (OPC)	7000 per MT
Sl. No.	Items	Penal Rates (Rs.)									
P-1	Cement (PPC)	4500 per MT									
P-2	Cement (OPC)	7000 per MT									
2.20.9	<p><b><u>General Notes:</u></b></p> <ol style="list-style-type: none"><li>1. BHEL reserves the right to recover from the contractor any loss arising out of damage/ theft or any other causes or during verification/stacking or at any time under the custody of the contractor.</li><li>2. The contractor shall in no case be entitled for any compensation on account of any delay in supply or non-supply thereof for all or any such materials. However, in case of non-availability of material which delays the completion of work, such cases shall be recorded separately in monthly planning format and shall be considered for time extension of contract.</li><li>3. Contractor will have to make his own arrangement at his own cost for procurement of any other materials except as mentioned above, as required for the works and of such quality as acceptable to BHEL.</li><li>4. The contractor shall maintain proper store account for all the BHEL issued materials and shall give Three (03) copies of monthly-computerized reconciliation statement of such account showing total receipt, consumption and balance materials at site to the BHEL. BHEL Engineer's certification for the reconciliation of material shall be final. The detailed reconciliation shall</li></ol>										



# TECHNICAL CONDITIONS OF CONTRACT (TCC)

## Chapter – II: SCOPE OF WORKS

	<p>be done at least once in three months (03) or before submission of final bill which comes earlier.</p> <ol style="list-style-type: none"> <li>5. Contractor shall also carryout in complete association with BHEL, the material management functions and execution like day-to-day update of materials, issued to contractor, etc. These functions shall also be carried out through computerized system utilizing suitable software. Contractor shall engage experienced software personnel to associate on dedicated basis for efficient discharge of the same in time.</li> <li>6. The contractor shall solely be responsible for the safety &amp; security of material after it is handed over and issued to contractor by the BHEL.</li> <li>7. BHEL issued materials, shall not be under any circumstances whatsoever, and shall be taken out of the project site unless otherwise permitted by BHEL for outside job.</li> </ol>
2.21	<p><b><u>LIQUIDATED DAMAGES</u></b></p> <p>Since time is the main essence of the contract, the mobilization by bidder is to be made within the time limit prescribed in relevant clause of the tender. In case contractor fails to mobilize within the period specified in the contract, BHEL will reserves the right to levy liquidated damages at the rate of 0.5% (half percent) of the awarded contract value delayed for each week of delay or part thereof without prejudice to any other relief or compensation due to BHEL under any other conditions of the order subject to a maximum limit of 10% of total contract value. In case of delay in mobilization of bidder, for reasons not attributable to BHEL, the 'Liquidated Damages' clause shall be strictly enforced, unless extension of delivery date is granted through an amendment to the work/ purchase order.</p>
2.22	<p><b><u>EXTENSION OF TIME FOR COMPLETION</u></b></p> <ol style="list-style-type: none"> <li>a) 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 supplier, the supplier shall make request for an extension of the contract and BHEL at its discretion may extend the contract.</li> <li>b) However, if any 'Time extension' is granted to the supplier to facilitate continuation of work and completion of contract, due to backlog attributable to the supplier alone, then it shall be without prejudice to the rights of BHEL to impose penalty / LD for the delays attributable to the supplier, in addition to any other actions imposed by BHEL on the contractor.</li> <li>c) 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 supplier as per specified format as informed during execution of the work. Review of the programme and record of shortfall shall be also done</li> <li>d) During the period of 'Time extension', supplier shall maintain their resources as per mutually agreed program</li> <li>e) 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) Supplier, (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</li> </ol>



# TECHNICAL CONDITIONS OF CONTRACT (TCC)

## Chapter – II: SCOPE OF WORKS

	<p>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 supplier after adjusting delay attributable to BHEL &amp; Force majeure and recoverable from the dues payable to the supplier.</p> <p>f) It is understood that towards end of contract period, the requirement of RMC will taper down. If the completion period is extended for reasons not attributable to the vendor and the daily requirement reduces considerably than in such condition the vendor may be allowed to demobilize part of equipment with mutual discussion and approval by BHEL Site In-charge.</p>
2.23	<p><b><u>HEALTH, SAFETY &amp; ENVIRONMENT</u></b></p> <ul style="list-style-type: none"><li>• As per HSE Plan of LARA Site.</li></ul>
2.24	<p><b>HEIRARCHY</b></p>
2.24.1	<p>In case of any conflict/deviations amongst various documents, the order of precedence shall be as follows:</p> <ol style="list-style-type: none"><li>1. BOQ Items in BOQ Cum Rate Schedule</li><li>2. Technical Conditions of Contract (TCC)</li><li>3. IS Standard</li></ol>

# TECHNICAL CONDITIONS OF CONTRACT (TCC)

## Chapter – III: FACILITIES IN THE SCOPE OF CONTRACTOR/BHEL (SCOPE MATRIX)

Sl. No	Description  PART I	Scope		Remarks
		BHEL	Bidder	
3.1	<b>Establishment:</b>			
3.1.1	<b>For Construction Purpose:</b>			
a	Open space for office (as per availability)	Yes		Location will be finalized after joint survey with owner
b	Open space for storage (as per availability)	Yes		Location will be finalized after joint survey with owner
c	Open space for labour colony (as per availability)		Yes	Contractor has to make his own arrangements shelter and transportation of labours as per their requirement.
d	Labour Colony with internal roads, sanitation, complying with statutory requirements		Yes	Construction Plan shall be approved by BHEL
e	Construction of bidder's office, canteen and storage building including supply of materials and other services		Yes	
f	Bidder's all office equipments, office / store / canteen consumables		Yes	
g	Canteen facilities for the bidder's staff, supervisors and engineers etc		Yes	
h	Firefighting equipments like buckets, extinguishers etc		Yes	
i	Fencing of storage area, office, canteen etc of the bidder		Yes	
3.2	<b>Electricity:</b>			
3.2.1	<b>Electricity for construction purposes 3 Phase 415/440 V</b>			
a	Single point source	Yes		<b>Chargeable.</b> Bidder to make own arrangement of distribution of electricity at its own cost.

**TECHNICAL CONDITIONS OF CONTRACT (TCC)**  
**Chapter – III: FACILITIES IN THE SCOPE OF CONTRACTOR/BHEL (SCOPE MATRIX)**

Sl. No	Description  PART I	Scope		Remarks
		BHEL	Bidder	
b	Further distribution including all materials, Energy Meter, Protection devices and its service		Yes	
c	Duties and deposits including statutory clearances if applicable		Yes	
3.2.2	<b>Electricity for office, stores, canteen, living accommodation of the bidder's staff, engineers, supervisors etc. of the bidder.( Chargeable )</b>			
a	Single point source	Yes		<b>Chargeable.</b> Bidder to make own arrangement of distribution of electricity at its own cost.
b	Further distribution including all materials, Energy Meter, Protection devices and its service		Yes	
c	Duties and deposits including statutory clearances if applicable		Yes	
3.3	<b>Water Supply:</b>			
3.3.1	<b>For all purposes:</b>			
a	Making the water available at single point		Yes	
b	Further distribution as per the requirement of work including supply of materials and execution		Yes	
3.4	<b>Lighting</b>			
a	For construction work (supply of all the necessary materials) 1. At office/storage area		Yes	
b	For construction work (execution of the lighting work/ arrangements) 1. At office/storage area		Yes	
c	Providing the necessary consumables like bulbs, switches, etc during the course of project work		Yes	
d	Lighting for the living purposes of the bidder at the colony / quarters		Yes	
3.5	<b>Communication facilities for site operations of the bidder</b>			
a	Téléphone, fax, internet, intranet, e-mail etc		Yes	

**TECHNICAL CONDITIONS OF CONTRACT (TCC)**  
**Chapter – III: FACILITIES IN THE SCOPE OF CONTRACTOR/BHEL (SCOPE MATRIX)**

Sl. No	Description  PART I	Scope		Remarks
		BHEL	Bidder	
3.6	Compressed air wherever required for the work		Yes	
3.7	Demobilization of all the above facilities		Yes	
3.8	Transportation			
a	For site personnel of the bidder		Yes	
b	For bidder's equipments and consumables (T&P, Consumables etc)		Yes	

# TECHNICAL CONDITIONS OF CONTRACT (TCC)

## Chapter – IV: T&PS AND MMES TO BE DEPLOYED BY CONTRACTOR

<b>4.0</b>	<b>TOOLS &amp; PLANTS (TO BE PROVIDED BY CONTRACTOR)</b>	
4.1	Tentative list of T&P to be deployed by contractor for successful completion of work is detailed below. 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 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.	
4.2	Following Major T&Ps to be deployed by contractor within the indicated time from date of LOI.	
	<b>Major T&amp;P items</b>	<b>Tentative Time from date of LOI</b>
4.2.1	30 Cum/Hr. capacity of Automatic Batching Plant with Printing facility with minimum total 300T storage capacity silos for storing of Cement for each batching plant. – 2 Sets of Batching Plant. <b>Batching plant installed shall have provision of feeding silos with cement bags also as per site requirement.</b>	1 <sup>st</sup> Within 45 days 2 <sup>nd</sup> within 75 days (Mobilization, Installation & Commissioning)
4.2.2	1 No. 40'0" x 8'0" or 2 Nos. 20'0" x 8'0" office Porta Cabin or equivalent.	Within 25 days
4.2.3	2 Nos. Pay loader	Within 30 days
4.2.4	Dumper (min 1 nos)	Within 30 days
4.2.5	DG set 125 KVA(min 1 nos)	Within 30 days
4.2.6	Ready mix concrete Testing Lab 1 AC Lab 4.50m x 6.0m and 1 Non-AC Lab min 4.50m x 4.50m with required Equipment & Instrument as per Annexure - A	Within 45 days
4.2.7	Ready mix concrete compressive strength testing moulds– 100 Nos.	Within 30 days
4.2.8	Drinking water tank – 1000 lit.	Within 30 days
4.2.9	Self-priming water pump 5HP (diesel / electric)	Within 30 days
4.2.10	Welding rectifier	As per requirement
4.2.11	Portable fire extinguishers as below: Soda acid – 2 sets. Dry chemical powder – 2 sets CO2 – 2 sets. Water & sand bucket (4 buckets in one stand) – 2 sets. Fire hose with nozzle (50 M length) – 2 sets	Within 30 days
4.3	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	

# TECHNICAL CONDITIONS OF CONTRACT (TCC)

## Chapter – IV: T&PS AND MMES TO BE DEPLOYED BY CONTRACTOR

	T&P/ IMTEs to maintain work progress, BHEL will be at liberty to arrange the same from any of BHEL site/ other agency & charges along with 5% overheads shall be deducted from contractor's RA bill. Decision of BHEL in this regard will be final & binding on contractor.
4.4	Batching Plant shall not be more than 3-year-old. All the batching plants shall maintain adequate spares to cater immediate day to day maintenance. Contractor shall submit relevant papers of major T&Ps for verification of BHEL prior to dispatch of the same.
4.5	<p>T&amp;P shown in the above mentioned list are tentative based on planned progress requirement, construction schedule and material availability at site. It is to be reviewed and mutually agreed with CM, BHEL site periodically from time to time for mobilization of major T&amp;Ps, and the same have to be adhered to. No change will be permitted without written approval of Construction Manager, BHEL site.</p> <p>Further requirement will be reviewed time to time at site and contractor will provide additional T&amp;P/equipment to ensure completion of entire work within schedule time without any financial implication to BHEL. All other T&amp;Ps shall be provided by the contractor without any extra cost to BHEL. Vendor will give advance intimation &amp; certification regarding capacity etc. prior to dispatch of heavy equipment.</p>
4.6	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.
4.7	In the event of non mobilisation 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 on market Rate.
4.8	<p><b><u>MMEs / MMRs</u></b></p> <p>To be finalized as per site requirement.</p>

# TECHNICAL CONDITIONS OF CONTRACT (TCC)

## Chapter – IV: T&PS AND MMES TO BE DEPLOYED BY CONTRACTOR

### ANNEXURE- A

#### LIST OF EQUIPMENTS FOR CIVIL SITE LABORATORY

SL NO.	NAME OF TEST	NAME OF EQUIPMENT	SIZE OF EQUIPMENT	IS REF.
1	Initial & final setting time, Consistency of cement	Vicat Apparatus with desk pot	Standard	IS 5513
2	Abrasion value test	Los Angeles Abrasion testing machine	Standard	IS 2386
3	Aggregate Impact value test	Aggregate Impact value testing machine.	Standard	IS 9377
4	Aggregate crushing value test	Crushing value apparatus	Standard	IS 2386
5	Flakiness index	Thickness gauge for measuring flakiness index.	Standard	IS 2386
6	Elongation Index	Elongation gauge	Standard	IS 2386
7	Bulk density, voids and bulking apparatus	Measuring cylinders	3, 5, 10 & 15 liters cylinders	
8	Ready mix concrete Compressive test	Digital Compressive Testing Machine.	2000KN capacity	IS 2505
9	Cement cube casting	Cube mould	70.6 x 70.6 x 70.6 mm, 09 Nos. minimum	IS 10086
10	Ready mix concrete Cube Testing	Ready mix concrete Cube Mould	150x150x150mm, minimum 120 Nos.	IS 10086
11	Workability of ready mix concrete	Slump cone	Standard, at least 04 nos	IS 456
12	Specific gravity of aggregates	Pycnometer	Standard, at least 02 nos	IS 383
13	Cement mortar vibration	Motorised vibration machine for cement cube casting	Standard	IS 4031
14	Course aggregate Sieve analysis (Ready mix 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 (2 Sets)	IS 383
15	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	IS 383



# TECHNICAL CONDITIONS OF CONTRACT (TCC)

## Chapter – IV: T&PS AND MMES TO BE DEPLOYED BY CONTRACTOR

			micron, 75 micron, Pan and cover (2 Sets)	
16	Seive Shaker	Motorised Sieve shaker	Mfg. Catalogue	
17	Silt content check	Sand silt content beaker	Standard	

Process Control Accessories				
Sl	Description of Equipment	Specification	Size / No.	
1	Hot air oven	Temperature range 50° C to 300° C	600 x 600 x 600 mm (min. size)	
2	Electronic balance	600g x 0.01g, 10Kg and 50 kg	3 nos.	
3	Physical balance	5 kg capacity	Loose weights up to 5 kg	
4	Thermometer	Temperature 0°C to 50°C	1 No. Digital & 2 Analogue.	
5	Measuring jars	100ml, 200ml, 500ml & 1000 ml	2 nos. set of each size	
6	Gauging trowel	100mm & 200 mm with wooden handle	4 nos.	
7	Spatula	100mm & 200 mm with long blade wooden handle	2 nos. each size	
8	Stainless steel scoop	2 kg and 5 kg	2 nos. each	
9	Digital pH meter	0.1 least count	02 nos.	
10	GI tray	600 x 450 x 50 mm, 450 x 300 x 40 mm, 300 x 250 x 40 mm	02 nos. each	
11	Electric mortar mixer	0.25 CUM capacity.	01 no	

# TECHNICAL CONDITIONS OF CONTRACT (TCC)

## Chapter – V: T&PS AND MMES TO BE PROVIDED BY BHEL

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### **5.0 LIST OF T&P TO BE PROVIDED BY BHEL FREE OF HIRE CHARGES ON SHARING BASIS:**

BHEL shall not provide any T&Ps for this scope of work.

All T&Ps required for handling of items / materials to be arranged by bidder.

# TECHNICAL CONDITIONS OF CONTRACT (TCC)

## Chapter – VI: TIME SCHEDULE

### 6. Time Schedule and Mobilization:

#### 6.1 Initial Mobilization and Time Schedule:

After issue of LOI (though Fax/courier/email) the contractor shall report to the Construction Manager/Site In-Charge of BHEL at site within seven (07) days from date of LOI and submit detailed plan to start production within stipulated timelines unless instructed by BHEL to differ start of work in writing.

**The exact date of start of work shall be reckoned as the LOI date of the contract. However, the date of start may be reviewed and changed accordingly by Construction Manager / Site-in-Charge / Project Manager of BHEL with recorded reasons in the KOM (Kick of Meeting).**

#### 6.2 Schedule of Completion:

The entire work under the scope of work shall be successfully completed in all respect as below:

**Supply of Ready Mix Concrete (RMC): within 30 (Thirty) months from date of start of work.**

Below schedule is indicative. The contractor shall plan his work in such a manner so as to meet the overall project schedule, in consultation with BHEL Engineer.

Sl. No.	Activity	Schedule of completion from LOI
6.2.1	Mobilisation, Installation & Commissioning of 1st Batching Plant (Readiness for the production of RMC)	45 Days
6.2.2	Mobilisation, Installation & Commissioning of 2nd Batching Plant (Readiness for the production of RMC)	75 Days

**Contractor shall make all efforts to install & commission the 1<sup>st</sup> Batching Plant well within stipulated timelines to meet urgent site requirements.**

**Note- In case of any failure in supply of daily/weekly/monthly target of RMC supply, BHEL reserves the right to arrange the required RMC. Any additional cost towards the arrangement of RMC shall also be recovered from the running bills of the bidder along with 5% overheads.**

#### 6.3 COMPLETION OF WORK AND COMMENCEMENT OF GUARANTEE PERIOD

- 6.3.1 The works shall be completed to the entire satisfaction of the Engineer and in accordance with the completion schedule as specified in the Contract, and all unused stores and materials, tools, plant, equipment, temporary buildings, site office, labour hutments and other things shall be removed and the site and work cleared of rubbish and all waste materials and delivered up clean and tidy to the satisfaction of the Engineer at the Contractor's expenses.

# TECHNICAL CONDITIONS OF CONTRACT (TCC)

## Chapter – VI: TIME SCHEDULE

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- 6.3.2 Guarantee period for the work done shall be **Three (3)** months from the date of supply of last lot of ready mix concrete along with submission of accepted test results of ready mix concrete specimens.
- 6.3.3 The supplier will be responsible for the quality of ready mix concrete supplied, quality of materials / design of ready mix concrete. In case the ready mix concrete fail to give the required strength, the cost of re-test, demolition, re-work & other cost / charges shall be recovered from the vendor. Decision of Engineer in this regard is final & binding on the vendor.

# TECHNICAL CONDITIONS OF CONTRACT (TCC)

## Chapter – VII: TERMS OF PAYMENT

<b>7.0</b>	<b>Terms of Payment:</b>
<b>7.1</b>	<b>Progressive Payment/ Final Payment:</b> The payments for works under the scope of this contract shall be as per clause no 2.6; 2.22; 2.23 of General Conditions of Contract and Volume-IB, Chapter-X of SCC.
<b>7.1.1</b>	<b>Documents required for RA Bill:</b> <ul style="list-style-type: none"> <li>• GST Complied Invoice of the work done as per approved BBU.</li> <li>• WAM -6 for RA Bill.</li> <li>• Jointly signed Measurement sheet.</li> <li>• Power of Attorney before submission of Bill.</li> <li>• Validity of Bank Guarantees as applicable under the contract.</li> <li>• HR/IR compliance documents: <ul style="list-style-type: none"> <li>i. Wages payment sheet as per applicable minimum wages.</li> <li>ii. Proof of PF contribution submission.</li> <li>iii. Proof of ESI/ WC contribution submission</li> <li>iv. Proof of Bonus payment as per Bonus Act if applicable.</li> <li>v. Proof of EL payment if applicable.</li> <li>vi. Any other statutory document if applicable.</li> </ul> </li> </ul> <p><b>Documents required for Final Bill:</b> The final bill is drawn as soon as the entire work is completed. From the final amount due, all amounts already claimed up to the previous running account bill will be deducted. It should be ensured that in the final bill the following additional particulars have been provided:</p> <ul style="list-style-type: none"> <li>• Final Bill in WAM-7 Format.</li> <li>• ‘No claim’ certificate from the contractor.</li> <li>• Clearance certificates where ever applicable viz. Clearance Certificates from Customer, various Statutory Authorities like Labour department, PF Authorities, Commercial Tax Department etc.</li> <li>• Final Material re-conciliation statement duly approved by BHEL.</li> <li>• Indemnity Bond as per prescribed format.</li> <li>• Deviation statement showing the difference between the actuals and as per the contract.</li> <li>• Final Delay Analysis.</li> </ul>

# TECHNICAL CONDITIONS OF CONTRACT (TCC)

## Chapter – VII: TERMS OF PAYMENT

7.2

### PRICE VARIATION CLAUSE/ESCALATION

ESCALATION / PRICE VARIATION CLAUSE shall be applicable as detailed below: -

In order to take care of variation in cost of execution of work on either side, due to variation in the index of Aggregate, Labour & Diesel, Price Variation Formula as described herein shall be applicable

85% component of Contract Value shall be considered for PVC calculations and remaining 15% shall be treated as fixed component. The basis for calculation of price variation in each category, their component, Base Index, shall be as under:

Category	Index	Component (K)
Aggregates	Monthly index numbers for STONE, CHIP as per Office of the economic Adviser. (website: <a href="http://eaindustry.nic.in/home.asp">http://eaindustry.nic.in/home.asp</a> )	60
Labour (All Categories)	MONTHLY ALL-INDIA AVERAGE CONSUMER PRICE INDEX NUMBERS FOR INDUSTRIAL WORKERS' published by Labour Bureau, Ministry of Labour and Employment, Government of India. (Website: <a href="http://labourbureau.nic.in">labourbureau.nic.in</a> )	10
Diesel	Monthly index numbers for HSD as per Office of the economic Adviser. (website: <a href="http://eaindustry.nic.in/home.asp">http://eaindustry.nic.in/home.asp</a> )	15

Payment / recovery due to variation in index shall be determined on the basis of the following notional formula without any initial absorption, in respect of the identified components viz Aggregates, Labour & Diesel.

$$P = K \times R \times (X_n - X_o) / X_o$$

Where,

- P = Amount to be paid / recovered due to variation in the Index for Aggregates, Labour & Diesel
- K = Percentage component applicable for Aggregates, Labour & Diesel.
- R = Value of work done for the billing month
- X<sub>n</sub> = Revised Index for Aggregates, Labour & Diesel for the billing month under consideration.
- X<sub>o</sub> = Index for Aggregates, Labour & Diesel as on the Base date.

Base date shall be calendar month of the 'last date of submission of Tender

# TECHNICAL CONDITIONS OF CONTRACT (TCC)

## Chapter – VII: TERMS OF PAYMENT

	<ul style="list-style-type: none"> <li>PVC shall be applicable for the entire original contract period plus the extended period, i.e. for the complete execution period, as follows:  <u>For PVC computation of the <math>n^{\text{th}}</math> month:</u>   Let the cumulative delay attributable to the Contractor is <math>D_n</math> in the <math>n^{\text{th}}</math> month as per Form-14.   Considering <math>R_n</math> as the billing value for the <math>n^{\text{th}}</math> month, PVC for the <math>n^{\text{th}}</math> month shall be calculated as follows:   a) PVC for the portion of <math>R_n</math> for an amount of <math>D_{(n-1)}</math> shall be payable as per indices for the <math>(n-1)^{\text{th}}</math> month.  b) PVC for the balance portion of <math>R_n</math> shall be payable as per indices for the <math>n^{\text{th}}</math> month   In case <math>D_{(n-1)}</math> is greater than <math>R_n</math>, then entire <math>R_n</math> shall be payable as per indices for the <math>(n-1)^{\text{th}}</math> month and the balance portion of <math>D_{(n-1)}</math> shall be adjusted from <math>R_{(n+1)}</math> of the <math>(n+1)^{\text{th}}</math> month and will be payable as per indices for the <math>(n-1)^{\text{th}}</math> month. The above process shall be continued for subsequent month(s) also till full <math>D_{(n-1)}</math> is consumed.   Other Important Points: -   a) PVC shall not be payable for the ORC amount, Supplementary/Additional Items, Extra works. However, PVC will be payable for items executed under quantity variation of BOQ items under originally awarded contract.  b) RMC supplier shall furnish necessary monthly indices for Aggregates, Labour &amp; Diesel from the relevant websites along with Bills.  c) The contractor will be required to raise the bills for price variation payments on a monthly basis along with the running bills irrespective of the fact whether any increase/decrease in the index for relevant categories has taken place or not. In case there is delay in publication of bulletins (final figure), the provisional values as published can be considered for payments and arrears shall be paid/recovered on getting the final values.  d) PVC shall not be applicable for time extension provided for the delays solely attributable to the contractor. No PVC is payable during the period of Provisional Time Extension till grant of final time extension. Applicability of PVC will be decided at the time of grant of final time extension  e) The total amount of PVC shall not exceed 15% of the cumulatively executed contract value. Executed contract value for this purpose is exclusive of PVC, ORC, Supplementary/Additional Items and Extra works except items due to quantity variation.</li> </ul>
7.3	<p><b>SECURED RECOVERABLE ADVANCES:</b></p> <p><b>Interest Free Secured Mobilization Advance as per GCC Clause No. 2.13</b> will be payable under exceptional circumstances on certification of BHEL Construction Manager at Site. Interest Free Mobilization Advance shall be disbursed in specifically mentioned stages of major resource mobilization as specified hereunder:</p>



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	<ol style="list-style-type: none"><li>1. For Mobilization and Installation of Batching Plants along with required Silos - 2.0%</li><li>2. For Mobilization of required T&amp;Ps (pay loader &amp; dumper) - 1.5%</li><li>3. For Installation and Erection of Site Infrastructure by contractor i.e. site office and quality lab - 1.5%</li></ol> <p>Note:</p> <ol style="list-style-type: none"><li>1. BHEL Site-CM shall be the deciding authority for assessing the admissibility of advance payment to contractor.</li><li>2. In case contractor do not fulfil the agreed conditions of payment of 1st mobilization advance, BHEL Construction Manager will have the authority to not allow the 2nd mobilization advance to contractor.</li></ol>

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## Chapter – VIII: TAXES AND DUTIES

8.0	<b>TAXES &amp; DUTIES</b>
8.1	<p>The contractor shall pay all (save the specific exclusions as enumerated in this clause) taxes, fees, license, charges, deposits, duties, tools, royalty, commissions, other charges, etc. which may be levied on the input goods &amp; services consumed and output goods &amp; services delivered in course of his operations in executing the contract. In case BHEL is forced to pay any of such taxes/duties, BHEL shall have the right to recover the same from his bills or otherwise as deemed fit.</p> <p>However, provisions regarding <b>GST</b> on output supply (goods/service) and TDS/TCS as per Income Tax Act shall be as per following clauses.</p>
8.2	<b>GST (Goods and Services Tax)</b>
8.2.1	GST as applicable on output supply (goods/services) are excluded from contractor's scope; therefore, contractor's price/rates shall be <b>exclusive</b> of GST. Reimbursement of GST is subject to compliance of following terms and conditions. BHEL shall have the right to deny payment of GST and to recover any loss to BHEL on account of tax, interest, penalty etc. for non-compliance of any of the following condition.
8.2.2	The admissibility of GST, taxes and duties referred in this chapter or elsewhere in the contract shall be limited to direct transactions between BHEL & its Contractor. BHEL shall not consider GST on any transaction other than the direct transaction between BHEL & its Contractor.
8.2.3	Contractor shall obtain prior written consent of BHEL before billing the amount towards such taxes. Where the GST laws permit more than one option or methodology for discharging the liability of tax/levy/duty, BHEL shall have the right to adopt the appropriate one considering the amount of tax liability on BHEL/Client as well as procedural simplicity with regard to assessment of the liability. The option chosen by BHEL shall be binding on the Contractor for discharging the obligation of BHEL in respect of the tax liability to the Contractor.
8.2.4	Contractor has to submit GST registration certificate of the concerned state. Contractor also needs to ensure that the submitted GST registration certificate should be in active status during the entire contract period.
8.2.5	Contractor/Vendor has to issue Invoice/Debit Note/Credit Note indicating HSN/SAC code, Description, Value, Rate, applicable tax and other particulars in compliance with the provisions of relevant GST Act and Rules made thereunder.
8.2.6	Vendor has to submit GST compliant invoice within the due date of invoice as per GST Law. In case of delay, BHEL reserves the right of denial of GST payment if there occurs any hardship to BHEL in claiming the input thereof. In case of goods, vendor has to provide scan copy of invoice & GR/LR/RR to BHEL before movement of goods starts to enable BHEL to meet its GST related compliances. Special care should be taken in case of month end transactions.
8.2.7	Vendor has to ensure that invoice in respect of such services which have been provided/completed on or before end of the month should not bear the date later than last working day of the month in which services are performed.
8.2.8	<p>Subject to other provisions of the contract, GST amount claimed in the invoice shall be released on fulfilment of all the following conditions by the Contractor: -</p> <p>a. Supply of goods and/or services have been received by BHEL.</p>

# TECHNICAL CONDITIONS OF CONTRACT (TCC)

## Chapter – VIII: TAXES AND DUTIES

	<ul style="list-style-type: none"> <li>b. Original Tax Invoice has been submitted to BHEL.</li> <li>c. Contractor/ Vendor has submitted all the documents required for processing of bill as per contract/ purchase order/ work order.</li> <li>d. In cases where e-invoicing provision is applicable, vendor/contractor is required to submit invoice in compliance with e-invoicing provisions of GST Act and Rules made thereunder.</li> <li>e. Contractor has filed all the relevant GST return (e.g. GSTR-1, GSTR-3B, etc.) pertaining to the invoice submitted and submit the proof of such return along with immediate subsequent invoice. In case of final invoice/ bill, contractor has to submit proof of such return within fifteen days from the due date of relevant return.</li> <li>f. Respective invoice has appeared in BHEL's GSTR - 2A for the month corresponding to the month of invoice and in GSTR-2B of the month in which such invoices has been reported by the contractor along with status of ITC availability as "YES" in GSTR-2B. Alternatively, BG of appropriate value may be furnished which shall be valid at least one month beyond the due date of confirmation of relevant payment of GST on GSTN portal or sufficient security is available to adjust the financial impact in case of any default by the contractor.</li> <li>g. Contractor has to submit an undertaking confirming the payment of all due GST in respect of invoices pertaining to BHEL.</li> </ul>
8.2.9	Any financial loss arises to BHEL on account of failure or delay in submission of any document as per contract/purchase order/work order at the time of submission of Tax invoice to BHEL, shall be deducted from contractor's bill or otherwise as deemed fit.
8.2.10	TDS as applicable under GST law shall be deducted from contractor's bill.
8.2.11	Contractor shall comply with the provisions of e-way bill wherever applicable. Further wherever provisions of GST Act permits, all the e-way bills , road permits etc. required for transportation of goods needs to be arranged by the contractor.
8.2.12	Contractor shall be solely responsible for discharging his GST liability according to the provisions of GST Law and BHEL will not entertain any claim of GST/interest/penalty or any other liability on account of failure of contractor in complying the provisions of GST Law or discharging the GST liability in a manner laid down thereunder.
8.2.13	In case declaration of any invoice is delayed by the vendor in his GST return or any invoice is subsequently amended/altered/deleted on GSTN portal which results in any adverse financial implication on BHEL, the financial impact thereof including interest/penalty shall be recovered from the Contactor's due payment.
8.2.14	Any denial of input credit to BHEL or arising of any tax liability on BHEL due to non-compliance of GST Law by the Contractor in any manner, will be recovered along with liability on account of interest and penalty (if any) from the payments due to the Contactor.
8.2.15	In the event of any ambiguity in GST law with respect to availability of input credit of GST charged on the invoice raised by the contractor or with respect to any other matter having impact on BHEL, BHEL's decision shall be final and binding on the contractor.

# TECHNICAL CONDITIONS OF CONTRACT (TCC)

## Chapter – VIII: TAXES AND DUTIES

8.2.16	<p><b><u>Variation in Taxes &amp; Duties:</u></b></p> <p>Any upward variation in GST shall be considered for reimbursement provided supply of goods and services are made within schedule date stipulated in the contract or approved extended schedule for the reason solely attributable to BHEL. However downward variation shall be subject to adjustment as per actual GST applicability.</p> <p>In case the Government imposes any new levy/tax on the output service/goods after price bid opening, the same shall be reimbursed by BHEL at actual. The reimbursement under this clause is restricted to the direct transaction between BHEL and its contractor only and within the contractual delivery period only.</p> <p>In case any new tax/levy/duty etc. becomes applicable after the date of Bidder's offer but before opening of the price Bid, the Bidder/Contractor must convey its impact on his price duly substantiated by documentary evidence in support of the same before opening of price bid. Claim for any such impact after opening the price bid will not be considered by BHEL for reimbursement of tax or reassessment of offer.</p>
8.3	<p><b><u>Income Tax:</u></b></p> <p>TDS/TCS as applicable under Income Tax Act, 1961 or rules made thereunder shall be deducted/collected from contractor's bill.</p>

### **8.4 BOCW Act & Cess Act**

**8.4.1 BOCW Cess is not to be borne by contractor.** Refer Annexure-I for BOCW Act & Cess Act.

<b>Annexure-I:</b>	
Bidder may please note that the sub-contractor/bidder of BHEL engaging building or construction worker in connection with building or other construction work, are required to follow the procedures enumerated below:	
1.	It shall be the sole responsibility of the contractor as employer to ensure compliance of all the statutory obligations under the Building and other Construction Workers' (Regulation of Employment and Conditions of Service) Act, 1996 and the Building and other Construction Workers' Welfare Cess Act, 1996 and the rules made thereunder.
2.	It shall be sole responsibility of the contractor engaging Building Workers in connection with the building or other construction works in the capacity of employer to apply and obtain registration certificate specifying the scope of work under the relevant provisions of the Building and Other Construction Workers' (Regulation of Employment and Conditions of Service) Act, 1996 from the appropriate Authorities.
3.	It shall be responsibility of the contractor to furnish a copy of such Registration Certificate within a period of one month from the date of commencement of Work.
4.	It is responsibility of the contractor to register under the Building and other Construction Workers' Welfare Cess Act, 1996 and deposit the required Cess for the purposes of the Building and other Construction Workers' (Regulation of Employment and Conditions of Service) Act, 1996 at such rate as the Central Government may, by notification in the Official

# TECHNICAL CONDITIONS OF CONTRACT (TCC)

## Chapter – VIII: TAXES AND DUTIES

	Gazette, from time to time specify. However, before registering and deposit of Cess under the Building and other Construction Workers' Welfare Cess Act, 1996, the contractor will seek written prior approval from the Construction Manager.
5.	It shall be sole responsibility of the contractor as employer to get registered every Building Worker, who is between the age of 18 to 60 years of age and who has been engaged in any building or other construction work for not less than ninety days during the preceding twelve months as Beneficiary under the Building and other Construction Workers' (Regulation of Employment and Conditions of Service) Act, 1996.
6.	It shall be sole responsibility of the contractor as employer to maintain all the registers, records, notices and submit returns under the Building and other Construction Workers' (Regulation of Employment and Conditions of Service) Act, 1996 and the Building and other Construction Workers' Welfare Cess Act, 1996 and the rules made thereunder.
7.	It shall be sole responsibility of the contractor as employer to provide notice of poisoning or occupation notifiable diseases, to report of accident and dangerous occurrences to the concerned authorities under the Building and other Construction Workers' (Regulation of Employment and Conditions of Service) Act, 1996 and the rules made thereunder and to make payment of all statutory payments & compensation under the Employees' Compensation Act, 1923.
8.	It shall be the responsibility of the sub-contractor as employer to make payment/deposit of applicable cess amount on the extent of work involving building or construction workers engaged by the sub-contractor within a period of one month from the receipt of payment. It shall also be responsibility of the Contractor to furnish BHEL on monthly basis, Receipts/ Challans towards Deposit of the Cess under the Building and other Construction Workers' Welfare Cess Act, 1996 and the rules made thereunder along with following statistics: (i) Number of Building Workers employed during preceding one month. (ii) Number of Building workers registered as Beneficiary during preceding one month. (iii) Disbursement of Wages made to the Building Workers for preceding wage month. (iv) Remittance of Contribution of Beneficiaries made during the preceding month
9.	<b>BHEL shall reimburse the contractor the Cess amount deposited for the purposes of the Building and other Construction Workers' (Regulation of Employment and Conditions of Service) Act, 1996 under the Building and other Construction Workers' Welfare Cess Act, 1996 and the rules made thereunder.</b> However, BHEL shall not reimburse the Fee paid towards the registration of establishment, fees paid towards registration of Beneficiaries and Contribution of Beneficiaries remitted.
10.	It shall be responsibility of the Building Worker engaged by the Contractor and registered as a beneficiary under the Building and other Construction Workers' (Regulation of Employment and Conditions of Service) Act, 1996 to contribute to the Fund at such rate per mensem as may

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	be specified by the State government by notification in the Official Gazette. Where such beneficiary authorizes the contractor being his employer to deduct his contribution from his monthly wages and to remit the same, the contractor shall remit such contribution to the Building and other construction Workers' Welfare Board in such manner as may be directed by the Board , within the fifteen days from such deduction.
11.	<b>Bidders may please note that though the quoted price is exclusive of BOCW (which will be reimbursed by BHEL as per sub-clause 9 above) , however, If at any point of time during the contract period, non-compliance of the provisions of the Building and other Construction Workers' (Regulation of Employment and Conditions of Service) Act, 1996 and the Building and other Construction Workers' Welfare Cess Act, 1996 and the rules made thereunder is observed, BHEL reserves the right to deduct the applicable cess (1%) on the contract value and penalty ( if any, imposed by Cess Authorities) from the payables on account of non-compliance.</b>
12.	The contractor shall declare to undertake any liability or claim arising out of employment of building workers and shall indemnify BHEL from all consequences / liabilities / penalties in case of non-compliance of the provisions of the Building and other Construction Workers' (Regulation of Employment and Conditions of Service) Act, 1996 and the Building and other Construction Workers' Welfare Cess Act, 1996 and the rules made thereunder.



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## Chapter-IX: BILL OF QUANTITIES AND % WEIGHTAGE OF INDIVIDUAL ITEMS

**This Chapter consists of Part A & Part B of Volume II “Price bid”:**

<b><u>CONTENTS</u></b>	
<b>Description</b>	<b>Remarks</b>
<b>PART A:</b> Instructions to the Bidders	Instructions
<b>PART B:</b> % weightage for amount of individual items of Schedule of quantity	BILL OF QUANTITIES AND % WEIGHTAGE OF INDIVIDUAL ITEMS) – Attached separately.
<b>PART C:</b> Total Price for entire scope of Work	This part is implanted in the E- Procurement portal entitled as “Part-C of Vol-II Price Bid”.

<b><u>Part A:</u></b>	<b><u>Instructions to the Bidders</u></b>
<b>1.</b>	<b><u>Bidders shall quote Total Price for the entire scope of work in Rupees in VOL II PRICE BID at BHEL E-procurement Portal.</u></b> Any other entry elsewhere in the offer of the bidder shall be treated as Null and Void. The total value shall be automatically calculated on E-portal.
<b>2.</b>	Bidder shall quote the total price in “Price Bid”.
<b>3.</b>	BHEL has fixed the % weightages as in “Part-B” for the amount of individual items of BOQ Cum Rate Schedule w.r.t. the total price of Price Bid Vol-II.
<b>4.</b>	Based on the pre-fixed % weightages, amount of individual items shall be derived by BHEL. This amount shall not be rounded off.
<b>5.</b>	Based on the quantities of individual item and the amount arrived in Sl. No. 4 above, item rate of individual items shall be derived by BHEL. This item rate shall be rounded off up to two decimal places and shall be used to calculate the total amount of an item.
<b>6.</b>	Bidders to note that this is an ‘ <b><u>Item rate contract</u></b> ’. Payment shall be made for the actual quantities of work executed at the Unit rate arrived at as per serial no. 5 above.
<b><u>PART B:</u></b>	% weightage for amount of individual items of BOQ CUM RATE SCHEDULE w.r.t. the total price (as quoted by the bidder in “Part C of Vol-II-Price Bid”)- attached separately.

# TECHNICAL CONDITIONS OF CONTRACT (TCC)

## Chapter-X: TECHNICAL SPECIFICATIONS AND DRAWINGS

<b>10.0</b>	<b>Technical Specifications</b>
<b>10.01</b>	Mix design for all concreting shall be carried out from NCCBM, IITs, NITs approved by NTPC/BHEL, contractor has to ensure adding of high grade PCE based admixture to minimize the cement content in line with ASTM C 494 as advised by BHEL time to time without any additional cost.
<b>10.02</b>	In case of change of brand of cement in a particular design mix, bidder may have to re-design the concrete mix with new brand of cement before actual usage at site, cost incurred will be borne by Bidder.
<b>10.03</b>	In case ambient temperature is greater than 32 Degree Celsius, Placement temperature should be controlled with necessary temperature correction of concrete by introducing Chiller Plant along with Batching Plant
<b>10.04</b>	<p><b><u>Quality Control:</u></b></p> <p>Contractor shall establish and maintain quality control for different items of work and materials as may be directed by the Engineer to assure compliance with contract requirements and maintain and submit to the Engineer records of the same.</p> <p>The quality control operation shall include but not be limited to the following items of work:</p> <ol style="list-style-type: none"> <li>1. Admixture: Type, quantity, physical and chemical properties that affects strength, workability and durability of concrete. For air entraining admixtures, dosage to be adjusted to maintain air contents within desirable limits.</li> <li>2. Aggregate: Physical, chemical and mineralogical qualities. Grading, moisture content and impurities.</li> <li>3. Water: Impurities tests.</li> <li>4. Cement: Tests to satisfy relevant IS Specifications (only association with Owner's tests, if the supply is made by Owner).</li> <li>5. Grades of Concrete: Usage and mix design, testing of all properties.</li> <li>6. Batching &amp; Mixing: Types and capacity of plant, concrete mixers and transportation equipment.</li> </ol>
<b>10.05</b>	<p><b><u>Installation:</u></b></p> <p>All installation requirements shall be in accordance with IS 4926 &amp; IS:456 and as supplemented or modified herein or by other best possible standards where the specific requirements mentioned in this section of the specification do not cover all the aspects to the full satisfaction of the Engineer.</p>
<b>10.06</b>	<p><b><u>Washing and Screening of Aggregates</u></b></p> <p>Washing and Screening of coarse aggregate shall be carried out to remove fines, dirt or other deleterious materials. Washing of fine aggregate shall not be allowed, Fine aggregates shall be screened only to remove dirt or other deleterious materials. However, all washing &amp; screening</p>



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## Chapter-X: TECHNICAL SPECIFICATIONS AND DRAWINGS

	of aggregates shall be carried out by approved means to ensure compliance with the aggregate specification.
10.07	<p><b>Sampling and Testing of Materials:</b></p> <ol style="list-style-type: none"> <li>The method of sampling for testing of construction materials and work / job samples shall be as per the relevant IS / standards / codes and in line with the requirements of the technical specifications / quality plans. All samples shall be jointly drawn, signed and sealed wherever required, by the Contractor and the engineer or his authorized representative.</li> <li>The Contractor shall carry out testing in accordance with the relevant IS / standards/codes and in line with the requirements of the technical specifications/quality plans. Where no specific testing procedure is mentioned, the tests shall be carried out as per the best prevalent engineering practices and to the directions of the Engineer. All testing shall be done in the presence of the engineer or his authorized representative.</li> <li>Before execution of any civil work the Contractor shall conduct full scale suitability tests on various construction and building material such as fine and coarse aggregates, cement, admixtures, supplementary cementations materials and construction water to ascertain their suitability for use and the concrete mix designs conducted from all IITs, NCB, CSMRS, reputed government / autonomous laboratories / organizations, NITs and other reputed testing laboratories. The test samples for such full scale testing shall be jointly sampled and sealed by the engineer and Contractor, thereafter these shall be sent to the concerned laboratory through the covering letter signed by field quality assurance (FQA) representative of the engineer.</li> <li>The Contractor shall timely initiate the action with regard to the evaluation of aggregates and other building material including concrete mix design, so as to ensure completion of these tests before start of civil works at site, thereby not affecting any project work. The test reports and recommendations for suitability of the materials including concrete mix design shall be promptly submitted by the Contractor to the engineer.</li> </ol>
10.07.1	<p><b>Aggregates: -</b></p> <p>Evaluation of aggregate for potential alkali-aggregate reactivity shall be carried out as per following scope of work.</p> <ol style="list-style-type: none"> <li><b>Evaluation of Aggregates for Mechanical / Physical Properties:</b> <ol style="list-style-type: none"> <li>To carry out different tests on coarse aggregate sample i.e. specific gravity, water absorption, sieve analysis, deleterious material; soundness, crushing value, impact value, abrasion value, elongation index and flakiness index, as per IS: 2386.</li> <li>To carry out different tests on fine aggregate sample i.e. specific gravity, water absorption, sieve analysis, deleterious material, soundness, silt content, clay content and organic impurities as per IS: 2386.</li> <li>To prepare evaluation report based on test results of a) and b) above and to advise regarding suitability of fine and coarse aggregates.</li> </ol> </li> <li><b>Evaluation of Aggregates for Potential Alkali-Aggregate Reactivity:</b></li> </ol>

# TECHNICAL CONDITIONS OF CONTRACT (TCC)

## Chapter-X: TECHNICAL SPECIFICATIONS AND DRAWINGS

	<p>a) To carry out petrographic analysis and accelerated Mortar bar Test on aggregate samples (1N NaOH at 80 deg. Centigrade for 14 days as per ASTM 1260, or the method established/ developed by CSMRS for 22days test).</p> <p>b) To prepare a report based on test results of a) above and to advise regarding suitability of aggregates to be used and further testing required if any.</p>
10.07.2	<p><b>Cement :-</b></p> <p>Representative samples will be taken from each consignment of cement received from the manufacturer/supplier for carrying out the tests for fineness (by hand sieving), setting time and compressive strengths. Soundness Tests may also be required to be carried out if required by the Engineer.</p> <p>The tests shall be carried out free of charge by Contractor as per the terms and conditions of the Contract the tests shall be carried out by him.</p>
10.07.3	<p><b>Water</b></p> <p>Sampling and Testing of water being used for concrete works as per IS: 3550 will be carried out by the Contractor at regular intervals and whenever directed by the Engineer. The final acceptance criteria in case of doubt will be as per IS: 3025 &amp; IS: 456.</p>
10.07.4	<p><b>Admixture</b></p> <p>a) <b>Air Entraining Agents (A.E.A) :-</b> Initially, before starting to use A.E.A., relationship between the percentage of air entrained and the cube crushing strength vis-à-vis quantity of A.E.A. used for all types of concrete will be established by the Contractor by carrying out sufficiently large number of tests. After then, at regular intervals and whenever directed by the Engineer, the Contractor will check up the actual percentages of air entrained and corresponding crushing strengths to correlate with the earlier test results.</p> <p>b) <b>Other Admixtures :-</b> Tests for establishing the various properties of any other admixtures which may be required to be added shall be carried out by the Contractor.</p>
10.07.5	<p><b>Concrete</b></p> <p>The sampling of concrete, making the test specimens, curing and testing procedure etc. shall be in accordance with IS:516 and IS:1199 the size of specimen being 15 cm cubes. Normally, only compression tests shall be performed but under special circumstances the Engineer may require other tests to be performed in accordance with IS: 516.</p> <p>Sampling procedure, frequency of sampling and test specimen shall conform to Clause 14 of IS: 456.</p> <p>To control the consistency of concrete from every mixing plant, slump tests and/or compacting factor tests in accordance with IS: 1199 and as mentioned in Clause 3.6 of this Specification shall be carried out by the Contractor every two hours or as directed by the Engineer. Slumps corresponding to the test specimens shall be recorded for reference.</p>

# TECHNICAL CONDITIONS OF CONTRACT (TCC)

## Chapter-X: TECHNICAL SPECIFICATIONS AND DRAWINGS

	<p>The acceptance criteria of concrete shall be in accordance with Clause 15 of IS: 456.</p> <p>Concrete work found unsuitable for acceptance shall have to be dismantled and replacement is to be done as per specification by the Contractor. No payment for the dismantled concrete, the relevant formwork and reinforcement, embedded fixtures, etc. wasted in the dismantled portion shall be made. In the course of dismantling, if any damage is done to the embedded items or adjacent structures, the same shall be made good to the satisfaction of the Engineer</p>
10.08	<p><b>Acceptance Criteria:-</b></p> <ol style="list-style-type: none"> <li>Standard Deviation</li> <li>Standard deviation shall be based on test results and determination of Standard deviation shall conform to clause 16 of IS: 456.</li> <li>Acceptance Criteria</li> <li>The strength requirements and acceptance criteria shall conform to Clause 16 of IS: 456.</li> <li>Inspection and Core Tests</li> <li>Inspection of concrete work immediately after stripping the formwork and core test of structures shall conform to Clause 17 of IS: 456.</li> </ol>
10.09	<p><b>Laboratory and Field Testing:</b></p> <ol style="list-style-type: none"> <li>The field laboratory for QA and QC activities shall be constructed and setup by the Contractor in line with the indicative field QA&amp;QC laboratory set-up enclosed at Annexure-I. The Laboratory building shall be constructed and installed with the adequate facilities to meet the requirement of envisaged test setup. Temperature and humidity controls shall be available wherever necessary during testing of samples. The quality plan shall identify the testing equipment / instrument, which the Contractor shall deploy and equip the field quality laboratory for meeting the field quality plan requirements. The Contractor shall furnish a comprehensive list of testing equipment / instrument required to meet the planned/scheduled tests for the execution of works for OWNER acceptance/ approval. The Contractor shall mobilize the requisite laboratory equipment and QA&amp;QC manpower at least 15 days prior to the planned test activity as per the schedule of tests.</li> <li>All equipment and instruments in the field shall be calibrated before the commencement of tests and then at regular intervals, as per the manufacturer's recommendation and as directed by the OWNER. The calibration certificates shall specify the fitness of the equipment and instruments within the limit of tolerance for use. Contractor shall arrange for calibration of equipment and instruments by an NABL / NPL accredited agency and the calibration report shall be submitted to OWNER.</li> <li>The tests which cannot be carried out in the field laboratory shall be done at a laboratory of repute. This includes all IITs, NCB, CSMRS, reputed government / autonomous laboratories / organizations, NITs and other reputed testing laboratories. The test samples for such test shall be jointly selected and sealed by the engineer and thereafter these shall be sent to the concerned laboratory through the covering letter signed by OWNER engineer.</li> </ol>

# TECHNICAL CONDITIONS OF CONTRACT (TCC)

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	<p>d) The test report along with the recommendations shall be obtained from the laboratories without delay and submitted to OWNER.</p> <p>e) Based on the schedule of work agreed with the engineer-in-charge and the approved FQP, the Contractor shall prepare a schedule of tests and submit them to the engineer-in-charge and organize to carry out the tests as scheduled /agreed.</p>
10.10	<p><b>Materials to be used</b></p> <p>All materials whether to be incorporated in the work or used temporarily for the construction shall conform to the relevant IS Specifications unless stated otherwise and be of best approved quality.</p> <p>1. <b>Aggregates:</b></p> <p>a) <b>Coarse Aggregate:</b></p> <p>Coarse aggregate for concrete shall be crushed stones chemically inert, hard, strong, durable against weathering of limited porosity and free from deleterious materials. It shall be properly graded. It shall meet the requirements of IS: 383.</p> <p>b) <b>Fine Aggregate:</b></p> <p>Fine aggregate shall be hard, durable, clean and free from adherent coatings of organic matter and clay balls or pellets. Fine aggregate in concrete shall conform to IS: 383. For plaster, it shall conform to IS: 1542 and for masonry work to IS: 2116.</p> <p>c) Petrographic examination of aggregate shall be carried out by the contractor at National Council for Cement and Building Materials (NCB), Ballabgarh or any other approved laboratory to ascertain the structure and rock type including presence of strained quartz and other reactive minerals. In case, the coarse aggregate sample is of composite nature, the proportions (by weight) of different rock types in the composite sample and petrographic evaluation of each rock should also be ascertained. While determining the rock type, special emphasis should be given on identification of known reactive rocks like chalcedony, opal etc. The procedure laid down in IS 2430 for sampling of aggregates may be followed.</p> <p>d) The laboratory shall determine potential reactivity of the aggregate, which may lead to reaction of silica in aggregate with the alkalis of cement and / or potential of some aggregates like limestone to cause residual expansion due to repeated temperature cycle. If the same is established, the contractor shall further carry out alkali aggregates reactivity test as per IS 2386 (Pt. VII) and / or repeated temperature cycle test to establish the suitability of the aggregates for the concrete work. The test results, with the final recommendations of the laboratory, as to a suitability of the aggregate, for use in the concrete work for various structures and suggested measures, in case of results are not satisfactory, shall be submitted to the Engineer for his review, in a report form. In case in the report, it is established, that the aggregates contain reactive silica, which would react with alkalis of the cement, the contractor shall change the source of supply of the aggregate or use low alkali cement as per recommendation or take measures as recommended in the report as instructed by Engineer. In case aggregates indicate residual expansion, under repeated temperature cycle test (from 10 Degree Celsius to 65 Degree Celsius and</p>

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	<p>for 60 temperature cycles) the material shall not be used for concreting of Lime stone crusher decks, Mills, Fans and other equipment foundations which are likely to be subjected to repeated temperature cycle. The contractor shall use aggregates free from residual expansion under repeated temperatures cycle test.</p> <p><b>2. Water:</b></p> <p>Water for use in Concrete shall be clear and free from injurious oils, acids, alkalis, organic matter, soluble silts or other deleterious substances which may cause corrosion, discoloration, efflorescence etc. Normally potable water is found to be suitable. Generally, IS: 3550 will be followed for routine tests. Acceptance test for water shall be as per IS: 3025, and Table-1 of IS: 456. In case of doubt regarding development of strength, the suitability of water for making concrete shall be ascertained by compressive strength and initial setting time tests as per method of tests in accordance with the requirements of IS-516 &amp; IS- 4031 respectively. The pH value of water shall generally be not less than 6.</p> <p><b>3. Admixture:</b></p> <p>i) The design mix of structural concrete M-20 and above should be design with High performance super plasticizer PCE-based water reducing admixture of Type-G/F as per ASTM C-494 of approved make FOSROC/SIKA/BASF or Equivalent having minimum water reduction capability of 30% with the approval of BHEL.</p> <p>ii) The performance compliance of the Super-plasticizer should be ensured based on the following test.</p> <ul style="list-style-type: none"> <li>➤ Marsh cone test for optimum dosage of admixture with specific brand of cement.</li> <li>➤ Slump retention test of concrete.</li> <li>➤ Water reduction capability test by doing trial mix.</li> <li>➤ Rheological properties of fresh concrete on trial mix.</li> </ul>
10.11	<p><b><u>Mixing of Concrete:</u></b></p> <p>Concrete shall always be mixed in mechanical mixer unless specifically approved by the Engineer for concrete to be used in unimportant out of the way locations in small quantities. Water shall not normally be charged into the drum of the mixer until all the cement and aggregates constituting the batch are already in the drum and mixed for at least one minute. Mixing of each batch shall be continued until there is a uniform distribution of the materials and the mass is uniform in colour and consistency, but in no case shall mixing be done for less than 2 (two) minutes and at least 40 (forty) revolutions after all the materials and water are in the drum. When absorbent aggregates are used or when the mix is very dry, the mixing time shall be extended as may be directed by the Engineer. Mixers shall not be loaded above their rated capacity as this prevents thorough mixing.</p> <p>The entire contents of the drum shall be discharged before the ingredients for the next batch are fed into the drum. No partly set or remixed or excessively wet concrete shall be used. Such concrete shall be immediately removed from site. Each time the work stops, the mixer shall be</p>

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	<p>thoroughly cleaned &amp; when the next mixing commences, the first batch shall have 10% additional cement to allow for loss in the drum.</p> <p>Regular checks on mixer efficiency shall be carried out as directed by the Engineer as per IS: 4634 on all mixers employed at site. Only those mixers whose efficiencies are within the tolerances specified in IS: 1791 will be allowed to be employed.</p> <p>Ingredients for design mix concrete shall be measured by weight. For small jobs portable swing weigh Batchers conforming to IS: 2722 may be used.</p> <p>Batching plant conforming to IS: 4925 shall be used for large jobs. The accuracy of the measuring equipment shall be within + 2% of the quantity of Cement, water or total aggregates being measured and within + 5% of the quantity of any admixture being used. The batching equipment shall be fitted with an accurate mechanism for weighing separately the cement, fine aggregate and coarse aggregate. Water may be measured by volume or by weight. All measuring equipment should be maintained in a clean serviceable condition, and their accuracy shall be checked periodically.</p> <p>Mechanical / electrical control shall be provided on the mixing equipment to ensure the batch cannot be discharged until approved mixing time has elapsed and the entire batch shall be discharged before the mixer is recharged.</p> <p>Where admixtures are employed, separate containers &amp; measuring devices shall be used.</p> <p>For minor concreting works, batching by volume according to specific weight may be permitted by the Engineer. In that case the whole bags of cement shall be used and gauge boxes used for measuring aggregates.</p> <p>When hand mixing is permitted by the Engineer, it shall be carried out on a water-tight platform and care shall be taken to ensure that mixing is continued until the mass is uniform in colour and consistency. In case of hand-mixing, 10% extra cement shall be added to each batch.</p>
10.12	<p><b><u>Cold Weather Concreting:</u></b></p> <p>When conditions are such that any operation of concreting may be expected to be done at 5°C atmospheric temperature or below the work shall conform to the requirement of Clause 14 of IS:456 and IS:7861 (Part - II).</p> <p><b><u>Hot Weather Concreting:</u></b></p> <p>When depositing concrete in very hot weather, the Contractor shall take all precautions as per IS:7861 (Part-I) and stagger the work to the cooler parts of the day to ensure that the temperature of wet concrete used in massive structures does not exceed 40°C while placing. Positive temperature control by pre cooling, post cooling or any other method, if required, will be specified.</p> <p><b><u>Concreting Under Water:</u></b></p> <p>When it is necessary to deposit concrete under water it shall be done in accordance with the requirements of clause 14 of IS: 456.</p>