VOLUME–II

NOTICE INVITING TENDER

ADDITIONAL CONDITIONS OF CONTRACT

TECHNICAL SPECIFICATIONS

DRAWINGS
ENGINEERING PROJECTS (INDIA) LTD.  
(A Govt. of India Enterprise)  

Tender No. NERO/CON/ASR/AGARTALA/320 Date: 04.09.2018  

NOTICE INVITING e-TENDER  

Tender for Construction of 02 Nos. Single Officer’s Accn.(G+I), 01 No. Single JCO accommodation(G) and 02 Nos. SM Barrack (G+I) along with development works for AR Battalion at Agartala, Tripura.  

Engineering Projects (India) Ltd., on behalf of Assam Rifles invites percentage rate open e-Tenders through e-tendering from the eligible contractors/firms who fulfill the eligibility criteria as per the brief particulars of scope for Construction of 02 Nos. Single Officer’s Accn. (G+I), 01 No. Single JCO accommodation(G) and 02 Nos. SM Barrack (G+I) along with development works for AR Battalion at Agartala, Tripura in single stage Two Envelope system (Technical bid & Price bid) for the following works:  

<table>
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<tr>
<th>Sl. No.</th>
<th>NAME OF WORK</th>
<th>ESTIMATED COST (Rs.)</th>
<th>TIME OF COMPLETION</th>
<th>EMD DEPOSIT (Rs.)</th>
<th>TENDER FEES (Rs.)</th>
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<td>Construction of 02 Nos. Single Officer’s Accn. (G+I), 01 No. Single JCO accommodation (G) and 02 Nos. SM Barrack (G+I) along with development works for AR Battalion at Agartala ,Tripura.</td>
<td>Rs. 3,39,54,261.00 (Rupees Three Crore Thirty Nine Lakhs Sixty One only)</td>
<td>15 (Fifteen) Months</td>
<td>Rs. 3,39,543.00 (Rupees Thirty Nine Thousand Sixty One only)</td>
<td>11,800.00 (Rupees Eleven Thousand Eight Hundred only) (GST @ 18% included)</td>
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</table>

The brief scope of work included in this tender shall include providing all labour, materials, tools and plant, transportation to site, storage and safe custody of the materials, earthwork in excavation, earthwork in filling, PCC, RCC, drains etc. as required in Construction of 02 Nos. Single Officer’s Accn. (G+I), 01 No. Single JCO accommodation (G) and 02 Nos. SM Barrack (G+I) along with development works for AR Battalion at Agartala ,Tripura on percentage rate basis as per bill of quantities and tender conditions. Apart from above, any other service but required as per direction of EPI/ DGAR for completion of works are deemed to be included in the scope of work.  

The detailed scope of work is given in tender document.  

Time schedule of Tender activities:  
(i) Start of Date & Time of availability of documents: From 08:00 PM 04.09.2018  
(ii) Last Date & Time for Downloading of tender documents: 25.09.2018 up to 11:00 AM  
(iii) Last Date & Time of online submission of Tenders: on or before 25.09.2018 up to 12:00 Noon.
(iv) Date & Time of online opening of tenders (Techno-Commercial Bid): 25.09.2018 at 03:00 PM.
(v) Pre-bid meeting at 4th Floor, Hindustan Tower Block-A, Jawahar Nagar, N.H.37, Guwahati-781022 Assam on 19.09.2018 at 4.00 PM.
(vi) Date & Time of submission of documents in physical form: 25.09.2018 (upto 01:00 PM)

1.0 Contractors who fulfill the following basic qualifying requirements are eligible to Participate in this tender.

The tenderers shall submit his query for the pre-bid meeting on or before 19.09.2018 by 12.00 hours to nerocontracts@gmail.com and neroguwahati@gmail.com or by post to the address given at sl. No. 14 below.

Contractors who fulfill the following requirements are eligible to participate in this tender. The joint ventures/Consortium are not accepted.

a) The bidder must have experience of having satisfactorily completed following “similar works” during the last 7(seven) years ending last day of month previous to the one in which applications are invited.

a) Three similar works each of costing minimum 40% of the estimated cost of this work.

OR

Two similar works each of costing minimum 50% of the estimated cost of this work.

OR

One similar work costing minimum 80% of the estimated cost of this work.

i) The “similar works” shall mean works comprising Civil, Sanitary, Plumbing, Electrical and Internal Finishes etc. in Building work including site development works.

ii) The cost of free issue materials shall not be included in the completion cost of works.

iii) For evaluation purpose, the completion cost of works mentioned in the completion certificate shall be enhanced by 7% per annum till the end of month prior to date of NIT.

b) Should have had average annual financial turnover of at least 30% of the estimated cost put to tender during the immediate last three consecutive financial years ending on 31.03.2017 duly supported by annual financial report (i.e. audited copies of balance sheet and profit and loss statement) or certified by Chartered Accountant along with Income Tax return for last three assessment years (i.e. 2017-18, 2016-17 and 2015-16). Turnover means income from construction works only.

c) Should not have incurred any loss in more than two years during the immediate last five consecutive financial years, ending 31.03.2017, Copies of balance sheet/ Certificate from Chartered Accountant duly self attested by the tenderer shall be submitted.
d) Should have a Solvency of 40% of the estimated cost issued by his bankers in the name of the bidder. The Solvency Certificate should not have been issued earlier than one year of last date of submission of the tender.

e) Should have valid Permanent Account Number of Income Tax and GST registration certificate.

f) Should have valid PF Registration number. In case the bidder does not have this registration number, he shall remain bound to obtain them within one month from the date of LOI or before release of 1st R/A bill whichever is earlier.

g) Bid Capacity: The bidding capacity of the tenderer should be equal to or more than the estimated cost of the work put to Tender.
   The Bidding capacity shall be worked out by the following formula:

   \[ \text{Bidding Capacity} = \left[ A \times N \times 2 \right] - B \]

   Where,
   
   \( A \) = Maximum value of construction works executed in any one year during the last five years taking into account the Completed as well as works in progress ending last day of the month previous to the one in which applications invited.
   
   \( N \) = Number of years prescribed for completion of work for which bids have been invited

   \( B \) = Value of existing commitments and ongoing works to be completed during the period of completion of work for which bids have been invited. The Tenderer is requested to furnish the existing commitments of works under execution along with stipulated period for completion of remaining for each of the work should be furnished in an affidavit on non-judicial stamp paper of value of Rs. 100/- duly certified that the particulars furnished are correct as per the Performa in Annexure-A

h) Site visit for the subject tender is mandatory. The bidders shall visit the site to Study/assess the tendered work and also acquaint themselves of the prevailing local conditions & detail requirement of the project work before submitting their bid. Bidder has to enclose a certificate counter signed by EPI official or furnish undertaking for having visited the site.

i) Bidders who intend to get exemption from submission of Tender fee and EMD shall submit confirmation letter whether they are registered under MSME Act or not and if yes, then relevant copies of the registration letter (Registered under single point registration scheme of NSIC, Govt. of India, Ministry of MSME, New Delhi) vide Gazette Notification dated 26.03.2012 along with the form of Memorandum-2 (with the concerned DIC) certificate in the appropriate category and limit as applicable under the present tender to be enclosed in Technical Bid and a request letter for exemption from submission of Tender fee and EMD.

j) Even though an applicant may satisfy the eligibility criteria, EPI reserves the right for not issuing the tender document if he has record of poor performance such as abandoning work, not properly completing the work, delay in execution of work, poor quality of work, financial failure / weakness etc.
The experience certificates issued by Government Organizations / Semi Government Organizations / State Government / Public Works Department / Central Government / Public Sector Undertakings / Autonomous Bodies / Municipal Bodies / Public Limited Companies listed on BSE/NSE shall only be accepted for assessing the eligibility of the tenderer. However, the certificates issued by Public Limited Company and Private Party can be considered only if they are supported by TDS certificates/Turnover Certificate from Chartered Accountant in support of value of work done by the tenderer.

Completion certificates from the client shall be in the name of the company who is submitting the tender. The contractor has to produce original documents for their verification as and when demanded by EPI. The tender of any tenderer shall be rejected if on detailed scrutiny; documents submitted along with the tender are found to be unsatisfactory / forged. The decision of EPI in this regard shall be final and the binding on the tenderer.

Relevant experience certificates and other documents as mentioned above fulfilling the qualifying criteria duly self-attested by the tenderer shall be enclosed in Envelope-1. Completion Certificates from clients shall be in the name of the Company who is submitting the tender. The bidder has to produce original documents for verification at the time of opening of tender or as and when demanded. The Tender of any tenderer shall be rejected if on detailed scrutiny, documents submitted along with the tender are found to be unsatisfactory. The decision of EPI in this regard shall be final and binding on the tenderer.

The tenderers may note that they are liable to be disqualified and not considered for the opening of Price Bid if:

a) Representation in the forms, statements and attachments submitted in the prequalification document are proved to be incorrect, false and misleading.

b) They have record of poor performance during the past 10 (ten) years such as abandoning the work, rescinding of contract for which the reasons are attributable to the non-performance of the contractor, inordinate delay in completion, consistent history of litigation / arbitration awarded against the contractor or any of its constituents or financial failures due to bankruptcy etc. in their ongoing / past projects.

c) They have submitted incompletely filled in formats without attaching certified supporting documents and credentials to establish their eligibility to participate in the Tender.

d) If the tenderers attempt to influence any member of the selection committee.

EPI reserves its right to take appropriate action including disqualification of tenderer(s) as may be deemed fit and proper by EPI at any time without giving any notice to the contractor in this regard. The decision of EPI in the matter of disqualification shall be final and binding on the Tenderers.
The credentials of the Bidders shall be verified and inspection of the works, if required, to be carried out by EPI. If not found satisfactory, their bid will be considered non-responsive.

2.0 Tender documents comprising of the following are available on the website of EPI: www.engineeringprojects.com, CPP-Portal: www.eprocure.gov.in and as well as on TCIL portal http://www.tcil-india-electronic tender.com.

Volume I: Instructions to Tenderers, Addendum to Instructions to Tenderers, Special Instructions to Bidders for e-Tendering & General Conditions of Contract (ITT&GCC) of EPI

Volume II: a) Notice inviting Tender
   b) Additional Conditions of Contract
   c) Technical Specifications
   d) Tender Drawings (as mentioned in the list)

Volume III: Price bid/bill of quantity

3.0 In order to participate, the bidder should have Digital Signature Certificate (DSC) from one of the authorized Certifying Authorities.

4.0 Interested bidders have to necessarily register themselves on the portal https://www.tcil-india-electronic tender.com through M/s Telecommunications Consultants India Limited, New Delhi to participate in the bidding under this invitation for bids. It shall be the sole responsibility of the interested bidders to get them registered at the aforesaid portal for which they are required to contact M/s Telecommunications Consultants India Limited, New Delhi at following address to complete the registration formalities:

M/s Telecommunications Consultants India Limited,
6th Floor, TCIL Bhawan, Greater Kailash – 1, New Delhi 110 048
Contact No.: 011-26241790, 98683 93717/75/92
Email-ID: ets_support@tcil-india.com

They may obtain further information regarding this tender from DGM (Contracts) at the address given at Clause No.14.0 below from 10:00 hours to 17:00 hours on all working days till the last date of online submission of Bidding Documents.

For proper uploading of the bids on the portal namely https://www.tcil-india-electronic tender.com (hereinafter referred to as the “portal”), it shall be the sole responsibility of the bidders to apprise themselves adequately regarding all the relevant procedures and provisions as detailed at the portal as well as by contacting M/s Telecommunications Consultants India Limited, New Delhi directly, as and when required, for which contact details are mentioned above. The EPI in no case shall be responsible for any issues related to timely or properly uploading/submission of the bid in accordance with the relevant provisions of Section: Instruction to Bidders of the Bidding Documents.

5.0 Bidders can download the bid document from the portal without paying document fees in advance, any time from 20:00 Hrs on 04.09.2018; however, interested bidders have to pay tender fees for participating in the tendering and submitting the bid. For this purpose the interested bidders shall be required to pay ` 11,800/- (Rupees Eleven Thousand Eight Hundred only) (GST @ 18% included), the GSTIN of EPI
for Assam is 18AAACE0061C1ZC as non-refundable document fees in the form of Demand Draft in favour of “Engineering Projects (India) Ltd.” payable at Guwahati. The fees to be paid to TCIL are separate.

6.0 E-Bids must be submitted/uploaded along with scanned copies of relevant documents as mentioned at clause no 2 of “Addendum to Instructions to Tenderers” under Single Stage Two Envelope Bidding Procedure on the TCIL portal on or before last date & time of online bid submission. Late bids will not be accepted. Under the above procedure, only first envelope (Technical Part) shall be opened in the presence of the bidders’ representatives who choose to attend in person at the address given below on scheduled date & time of bid opening or may be viewed by the bidders by logging in to the portal as per features available to them. Second envelope i.e. Price part shall be opened of technically qualified bidders.

The bid must be accompanied by Earnest Money Deposit (EMD) of Rs. 3, 39, 543.00 (Rupees Three Lakhs Thirty Nine Thousand Five Hundred Thirty only). This shall be in the form of Crossed Demand Draft or Pay Order (in CTS form) of any Nationalized Bank/Scheduled Bank for the full amount of EMD payable favouring “Engineering Projects (India) Ltd.”, payable at Guwahati. The EMD shall be valid for minimum period of 150 days (one hundred fifty days) from the last day of submission of tender. Tenders submitted without EMD or inadequate amount of EMD shall be rejected. The bid shall be valid for 90 days from date of opening of Price Bid.

Tender fee, EMD (In original), Power of Attorney, NSIC/MSME(Registered under single point registration scheme of NSIC, Govt. of India, Ministry of MSME, New Delhi vide Gazette Notification dated 26.03.2012 along with the form of Memorandum-2 with the concerned DIC) certificate as per Clause No.1 (j) if bidder is claiming EMD/Tender fee exemption and Pass Phrase (Both for technical and financial bid in separate envelope) to decrypt the bid must be submitted in physical form at the address given at Clause No. 14.0 below as stipulated at sl. no iv of iv under Time Schedule of Tender Activities. If the above documents are not received in time then their offer shall not be considered and EPI shall not be responsible for any postal delay in respect of submission of hard copy part of the bids.

7.0 The Terms & Conditions contained in the NIT and tender document shall be applicable.

8.0 The tenderers should note that the credentials such as value and volume of works completed, as submitted by the tenderers along with their offers shall be forwarded by EPI to Client for his opinion. The offer of tenderers against whom client does not give satisfactory remarks shall be rejected by EPI.

9.0 The corrigendum or addendum, extension, cancellation of this NIT, if any, shall be hosted on the EPI’s website/CPP portal as well as on TCIL portal http://www.tcil-india-electronic-tender.com the bidders are required to check these websites regularly for this purpose, to take into account before uploading/submission of tender. All Corrigendum and addendum are to be uploaded duly signed & stamped with tender documents as bid Annexure.

10.0 The tenderers should note that the credential such as value and volume of works completed as submitted by the tenderers along with their offers may be forwarded by EPI to the owner, DGAR for his opinion. The offer of the tenderers against whom the Owner does not give satisfactory remarks shall be rejected by EPI.
11.0 The price bid of those bidders who are found to be prima-facie techno-commercially acceptable based on the documents submitted at the time of bid submission and subject to confirmation of authenticity of the PQ documents/ EMD /Tender fee from the concerned department/ bank with prior intimation to them. **Hence the intending bidders must furnish their e-mail id and contact phone number along with the techno-commercial part.** In case the PQ documents such as work experience certificate, bank solvency certificate etc submitted by a bidder is found to be fake the EMD submitted by him shall be forfeited by EPI without making any reference to him. Further such a tenderer shall be at a risk of losing his right to participate in any tender called by EPI for a minimum period of one year.

12.0 EPI reserves the right to accept any tender or reject any or all tenders or split the work of tender or annul this tendering process without assigning any reason and liability whatsoever and to re-invite tender at its sole discretion.

13.0 In case of tie-tender, where two firms are bidding lowest, EPI reserves the right to split the work among these bidders and / or EPI will reserve the right to award the tender to any one of such bidder.

14.0 Tender documents shall be issued by and submitted to:
Dy. General Manager
Engineering Projects (India) Ltd.
North Eastern Regional Office
4th Floor, Hindustan Tower,
Jawahar Nagar, National Highway No.37,
Guwahati (Assam) -781022 (Tel No. 0361-2314681)

15.0 Contact details for site related quarries:
Shri R Borah, Sr. Manager
Mobile No. -09774009648/09774364563
For more information on EPI, visit our website at: [http://www.engineeringprojects.com](http://www.engineeringprojects.com)
For more information on the e-tender, visit website of M/s Telecommunications Consultants India Limited, New Delhi at: [https://www.tcil-india-electronic-tender.com](https://www.tcil-india-electronic-tender.com)

Dy. General Manager (Contracts)
BID CAPACITY

| Name of the Work: Construction of 02 Nos. Single Officer’s Accn.(G+I), 01 No. Single Jco accommodation(G) and 02 Nos. SM Barrack (G+I) along with development works for AR Battalion at Agartala ,Tripura. |
| NIT No: NERO/CON/ASR/AGARTALA/320 |

ESTIMATED COST PUT TO TENDER : Rs. 3,39,54,261.00

Bid Capacity: The bidding capacity of the contractor should be equal to or more than the estimated cost of the work put to Tender. The bidding capacity shall be worked out by the following formula:

Bidding Capacity = \[ A \times N \times 2 \] – B

Where,
A = Maximum value of construction works executed in any one year during the last five years taking into account the completed as well as works in progress
N = Number of years prescribed for completion of work for which bids have been invited
B = Value of existing commitments and ongoing works to be completed during the period of completion of work for which bids have been invited (Format enclosed)

BID CAPACITY CALCULATION BY BIDDER

SIGN & STAMP OF BIDDER
AFFIDAVIT

(To be typed on Rs. 100/- non-judicial stamp paper)

I/We ....................................... aged .............. years son of ................................. do hereby solemnly affirm and declare as follows for and on behalf of the Firm:

LIST OF EXISTING COMMITMENT AND ONGOING WORKS

<table>
<thead>
<tr>
<th>Sl. No.</th>
<th>Name of Works</th>
<th>Client Name &amp; Address</th>
<th>Work Order Value (in Rs)</th>
<th>Work Executed till Date (Rs)</th>
<th>Balance Amount of work to be completed (Rs)</th>
<th>Balance period to complete the works (Total months)</th>
<th>Work to be completed in 15 months (Rs)</th>
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Balance Commitments during 15 months as per NIT Rs.

It is certified that the above particulars furnished are true and correct. If any information given is found to be concealed at a later date, the Contract will be terminated forthwith without prejudice to the rights thereon consequent on termination and the bidder will be blacklisted. I/We agree for debarring tendering for one year if any facts are suppressed.

SIGN AND STAMP OF BIDDER
ADDITIONAL CONDITIONS OF CONTRACT (ACC)

1.0 The following Additional Conditions of Contract shall be read in conjunction with General Conditions of Contract (GCC) of EPI and other conditions of the tender documents. If there are any provisions in these Additional Conditions of Contract, which are at variance with the provisions of GCC and other conditions of the tender documents, the provisions in these Additional Conditions of Contract shall take precedence.

2.0 DGAR (Director General Assam Rifles), the Owner, has selected Engineering Projects (India) Limited (EPI) as the “PMC” for “Construction of 02 Nos. Single Officer’s Accommodation (G+I), 01 No Single JCO’s Accommodation (G) and 02 Nos Single Men Barrack (G+I) along with development works for Assam Rifles Battalion at Agartala, Tripura”. The works intended to be executed under the instant contract shall include (but not limited to) providing labour, tools and plants, machineries, transport and all other components including materials (except those which are specifically excluded from scope/present tender as spelt out elsewhere in the tender documents) required for completion of the works. The works are to be executed at Assam Rifles Battalion at Agartala, Tripura.

3.0 Clause no 3.0 of GCC shall stand amended as below:
The items of work given in the tender documents are for general guidance of the contractors and the works shall be carried out by the contractor on Percentage rate basis in conformity with the detailed drawing, scope of work, technical specifications, additional conditions of contract (including any addition/modification/ alteration/deletion made from time to time therein found essential for completion of works). The contractor shall be deemed to have satisfied himself before tendering as to the sufficiency and correctness of his tender for the works and of the rates and prices quoted in the brief specifications, drawings, scope of work and payment (billing) schedule, which rates and prices shall, except as otherwise provided, cover all obligations under the contract and all matters and things found necessary for proper completion and maintenance of the works. It shall be responsibility of the contractor to incorporate the changes that may be in the scope of work envisaged at the time of tendering and as actually required to be executed. The contractor has quoted his rates after clearly studying the scope of work given in Tender Documents availed by him by downloading from the website at the tendering stage itself and getting fully satisfied with the various items and technical intricacies involved in the work under his scope of work as envisaged in the tender. EPI shall not entertain any claim of the contractor on account of error or omission by him in this respect except what is admitted by the client.
4.0  **No mobilisation advance shall be paid and hence clause no. 8 of GCC shall stand deleted.**

5.0  **Safety Code:**

**General**
Contractor shall adhere to safe construction practice and guard against hazardous and unsafe working conditions and shall comply with safety rules as stated forth herein for information and guidance:

First Aid and Industrial Injuries
(1)  Contractor shall maintain first aid facilities for his employee and labours.

(2)  Contractor shall make out side agreements for ambulance service and for the treatment of industrial injuries. Names of those providing these services shall be furnished to the EIC prior to start of construction and their telephone numbers shall be prominently posted in Contractor’s field office.

(3)  All critical industrial injuries shall be reported promptly to the EIC, and a copy of Contractor’s report covering each personal injury requiring the attention of a physician shall be furnished to the EIC.

**General Rules**
Smoking within the battery area, tank farm or dock limits is strictly prohibited.
Violators of the no smoking rules shall be discharged immediately

**Contractors Barricades**
(1)  Contractor shall erect and maintain barricades required in connection with his Operation to guard or protect.
   (a)  Excavations.
   (b)  Hoisting areas.
   (c)  Areas adjudged hazardous Contractor’s or Owner’s inspectors.
   (d)  Owner’s existing property subject to damage by Contractor’s operations.
   (e)  Rail road unloading spots.

(2)  Contractors employee and these of his sub-contractors shall become acquainted with owner’s barricading practices and shall respect the provisions thereof.
(3) Barricades and hazardous areas adjacent to but not located in normal routes of travel shall be marked by red flasher lanterns at nights.

Scaffolding:
(i) Suitable scaffolding should be provided for workmen for all works that safety be done from the ground or from solid construction except such short period work as can be done safely from ladders. When a ladder is used an extra mazdoor shall be engaged for holding the ladder and if the ladder is used for carrying materials as well, suitable footholds and handholds shall be provided on the ladder shall be given an inclination not steeper more than 1 in 4 (1horizontal and 4 vertical)

(ii) Scaffolding or staging than 4 meters above the ground or floor, swing suspended from an overhead support or erected with stationary support shall have a guard rail properly attached, bolted, braced and otherwise rewarded at least 3 ft.

High above the floor or platform of such scaffolding or staging and extending along the entire length of the outside and ends thereof with only such openings as maybe necessary for the delivery of materials. Such scaffolding or staging shall be so fastened as to prevent it from swaying from the building or structure.

(iii) Every opening the floor of a building or in a working platform shall be provided with suitable means to prevent the fall of persons or materials by providing suitable fencing or railing whose minimum height shall be 1 meter.

(iv) Working platform, gangways and stairways should be so constructed that they should not sag unduly or unequally and if the height of the platform of the gangway or the stairway is more than 4 metres above ground level or floor level, they should be closely boarded, should have adequate width and should be suitably fastened as described in above.

(v) Safe-means of access shall be provided to all working platforms and other working places, every ladder should be securely fixed. No portable single ladder shall be over 9 meters in length while the width between side rails in rung ladder shall in no case be less than 30cms for ladder up to and including 3metres in length. For longer ladder this width should be increased at least 5 mm for each additional foot of length. Uniform steps spacing shall not exceed 30 cms. Adequate precautions shall be taken to prevent danger from electrical equipment. No materials on any of the site
of work shall be so stacked or placed to caused anger or inconvenience to any person or public. The Contractor shall also provide all necessary fencing and light to protect the workers and staff from accidents, and shall be bound to bear the expenses of defense of every suit, action or other proceedings of law that may be brought by any person for injury sustained owing to neglect of the above precautions and pay any damages and costs which may be awarded in any such suit or action or proceedings to any such person or which may with the consent of the Contractor be paid to compromise any claim by any such person.

Excavation and Trenching
All trenches 1.2 meters or more in depth, shall at all times be supplied with at least one ladder for each 50 meters length or fraction thereof.

Ladder shall be extended from bottom of the trench to at least 1 meter above the surface of the ground. The sides of the trenches which are 1.5 meters in depth shall be stepped back to give suitable slope or securely held by timber bracing, so as to avoid the danger of sides to collapse. The excavated materials shall not be placed within 1.5 metres of the edge of the trench or half of the trench width whichever is more. Cutting shall be done from top to bottom. Under no circumstances undermining or undercutting shall be done.

Demolition:
(i) Before any demolition work is commenced and also during the progress of the work.
(a) All road and open areas adjacent to the work site shall either be closed or suitably protected
(b) No electric cable or apparatus which is liable to be a source of danger shall remain electrically charged.
(c) All practical cares shall be taken to prevent danger to persons employed from risk of fire or explosion or flooding. No floor, roof or other part of the building shall be so over-loaded with debris or materials as to render it unsafe.

(ii) All necessary personal safety equipment as considered adequate by the Engineer-in-charge (i.e. EIC) should be kept available for the use of the persons employed on the site and maintained in condition suitable for immediate use, and the Contractor shall take adequate steps to ensure proper use of equipment by those concerned.
(a) Workers employed on mixing asphaltic materials, cement and lime mortars shall be provided with protective footwear and protective gloves.

(b) Those engaged in white washing and mixing or stacking of cement bags or any materials which are injurious to the eyes shall be provided with protective goggles.

(c) Those engaged in welding and cutting works shall be provided with protective face and eye shields, hand gloves etc.

(d) Stone breakers shall be provided with protective goggles and protective clothing, and seated at sufficiently safe intervals.

(e) When workers are employed in sewers and manholes, which are in use, the Contractor shall ensure that the manhole covers are opened and are ventilated at least for an hour before the workers are allowed to gate in to the manholes, and the manholes so opened shall be cordoned off with suitable railing and provided with warning signals or board to prevent accident to the public.

(f) The Contractor shall not employ men below the age of 18 years and women on the work of painting with products containing lead in any form. Wherever men above the age of 18 years are employed on the work of lead painting, the following precautions should be taken,

1. No paint containing lead or lead product shall be used except in the form of paste or ready-made paint.

2. Suitable face masks should be supplied for use by the workers when Paints are applied in the form of spray or a surface having lead paint dry rubbed and scrapped.

3. Overalls shall be supplied by the Contractor to the workmen and adequate facilities shall be provided to enable the working painters to wash them during and on cessation of.

(iii) When the work is done near any place where there is a risk of drowning, all Necessary safety equipment should be provided and kept ready for use
and all necessary steps taken for prompt rescue of any person in danger and adequate provision should be made for prompt first aid treatment of all injuries likely to be sustained during the course of the work.

(iv) Use of hoisting machines and tackles including their attachments, anchorage and supports shall conform to the following standards or conditions:

(a) These shall be of good mechanical construction, sound materials and adequate strength and free from patent defect and shall be kept in good working order.

(b) Every rope used in hoisting or lowering materials or as means of suspension shall be of durable quality and adequate strength and free from patent defects.

(c) Every crane driver or hoisting appliance operator shall be properly qualified and no person under the age of 12 years should be in charge of any hoisting machine including any scaffolding, which or give signals to the operator.

(d) In case of every hoisting machine and of every chain ring hook, shackle, swivel, and pulley block used in hoisting or lowering or as means of suspension, the safe working load shall be ascertained by adequate means. Every hoisting machine and all gears referred to above shall be plainly marked with the safe working load of the conditions under which it is applicable which shall be clearly indicated. No part of any machine or any gear referred to above in this paragraph shall be loaded beyond the safe working load except for the purpose of testing.

(e) In case of departmental machine, the safe working load shall be notified by the Engineer-in-charge. As regards Contractor’s machines, the Contractor shall notify the safe working load of the machine to the Engineer-in-charge whenever he brings any machinery to site of work and get it verified by the Engineers concerned.

(v) Motors, gearing transmission, electric wiring and other dangerous part of hoisting appliances should be provided with such means as to reduce to the minimum the accidental descent of the load, adequate precautions should be taken to reduce to the minimum the risk of any part or any part of a suspended load becoming accidentally displaced. When workers are employed on electrical installations which are already energized, insulating mats, wearing apparel, such as gloves, sleeves, and boots as
may be necessary should be provided. The workers shall not wear any rings, watches and carry keys or other materials which are good conductors of electricity.

(vi) All Scaffolds, ladders and other safety devices mentioned or described herein shall be maintained in safe conditions and no scaffold, ladder or equipment shall be altered or removed while it is in use. Adequate washing facilities should be provided at or near places of work.

(vii) These safety provisions should be brought to the notice of all concerned by the displaying on a notice board at a prominent place at the work-spot. The person responsible for compliance of the safety code shall be named therein by the Contractor.

(viii) To ensure effective enforcement of the rules and regulations relating to safety precautions, the arrangements made by the Contractor shall be open to inspection by the Welfare Officer, Engineer-in-Charge or safety Engineer of the administration or their representatives.

(ix) Notwithstanding the above clauses there is nothing in these to exempt the contractor from the operations of any other Act or rules in force in the Republic of India. The works throughout including any temporary works shall be carried out in such a manner as not to interfere in any way whatsoever with the traffic on any roads or footpaths at the site or in the vicinity thereto or any exiting works whether the property of the Administration or of a third party. In addition to the above, the Contractor shall abide by the safety code provision as per C.P.W.D. Safety Code and Indian standard Safety Code framed from time to time.

(x) The contractor shall keep one earmarked vehicle such as EECO or MAGIC or equivalent with driver, fuel & lubricant for meeting any emergent condition at site till the works under the instant contract are completed and taken over by the Owner.

(xi) The contractor shall also construct a suitable office accommodation at site at his cost to ensure safe and proper custody of all drawings, documents, appliances including easy access to them and relief to the staff and other personnel in case of any exigency. The office should be fully equipped with basic facilities such as telephone, internet, regular electric and water supply, computer/typing with printing facilities, storage of documents and data like almirahs or file cabinets etc.
6.0 The clause no. 10.0 of GCC shall stand amended as below:
An amount @5% (Five percent) of the gross value of the running bill shall be
deducted from each running bill by way of retention money. In case the EMD has
been deposited by the contractor in the form of demand draft, the said amount of
EMD shall be adjusted first towards the retention money and further recovery of
retention money shall commence when the upto date amount of retention money
exceeds the amount of EMD deposited in the form of demand draft. The retention
money shall become refundable to the contractor at the end of the defects liability
period free of any interest provided always that the contractor has rectified all the
defects arising during the defect liability period pertaining to his scope of work,
EPI did not have to incur any expenditure in setting right the defects, if any,
pertaining to the contractor’s scope of work, the contractor has demolished and
removed all structures including foundations and withdrawn fully from the
worksite and EPI has received the clearance certificate from the concerned
Labour Enforcement Officer/RLC pertaining to the labour etc. deployed by him at
the worksite or there is nothing on record against him in the local market affecting
functions of EPI. In case EPI has been required to make any expenditure on any
of these accounts EPI will keep the retention money till the time all these matters
are settled in full including recovery of the expenses, if any, made by EPI from
the retention money. Further the contractor has to furnish a ‘No Claim’ certificate
to EPI in confirmation of his having no claim on getting refunded the retention
money to EPI at the time of claiming refund of retention money.
Further the retention money shall be released only after the contractor furnishes
two numbers of bank guarantees equivalent to the value of the works of
waterproofing treatment and anti-termite treatment valid for 10 years from the
date of handing over of the works in the name of Chief Engineer, Head Quarters,
DGAR.

7.0 Setting out works
The Engineer-in-Charge shall furnish the Contractor with only the four corners of
the work site and a level bench mark and the Contractor shall set out the works
and shall provide and efficient staff for the purpose and shall be solely
responsible for the accuracy of such setting out.

The Contractor shall provide, fix and be responsible for the maintenance of all
stakes, templates, level marks, profiles and other similar things and shall take
necessary precautions to prevent their removal or disturbance and shall be
responsible for the consequence of such removal or disturbance should the
same take place and for their efficient and timely reinstatement. The Contractor
shall also be responsible for the maintenance of all existing survey marks,
boundary marks, distance marks and centre line marks, either existing or
supplied and fixed by the Contractor. The work shall be set out to the satisfaction
of the Owner. The approval thereof or joining with the Contractor by the Owner in setting out the work, shall not relieve the Contractor or any of his responsibilities. Before beginning the works, the Contractor shall at his own cost, provide all necessary reference and level posts, pegs, bamboo, flags, ranging rods, strings and other materials for proper layout of the work in accordance with the scheme for bearing marks acceptable to the Owner. The Centre, longitudinal or face lines and cross lines shall be marked by means of small masonry pillars. Each pillar shall have distinct marks at the centre to enable a theodolite to be set over it. No work shall be started until all these points are checked and approved by the Engineer-in-Charge in writing but such approval shall not relieve the Contractor of any of his responsibility. The Contractor shall also provide all labour, material and other facilities, as necessary, for the proper checking of layout and inspection of the points during construction. Pillars bearing geodetic marks located at the sites of units of works under construction should be protected and fenced by the Contractor. On completion of works, the Contractor must submit the geodetic documents according to which the work was carried out.

8.0 Responsibility for level and alignment

The Contractor shall be entirely and exclusively responsible for the horizontal and vertical alignment, the levels and correctness of every part of the work and shall rectify effectually any errors or imperfections therein. Such rectifications shall be carried out by the Contractor, at his own cost, when instructions are issued to that effect by the Engineer-in-Charge. It is highly possible that there shall be more than one agency working at the same time at the site. The contractor shall at all times remain bound to co-ordinate with the agencies, deployed by EPI for the above works, including providing free access and making required provisions for them in execution of works pertaining to their portion of works. He shall also remain bound to ensure uninterrupted progress of work by these agencies in a peaceful and smooth manner. He shall also remain bound to make the required changes/additions/alterations in the works done by him to accommodate the items under the scope of work of such other agencies deployed by EPI or the client. The contractor is deemed to have made the estimated allowances in this respect while quoting his rates at the tendering stage.

Even though EPI has taken all care to attach all the drawings as vetted by the client it shall be the responsibility of the contractor to interpret the drawings for completion of the works under this contract.

The list of minimum tools, plant and machinery to be provided by the contractor within the period mentioned against the respective item is given at Annexure-A.
9.0 The following shall also be read with clause number 13 of the GCC:

a) The bidder/contractor must be registered with GST and should have valid GSTIN number.

b) The bidder/contractor must submit as a compliance under GST Act, the invoices in GST complaint format failing which the GST amount shall be recovered/adjusted without any prior notice from the next invoices or available dues with EPI.

c) The bidder/contractor are required to update/upload the GST/Taxes data periodically so as to avail ITC credit by EPI failing which it shall be recovered/adjusted by EPI without any prior intimation.

d) The rates quoted by the contractor shall be “inclusive of all taxes and duties, cess including GST” which shall be reimbursed to him subject to raising of tax invoice and filing of return and payment of tax as per GST law, failing which EPI shall not be able to honour his claims for any payment. The contractor has quoted his rates knowing fully well that submission of return and display of the same on GSTN portal is mandatory.

e) Incase of any reduction in rate of GST or other taxes in future or the project getting exemption status prior to the last date of Bid submission or afterwards, the subcontractor shall pass on the benefit to EPIL immediately, failing which EPIL shall have the right to recover the differential amount from the amounts due to the subcontractor. Further in case of any increase in rate of GST or other taxes in future or the project losing exemption status prior to last date of bid submission or afterwards, the said increase of taxes shall be paid/reimbursed to the subcontractors, subject to the condition that the client reimburses the said increased taxes to EPIL.

9.1. The following shall stand added to the clause no 23.2 of GCC:

The PF & ESI contributions on part of employer shall be paid by the Contractor. These contributions shall be reimbursed by EPI/DGAR to the Contractor against documentary evidence subject to a limit of 3.4 % towards PF and 1.19% towards ESI (if applicable) of the Contract Price. The contractor is required to furnish PF & ESI deposit proofs progressively along with his RA bills failing which 4.70% of his gross bill value shall be hold from his RA bills/Payments. If it is incumbent upon EPI to deposit the withheld amount with EPFO, the same shall be deposited by EPI and the amount shall not be refunded to the contractor even after production of PF deposit proofs by the contractor at a later date.
However, any variation in taxes and duties after submission of due date of submission of tender shall be to the owner's account i.e. in case of any decrease in the taxes and duties shall be passed on to the owner and any increase in taxes and duties shall be borne by the Owner. Similarly, the imposition of any fresh taxes and duties shall also be borne by the Owner.

All the above reimbursements shall be admitted to the extent these are admitted by the Owner.

10.0 **The following shall stand added to the clause no 20 of GCC:**
The contractor shall keep EPI indemnified against all claims, damages, compensation and expenses payable, if any, in consequence of any accident, or injury sustained by any workman or any other person employed by the contractor.

11.0 **The following shall stand added to the clause no 27.0 including its sub clauses of GCC of EPI:**
The contractor, within 10 days of issuance of LOI (Letter of Intent) to him shall depute at least One Graduate Civil Engineer of min 2 years post qualification experience or One Diploma in Civil Engineering having 5 years post qualification experience. Should the contractor fail to provide them within such period or as directed by the Engineer-in-charge, EPI shall be at liberty to recover an amount @30,000.00 per month person from any amount including the retention money due to the contractor.

12.0 **The clause no 28.3 of the GCC shall stand deleted.**

13.0 **No secured advance shall be paid to the contractor and hence clause no. 35.0 of GCC shall stand deleted.**

14.0 **The clause no. 43.2 shall stand amended as below:**
The contractor shall execute the works so as to complete the works within the stipulated completion time. He shall remain bound to submit a programme of completion of items.

15.0 **The following shall stand added to clause no 45.0 of the GCC:**
The contractor shall at all-time remain bound to provide the samples in quantity and manner as instructed by EPI to be analyzed or tested in an outside laboratory or in the field laboratory at site. The cost of testing charges is included in the prices of the contractor. EPI shall, however, be at liberty to get the materials tested independent of the contractor and the contractor shall remain bound to render all assistance to EPI in conductance of such tests including
making available the materials in sufficient quantity and in time and payment of the testing charges. EPI/client shall at all times have full access to the works and to all workshops and places where work is being prepared or from where materials, manufactured articles or machinery. The contractor shall afford every facility and assistance and cost in obtaining the right and visit to such access.

EPI shall have full powers to require the removal from the premises of all materials which in their opinion are not in accordance with the specifications and in case of default, EPI shall be at liberty to employ at the expense of the contractor, other persons to remove such materials without being answerable or accountable for any loss or damage that may happen or arise to such materials. EPI shall also have full powers to require other proper materials to be substituted thereof and in case of default by the contractor, may cause the same to be supplied and all costs which may require such removal and substitution shall be to the contractor’s account.

16.0 The following shall be added to clause no 52.6 of GCC:
The field testing laboratory to be established by the contractor at his cost shall be equipped with the minimum number of testing equipment as per Annexure-B. In case the contractor fails to provide them EPI shall get them installed and debit the cost to the contractor.

17.0 The following provisions shall supersede that of clause no 69 of GCC wherever applicable:
No claim on account of extra / substituted / variation of items etc. pertaining to the contractor’s portion of work save and except what is admitted and paid by Owner, shall be entertained or admitted by EPI. Any claim by the contractor, if not paid by the Owner, whatsoever be the reason shall not be admitted by EPI. But under no circumstances contractor shall suspend the work on the non-settlement of rates under this clause.

18.0 In case the project execution is delayed beyond the contractual scheduled completion period due to reasons attributable to the contractor, the staff and site expenses of EPI for extended period shall be paid by him to EPI at the rate of Rs. 10,000/- per month. This shall be in addition to the other recoveries, if applicable as per clause no 72 (including its sub clauses) of GCC and Penalties etc. if any, levied by Owner for the works pertaining to the contractor’s scope of work. The decision of EPI in this regard shall be final & binding on the contractor.

19.0 The work executed by the contractor shall be subject to audit and quality control checks from Quality Control Division & Technical Audit of EPI, Client, and Inspecting Agency of the Client and Chief Technical Examiner of Central
Vigilance Commission, Govt. of India. In the eventuality of any defect/substandard works as brought out in the report or noticed otherwise at any time during execution, maintenance period etc., the same shall be made good by the contractor without any cost to EPI. In case the contractor fails to rectify the defect/sub-standard work within the time period stipulated by EPI, EPI shall get it rectified at the risk and cost of the contractor and shall recover the amount from the dues of the contractor.

Further all works executed by the contractor shall be subject to third party testing to be deployed by EPI for which the expenses shall be borne by the contractor within his quoted rates.

20.0 Execution of Work. Once the contract is awarded a work order will be issued to the contractor and site handed over and in no case this will be issued on back date. Time for completion will commence from the date of issue of work order. Engineer in charge will be nominated by name and communicated to all concerned and during his absence relief will be given by name. Following procedures to be ensured:

(a) A Testing Laboratory will be established by the Agency or suitable tie up done with approved testing laboratory or consultancy for quality check.

(b) Following registers/documents will be maintained and produced when asked for:

   i. Hindrance recording register.
   ii. Stage passing register.
   iii. Site order book.
   iv. Inspection register.
   v. Materials testing register.
   vi. Contractor ledger.
   vii. Labour license.
   viii. CAR/EAR/MCI Policy with STPI, Earthquake & TPL.

(c) Monthly progress will be monitored and forwarded to all concerned.

(d) Time extension if required must be processed well in advance before existing completion date supported by documents like newspaper cutting, letter from user etc.

(e) If any willful delay from contractor is noticed suitable action taken as per contract condition and work to be completed by due date by resorting to alternate means specified in contract conditions.

(f) Quality checks to be carried out at each level to be laid down percentage wise during the process of execution.
(g) If any unforeseen delay occurs the same must be resolved by coordinating with all stakeholders.

21.0 Preparation of Running Account Register. Work carried out by the contractor should be jointly measured and entered in to the measurement book. Any mistakes in the MB will be scored and initialed. Following documents to be submitted along with RAR:

(a) Measurement Book.
(b) Photographs of the work carried out duly signed by Agency and SO1 Wks.
(c) Quality test reports from approved laboratory.
(d) Recommended Liquidity Damages for delayed works.
(e) RAR Movement slip.

22.0 Completion and Handing over of Assets to User. Once the work is completed certificate will be obtained from user and work officer of the sector and then the same will be intimated to Engineers branch for ordering Board to verify and take over assets. All construction materials and tools lying in the site will be removed and assets will be kept ready for handing over to user. A performance report of the contractor will be forwarded to the Engineers branch and all warranty will be documented and handed over to the works officer of the sector.

It is mandatory to adhere to the guidelines for executing the works pertaining to Assam Rifles. Any deviation or failure will be treated as violation of MoU and due penalty will be imposed on the Agency charges and denial of future works.

23.0 ARBITRATION: Clause no. 76.1 of GCC shall stand amended as below:

Before resorting to arbitration as per the clause given below, the parties if they so agree may explore the possibility of conciliation as per the provisions of Part III of the Arbitration and Conciliation Act, 1996 as amended by Arbitration and Conciliation (Amendment) Act, 2015. When such conciliation has failed, the parties shall adopt the following procedure for arbitration:

i) Except where otherwise provided for in the contract, any disputes and differences relating to the meaning of the Specifications, Design, Drawing and Instructions herein before mentioned and as to the quality of workmanship or materials used in the work or as to any other questions, claim, right, matter or things whatsoever in any way arising out of or relating to the Contract, Designs, Drawings, Specifications, Estimates, Instructions, or these conditions or otherwise concerning the works of the execution or failure to execute the same whether arising during the progress of the work or after the completion or abandonment thereof shall be referred to the Sole Arbitrator appointed by the Chairman & Managing Director (CMD) of Engineering Projects (India) Limited (EPI) or any other person discharging the functions of CMD of EPI. The person approached for appointment as Arbitrator shall disclose in
writing circumstances, in terms of Sub-Section (1) of Section (12) of the Arbitration and Conciliation Act, 1996 as amended by Arbitration and Conciliation (Amendment) Act, 2015 as follows:

a) such as the existence either direct or indirect, of any past or present relationship with or interest in any of the parties or in relation to the subject-matter in dispute, whether financial, business, professional or other kind, which is likely to give rise to justifiable doubts as to his independence or impartiality; and

b) Which are likely to affect his ability to devote sufficient time to the arbitration and in particular his ability to complete the entire arbitration within a period of twelve months.

The Arbitrator shall be appointed within 30 days of the receipt of letter of invocation of arbitration duly satisfying the requirements of this clause.

ii) if the arbitrator so appointed resigns or is unable or unwilling to act due to any reason whatsoever, or dies, the Chairman & Managing Director aforesaid or in his absence the person discharging the duties of the CMD of EPI may appoint a new arbitrator in accordance with these terms and conditions of the contract, to act in his place and the new arbitrator so appointed may proceed from the stage at which it was left by his predecessor.

iii) It is a term of the contract that the party invoking the arbitration shall specify the disputes, differences or questions to be referred to the Arbitrator under this clause together with the amounts claimed in respect of each dispute.

iv) The Arbitrator may proceed with the arbitration ex-parte, if either party, in spite of a notice from the arbitrator, fails to take part in the proceedings.

v) The work under the contract shall continue as directed by the Engineer-In-Charge, during the arbitration proceedings.

vi) Unless otherwise agreed, the venue of arbitration proceedings shall be at the venue given in the 'Memorandum' to the 'Form of Tender'.

vii) The award of the Arbitrator shall be final, conclusive and binding on both the parties.

viii) Subject to the aforesaid, the provisions of the Arbitration and Conciliation Act, 1996 as amended by Arbitration and Conciliation (Amendment) Act, 2015 or any statutory modifications or re-enactment thereof and the Rules made there under and for the time being in force shall apply to the arbitration proceedings and Arbitrator shall publish his Award accordingly.
23.1 **Clause no 76.2 of GCC shall stand amended as under**

“In the event of any dispute or difference relating to the interpretation and application of the provisions of commercial contract(s) between Central Public Sector Enterprises (CPSE) / Port Trust inter se and also between CPSE and Government Departments / Organizations (excluding disputes concerning Railways, Income Tax, Customs and Excise Departments), such dispute or differences shall be taken up by either party for resolution through AMRCD as mentioned in DPE OM No. 4(1)/2013-DPE(GM)/FTS-1835 dated 22.05.2018”

23.2 **Clause 76.3 of GCC shall remain unchanged.**

24.0 **EPI has awarded this contract on behalf of DGAR (Director General Assam Rifles), Owner. In case EPI ceases to or exits from the project the right and responsibility etc. of EPI in the contract shall get transferred to DGAR (Director General Assam Rifles) or his nominated agency (ies).**

25.0 **Completion and taking over:**

As soon as the works are completed the contractor shall inform EPI and EPI in turn shall inform DGAR who will nominate a board of officers for checking/verification of completed work as per the contract for final taking over of the project.

A final certificate of rectification of all defects pointed out during handing/taking over by the nominated board of DGAR and/or during defect liability period shall be obtain from the SO1(works) of the respective range prior to release of security deposit.

a) Completion certificate issued by the Engineer-in-charge specifying the handing over of the work including list of inventories (fitting & fixtures).

b) No claim certificate by the Contractor.

c) No claim certificate from the sub-agencies/vendors engaged by the Contractor.

 d) Detail required for preparing as built drawings.

e) Periodical services and measurement books.

f) Drawings for layout of underground cables and details showing location of sluice valves, electric cable joints etc.
## ANNEXURE-A

**LIST OF MINIMUM TOOLS, PLANT AND MACHINERY**

<table>
<thead>
<tr>
<th>SL. No.</th>
<th>Description</th>
<th>Minimum numbers required</th>
<th>Period</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Digital theodolite/Total station</td>
<td>One no</td>
<td>As and when instructed/required</td>
</tr>
<tr>
<td>2</td>
<td>Levelling Instruments/ Auto level</td>
<td>One no</td>
<td>10 days</td>
</tr>
<tr>
<td>3</td>
<td>DG Set 50 KVA (Minimum)</td>
<td>One no</td>
<td>As and when instructed/required</td>
</tr>
<tr>
<td>4</td>
<td>Concrete chipping machine</td>
<td>One no</td>
<td>-do-</td>
</tr>
<tr>
<td>5</td>
<td>5 HP Diesel pump</td>
<td>One no</td>
<td>10 days</td>
</tr>
<tr>
<td>6</td>
<td>Diesel concrete mixer with hopper &amp; Weighing arrangement (Full bag capacity)</td>
<td>Two nos.</td>
<td>15 days</td>
</tr>
<tr>
<td>7</td>
<td>Concrete Vibrators with needles</td>
<td>Two nos.</td>
<td>15 days</td>
</tr>
<tr>
<td>8</td>
<td>Steel/Plywood Shuttering</td>
<td>500 sq. m</td>
<td>Progressively by 30 days</td>
</tr>
<tr>
<td>9</td>
<td>Dumpers/trucks</td>
<td>Two no.</td>
<td>As and when instructed/required</td>
</tr>
<tr>
<td>10</td>
<td>Excavators (JCB/Poclaine)</td>
<td>One no</td>
<td>-Do-</td>
</tr>
<tr>
<td>11</td>
<td>Welding machines</td>
<td>One no.</td>
<td>-Do-</td>
</tr>
<tr>
<td>12</td>
<td>2 HP Electric pump</td>
<td>Two nos.</td>
<td>-Do-</td>
</tr>
<tr>
<td>13</td>
<td>Utility vehicle</td>
<td>One no</td>
<td>-Do-</td>
</tr>
<tr>
<td>14</td>
<td>Truck mounted water tanks</td>
<td>One no</td>
<td>-Do-</td>
</tr>
<tr>
<td>15</td>
<td>Portable Welding Machine</td>
<td>One no.</td>
<td>-Do-</td>
</tr>
</tbody>
</table>

**Notes:**

1) The period mentioned above shall be reckoned from the date of start of commencement of work as mentioned under this contract.

2) The quantities and list of equipment indicated are tentative and can be increased/amended as per the requirement of work OR as per the direction of Engineer-in-Charge. The above equipment list is indicative and not complete. The contractor has to deploy all the required equipment to complete all the works within stipulated specifications & time period as contract documents.

3) The contractor will not be allowed to take out equipment from the site without the written permission of Engineer-in-Charge.

(Signature and seal of the Tenderer)
<table>
<thead>
<tr>
<th>SL. No.</th>
<th>Description</th>
<th>Minimum numbers required</th>
<th>Period</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Compressive Testing machine</td>
<td>One no</td>
<td>20 days</td>
</tr>
<tr>
<td>2</td>
<td>Electrically operated Digital Weighing Machine (0-5 kg)</td>
<td>One no</td>
<td>10 days</td>
</tr>
<tr>
<td>3</td>
<td>Slump test apparatus</td>
<td>One no</td>
<td>10 days</td>
</tr>
<tr>
<td>4</td>
<td>Set of sieves for grading of coarse aggregates</td>
<td>One set</td>
<td>10 days</td>
</tr>
<tr>
<td>5</td>
<td>Set of sieves for grading fine aggregates</td>
<td>One set</td>
<td>10 days</td>
</tr>
<tr>
<td>6</td>
<td>Cement consistency apparatus</td>
<td>One no</td>
<td>20 days</td>
</tr>
<tr>
<td>7</td>
<td>Electrically operated oven (300 deg. Centigrade)</td>
<td>One no</td>
<td>10 days</td>
</tr>
<tr>
<td>8</td>
<td>Trays for sampling</td>
<td>One set</td>
<td>10 days</td>
</tr>
<tr>
<td>9</td>
<td>Apparatus for testing of cement</td>
<td>One set</td>
<td>30 days</td>
</tr>
<tr>
<td>10</td>
<td>150X150X150 CI Cube Moulds</td>
<td>12 nos.</td>
<td>10 days</td>
</tr>
<tr>
<td>11</td>
<td>Vicat Apparatus with needles, Test Tubes, breakers, thick glass plates etc.</td>
<td>One set</td>
<td>15 days</td>
</tr>
<tr>
<td>12</td>
<td>Measuring Cylinders, 1000ml, 500 ml</td>
<td>01</td>
<td>15 days</td>
</tr>
<tr>
<td>13</td>
<td>Wash Bottles, Capacity 500 ml</td>
<td>02</td>
<td>15 days</td>
</tr>
<tr>
<td>14</td>
<td>Sink</td>
<td>01</td>
<td>15 days</td>
</tr>
<tr>
<td>15</td>
<td>Litre: Measures:</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>2 Lit</td>
<td>02</td>
<td>15 days</td>
</tr>
<tr>
<td></td>
<td>04 Lit</td>
<td>01</td>
<td>15 days</td>
</tr>
<tr>
<td></td>
<td>0.5 Lit</td>
<td>01</td>
<td>15 days</td>
</tr>
</tbody>
</table>

**Notes:**

1) The period mentioned above shall be reckoned from the date of start of commencement of work as mentioned under this tender.

2) The quantities of equipment indicated are tentative and can be increased as per the requirement of work OR as per the direction of Engineer-in-Charge. The above equipment list is indicative and not complete. The contractor has to deploy all the required equipment to complete all the works within stipulated specifications & time period as per contract documents.

3) The contractor will not be allowed to take out equipment from the site without the written permission of Engineer-in-Charge.

(Signature and seal of the Tenderer)
SPECIFICATION FOR SANITARY, WATER SUPPLY & PLUMBING

1.0 GENERAL

1.1 The scope of work comprises supply, installation, testing and commissioning of the facilities for water supply, sewerage and drainage, sanitary fixtures & fittings etc. The scope of work includes supply of all materials as per specifications and drawings, laying, fitting, fixing, installation, commissioning and testing of the same.

1.2 For all items of works the rates shall be comprehensive and all inclusive. The rate shall include for all matters and things necessary for satisfactory completion and maintenance of the work in proper working order and to the satisfaction of the Engineer, including testing, making samples etc. and all that have been indicated in the specifications or other tender documents either directly, or indirectly, and cover all obligations of the contractor under the contract. No claim for additional payment shall be allowed for any error or misunderstanding by the contractor of the work involved.

1.3 Unless otherwise mentioned in the description of the item, this BOQ shall be applicable for work in any height, position or condition.

1.4 Unless otherwise stated, method of measurement as described in the latest editions of IS: 1200 with its parts corresponding to different sections of work shall be followed. In case of any dispute in this matter, the decision of Engineer shall be final, binding and conclusive.

1.5 All the water supply, drainage and sanitary works shall be carried out strictly as per Central PWD specifications, 1996 Vol. (Two), 2002 Edition with upto date corrections slips for sanitary installation, water supply, drainage and miscellaneous works.

1.6 All the water supply and sanitary works shall be carried out by the licensed plumbers approved by the local authorities and skilled workmen, experienced in the trade.

1.7 All works shall be completely concealed within shafts or chases or in fills and dropped ceilings unless specifically shown in the drawings or required otherwise.

1.8 All works shall be adequately protected, to the satisfaction of the Engineer, so that the whole work is free from damage throughout the period of construction upto the time of handing over.

1.9 No work shall be covered without approval of the Engineer.

1.10 The contractor shall be responsible for coordinating the work with works of other trades sufficiently ahead of time to avoid unnecessary hold-ups. Hangers, sleeves, recesses, etc. shall be left in time as the work proceeds whether or not these are shown in drawings.

1.11 All clamps, screws, brackets, hangers and all miscellaneous steel work needed in the work shall be fully galvanized.

1.12 Only specified brand of materials will be used subject to approval of the sample.
1.13 Before the work is handed over, the contractor shall clean all fixtures, removing all plasters, stickers, rust stains and other foreign matter of discoloration of fixtures leaving every part in acceptable condition and ready for use to the satisfaction of the Engineer.

1.14 All sanitary-ware and fittings shall conform to respective BIS standards. The contractor shall submit samples of all fittings and fixtures proposed to be used to the Engineer for his approval.

1.15 The approved samples shall remain with the Engineer till the completion of the work.

2.0 SCOPE OF WORK

The contractor shall carry out and complete the work under this contract in every respect in conformity with the rules and regulations of the local authority. The contractor shall furnish all labour, supply and install all materials, appliances, equipments necessary for complete installation and testing of the whole plumbing services as specified and as per the relevant BIS codes and as shown on the drawings. This also includes all materials, appliances, equipment etc. not specifically mentioned herein or noted on the drawings but which are necessary and customary to make a complete installation as per the drawings or described herein, properly connected and in working order.

In general, the work to be performed under this contract shall comprise of the following:

1. All incidental jobs connected with plumbing services installation, such as excavation in trenches and back filling, cutting chases in concrete and brick work and making good, cutting / drilling holes through walls, floors and grounding for fixing of fixtures equipment etc.

2. Furnish and install a complete working, plumbing services installations shown on the drawings and described in this specification and as per the latest BIS specification.

3. Complete installation of internal and external water supply system.

4. Complete installation of the sewerage and sewerage appurtenances internally as well as around the buildings.

5. Complete installation of all sanitary and plumbing fixtures.

6. Repair of all damages done to the premises as result of this installations and removal of all debris left by those engaged in these installations.

7. Clean all plumbing fixtures, and ensure a satisfactory performance of all the fixtures at the time of testing and commissioning.

8. It is the responsibility of the contractor to take care of all the fixtures fitted until the time of handing over to the owner in working condition.

9. Painting of all the concealed and expose pipes, as specified.
3.0 Fee, Permits and Tests

The contractor shall pay all fees and obtain permits required for the installations of this work.

On completion of the work, the contractor shall obtain and deliver to the owner, certificates of final inspection and approval by the local authority. The EIC shall have full power to demand the materials or work to be tested by an independent agency at the contractor’s expenses in order to prove their soundness and adequacy.

4.0 Drawings and Specifications

The drawings and specifications shall be considered as part of this contract and any work or materials shown on the drawings and not called for in the specifications and vice versa, shall be executed as if specifically called for in both. The drawing indicate the extend and general arrangement of the fixtures, drainage system, etc. and are essentially diagrammatic. The drawings indicate the points of supply and termination of pipelines and broadly suggest the routs to be followed.

The work shall be installed as indicated on the drawings. However, any minor changes found essential to co-ordinate this work with other trades shall be made without any additional cost. The data given herein and on the drawings is as exact as could be secured, but its complete accuracy is not guaranteed. The drawings and specifications are for the assistance and guidance of the contractor and exact locations, distances and levels will be governed by the building drawings and approval of the Engineer-in-charge herein after referred to as EIC shall be obtained before commencement of work.

At the completion of the work, contractor shall furnish necessary information like invert levels and layout of pipeline, for the preparation of final completion drawings, to the EIC.

5.0 Manufacturer’s Instructions

Where manufacturers have furnished specific instructions, relating to the materials used in this job, covering points not specifically mentioned in the documents, these instructions shall be followed in all cases.

6.0 Changes in Dimensions

If the size of the fixtures mentioned is not available, then the nearest available size shall be fixed with due consent of the EIC.

7.0 Materials

1. Unless otherwise specified all the materials shall conform to the respective Bureau of Indian Standards.

2. All the materials shall be as per the list of approved brand of manufacturers and sample for the same shall be got approved before placing order. The approved samples shall be deposited with the EIC.
8.0 Sewerage Line

Providing and laying sewerage line Non presence NP2 class (light duty) RCC pipe of 150 mm to 300 mm dia as required from the outlet of the building to the inlet of the septic tank or sewerage treatment plant with necessary manhole chambers etc. as per CPWD specifications.

9.0 Sewer Appurtenances

9.1 Inspection Chambers & Manholes

9.1.1 Size of chambers/manholes

The size given in bill of quantities and drawings shall be internal size of chamber. The work shall be done strictly as per standard drawing and following specifications.

9.1.2 Benching

Chanelling and benching shall be done in 1:3:6 cement concrete, rendering smooth with neat cement. The following size of chanells for the bench shall be adopted.

<table>
<thead>
<tr>
<th>Size of drain</th>
<th>Depth at Centre i.e. at walls</th>
<th>Depth at Sides</th>
</tr>
</thead>
<tbody>
<tr>
<td>10 cm</td>
<td>15 cm</td>
<td>25 cm</td>
</tr>
<tr>
<td>15 cm</td>
<td>20 cm</td>
<td>30 cm</td>
</tr>
</tbody>
</table>

9.1.3 Chamber / Manhole

Covers shall be of tough homogenous cast iron conforming to IS : 1726 with lifting hooks, as per the details given in the drawing and fixed on the MS frame embedded in the concrete.

C.I. steps duly painted shall be provided whenever the depth of the manhole/chamber is more than 1.2 mtr., as per instructions of EPI.

10.0 Water Supply

All water supply installation work shall be carried out through licensed plumber.

10.1 Pipes and Fittings

The pipes shall be of the medium quality galvanized iron, conforming to IS: 1239 and of approved make. It shall be of screwed or socket type. All fittings shall be malleable galvanized iron fittings of approved make. A sample of each kind shall be got approved from Engineer-in-Charge and all the materials should be according to the approve sample.
10.2 **Laying and Fixing**

The pipes shall be checked for any visible damage and shall be sorted out for reclamation. Any pipe which shows any damage shall not be used.

For internal work, all pipes and fittings shall be fixed truly vertical or horizontal, either by means of standard pattern holder-bat clamps keeping the pipes clear of the walls by 12mm every where or by concealing, as directed by EIC.

For external work, G.I pipes and fittings shall be laid in trenches. The width of the trench shall be the minimum width required for working. The pipes laid underground shall not be less than 50 cms from the finished ground level. The work of excavation and refilling shall be done as specified elsewhere, or instead concealed as directed.

10.3 **Jointing**

The pipes shall be cleaned and cleared from all foreign matter before being laid. In jointing the pipes, the inside of the socket and the screwed end of the pipes shall be oiled and rubbed over with white lead and a few turns of spun yarn wrapped round the screwed end of the pipe. The end shall then be screwed in the socket, Tee etc. with the pipe wrench. Care shall be taken that all the pipe fittings are properly jointed so as to make the joints completely water tight and pipes are kept at all times free from dust and dirt during fixing. Burr from the joints shall be removed after screwing. After lying, the open ends of the pipes shall be temporarily plugged to prevent access of water, soil or any other foreign matter.

10.4 **Painting**

All buried GI pipes shall be painted with two coats of anti-corrosive bituminastic paint of approved make.

10.5 **Testing**

Before any pipes are painted or covered, they shall be tested to a hydrostatic pressure of 7 Kg/sq.cm. Pressure shall be maintained for at least eight hours without appreciable drop in pressure. In addition to the sectional testing of water supply pipes, the contractor shall test the entire installation to the complete satisfaction of the EIC. He shall rectify any leakages, failure of fittings or valves.

10.6 **Water Fittings (Taps, Stop Cock etc.)**

All water fittings shall be of approved make and shall generally comply to the latest BIS specifications. The fittings and joints shall be tested as specified & for pipe line; to ensure that the joint are leak proof, defective fittings and the joints shall be repaired or redone/replaced as directed. A sample of each kind shall be for approved from Engineer-in-Charge and all the materials should be according to the approve sample.
10.7 **Valves**

a) Fullway and check valve above 65 mm dia shall be CI double flanged conforming to IS-780 and as per approved make.

b) Fullway and check valve upto 65 mm dia shall be gun metal tested in 20 kg/cm² pressure and conforming to IS-778.

c) Foot valve shall be of gun metal.

11.0 **Sanitary Fixtures and Fittings**

11.1 **Workmanship**

All sanitary-ware shall be fixed in a neat workman like manner, true to level and plumb. Manufacturers instructions shall be followed closely regarding installation and commissioning.

11.2 **Sanitary Ware**

All sanitary ware shall be of first quality, free from warps, cracks and glazing defects. All sanitary ware, fittings and fixtures shall be as shown in drawings.

11.3 **Testing**

When the installation has been completed the satisfaction of the Engineer it shall be tested in the following manner.

(a) The entire system shall be slowly filled with water, allowing any trapped air to escape.

(b) When all outlets are closed the system shall be checked for water tightness.

(c) Each outlets shall then be checked for rate of flow and correct operation.

12.0 **Sanitary Installation and Fixtures**

All fixtures shall be fixed in a neat workman-like manner, true to line and as recommended by the manufacturers or as shown on the drawings. Care shall be taken to fix all fixtures, bolts and nuts and each fixture will warrant the correct size of screws or nuts and bolts.

Care shall be taken in fixing all chromium plated fixtures and accessories so as not to leave any tool marks or damages on the finish. All such fixtures shall be tightened with fixed spanner. Use of ‘Stiltson’ type pipe wrenches with toothed jaws shall not be allowed.

All fixtures shall be thoroughly tested after connecting with the drainage water supply system. All fixtures shall be thoroughly flashed and any leakage in piping, valves and fittings corrected to the complete satisfaction of EIC.

Upon completion of the works remove all levels, stickers, plasters etc. from the fixtures and clean all fixtures with soap and water so as to present neat and clean toilets. All vitreous sanitary appliances (Vitreous China) shall conform to IS: 2556 (Part – I).
12.1 Indian Water Closet

Indian water closet with ‘P’ or ‘S’ trap shall be of Orissa type with 32 mm PVC flush pipes, lower level PVC cistern, CP stop cock. Indian water closet and trap shall be set in 1:4 lime surkhi concrete and flush with floor. Low level cistern shall be fixed at a height as per drawings or as directed by the EIC.

12.2 Wash Basins

This shall be of white vitreous china clay of good quality, of approved make and size as specified in the drawing. These shall be supported on a pair of CI brackets of approved design.

12.3 Sinks

Sinks shall be of stainless steel and of approved make and size as specified in the drawing.

12.4 Mirror

The mirror shall be of 5.5 mm thickness. The size shall be as specified in the approved drawing and made with commercial plywood fixed to the back of the mirror. Mirror shall be fixed to the wall with CP side clips and screws. The mirror shall be as per relevant BIS specification.

12.5 Towel Rail

Towel rail shall be of chromium plated steel with brackets, bends and circular flanges. The size of the rail shall be as specified in the drawing. The brackets shall be fixed by means of CP brass screws to wooden cleats, firmly embedded in the wall.

12.6 Floor Traps

The traps shall be of CI and self cleaning and deep water seal type with a 50 mm water seal. It shall have a 150 mm dia grating. These shall be fixed in concrete to the required level and position.

12.7 Shower

These shall be of CP finish swivel type and of size as mentioned in the drawing.

12.8 Towel Ring, Soap Tray, Cloth Stand etc.

These shall be of CP finish. These shall be fixed by means of CP brass screw to wooden clips firmly embedded in the wall.

13.0 Location of septic tank, if constructed shall be at a maximum distance of 30.00 (thirty) metre from the edge of the building if not otherwise mentioned in the drawing.
14.0 Feed point for water supply pipe line to buildings shall be at a maximum distance of 30.00 (thirty) metre from the edge of the buildings.

15.0 If sewerage treatment plant is provided instead of septic tank sewer line including inspection chamber upto a distance of 30.00 m from the edge of the building shall be considered included in the lump-sum price of the building.

16.0 LIST OF APPROVED MAKE OF MATERIAL

<table>
<thead>
<tr>
<th>Sl. No.</th>
<th>Description</th>
<th>Make</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Synthetic Enamel Paint</td>
<td>Berger / Asian / ICI / Dulux / Nerolac /</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Shalimar / J&amp;N</td>
</tr>
<tr>
<td>2.</td>
<td>Vitreous China Sanitary Ware</td>
<td>Hindustan Sanitary Ware / Cera / Neycer /</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Parryware</td>
</tr>
<tr>
<td>3.</td>
<td>Stainless Steel Tank</td>
<td>Orient / Suhag / Nirali / Anjali / Swastik/</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Diamond</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Kalinga / Kejrawal</td>
</tr>
<tr>
<td>5.</td>
<td>Valves</td>
<td>Kirloskar / Kilburn / IVC / L&amp;T</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Mather &amp; Platt</td>
</tr>
<tr>
<td>7.</td>
<td>Submersible Pumps</td>
<td>Kirloskar / KSB / Grudfoxx</td>
</tr>
<tr>
<td>8.</td>
<td>CP Fittings</td>
<td>Sona / Gem / Jaguar / Esses / Essco</td>
</tr>
<tr>
<td>9.</td>
<td>White Glazed Fire Clay Sinks</td>
<td>EID / Parry</td>
</tr>
<tr>
<td>10.</td>
<td>Hot Water Heaters</td>
<td>Racold / Bajaj / Voltas / Venus</td>
</tr>
<tr>
<td>11.</td>
<td>Ball Valve with Float</td>
<td>Leader / Kilburn / Prayag</td>
</tr>
<tr>
<td>12.</td>
<td>Manhole Cover</td>
<td>BC / TDS or equivalent</td>
</tr>
<tr>
<td>13.</td>
<td>CI Sluice Valve</td>
<td>Kirloskar / IVC / Leader</td>
</tr>
<tr>
<td>14.</td>
<td>Overhead Water Tank</td>
<td>Sintex / Polycon / Roma / Patton</td>
</tr>
<tr>
<td>15.</td>
<td>PVC Pipes Fittings</td>
<td>Parag / Jindal / Supreme/ KiTEC / Prince</td>
</tr>
<tr>
<td>16.</td>
<td>GI Pipes Fittings</td>
<td>Jindal / Tata / Kalinga / ITC / BST / Zenith</td>
</tr>
</tbody>
</table>
### 17.0 IS CODE

<table>
<thead>
<tr>
<th>Code</th>
<th>Year</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>IS 1172</td>
<td>1971</td>
<td>Code of basic requirements for water supply, drainage and sanitation (Revised).</td>
</tr>
<tr>
<td>IS 4111</td>
<td>1967</td>
<td>Code of practice for ancillary structures in sewerage system.</td>
</tr>
<tr>
<td>IS 1626</td>
<td>1960</td>
<td>A.C. building pipes gutters and fittings (spigot and socket type).</td>
</tr>
<tr>
<td>IS 3989</td>
<td>1970</td>
<td>Centrifugally span cast iron spigot and socket soil, and ventilating pipes, fittings and accessories.</td>
</tr>
<tr>
<td>IS 1239</td>
<td>1968</td>
<td>Specifications for mild steel tube, tubulars and other steel pipes and fittings.</td>
</tr>
<tr>
<td>IS 6295</td>
<td>1971</td>
<td>Code of practice for water supply and drainage in high altitude and or sub-zero temperature regions.</td>
</tr>
<tr>
<td>IS 6511</td>
<td>1965</td>
<td>Specifications for salt glazed stoneware pipes and fittings (first version).</td>
</tr>
<tr>
<td>IS 2556</td>
<td>-</td>
<td>Specifications for vitreous sanitary appliances (vitreous china).</td>
</tr>
</tbody>
</table>

**Note:** The material other than approved list shall also bear ISI Mark and / or to be approved by the Engineer-in-Charge before use. Required tests are to be conducted by the contractor before use at works.
1.0 GENERAL

1.1 The Electrical installation work shall be carried out in accordance with Indian Standard code of practice for Electrical Wiring Installation IS: 732 – 1963 and IS: 2274 – 1963. It shall also be in conformity with the current Indian Electricity rules and regulations and requirements of the Local Electric Supply Authority and fire insurance regulations in so far as these become applicable to the installation. Electrical work in general shall be carried out as per following specifications.

General Specifications of Electrical Works

(Part I – Internal) – 1994

General Specifications of Electrical Works

(Part II – External) – 1994

Whenever these specifications calls for a higher standard of materials and on workmanship than those required by any of the above mentioned regulation and specifications, then the specification mentioned here under shall take precedence over the said regulations and standards.

2.0 MATERIALS

All materials to be used in this work shall be new and shall be approved by Engineer-in-Charge.

List of approved makes and manufacture of electrical materials is attached herewith. Only such materials as are on the list shall be allowed to be used.

3.0 RECEPTACLES

All 250V receptacles shall be 2 wire three pole 5 amp. flush mounted or flush type of approved make. For power loads, the flush type switches and socket shall of 15 amp. rating and be also of approved make.

4.0 SWITCHES

All flush type switches shall be totally enclosed type of 5 amp. rating for upto four light outlets and 15 amp rating for more than four light outlets, being controlled by one switch. These shall be of approved make for light loads. For power loads, the flush type switches shall be of 15 amp rating and be of approved make.

5.0 COVER PLATE

These shall be the integral part of the switch and socket and of a colour approved by the Engineers as required.
6.0  **POSITION OF LIGHTING & DISTRIBUTION BOARDS AND SWITCH GEARS**

The recommended position of the lighting control switches, distribution boards and switch gears, as shown on the layout drawings, will be adhered as far as practicable.

Should there be any discrepancy or incomplete description, ambiguity or omission in the drawings and other documents, whether original or supplementary, forming the contract, the contractor shall immediately on discovering the same, draw attention of the Engineer.

Prior to the installation of lighting, fan and plug points and the distribution boards switches etc. final position shall be ascertained by the contractors with the Engineer-in-Charge’s representative.

7.0  **PAINTING AND MARKING**

All exposed steel work not actually embedded in building construction (viz. junction boxed, switch boards etc) will be painted to match the existing shades of walls as instructed.

8.0  **SUPPLY**

The 415 KV supply mains will be brought in at place/s pointed out by the Engineer and will be three phase 4 wire, 50 cycles system 415V between phases. All necessary arrangements, to obtain the required supply connections shall be made by the contractors.

9.0  **CONCEALED WIRING INSTALLATIONS**

9.1  **CONDUITS**

These shall be of 16 SWG upto 32 mm dia and 14 SWG for 38 mm and above dia, PVC having perfectly circular tubing and capable of being cleaned and tight fitting joints.

9.2  **ERECTION**

Conduits shall be laid before casting in the upper portion of a slab or otherwise, as may be instructed or in accordance with approved drawing so as to conceal the entire run of conduits and ceiling outlet boxes. Vertical drops shall be buried on columns or walls. Wherever necessary, chases will be cut by the contractor with the prior written orders of the site Engineer-in-Charge to sufficient depth to allow fill thickness of plaster over conduits. Width of the chases will be made to accommodate the required no. of conduits. The chases will be filled with cement, coarse sand mortar (1:3) and properly cured by watering. If a chase is cut in an already finished surface the contractor shall fill the chase and finish is to match the existing finish. Contractor should not cut any iron bars to fix conduits. When the conduit is to be embedded in a concrete member, it shall be adequately tied to reinforcement to prevent displacement during casting.

Suitable expansion joint fittings of approved make shall be provided at all points where the conduit crosses any expansion joint in the building.
9.3 **USE OF BENDS**

This shall be of 14 SWG. As far as possible, the conduit system shall be so laid out that it will obviate the use of tees, elbows and sharp bends. No length of conduit shall have more than the equivalent of two quarter bends from inlet to outlet.

9.4 **CROSS SECTION**

The conduits shall be of ample sectional area to facilitate the drawing of cables. In no case shall the total cross section of cables measured over all, be more than half the area of the conduit.

9.5 **CEILING OUTLET BOXES**

Outlet boxes for ceiling fan shall be fabricated for a minimum 3 mm thick, 200 mm depth and 60 mm sides with 12 mm dia rod welded to the box. These shall be so protected at the time of laying that no material finds its way inside during concrete casting or plastering.

9.6 **DRAW BOXES**

MS draw boxes of ample dimension shall be provided at convenient points on walls to facilitate pulling of long run of cables. They will be completely concealed with asbestos cement covers flush with plaster wall. These boxes will be as few as possible and located where found suitably by the Engineer-in-charge. All the MS boxes used for house switches, plugs, drawing of wires etc., shall be five sided and of minimum 20 SWG.

9.7 **SWITCH BOXES**

MS boxes of required sizes shall be provided to house speed regulators, switches and plug sockets. This shall be attached to conduits by means of check nuts on either side of their walls. These shall be completely concealed leaving edges flush with wall surfaces. MS box shall be fitted with a brush earth terminal.

9.8 **CLEANING OF CONDUIT RUNS**

The entire conduit system including outlets and boxes shall be thoroughly cleaned after completion of erection and before drawing in cables.

9.9 **PROTECTION**

To safeguard against filling up with the plaster etc., all the outlets boxes and switch boxes will have to be provided with temporary covers and plugs within the tendered cost which shall be replaced by sheet covers as required.

9.10 **PAINTING**

Before erection, the conduit shall be painted at such places where the pipe had been damaged due to vice and wrange grip.
9.11 **FAN REGULATOR**

These shall be flush type, located in the same box as light switches wherever possible. The regulators shall be tested before installation to ensure proper graduation of fan speed.

9.12 **LAYING OF CONDUIT ONLY FOR TELEPHONE OR OTHER DUMMY CONDUITS**

The conduit for telephone system shall be the same as conduits for other work and as specified before. The minimum size shall be 20 mm dia. Junction boxes shall be provided at distance not exceeding 10 M. The whole work shall be done in cooperation with the Telephone Authority and the contractor must make such modifications as the company desires in consultation with Telephone Department. The same will apply to any other dummy conduit.

9.13 **WALL SOCKETS AND PLUGS**

Wall sockets will be of the following type:

- b) For power plug point - 15 / 16 Amps. Capacity, 5 / 6 pin type.

The quoted rates shall also include earthing the third pin with 16 SWG GI wire.

9.14 **WIRES AND CABLES**

- a) All wires shall have been manufactured in accordance with latest IS specification amended upto date. Wire shall be carried out with PVC insulated 660 / 1100 volt grade unsheathed single core with electrolytic studded copper conductor.

- b) Twin flexible cables used for pendants shall have cross sectional area of 0.001 sq. inch (equivalent to 23/0.0076 inch) or large and be insulated in accordance with relevant IS specification amended upto date.

9.15 **POINT WIRING**

- a) The point wiring shall be carried out in the under mentioned manner each of which will conform to the given specification:

1. In concealed conduit system including providing supply and fixing of conduit, bends, junction boxes, brass bushes, check nuts etc.

2. Looping system will be followed throughout including supply and drawing of required sizes of wire without damaging the same.

3. All flush type accessories will be used.

4. The point will commence from the distribution board including circuits each having independent neutral wire and will end upto the outlet box and switch box.
5. The point will be complete with conduit including accessories and wire, necessary junction outlet and switch boxes, connections and ceiling roses, switch boxes and flush plates, necessary earthing connection etc., as required.

6. The installation will generally be carried out in conformity with the ISI code, electrical rules and the Electrical Rules and Institution of Engineers (London) briefly called IEE Rules, where the specification differs these specifications will prevail.

For the purpose of determining the load per circuit, the following rating of points shall be assumed:

- Light point 80 watts.
- Convenience plug points 100 watts.
- Fan points 80 watts.
- Exhaust fan point 12" 80 watts.
- Exhaust fan point 15" 90 watts.
- Exhaust fan point 18" 120 watts.
- Power plug points 1000 watts.

The convenience plug point shall be complete with 3 / 5 pin 5 / 6 Amps. Plug and socket enclosed in MS box with the controlling switch as required and the third pin shall be earthed with no. 16 SWG bare copper wire.

The ceiling fan point shall be complete with ceiling outlet box with recessed fan hook and a provision in the switch box for mounting the regulators. The ceiling fan/exhaust fan and its regulator shall be earthed. The point shall be complete as above.

Each circuit shall have not more than one power plug and the plugs shall be earthed with no. 14 SWG bare GI wire. The point shall be completed with a 5 / 6 pin 15 / 16 Amps plug socket switch combined mounted on a MS box.

9.16 MAINS AND SUB-MAINS

Mains and sub-mains shall consists of wires, cables and conduits bends junction boxes, PVC bushes, check nuts etc., as specified herein before. The sizes and capacities of conduits and wires shall be required as per load and shall commence from main switches to various distribution boards. Wires shall be drawn in the concealed without being damaged. For this purpose, draw boxes shall be located at convenient place. Every main and sub-main will run in an independent conduit with an independent earth wire of suitable capacity running along the entire run of conduit. For single phase, one earth wire shall run and for 3 phase, 2 earth wire shall run. Necessary provision of wire lengths entering and emerging out of conduit must be made for connections.

9.17 COMPLETION TEST

The installation with fittings complete shall satisfactorily pass the following tests before current is switched on:
a) All lamps and appliances having been connected and with all switches ‘ON’ a pressure not less than twice the working pressure (subject to a limit for 500V) shall be applied and the insulation resistance must not be less than 50 meg. Ohms divided by the number of points.

b) With all lamps and appliances removed from the circuit and all switches ‘ON’ a similar test between poles shall satisfy the above requirement.

c) As soon as the conduit in slab/screed is fixed, the contractor shall arrange to give it earth continuity test to ensure that the conduit or lead sheathing is electrically continuous throughout and connected to earth.

d) To ensure that all single pole switches are on the live side of the apparatus they control.

The contractor shall notify in writing to the Engineer about the completion of the work. The contractor will fix up the date of testing in consultation with the Engineer-in-Charge for such tests.

Should the above tests not comply with the limits as laid down in IEE Rules, the contractor shall rectify the faults at his own cost until the required results are obtained.

9.18 DISTRIBUTION BOARDS / SUB DISTRIBUTION BOARDS

All the distribution boards shall be factory manufactured of approved brands only. These shall be complete with necessary supporting structures, copper bus bars, neutral link and removable cover. The miniature circuit breaker shall be with notified operating curves and be capable of clearing a fault of 5 KA. The miniature circuit breaker to be used to control lighting circuits shall have tripping characteristics of 5.0 sec. At 150% full load current and those for power point circuits of 0.01 seconds at 700% full load current. The miniature circuit breakers shall be rated for the ambient temperature prevailing at site and shall have the trip devices correctly calibrated. All these MCB’s shall be factory tested and supported by suitable test certificates.

10.0 UNDER GROUND CABLE

10.1 MEDIUM AND LOW VOLTAGE

Cables should be doubled steel tape armoured PVC insulated conforming to quality as specified in the schedule of work. All joints of cables should be in joint boxes and filling in of the compound shall be done as per IS specification using the best quality materials. All cables, accessories and other materials should conform to IS specification. The jointing work should be carried out by a competent authorized cable jointer.

10.2 H.T. CABLES

All cables used for 11/33 KV system shall be XLPE cables. These cables shall have individually screened course and be manufactured and tested according to IS:7098 (Part – II) – 1973 amended upto date. The conductor for these cables shall be from electrical purity aluminum ¾ H or H temper. All conductors shall be compacted circular in shape. The insulation shall be high quality cross linked polyethylene – obtained by chemical cross linking of polythene molecules. The armouring applied over the common covering shall be of flat steel wires.
Each and every delivery length of the cable shall be subjected to routine test as per IS:7098 (Part – II) – 1973 amended upto date. The operating characteristics of these cables shall be as under:

i) Permissible maximum continuous operating temperature - 90°C
ii) Permissible short circuit temperature - 250°C
iii) Dielectric constant (Er) st 50 Hz 30°C to 90°C - 2.4
iv) Loss factor at 50 Hz, 30°C to 90°C - 0.05×100×314
v) Special voltage resistivity at 20°C - >10ohm cm

10.3 TRENCH

Trenches shall not be less than 35 cm wide and 75 cm below ground level for cables upto 1.1 KV and 35 cm wide and 120 cm deep for cables above 1.1 KV grade. Wherever necessary, suitable propping and shoring made on to avoid caving of the adjoining trench walls. Where the cables cross other service lines adequate protection should be taken to prevent accidental exposure and or damage to the cables.

10.4 SPACING BETWEEN CABLES

Before the cables are laid, a layer of 8 cm sand is provided for purpose cushioning. The cables after being uncoiled and laid into the trench from the rollers should be drawn in straight lengths. After the cable is laid, it is to be covered with another layer of sand of about 15 cm in depth, and the top surface to be suitably leveled to receive the cable covers. These covers shall be of concrete blocks of 20 cm × 20 cm × 5 cm and laid in a manner to overlap the cables of either side by at least 5 cm. Cable markers of aluminum or GI shall be provided at ground level after being suitably embedded in concrete blocks of 20 cm × 20 cm × 20 cm and spaced at distance of about 30 m from center to center at every change in direction.

Cables may also be laid in tire formation in the same trench. In this case also after the first 8 cm sand cushion, the first tire of cable is laid and sand filled in the trench to form a bed of 23 cm. above this tier. After this the second cable is laid and process repeated the top most tier being at least 45 cm. below the ground level. The cable shall be suitably covered with breaks or tiles.

When laying the cables care should be taken to see that the PVC insulated cables are bend or straightened slowly and sharp radii. The minimum safe bending radius for single – core cables is 20 dia and for multi-core cables 15 diameters and for armoured cables 12 diameters, the diameter being the overall diameter of the cable. Where the cables are required to cross roads this should be normally taken through hume pipe at least 15 cm in diameter.

Cables laid inside the building should be properly protected and be carried either through ducts with suitable covers with slab or chequered plates or fixed to walls by clamps, brackets or cables trays.

Cable entering or leaving the buildings should be taken through GI pipes. These pipes/sleeves shall be properly sealed after pulling the cables for preventing the water from entering inside the building as per directions of Engineer-in-Charge.
10.5 **LAYING OF CABLE TRAY / SURFACE**

Cable shall be laid in perforated MS cable tray / ladder. Cable shall be properly dressed before cable ties / clamps are fixed.

10.6 **CABLE TAGS**

Cable tags shall be made out of 2 mm aluminum sheets, each tag (1 – ½) inch dia with one hole of 2.5 mm dia, 6 mm below the periphery. Cable designations are to be punched with letter / number and the tags are to be tied inside the panels beyond the glands as well as below the glands at cable entries. Tray tags are to be tied at all bends. One straight length, tags shall be provided at every 5 meters.

10.7 **TESTING THE CABLES**

High voltage test should be undertaken to ensure that no damage has occurred during the laying operation and that the joints are in order. Cables of 1.1 KV suitable for low and medium voltage should withstand for 15 minutes, 3000 D.C. volts applied between the conductors and between each conductor and sheath. In absence of pressure testing arrangement it is sufficient to test for 1 minute with 2000 volts. If the test results are found to be not satisfactory the contractor shall arrange for having this set right at their cost, including removal of rejected materials, re-laying, etc.

10.8 **EARTHING**

**Plate Electrode:** shall be made of as plats of 6 mm thick and (600 x 600) mm size GI electrode. The plate shall be buried vertically in ground at depth of not less than 3.5 meters to the top of plate, the plate being en-cashed in charcoal and salt to a thickness of 15 cm all round. It is preferable to bury the electrode to a depth where the sub-soil water is present. Earth leads to electrode shall be laid in a GI pipe and connected to the plate electrode with GI bolts, nuts and washers. A GI pipe of not less than 19 mm dia shall be placed vertically over the plate and terminated in a funnel at 5 cm above ground. The tunnel shall be provided with a wire-mesh. The funnel shall be enclosed in a masonry chamber (100 x 50) cm. The chamber shall be provided with CI frame cover of (100 x 50) cm size. The earth station shall also be provided with a suitable permanent identification level tag.

**Pipe Electrode:** shall comprise of a 2.5 meter long 40 mm dia GI pipe buried in a plot of (35 x 35) cm size and filled with alternate layer of charcoal, salt and river sand and connected at the top to a GI pipe of 19 mm, 1 meter long with a funnel at the other end, 5 cm above the ground. The earth lead shall be properly fixed to the pipe electrode with brass bolt, nuts and washers. The funnel and earth lead connection shall be enclosed in a masonry chamber (30 x 30 x 30) cm dimension. The chamber shall be provided with a CI frame with cover. Proper permanent identification tag / level shall be provided for each electrode.

Normally each electrode shall not be situated less than 1.5 m from any building.
Testing: on completion of the entire installation, the following test shall be conducted and no earth electrode shall have ohmic resistance of more than 2 ohm and in rocky soil not more than 3 ohm.

11.0 The work shall basically consist the following:

<table>
<thead>
<tr>
<th>SL. NO.</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>POINT WIRING</strong></td>
<td></td>
</tr>
<tr>
<td>1.</td>
<td>Wiring for light point/fan point/exhaust fan point/call bell point with 1.5 sq.mm PVC insulated copper conductor cable in recessed PVC conduit as required including 5/6 amp piano type switch, C.I. cover plate etc. complete.</td>
</tr>
<tr>
<td>2.</td>
<td>Wiring for twin control light 1.5 sq.mm PVC insulated, copper conductor, cable in recessed PVC conduit with 2 way, 5/6 amp piano type switch etc. as required.</td>
</tr>
<tr>
<td>3.</td>
<td>Wiring for 3 pin 5/6 amps light plug point on same switch board including providing and fixing 3 pin 5/6 amp socket outlet and 5/6 amp piano type switch connection etc. as required.</td>
</tr>
<tr>
<td>4.</td>
<td>Wiring for light plug 2 × 1.5 sq.mm PVC insulated copper conductor single core cable in recessed PVC conduit along with 1 no. 2.24 mm dia bare copper wire for loop earthing as required.</td>
</tr>
<tr>
<td>5.</td>
<td>Wiring for power plug with 2 × 4 sq.mm PVC insulated copper conductor, single core cables in recessed PVC conduit along 1 no. 2.24 mm dia bare copper wire for loop earthing as required.</td>
</tr>
<tr>
<td>6.</td>
<td>Wiring for Ckt. Wiring with 2 × 2.5 sq.mm PVC insulated, copper conductors, single core cables in recessed PVC conduit complete as required.</td>
</tr>
<tr>
<td>7.</td>
<td>Wiring for sub main with 4 × 6 sq.mm PVC insulated copper conductor single core cables in recessed PVC conduit complete as required.</td>
</tr>
<tr>
<td>8.</td>
<td>Supplying and fixing metal box of 100 mm × 100 mm × 60 mm deep (nominal size) in recess with suitable size phenolic laminated sheet cover in the front including providing and fixing 3 pin 5/6 amps socket outlet and 5/6 amps tumbler/piano type switch, connections, painting etc. as required (for light plugs).</td>
</tr>
<tr>
<td>9.</td>
<td>Supplying and fixing metal box of 180 mm × 100 mm × 60 mm deep (nominal size) on surface or in recess with suitable size phenolithic laminated sheet cover in the front including providing and fixing 3 pin 15/16 amps tumbler/piano type switch, connections, painting etc. as required (for power points).</td>
</tr>
<tr>
<td>10.</td>
<td>Supplying and fixing 20 amps, 240 volts, SPN industrial type, socket outlet, with 2 pole and earth, metal enclosed plug top along with 20 amps G-series, SP, MCB, in sheet steel enclosure in recess with chained metal cover for the socket outlet and complete with connections, testing and commissioning etc. as required.</td>
</tr>
<tr>
<td><strong>SWITCH BOARDS, DBS &amp; CABLES</strong></td>
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<tr>
<td>11.</td>
<td>Supplying and fixing MCB type TPNDB 4 way prewired in recess complete as required with copper busbars, N link etc. and following.</td>
</tr>
<tr>
<td>12.</td>
<td>Supplying and fixing MCB TPNDB 4 way prewired in recess complete as required with copper busbars, N link etc.</td>
</tr>
<tr>
<td>13.</td>
<td>Providing and fixing of 63 A (Category A) TPNSFU with HRC fuses complete as required including supplying and fixing of suitable angle iron frame.</td>
</tr>
</tbody>
</table>
14. Supplying, installation, testing and commissioning of cubical type wall/floor TPN distribution board with aluminium bus bars, wiring, connections, painting etc. complete as required with following switch gear and accessories as per approved drawing and design. I/c 125 A TPNFSU – with HRC fuses o/g 40 A TPN-MCB-125 A4P change over switch.

15. Supplying, installation, testing and commissioning of cubical type wall/floor mounted TPN distribution board with aluminium bus bars, wiring, connections painting etc. complete as required with following switch gear and accessories as per approved drawing and design.
I/c 400 A TPNSFU with HRC fuses.
O/g 125 A TPNSFU.
63A TPN -

16. Supplying and installation of 1.1 KV grade PVC insulated sheathed and armoured Al. Conductor cable of following size as per IS : 1554 (Part – I)
1) 3.5 × 50 sq.mm.

17. Laying and fixing of 1.1 KV grade PVC insulated sheathed and armoured Al. Conductor cable in ground or on wall/ceiling complete as required.
1) 3.5 × 50 sq.mm.

18. Supplying and laying cable and termination with brass compression gland and crimped cable and sockets.
1) 3.5 × 50 sq.mm.

19. Providing earthing station with G.I. Plate 600 × 600 × 6 mm watering pipe, masonry enclosure, C.I. cover plate etc. complete as required including salt and charcoal.

20. Providing and fixing G.I earth strip 50 × 5 mm in 65 mm dia G.I. pipes in ground.

21. Supplying and laying 2 × 55 mm G.I. strip in 40 mm dia G.I. pipe from earth electrode as required.

22. Providing and fixing 6 SWG dia, G.I. wire in recess for loop earthing along with the exesting/recessed conduits/sub main wiring/cable as required.

23. Supplying and drawing 2.24 mm copper loop earth wire in conduit.

24. Supplying and laying of 20 × 3 mm GI strip in parapet wall and vertical dropping ground.

25. Supplying and fixing of 300 mm long GI tube having single prong at top with 85 mm dia, 6 mm thick GI base plate including making holes as required.

**INSTALLATION OF LIGHT FITTINGS, FAN AND FIXTURES**

26. Supply, installation, testing and commissioning of prewired, fluorescent fittings of all types complete with all accessories and tubes etc. directly on ceiling/wall, including connections with 1.5 sq.mm PVC insulated, copper conductor, single core cable as required.

27. Supply, installation, testing and commissioning of prewired, fluorescent fittings of all types complete with all accessories including supplying and fixing ball socket nos. down rod of 20 mm × 1.6 mm thick steel conduit upto 30 cm length painting and wiring the down rods and connections with 1.5 sq.mm PVC insulated, copper conductor, single core cable as required.

28. Supply, installation, testing and commissioning of ceiling fan and regulator, including wiring the down rod of standard length (upto 30 cm) with 1.5 sq.mm PVC insulated, copper conductor, single core cable including cartage etc.
<table>
<thead>
<tr>
<th></th>
<th>Description</th>
<th>Make(s)</th>
</tr>
</thead>
<tbody>
<tr>
<td>29.</td>
<td>Supply, installation, testing and commissioning of exhaust fan upto 450 mm sweep in the existing opening, including making the hole to suit the sizes of the above fan, making good the damage etc. complete.</td>
<td>Larsen &amp; Toubro, Siemens, HPL</td>
</tr>
<tr>
<td>30.</td>
<td>Supply, installation, testing and commissioning call bell/buzzer and piano type bell push, suitable for D.C./A.C. single phase 230 volts complete as required.</td>
<td>Larsen &amp; Toubro, Siemens, HPL</td>
</tr>
<tr>
<td>31.</td>
<td>Supply, installation, testing and commissioning, erection of wall bracket/ceiling fittings of all sizes and shapes containing upto two GLS lamps per fitting, complete with all accessories including connections etc. required.</td>
<td>Crompton, HPL, Harsh, Polycab</td>
</tr>
</tbody>
</table>

### 12.0 LIST OF APPROVED MAKE OF MATERIAL FOR ELECTRICAL

1. **Switch Fuse Unit (HRC Type)**
   - 1. Larsen & Toubro
   - 2. Siemens
   - 3. HPL

2. **MCCB**
   - 1. Larsen & Toubro
   - 2. Siemens
   - 3. HPL

3. **Aluminum Conductor PVC Insulated Wires**
   - 1. Plaza
   - 2. Paragon
   - 3. Finolex
   - 4. Universal
   - 5. Payal
   - 6. Polycab

4. **Copper Conductor PVC**
   - 1. Plaza Insulated Wires
   - 2. Paragon
   - 3. Finolex
   - 4. Universal
   - 5. Payal
   - 6. Harsh
   - 7. Polycab

5. **Metal Clad Socket Outlet**
   - 1. Crompton
   - 2. HPL

6. **L.T. Panels**
   - 1. Larsen & Toubro
   - 2. Crompton Greaves
   - 3. HPL

7. **Bus Duct**
   - 1. Zeta
   - 2. Best & Crompton
   - 3. ECS

8. **Energy Meter**
   - 1. HPL
   - 2. Havells

9. **Frequency Meter**
   - 1. Automatic Electric
<table>
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<th>1.</th>
<th>2.</th>
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<tbody>
<tr>
<td>10.</td>
<td>Meter / CTS</td>
<td>SG</td>
<td>HPL</td>
</tr>
<tr>
<td>11.</td>
<td>Selector Switches</td>
<td>KayCee</td>
<td>Larsen &amp; Toubro</td>
</tr>
<tr>
<td>12.</td>
<td>Contactors</td>
<td>Siemens</td>
<td>Larsen &amp; Toubro</td>
</tr>
<tr>
<td>13.</td>
<td>HRC Fuse</td>
<td>HPL</td>
<td>Siemens</td>
</tr>
<tr>
<td>14.</td>
<td>Push Button &amp; Pilot Lamps</td>
<td>Larsen &amp; Toubro</td>
<td>Siemens</td>
</tr>
<tr>
<td>15.</td>
<td>Battery Charger</td>
<td>Automatic Electric</td>
<td>Usha Rectifier</td>
</tr>
<tr>
<td>16.</td>
<td>Batteries</td>
<td>Exide</td>
<td>Standard</td>
</tr>
<tr>
<td>17.</td>
<td>Relays</td>
<td>HPL</td>
<td></td>
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<tr>
<td>18.</td>
<td>Timers</td>
<td>Larsen &amp; Toubro</td>
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<tr>
<td>19.</td>
<td>Motors</td>
<td>Siemens</td>
<td>Kirloskar</td>
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<td>NGEF</td>
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<td>Crompton</td>
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<tr>
<td>20.</td>
<td>Starters</td>
<td>Larsen &amp; Toubro</td>
<td>HPL</td>
</tr>
<tr>
<td>21.</td>
<td>Rising Mains</td>
<td>Zeta</td>
<td></td>
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<tr>
<td>22.</td>
<td>Volt / Amp. Meters</td>
<td>Automatic Electric</td>
<td></td>
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<tr>
<td>23.</td>
<td>Single Phase Preventor</td>
<td>HPL</td>
<td>Havells</td>
</tr>
<tr>
<td>24.</td>
<td>Indicating Lights</td>
<td>Siemens</td>
<td>SG</td>
</tr>
<tr>
<td>25.</td>
<td>Pumps</td>
<td>Beacon</td>
<td>Kirloskar</td>
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</tr>
</tbody>
</table>
| 26. | Diesel Pumps | 1. Crompton Greaves  
2. Kirloskar  |
| 27. | Air Compressor | 1. K.G. Khosla  
2. Ingersol  |
| 28. | Ceiling Fans | 1. Usha-ENERGIA/Apollo  
2. Khaitan  
3. Polar  
4. Havells  
5. Orient –Summer Cool  |
| 29. | Ceiling Light | 1. Havells  
2. Bajaj  
3. Jemco  |
| 30. | Lugs | 1. Dowells  |
| 31. | Epoxy based Cable Joints | 1. M. Seal  
2. Tropolin  |
| 32. | Bolts for Panel | 1. Cadmium Plated  |
| 33. | Clamps | 1. G.I.  |
| 34. | Transformer | 1. Kirloskar  
2. Crompton  
3. Bharat Bijlee  
4. VOLTAMP  
5. NGEF  
6. Voltas  
7. ABB  
8. ITL  
10. Siemens  |
| 35. | Vacuum Circuit Breaker | 1. Siemens  
2. G.E.C.  
3. BHEL  |
| 36. | Air Circuit Breaker | 1. Larsen & Toubro  
2. Siemens  
3. HPL  |
| 37. | Luminaries | 1. Philips  
2. Crompton Greaves  
3. Bajaj  |
<table>
<thead>
<tr>
<th>No.</th>
<th>Item</th>
<th>1.</th>
<th>2.</th>
<th>3.</th>
<th>4.</th>
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</thead>
<tbody>
<tr>
<td>38.</td>
<td>Capacitors</td>
<td>Khatau</td>
<td>Junkers</td>
<td>Universal</td>
<td>Voltas</td>
</tr>
<tr>
<td>39.</td>
<td>Wire (Standard only)</td>
<td>Skytone</td>
<td>National</td>
<td>Payal</td>
<td>KEI</td>
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<tr>
<td>40.</td>
<td>Exhaust Fan</td>
<td>Usha</td>
<td>Orient</td>
<td>Khaitan</td>
<td>Havells</td>
</tr>
<tr>
<td>41.</td>
<td>Metal Box</td>
<td></td>
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<tr>
<td></td>
<td></td>
<td>MS sheet 10 gauge, painted with black paint.</td>
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</tr>
<tr>
<td>42.</td>
<td>Switch Gear / Isolator</td>
<td>Standard</td>
<td>Havells</td>
<td>HPL</td>
<td>L &amp; T</td>
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<td></td>
<td></td>
<td></td>
<td>Siemens</td>
</tr>
<tr>
<td>43.</td>
<td>Bakelite sheet</td>
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<td></td>
<td></td>
<td>Hylam White</td>
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<tr>
<td>44.</td>
<td>Switch &amp; Sockets</td>
<td>Anchor</td>
<td>HPL</td>
<td>Universal</td>
<td>Veto</td>
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<td>Richa</td>
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<td>CPL</td>
</tr>
<tr>
<td>45.</td>
<td>Fluorescent &amp; Other Fittings</td>
<td>Philips</td>
<td>Bajaj</td>
<td>Crompton Greaves</td>
<td>HPL</td>
</tr>
<tr>
<td>46.</td>
<td>Conduit</td>
<td></td>
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<td></td>
<td></td>
<td>MS:- BEC, AKG, WAVIN, EMCO</td>
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<tr>
<td></td>
<td></td>
<td>PVC:- Plaza, Richa, Calico, Payal</td>
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<tr>
<td>47.</td>
<td>Cable</td>
<td>Payal</td>
<td>Incab</td>
<td>Crystal</td>
<td>Universal</td>
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<td>Finolex</td>
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<td></td>
<td>KEI</td>
</tr>
</tbody>
</table>
7. Polycab
8. RR KABEL

48. MCB Isolator & its DB
   1. MDS
   2. Havels
   3. Standard Koop
   4. Crompton Greaves
   5. HPL
   6. GECO

49. Fuse Carrier Bakelite / Rewirable
   1. Havells
   2. HPL
   4. Siemens

50. Other electrical fixtures
    Shall be of standard make and of BIS approved.

**Note:** The materials other than approved list shall bear IS mark and/or to be approved by the Engineer-in-charge before the use. Required tests are to be conducted by the contractor before use at works.

13.0 Electrical power supply feed point for connection to building shall be at a maximum distance of 30.00 (thirty) metres from the edge of the buildings.
14.0 **GENERAL NOTES ON ELECTRICAL WORKS**

(1) For switch boards – recessed 18 SWG sheet steel metal boxes of necessary size fitted with suitable size phenolic laminated sheet covers in front, including painting as required.

(2) Wiring shall be concealed with copper wire.

(3) Cable – PVC insulated with copper conductor for light points 1.50 sqmm ISI marked.

(4) Cable – PVC insulated with copper conductor for circuit wiring 2.50 sqmm ISI marked.

(5) Cable – PVC insulated with copper conductor for power points 4.00 sqmm ISI marked.

(6) All fittings & fixtures including switch / socket on existing board should be ISI marked of approved quality.

(7) All electrical fittings will be ISI marked and approved make.

(8) A sample of each kind shall be approved from engineer-in-charge and all the materials should be according to the approved sample.

(9) Two way switch shall be provided for staircase.

(10) Conduit for cable TV shall be provided.

(11) The location of light fitting shown in the drawing are indicative and actual position shall be approved by Engineer-in-Charge.

(12) Sub main wiring with cable PVC insulated sheathed copper conductor size 10 to 16 sqmm 32 mm dia PVC conduit.

(13) Electric power supply feed point for connection to the building will be at a maximum distance of 30 m from the edge of the building.

(14) Lighting conductor final, made of 25 mm dia, 300 mm long GI tube having single prong at top with 85 mm dia, 6 mm thick GI base plate including making holes etc. complete including GI tape 20 mm x 3 mm, testing joint made of 20 mm x 3 mm thick GI tape from earth electrode directly in ground all complete as per the instruction of Engineer-in-Charge.

(15) The location of main switch and distribution board shall be at ground floor below staircase.

(16) One no. earthing pit shall be provided for each block as per following details earthing with GI earth 600 mm x 600 mm x 6 mm thick including accessories and providing masonry enclosure with cover plate having locking arrangement and watering pipe etc. with charcoal or coke salt, b-class 50 mm dia GI pipe (normal) complete with GI fittings, including trenching, refilling etc. all complete as per the instruction of Engineer-in-Charge.
List of Drawings

NIT No.: NERO/CON/ASR/AGARTALA/320  
Date: 04.09.2018

Tender for Construction of 02 Nos. Single Officer’s Accn. (G+I), 01 No. Single JCO accommodation (G) and 02 Nos. SM Barrack (G+I) along with development works for AR Battalion at Agartala, Tripura.

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Note: The enclosed drawings are for tender purpose and for general guidance only. The works shall be executed as per the construction drawings to be issued during course of work and as per instructions of the Engineer-in-charge.

(Signature and seal of the Tenderer)