TENDER DOCUMENT

TENDER No: NERO/CON/457/271 dated: 02.11.2017

Tender for Construction of Single layer Smart Fence at G.I No.740 (BRO left out job) between BP No. 2263-10-S to BP No. 2364/3-S along Indo – Bangladesh Border in the state of Tripura.

VOLUME–II

NOTICE INVITING TENDER

ADDITIONAL CONDITIONS OF CONTRACT

TECHNICAL SPECIFICATIONS

DRAWINGS
NOTICE INVITING e-TENDER (NIT)

Tender for Construction of Single layer Smart Fence at G.I No.740 (BRO left out job) between BP No. 2263-10-S to BP No. 2364/3-S along Indo – Bangladesh Border in the state of Tripura.

Engineering Projects (India) Ltd. (EPI) , on behalf of Ministry of Home Affairs , invites percentage rate open e-Tenders through e-tendering in single stage two bid system (Technical bid & Price bid) from the eligible contractors/ firms who fulfill the eligibility criteria as per the brief particulars of scope of work for Construction of Single Line Fence at G.I No.740 between BP No. 2263-10-S to BP No. 2364/3-S along Indo – Bangladesh Border in the state of Tripura from for the following works

<table>
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<tr>
<th>Sl.No.</th>
<th>NAME OF WORK</th>
<th>ESTIMATED COST</th>
<th>EARNEST MONEY DEPOSIT (EMD)</th>
<th>TIME OF COMPLETION</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Construction of Single layer Smart Fence at G.I No.740 (BRO left out job) between BP No. 2263-10-S to BP No. 2364/3-S along Indo – Bangladesh Border in the state of Tripura</td>
<td>Rs 1,27,45,861.00 (Rupees One Crore Twenty seven lakhs forty five thousand eight hundred sixty one only)</td>
<td>Rs 1,27,500.00 (Rupees One lakh Twenty seven thousand five hundred Only)</td>
<td>06 Months</td>
</tr>
</tbody>
</table>

The brief scope of work in this tender shall include (but not limited to) civil works such Fence , Road work as Earth work in excavation & filling, retaining wall, RCC slab Culvert, Road, drainage, etc. all complete.

Time schedule of Tender activities:

(i) Starting Date & Time for Downloading of tender documents: from ....02.11. 2017 (05:00 PM)
(ii) Last Date & Time for Downloading of tender documents: up to ...... 15.11.2017 (12:00 PM)
(iii) Last Date & Time of online submission of Tenders: on or before 15.11.2017 upto 02:00 PM
(iv) Date & Time of online opening of tenders (Techno-Commercial Bid) 15.11.2017 at 03:00 PM
(v) Pre-bid meeting at 4th Floor, Hindustan Tower Block-A, Jawahar Nagar, N.H.37, Beltola, Guwahati-781022 Assam on 07.11.2017 at 4.30 PM.

The tenderers shall submit his query for the pre-bid meeting on or before 07.11.2017 by 12.00 hours to nerocontracts@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.

Three similar works each costing minimum **40%** of the estimated cost put to tender

OR

Two similar works each costing minimum **50%** of the estimated cost put to tender

OR

One similar work costing minimum **80%** of the estimated cost put to tender

i. The “similar works” means Construction of Fencing, Road, Retaining wall (RRM/RCC), Culvert etc. (See note below)

Note:

a) In the event, the bidder intends to qualify with single work, the work should be a combination of fencing, road, Retaining wall and culvert in International Border of North East Region.

b) If the bidder intends to qualify with two or three works, the combined credentials should contain the experience of the bidder in construction of fencing, road, Retaining wall and culvert in International Border of North East Region.

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 IT return of assessment year 2017-18,2016-17 and 2015-16. Turnover means income from construction works only.

c) Should submit **Sale Tax** return for last quarter of financial year (2016-17) or first quarter of Financial Year 2017-18

d) 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 profit-loss statement/ Certificate from Chartered Accountant duly self attested by the tenderer shall be submitted.

e) Should have a Solvency of 40% of the estimated cost issued by a Bank. The Solvency Certificate should have been issued not earlier than one year of last date of submission of the tender.

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

h) 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:

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 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

i) 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 before submitting their bid. Bidder has to enclose a certificate counter signed by EPI official or furnish undertaking for having visited the site.

j) 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.

k) 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.

iv. 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 and Private Party shall be accepted for assessing the eligibility of the tenderer. However, the certificates issued by Public Limited Company and Private Party must be supported by work order and TDS certificates. TDS certificates for full contract value as mentioned in the work order failing which the same shall not be considered.
l) 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.

m) 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.

n) 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 pre-qualification 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.epi.gov.in, 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, General Conditions of Contract (ITT&GCC) of EPI, Addendum to Instructions to Tenderers &Special instructions to Bidders for e-Tendering
Volume II:  
a) Notice inviting Tender  
b) Additional Conditions of Contract  
c) Technical Specification  
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 GM (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. 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 17:00 Hrs on 02.11.2017. However, interested bidders have to pay the registration/tender participating fees to TCIL in addition to the tender processing fees to EPI for participating in the tender and submitting the bid. The amount of tender processing fee payable to EPI is ` 10,000/-(Rupees Ten Thousand only) plus GST @ 18%, the GSTIN of EPI for Assam is 18AAAACE0061C1ZC as non-refundable document fees in the form of Demand Draft in favour of “Engineering Projects (India) Ltd.” payable at Guwahati..The ETS Bidding fee to be paid to TCIL is separate. 

6.0 E-Bids must be submitted/ uploaded along with scanned copies of relevant documents mentioned at Clause no.2 of Addendum to Instruction 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 only.

7.0 The bid must be accompanied by Earnest Money Deposit (EMD) of `Rs 1,27,500.00 (Rupees One lakh twenty seven thousand five hundred Only). This can be either 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.

8.0 Tender fee, EMD (In original), Power of Attorney, NSIC/MSME 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 separately sealed envelopes) to decrypt the bid must be submitted in physical form at the address given at Clause No. 14.0 below on or before Last date and time of online bid submission. 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.

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

10.0 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. In case any corrigendum or addendum has been published after submission/uploading of tender by any bidder and he has submitted the physical documents mentioned at sl.no. 8 before publication of the corrigendum or addendum he shall be deemed to have accepted the said corrigendum or addendum even if he has not revised his bid to upload such addendum/corrigendum.

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. 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 All correspondence with regard to the above shall be to the following address (By Post / In Person)
   General Manager (Contracts)
   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, Fax No.0361-2223617)

15.0 For Site related Queries / Site Visit:

   Shri Barun Poddar, Site-in-Charge
   EPIL, Tripura
   Mob: +91-9612108009

   For more information on EPI, visit our website at: http://www.epi.gov.in
   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
### BID CAPACITY

**Name of the Work:** Construction of Single layer Smart Fence at G.I No.740 between BP No. 2263-10-S to BP No. 2364/3-S along Indo – Bangladesh Border in the state of Tripura.

**NIT No:** NERO/CON/457/271

**ESTIMATED COST PUT TO TENDER:** Rs. 1,27,45,861.00

**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:

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

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
- **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**

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**SIGN & STAMP OF BIDDER**
ANNEXURE-A

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>Sr. 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 06 months (Rs)</th>
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Balance Commitments during 06 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. If there are any provisions in Additional Conditions of Contract which are at variance with the provision of General Conditions of Contract, then provision in this Additional Conditions of Contract shall take precedence over General Conditions of Contract.

2.0 Construction of Single Line Fence at G.I No.740 between BP No. 2263-10-S to BP No. 2364/3-S along Indo – Bangladesh Border in the state of Tripura is a Project of Ministry of Home Affairs, Govt. of India, and Engineering Projects (India) Limited. (A Govt. of India Enterprise) has been appointed as an “Executing Agency” for this project.

As per direction from Ministry of Home Affairs (MHA), the work will be executed by EPIL which was left out by Border Road Organization (BRO). Some materials /inventory is lying at site which will be handed over to the successful bidder from BRO and the cost shall be deducted from their RA bills / payables as per prevailing market rate during of those materials. The successful bidders have to accept those rate. Decision of EPI in this regard shall be final and binding on the contractor.

3.0 SITE VISIT AND COLLECTING OF LOCAL INFORMATION:

The following shall stand added to the clause no 2.0 of GCC:

3.1 Although as indicated by Border Security Force, the user of Fencing area/Nallah gaps, the land for this work is available. However, handing over of sites for all Fencing area/Nallah gaps may not be possible in one go due to deficiencies in total area of land required for construction. Therefore, the site may be handed over in parts progressively in phases to the contractor. The contractor shall take up the construction activities open such released fronts in parts/ phase without any reservation whatsoever. However, in case of any delay in handing over of the site to the contractor, Owner/ EPI shall only consider suitable extension of time for the execution of the work. It should be clearly understood that the Owner/ EPI shall not consider any other compensation whatsoever towards idleness of contractor’s labour, equipments etc.

3.2 The contractor shall make his own arrangement for approach to work site including borrow/ disposal area and for movement of men, carriage of materials, machineries, other equipment etc. required for carrying out the work under this contract. Nothing shall be paid extra on this account.

3.3 The approach roads/ path near to the work site may not to be available at all places. Machinery/Material may have to carry by manpower. The contractor shall plan his works by making approach road site at his own cost. All drainage of works area and all weather truckable/ haulage roads as required by the contractor shall be constructed and maintained during the construction period by the contractor at his own cost. Nothing extra will be paid on this account.

3.4 Payment for clearance of jungle/ bushes including uprooting of rank vegetation grass, brush wood, felling trees of beyond 30cm girth (measured at a height of 1m above ground level) including cutting of trunks branches removing the roots and stacking of serviceable material and disposal of unserviceable material with all lead and lift will be done one time as per given BOQ only. Nothing shall be paid extra on this account.
3.5 The work fronts of Fencing area/Nallah gaps may be released in progressive manner in phases. Nothing extra shall be payable to the contractor on account of carrying out the work in phases & sequences decided by Engineer-in-charge.

4.0 Scope of Work: The following shall stand added to the clause no 3 of GCC:

4.1 The brief scope of work to be Composite fencing with road, Box culvert etc. under the present tender shall generally comprise of (but not limited to) the following such as:-

- Civil Work mainly single line fencing with road as per drawings & layout
- Earth work & retaining wall, R.C.C slab culvert & drainage
- Road work
- Any other work not specified but required to be executed to complete the job.
- The actual quantity on execution may vary (+/-) 10% of the BOQ quantity.

4.2 The contractor shall also provide all assistance to EPI during handing over the site after their completion to the designated agency nominated by Ministry of Home Affairs. In case the quality at any point is found not as per specification or deficiencies are found, the contractor will get it rectified at its own cost.

5.0 MOBILIZATION ADVANCE:

No mobilisation advance shall be paid to the contractor and hence clause no 8 of GCC shall stand deleted.

6.0 MOBILISATION OF MEN, MATERIALS AND MACHINERY: The following shall stand added to the clause no 11 of GCC:

It shall be contractor’s responsibility to arrange, operate & maintain the total station instrument and its accessories at his own cost to carry out levels (including initial & final levels of earth work), dimensions and alignment of all parts of the works. Contractor shall provide Bench Marks and other reference points for the proper execution work and these shall be preserved till the end of work.

The contractor at his own has to deploy the following minimum Plant & Machinery at site immediately after award of work:-

<table>
<thead>
<tr>
<th>Sl.No.</th>
<th>Description</th>
<th>Minimum Equipment</th>
</tr>
</thead>
<tbody>
<tr>
<td>01.</td>
<td>Excavator</td>
<td>One</td>
</tr>
<tr>
<td>02.</td>
<td>Vibrators (Petrol/Electrical)</td>
<td>Two</td>
</tr>
<tr>
<td>03.</td>
<td>Concrete Mixer (10/7) with Hopper</td>
<td>One</td>
</tr>
<tr>
<td>04.</td>
<td>DG Set (63 KVA); DG welding set</td>
<td>Each</td>
</tr>
<tr>
<td>05.</td>
<td>Digital Theodolite &amp; Auto Level/ TOTAL STATION</td>
<td>One</td>
</tr>
<tr>
<td>06.</td>
<td>Compactor/roller</td>
<td>One</td>
</tr>
<tr>
<td>07.</td>
<td>Tipper</td>
<td>two</td>
</tr>
<tr>
<td>08.</td>
<td>Bar bending Machine</td>
<td>One</td>
</tr>
<tr>
<td>09.</td>
<td>Bar cutting machine</td>
<td>One</td>
</tr>
</tbody>
</table>

Note
ACC: NERO/CON/457/271
a) Any other equipment for site test as outlined in CPWD/BIS specification and as directed by the Engineer-in-charge.

b) The quantities of equipments 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.

c) The contractor will not be allowed to take out equipments from the site without the written permission of Engineer-in-charge.

7.0 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 (1 horizontal 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 metre.

(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 metres 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 metres or more in depth, shall at all times be supplied with at least one ladder for each 50 metres length or fraction thereof.

Ladder shall be extended from bottom of the trench to at least 1 metre above the surface of the ground. The sides of the trenches which are 1.5 metres 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 4 wheel vehicle such as Bolero or Scorpio 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 datas like almirahs or file cabinets etc.

8.0 TAXES & DUTIES:

The following shall also be read with clause no 13 of GCC:

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

b) The bidder/contractor must submit as 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.

The rates quoted by the contractor shall be deemed to be include all taxes and duties except 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 no 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.
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.

9.0 **TIME SCHEDULE AND PROGRESS**: The following shall stand added to the clause no 43 of GCC:

If during the course of execution of work, EPI/ MHA/ BSF fixes priority of execution of work/ fixes priority of execution of specific BOP, the contractor has to deploy resources and the work accordingly & nothing extra shall be payable to the contractor on this account.

The entire scope of work covered under this contract shall be completed within time as mentioned in memorandum of the NIT. The completion time includes monsoon/ rainy season coming during the currency of the contract. The work shall be performed in time and to achieve the targets, the contractor shall have to plan required mobilization of all resources. Within 10 (Ten) days of date of letter of Intent, the contractor shall submit a Time and Progress Chart (CPM/PERT/Quantified Bar Chart) along with a detailed plan and programme of all the input resources commiserating with the various activities to be executed and get it approved by the Engineer-in-charge. The chart shall be prepared in direct relation to the time stated in the contract documents for completion of times/ scope of the work. It shall clearly stipulate the forecast milestones of the dates of commencement and completion of various time, sections of the work and may be amended as necessary by agreement between the Engineer-in-charge and the contractor within the limitations of time imposed in the contract documents, to ensure good progress during the executing of the work. The physical report including photographs shall be submitted by the contractor on the prescribed format & at regular intervals (not later than a month) as decided by the Engineer-in-charge. The contractor shall also furnish along with Bar Chart, the methodology of construction, details of all equipment, manpower, machineries etc. required along with the date by which the equipment will be available at the site of work in working condition. All the activities shall be preformed and completed strictly in accordance with approved work schedule.

The Engineer-in-charge shall however, have the right to review the progress and modify the work schedule suiting the site conditions and the contractor shall be required to complete the work accordance thereof without any extra cost to the Owner/ EPI.

10.0 **MATERIALS AND SAMPLES**: The following shall stand added to the clause no 52 of GCC:

As part of the contract the contractor shall establish and maintain a site laboratory for the testing of construction material under the direction and general supervision of Engineer-in-charge. The laboratory room shall be constructed and installed with the required and appropriate facelift. Temperature and humidity controls shall be made available wherever necessary during the testing of samples.
All equipments as required shall be provided by the contractor so as to be compatible with the testing requirements specified. The contractor shall maintain the equipment in good working conditions for the duration of the contract.

The Contractor shall provide approved qualified personnel to run the laboratory for the duration of the contract. The number of staff and equipment available must at all times be sufficient to keep pace with the sampling and testing programme as required by Engineer-in-charge.

The contractor shall fully service the site laboratory and shall supply everything necessary for its functioning including all transport needed to move equipment and samples to and from sampling points on the site etc.

The contractor shall re-calibrate all measuring devices whenever so required by the Engineer-in-charge and shall submit the results of such measurements without delay.

11.0 TEMPERARY WORKS
Further to Clause no. 82.00 for “Approval of temporary/ Enabling works” of General Condition of Contract, as far as possible the labour hutments, bulk storage facility and vehicle parking shall preferably be located near the existing Border Out Post of Border Security Force. The area near BOP’s location shall be leveled and developed; supply of water and electricity, construction of approach road to these camps shall be arranged by the contractor at his own cost. In case the land in the vicinity of BOP is not of Govt., the contractor may have to hire the land from the owner of the land. The rent/ lease amount shall be borne by contractor.

12.0 FACILITIES
The sub-clause 28.3 of the clause no. 28 of General Conditions of Contract (GCC) stands deleted.

13.0 PAYMENT ON ACCOUNT
Further to Clause No. 37.00 General Conditions of Contract, the payments shall be released, out of the funds received from Govt. of India on deposit works basis for the project. Measurements of work carried out by contractors shall be recorded in the measurements books by Site Engineer. The measurements books shall be basis of all accounts of quantities of work done.

14.0 ANTI MALARIA MEASURES
The contractor shall at his own expenses make necessary arrangement for undertaking anti-malaria measures as prescribed by Local Health Authorities or as directed by Engineer-in-charge.

15.0 SECURITY & SAFETY
The site is located near Indo-Bangladesh Border (IBB) wherein the movement of personnel is limited and regulated by Security agencies. The contractor has to work as per the permission given by these Security agencies from time to time and contractor must check before quoting for this job, the working hours, restriction in working and safety of their manpower, plant & equipment. The contractor shall mobilize and organize his resources accordingly to complete the work within stipulated time. The contractor shall have no claim on MHA/ EPI or any other agency/ department for any loss of man hours/ machinery due to these restrictions/ regulations.

A general Security cover shall be provided by BSF/ State Police and payment of Security charges, if any demanded by BSF/ State Police authorities shall be borne by MHA/ EPI. However, the contractor shall make his own arrangements for Security and safety of his manpower, plant & equipment, materials etc. nothing extra shall be admissible on account of this and no compensation shall be paid by MHA/ EPI in case the contractor's personnel suffer body injury, loss of life or any damages caused to the plant and machinery of the contractor.

16.0 LAND ACQUISITION

The contractor should note that the Fencing area/Nallah gaps falls in agriculture land area/ forest area. The contractor shall be responsible for obtaining necessary approvals for acquisition of land if required and clearance from Department of Forest/ State Government/ Local Authority for carrying out construction of fencing and road and associated with related work.

17.0 DEFECTS LIABILITY PERIOD

Further to Clause No. 74.0 of General Conditions of Contract, in case Ministry of Home Affairs appoints an independent and impartial Agency to be called as Third Party Inspection Agency, the contractor shall provide all assistance to the Third Party Inspection Agency to carry out the functions assigned to them & quality at any point is not found as per specification, the contractor will get it rectified at its own cost.

18.0 COMPENSATION FOR DELAY

The contractor shall ensure adequate progress during the execution of work according to the Bar- Chart/ Work Schedule. The contractor shall also maintain monthly progress strictly in accordance with Bar- Chart/ detailed work schedule that will be worked out and mutually agreed upon. If the contractor fails to maintain the above progress or fails to complete the work and clear the site on or before the contract or extended date of completion, he shall without prejudice to any other right or remedy of EPI on account of such breach, pay compensation at the rate of 2.0% (Two Percent) of the Total value of work for each month of delay subject to a maximum of 10.0% (Ten Percent) of the total order value.
In addition to above, the Contractor shall also compensate EPI to the tune of Rs. 30,000/- (Rupees thirty Thousand only) per month towards extra expenditure on establishment of EPI for extended period of the job, if the delay is due to reasons solely attributable to the Contractor.

After evaluation of the rates/ price analysis, EPI may require that amount of performance guarantee be increased at the expense of the contractor to a level sufficient to project Owner/ EPI against financial loss in the event of default by the contractor.

19.0 **FINAL BILL**

The final bill will be submitted by the contractor within 90 days from the date of acceptance of completion of work accompanied by the following documents:-

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

b) Computerized stage wise payment schedule.

c) No claim certificate by the contractor.

d) No claim certificate from the sub-agencies/ vendors, if any engaged by the contractor.

e) ‘As built’ drawing.

f) Measurements Books.

g) Drawings for layout of underground cables and details showing location of sluice valves, electric cable joints etc.

h) All operation and maintenance manuals.

i) All statutory approvals from various State/ Central Govt. / Local Bodies/ BSF, if required for completion & handing over of the work included in scope of contractor.

j) Manufacture’s guarantee of various machines/ equipments installed as part of work.

20.0 **MODIFICATIONS OF CLAUSE NO. 76.0 OF GENERAL CONDITIONS OF CONTRACT (GCC)**

**CLAUSE NO. 76.1 OF GCC: DELETED**

**CLAUSE NO. 76.2: ARBITRATION BETWEEN CENTRAL PUBLIC SECTOR ENTERPRISES INTER SE/ GOVERNMENT OF INDIA DEPARTMENTS/ MINISTRIES.**

i) In the event of any dispute or difference relating to the interpretation and application of the provisions of the contract, such despite or difference shall be referred by either party to the arbitration as per the instructions (Office Memorandum/ Circulars) issued by Govt. of India from time to time with regard to arbitration between one Government Department and another, one Government Department and a Public Sector Enterprise and Public Sectors Enterprise inter se.

ii) Subject to any amendment that may be carried out by the Government of India from time to time, the procedure to be followed in the arbitration shall be as is contained in D.O. No. F.No.4(1)/2013-DPE (PMA)/FTS-1835 dated
21.0 **CLAUSE NO. 76.3 JURISDICTION**

The Courts of Guwahati alone will have jurisdiction to deal with matters arising from the Contract, to the exclusion of all other courts.

No extra or additional amount over and above the total quoted price will be admissible on any account whatsoever in any respect or aspect or else otherwise. Total price quoted will remain firm and fixed and free from any kind of escalation and without any kind of extra or additional amount on any account whatsoever in any respect or aspect or else otherwise during the entire tenure of the contractor and till completion and discharge of all the obligations as per the ambit of the contract in all respect and means.

EPI has awarded this contract on behalf of MHA, 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 MHA or his nominated agency(ies).
TECHNICAL SPECIFICATIONS

SECTION - 1

1.0. GENERAL:

1.1: The works shall be carried out in conjunction with specifications, schedule of items and the construction drawings issued from time to time. The latest edition of the specifications given in Govt. of India, Central Public Works Department (CPWD) specifications Vol. I to VI with up-to-date corrections; relevant to this work, with a cross reference to relevant codes of practice published by the Bureau of Indian Standards or published by the Indian Roads Congress in respect of matters not covered by the CPWD specifications shall be followed.

1.2: In interpreting the specifications the following sequence shall be followed unless Otherwise given in writing by the Engineer-in-charge:

(a) Nomenclature of items of the schedule of items.  
(b) Drawings and working details.  
(c) Technical Specifications given in the tender.  
(d) C.P.W.D specifications Vol I to Vol VI with up to date correction slips.  
(e) Relevant Indian Standard Codes with latest revisions.  
In absence of the specifications in any of the above, the specifications furnished by the Engineer-in-charge based on sound engineering practices shall be final and binding.

1.3: The schedule of quantities, the structural and Architectural drawings shall be properly co-related and all these documents should be read and operated in harmonious conjunction. In case of any discrepancy in items given in the Schedule of Quantities appended with the tender and architectural drawings relating to the relevant item the former shall prevail unless otherwise given in writing by the Engineer-in-charge.

1.4: All the works shall be carried out in sound workmanship and true to line, level, and plumb as per the best practice of the trade.

1.5: All mandatory tests specified in C.P.W.D specifications shall be got done from the approved laboratories as desired by the Engineer-in-charge and all expenses viz. cost of samples, testing charges, including cartage, conveyance etc. whatsoever shall be borne by the contractor. If after any such test and in the opinion of the Engineer-in-Charge any work or portion of work is found to be defective and unsound the contractor shall pull down and re-execute the same at his own cost. Defective material/materials failing in mandatory test shall be removed from the site.

1.6: All materials to be supplied by the contractor shall be new. All packed items shall arrive at site in original packing only. Any items found defective or damaged shall be replaced by the contractor at his own expenses. The sources of materials stated in the specifications are those from which materials are generally available. However, materials not conforming to specifications shall be rejected even if they come from the stated source. The contractor should satisfy himself that sufficient quantity of material of acceptable specification is available from the stated or other sources. strong scaffolding so as to withstand all loads likely to come upon it. Due care shall be taken by the contractor to ensure the execution of brick masonry walls in plumbs from outside. The contractor shall arrange sufficient quantity of scaffolding for this purpose so as to complete the project within stipulated time.

1.7: All the materials brought at site shall be stored and stacked in a proper manner. The materials requiring protection from the sun and rain shall be kept inside the temporary
structures to be erected at site by the contractor. The contractor shall also follow the manufacturer’s instructions for storing and stacking the materials. The storage facilities are to be created by the contractor at his own expense. The contractor shall consult the Engineer-in-Charge regarding collection and stacking of basic materials required for the work. They should not stack any materials in any place other than those approved by the Engineer-in-Charge within the plot area. On completion of the work the area used will be restored, properly dressed to satisfaction of the Engineer-in-Charge at no extra cost.

1.8: The contractor shall be responsible for co-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.

1.9: A site order book will be kept at the site of the work in which instructions shall be recorded by Site Engineer / Architect or their representatives. The contractor or his authorized agent shall sign the site order book to acknowledge the instructions in all events and follow the same.

1.10: The plumbing drawings issued from time to time to the contractor are diagrammatic but shall be followed as closely as actual construction work will permit. Any deviation from the drawings required as per building construction shall be made by the contractor at site with the permission of the Engineer- in-Charge. The architectural drawings shall take precedence over the services drawings as far as the civil and other trades’ works are concerned.

1.11: All works shall be adequately protected, to the satisfaction of the Engineer-in-charge, so that same is free from damage throughout the period of construction upto the time of handing over. Special care must be taken to prevent damage and scratching of all fittings and fixtures, Tool marks on exposed fixtures shall not be accepted. Protective paper on fixtures shall be removed with hot water only at the final completion of the work. Before handing over the possession of work, the contractor shall clean all elements of the complete installation, remove plasters, splashier, stickers, rust stains and other foreign matter and leave every part in acceptable condition and ready for use to the satisfaction of the Engineer-in-Charge/ Architect.

1.12: Rates for all items in which use of cement is involved, is inclusive of charges for curing.
SECTION – 2

The intent of this section of the specification is to define the general technical requirements of the major items of Building and site development works.

2.1 SITE CLEARANCE:

Before the work is started, the area coming under the building and upto an extent of 6m as required beyond the periphery of the building shall be cleared of shrubs, rank vegetation, grass, brushwood, trees and saplings of girth upto 30 cm measured at height of 1 M above the existing ground level including removal of roots of trees and saplings to a depth of 60cm below the ground level and all rubbish removed to a dumping ground within the project site as directed by the Engineer In-charge. Nothing extra shall be paid for the site clearance.

2.2 SETTING OUT OF REFERENCE MARKS:

A masonry pillar to serve as a bench mark shall be erected at a suitable point in the area, which shall be visible from the large area. These bench mark pillar shall be constructed as per the drawing to be issued by the Engineer In-charge and connected with the standard bench mark. Number of reference pillars shall be made with reference to the bench mark and levels recorded with the levels marked on them to indicate the correct formation level before the work is started. The contractor shall supply the labour and materials for constructing bench mark, setting out and making profiles and connecting bench mark with the standard bench mark at his own cost. The reference pillars, pegs, bamboos and the bench mark shall be maintained by the contractor at his own cost for checking profiles during execution.

2.3. EARTH WORK

2.3.1. Site levels: After site clearance and before commencement of excavation or filling the contractor shall take levels at 3 metre intervals in either direction or at lesser intervals as considered necessary at site for the entire plot. A record of these levels shall be signed jointly by the Contractor and the Engineer-in-charge. The records shall be kept by the Engineer-in-charge. The required labour and equipments for taking levels shall be supplied by the contractor at his own cost.

2.3.2. Earth work in Excavation:

a) Classification of soils: The earth work shall be classified under the following categories.

i) All kinds of soils: Generally any strata such as sand, gravel, loam, clay, mud, black cotton, moorum, shingle, river or nallah bed boulders, soling of roads, paths etc. and hard core, macadam surface of any description (water bound, grouted, tarmac etc.), lime concrete, mud concrete and theirs mixtures which for excavation yields to the application of picks, shovels, jumper, sanctifiers, ripper and other manual digging implements.

ii) Ordinary rock : Generally any rock, which can be excavated by splitting with crow bars or picks and does not require blasting, wedging or similar means for excavation such as lime stone, sand stone, hard laterite, hard conglomerate and un-reinforced cement concrete below ground level. If required light blasting may be resorted to, for loosening the materials but this will not in any way entitle the material to be classified as hard rock.
iii) **Hard rock**: Generally any rock or boulder for the excavation of which blasting is required such as quartzite, granite, basalt, reinforced cement concrete (reinforcement to the cut through but not separated from concrete) below ground level and the like.

iv) **Hard rock (blasting prohibited)**: Hard rock required blasting as described under para (iii) above but where the blasting is prohibited for any reason and excavation has to be carried out by chiseling, wedging or any other agreed method.

b) **Protections**:

i) Excavation where directed by the Engineer-in-Charge shall be securely fenced and provided with proper caution signs, conspicuously displayed during the day and properly illuminated with red light during the night to avoid accident.

ii) The contractor shall take adequate protective measures to see that the excavation operations do not damage the adjoining structures or dislocate the services. Water supply pipes, sluice valve chambers, sewerage pipes, manholes, drainage pipes and chamber, communication cables, power supply cables etc. made within the course of excavation shall be properly supported and adequately protected so that these services remain functional.

iii. Adequate shoring and strutting shall be provided to prevent slip during foundation excavation and till completion of foundation work or underground structures.

iv) Dewatering during excavation, foundation work and backfilling to keep the foundation pit free from water shall be provided. No extra payment on account of the above protection works shall be paid.

c) **Blasting**:
Where hard rock is encountered and blasting operations are considered necessary, the contractor shall obtain approval of the Engineer-In-Charge in writing for resorting to blasting operations. It will be the responsibility of the contractor to carry on the blasting operation with proper licenses from the competent authority and following all statutory rules. The contractor shall be responsible for any damages arising out of accident to workman, public or property due to storage, transportation and use of explosive during blasting operations. The contractor shall be responsible for safe and proper custody and accounting the explosive materials. For details the Explosive Act and Rules as amended up to date shall be referred.

d) **Backfilling in foundation trenches**:
Only selected earth from excavation shall be allowed for backfilling. The backfilling shall be done after dewatering the pit and laying the selected earth in layers of 20 cm and compacting to 90% proctor density. Backfilling when not allowed by the excavated soil partly or fully shall be done with approved quality Brahmaputra sand or hill sand and laid in layers of 20 cm and compacted up to 90% proctor density. Backfilling in foundation trenches either with selected excavated soil or imported soil shall not be paid.

e) **Disposal of excavated earth**:
All surplus earth available from excavation during execution and not utilized in backfilling shall be disposed off within the IIT Campus at a suitable location to be shown by the Engineer-in-Charge. This surplus earth may be allowed to be utilized for site development.
work outside the peripheral foundation line of the building and laid in 20cm thick layers and compacted to the required density. In such case the area to be filled up shall be prefixed by the Engineer-in-Charge and the levels of such work done shall be measured before filling is done over such layers by imported soil. Only selected approved soil from excavation shall be allowed inside the building area for filling. Such site development work done by surplus excavated earth shall not be paid.

f) Measurements:
Measurements of excavation for foundation work including backfilling in foundation trenches:
Measurements shall be taken on the vertical lines with 300mm tolerance all around the finished concrete/brickwork/masonry work for foundation and that for plinth beams/walls150mm around the finished surfaces. No extra payment shall be made on account of removal of slipped earth and backfilling thereof, dewatering, shoring and strutting etc.

2.3.3 Earth work in filling:
a) Removal of top vegetation: The top vegetation including grass with roots, trees and saplings of girth up to 30 cm measured at height of 1 M above the existing ground level including removal of roots of trees and saplings to a depth of 60 cm below the ground level and all rubbish shall be removed to a dumping ground within the project site as directed by the Engineer In-charge. Decomposed organic soil shall be removed to the extent, which may not cause perceptible settlement to the filled formation. Nothing extra shall be paid for the site clearance.

b) Types of soil for filling: All filling work for site development & in plinth shall be done by the approved quality Brahmaputra sand or hill sand. For site filling with excavated earth, the clause no.2.3.2 (e) shall be followed.

c) Mode of filling and compaction control:
i) Where cutting and filling are involved in hill slope the cutting for site preparation will be done up to the proposed formation level or to such levels as required as per drawing and all excavated soils shall be removed as given under clause .2.3.2(e) above. Filling works shall be done in layers not more than 20cm thick along with the progress of the sub-structure work and compacted by mechanical compactor to achieve minimum 90% proctor density. Measurements for earth work in excavation for site preparation: The original site levels shall be recorded as given under para 2.3.1 above. The final levels after excavations is complete to the proposed formation level, shall be taken jointly again by the contractor and the Engineer-in-charge in the same sections where original levels were taken and the final profile drawn and volume computed.

ii) Where only filling is involved the filling work within the building area shall be taken up after completion of the sub-structure of the building up to existing ground level. The disposal of the excavated earth shall be done as per clause no. .2.3.2(e) The filling work shall follow the sub-structure work up to the formation level. The filling works shall be done in layers not more than 20cm thick along with the progress of the sub-structure work and compacted by mechanical compactor .The filling work within the building area shall mean the area covered within the outer foundation lines of building peripheral columns. The filling work for site development beyond the peripheral foundation line shall be taken up in such a manner that it would not create any hindrance in the progress of sub-structure work and the filling work inside the building and in layers not more than 20cm thick and compacted by mechanical compactor to achieve minimum 90% proctor density. Filling works for site development may be allowed to be done with the selected earth available from foundation excavation. In such case, the area to be filled up will be prefixed by the Engineer-in-charge and the level of the filling work done shall be determined before filling with imported e soil is done over that
layer. Contractor shall not be entitled for payment of such filling work done with excavated soil from foundation trenches. All filling works shall be done in layers not more than 20cm and compacted by mechanical compactor.

d) Mode of measurement:
The measurement shall be given after quantity is worked out in profile with respect to spot levels at a grid of 3m taken before and after the filling work. No allowance for settlement of ground below fill will be considered.

2.4 SPECIFICATION SINGLE ROW SMART FENCE

A. For Weld Mesh Panels :

The weld mesh panel should be made of Mild Steel (MS) wires which are pre-galvanized and subsequently powder coated. The dia of the weld mesh should be 4mm (may have variation of +/- 0.05 mm) (as per IS 280-2006) each mesh panel should have wire mesh of size 12.7x76.2mm, Zinc coating on the wires 40 GSM and 60 to 80 microns of powder coating. Wire tensile strength should be minimum 550 N/mm². the panel should bear the following tests:

(a) Salt spray Test as per ISO 92227:
(b) It should be tested for 1000 Hours.
(c) UV-QUVA Test for 1000 Hours
(d) It should be tested for 1000 Hours.
(e) Adhesion Test
(f) Impact Test
(g) Gloss & Color Test

All the tests are to be certified as per the standard fixed by CECRI (Central Electro Chemical Research Institute) for enabling C3 level of protection.

B. For Razor Coil and Razor Tape :

The Galvanized Core Wire should be of diameter not less than 3.5 mm and the concertina coil of dia 850 mm (+/-50mm) when not stretched should have 56 loops of coil. The concertina coil should have 275 GSM Galvanization. Both Galvanized sheet and Galvanized wire should pass IS 6745 when tested for Zinc coating. The weight of the Razor Coil should not be less than 20.5 Kg (+/- 5%) per coil. The weight of the Razor tape should not be less than 9.8 Kg (+/- 5%) per 100 meter.

C. Fence Post :

The fence post should be of diameter 70 mm with thickness 3 mm (+/- 10%) of 3.4 meter height. The coating on the post should be hot dip galvanized to minimum 350 GSM as per IS 2629/ IS 4759/ ASTM A123 and thermoplastic coating of 200 microns - 250 microns. The weight of fence post should not be less than 5.4 Kg (+/- 5%) per meter.

The tolerance should be as per IS 1161. The fence post should withstand 480 hours of salt spray test which are to be certified as per the standard fixed by CECRI (Central Electro Chemical Research Institute) for enabling C3 level of protection.
D. Fitting Accessories::--

All the fastener should be of stainless steel of minimum grade SS 304 material with breaking security nuts. All the M.S. Clamps should be hot dip galvanized minimum to 350 GSM as per IS 2629/ IS 4759/ASTM A123.

E. Straining Y-arm::--

Straining Y-arm for supporting top concertina coil should be made of Mild steel (MS) Angle of size 50X50X5 mm. Length : 510 mm of one arm and pre-welded with sleep cap of outer diameter 63 mm; Mild steel material to be subsequently Hot dip galvanized to 350 GSM. Hot Dip Galvanizing as per IS 2629/IS 4759/ASTM A 123. Accessories for fitting Y-arm should be of stainless steel material.

F. Intermediated Y-arm::--

Intermediated Y-arm for supporting top concertina coil should be made of Mild steel (MS) Angle of size 40X25X3 mm. Length : 510 mm of one arm and pre-welded with sleep cap of outer diameter 63 mm; Mild steel material to be subsequently Hot dip galvanized to 350 GSM. Hot Dip Galvanizing as per IS 2629/IS 4759/ASTM A 123. Accessories for fitting Y-arm should be of stainless steel material.

G. Concrete Base : 1m concrete base is to be constructed on both side of the fence, so that wild growth of plants/creeper could be kept away from fence (Refer BSF U.O No. 26/44/Approved/Fence/BSF/Ops/BSF/2016 dated 17.07.2017)

2.5. CONCRETE (PLAIN AND Reinforced)

2.5.1 Scope: This specification establishes the materials, mixing, placing, curing, etc. of all types of cast-in-situ and pre-cast concrete used in foundation under-ground and over-ground structures, floors, etc., Any special requirement as shown or noted in the drawings shall supersede over the provisions of this specification

2.5.2 Materials:

a) Cement: Cement shall be Portland Pozzolana cement from reputed manufacturers of cement, having an annual production of at least one million tons or more conforming to IS: 1489 (Part-I & II). The cement shall be stored in a dry waterproof godown. As and when desired by the Engineer-in-charge the contractor shall be required to produce the test certificate from the approved test house at his own cost. The mandatory tests of cement shall be carried out by the contractor at his own cost in IITG Laboratory.

b) Fine Aggregate: For all concrete work, it shall be Medium coarse sand conforming to IS standard with locally available sand in order to produce durable concrete with desire compressive strength. Quality of sand shall be got approved by the Engineer-in-charge before bulk purchase. Silt content shall not exceed 4% by weight. The grading of fine aggregate shall be as follows:

<table>
<thead>
<tr>
<th>IS Sieve Designation</th>
<th>Percentage Passing by weight</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Grading Zone I</td>
</tr>
</tbody>
</table>

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c) **Coarse aggregate**: For concrete it shall be broken/crushed stone graded coarse aggregate. Coarse aggregate up to 20 mm size. Grading shall be within the limit as given below:

<table>
<thead>
<tr>
<th>ISSieve Designation</th>
<th>Percentage passing for graded aggregate of nominal size</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>40 mm</td>
</tr>
<tr>
<td>80mm</td>
<td>100</td>
</tr>
<tr>
<td>63mm</td>
<td></td>
</tr>
<tr>
<td>40mm</td>
<td>95-100</td>
</tr>
<tr>
<td>20mm</td>
<td>30-70</td>
</tr>
<tr>
<td>10mm</td>
<td>10-35</td>
</tr>
<tr>
<td>4.75 mm</td>
<td>0-5</td>
</tr>
<tr>
<td>2.36 mm</td>
<td></td>
</tr>
</tbody>
</table>

Note: If directed by Engineer-in-charge, the aggregate (fine as well as coarse) shall be washed to remove all dust, dirt, clay particles etc., at contractor’s expenses.

d) **Water**: Water to be used in concrete, brick work, plasters shall be clean, fresh and non-saline. Sample of water shall be got tested before use according to relevant IS code if required by Engineer-in-charge.

2.5.3 Grade of Concrete:
Whenever grade of concrete is mentioned as M20, M25, M30 etc., as per items only design mix concrete shall be used. The mix shall be designed to produce the required grade of concrete having required workability and characteristic strength as per IS: 456. As long as a quality of materials do not change a mix design done earlier shall be considered adequate for later work. However, in case the quality of materials changes, the Engineer-in-charge may ask for a new design mix. The concrete mix design will be carried out by the contractor at his own cost in Approved Laboratory. While designing the mix durability requirements as
given in IS:456 shall be taken into account. Proportioning of the mix shall mean the process of determining the proportions of various ingredients to be used to produce concrete of required strength, workability, durability and other properties. The Engineer-in-charge shall verify the strength of the concrete mix, before giving his sanction of its use. However, this does not absolve the contractor of his responsibility as regards achieving the prescribed strength of the mix. If during the execution of the work, cube tests show lower strength than required, the Engineer-in-charge shall order fresh trial mixes to be made by the contractor. No claim to alter the rates of concrete work shall be entertained due to such changes in mix variations. Any variation in cement consumption shall be taken into consideration for material reconciliation only. Preliminary mix designs shall be established well ahead of start of work. The design mix shall conform to the guidelines of IS: 10262.

a) Mixing: All cement concrete (plain or reinforced) shall be mixed in mechanical mixers. Wherever designation of concrete is given as M-20 or M-30, only design mix shall be followed.

b) Consolidation: Concrete for all reinforced concrete works in footings, columns, beams, slabs and the like shall be deposited and well consolidated by vibrating, using portable mechanical vibrators. Concrete in other items such as in chajjas, lintels, shelves etc., shall be laid and well consolidated by beating and tamping. Care shall be taken to ensure that concrete is not over vibrated so as to cause segregation and bleeding.

c) Finish to concrete work:
(i) All concrete while being poured against form work shall be worked with vibrators, rods, trowels as required so that good quality concrete is obtained.

(ii) All exposed surface of RCC lintels, beams, columns etc. shall be plastered to match with adjoining plastered face of walls after suitably hacking the concrete surface.

(iii) All soffits of RCC slabs, loft slab, cupboard slab, shelves and working platform in kitchen etc. and other exposed surfaces of RCC work not continuous to brick work shall be plastered with cement to give an even and smooth surface.

2.5.4 Curing: Concrete shall be cured by keeping it continuously moist for the specified period of time to ensure complete hydration of cement and its hardening. Curing shall be started after 8 hours of placement of concrete and in hot weather after 4 hours. The water used for curing shall be of the same quality as that used for making of concrete. Curing shall be assured by use of ample water supply under pressure in pipes, with all necessary appliances such as hose, sprinklers etc. A layer of sacking, canvas, hessian, or other approved material, which will hold moisture for long period and prevent loss of moisture from the concrete, shall be used as covering. Type of covering which would stain, disfigure, or damage the concrete, during and after the curing period shall not be used. Only approved covering shall be used for curing. Exposed surfaces of concrete shall be maintained continuously in damp or wet condition for at least the first 14 days after placing of concrete. The contractor shall have all equipment and materials required for curing on hand and ready to use before concrete is placed. For curing the concrete in pavements, floor, flat roofs or other level surfaces, ponding method of curing is preferred after the expiry of first 24 hours during which (i.e. first 24 hours) the concrete shall be cured by use of wet sacking, canvas hessian, etc. The minimum water depth of 25mm for ponding shall be maintained. The method of containing the ponded water shall be approved by the Engineer-in-charge. The ponded areas shall be kept continuously filled with water, and leaks, if any, shall be promptly repaired. Alternatively, membrane curing may be used in lieu of moist curing with the permission of the Engineer-in-charge. Such compounds shall be applied to
all exposed surfaces of the concrete by spraying or brushing as soon as possible after the concrete has set. Minimum film thickness of such curing compounds shall be as per the recommendation of the manufacturer so as to obtain as efficiency of 90% as specified by BS: 8110. This film of curing compound shall be fully removed from the concrete surface after the curing period specified earlier. The Engineer-in-charge may not allow curing by curing compounds for those surfaces where use of curing compound may be detrimental to future finishes according to him.

2.5.5. Sampling and testing of concrete:
a) Samples from fresh concrete shall be taken as per IS- 1199-1959 (method of sampling of concrete) and cubes shall be made, cured and tested in accordance with IS: 516-1959 (method of test for strength of concrete). For testing cement concrete the contractor shall arrange for all the tools / moulds for making necessary cubes and shall bear all the charges for making the cubes, curing and testing through an approved laboratory. Further, the contractor shall make available laboratory equipment as listed below. A temporary room of adequate size not less than 10 sqm to have these facilities shall also be constructed by the contractor at his expense. After completion of work the contractor shall remove the equipment, dismantle the room and clear the site:-

<table>
<thead>
<tr>
<th>Aggregate Size</th>
<th>Size of Sieves</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td></td>
</tr>
<tr>
<td>Sieve set (for aggregate 40 mm down)</td>
<td></td>
</tr>
<tr>
<td>80mm</td>
<td>60cms dia</td>
</tr>
<tr>
<td>63mm</td>
<td>60cms dia</td>
</tr>
<tr>
<td>40mm</td>
<td>45cms dia</td>
</tr>
<tr>
<td>20mm</td>
<td>45cms dia</td>
</tr>
<tr>
<td>12.5mm</td>
<td>45cms dia</td>
</tr>
<tr>
<td>10mm</td>
<td>45cms dia</td>
</tr>
<tr>
<td>4.75mm</td>
<td>45cms dia</td>
</tr>
<tr>
<td>2.36mm</td>
<td>45cms dia</td>
</tr>
<tr>
<td>2</td>
<td></td>
</tr>
<tr>
<td>Sieve set (for aggregate 20 mm down)</td>
<td></td>
</tr>
<tr>
<td>40mm</td>
<td>45cms dia</td>
</tr>
<tr>
<td>20mm</td>
<td>45cms dia</td>
</tr>
<tr>
<td>16mm</td>
<td>45cms dia</td>
</tr>
<tr>
<td>12.5mm</td>
<td>45cms dia</td>
</tr>
<tr>
<td>10mm</td>
<td>45cms dia</td>
</tr>
<tr>
<td>4.75mm</td>
<td>45cms dia</td>
</tr>
<tr>
<td>600 micron</td>
<td>20 cms dia</td>
</tr>
<tr>
<td>300 micron</td>
<td>20 cms dia</td>
</tr>
<tr>
<td>150 micron</td>
<td>20 cms dia</td>
</tr>
<tr>
<td>75 micron</td>
<td>20 cms dia</td>
</tr>
</tbody>
</table>

(iii) Electronic Weighting machines
(iv) Physical balance of capacity 200 gms with weight box (accuracy 0.5 gm.)
(v) Counter scale of 20 kg. Capacity.
(vi) Weights

<table>
<thead>
<tr>
<th>Sl no</th>
<th>Weight</th>
<th>Numbers</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>5kg</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>---</td>
<td>---</td>
<td>---</td>
</tr>
<tr>
<td>2</td>
<td>2kg</td>
<td>2</td>
</tr>
<tr>
<td>3</td>
<td>500gm</td>
<td>2</td>
</tr>
<tr>
<td>4</td>
<td>200gm</td>
<td>2</td>
</tr>
<tr>
<td>5</td>
<td>100gm</td>
<td>2</td>
</tr>
</tbody>
</table>

(vii) Slump cones 2 Nos.
(viii) 15 cm moulds 18 Nos.
(ix) Electric/ Kerosene heater 1 No.
(x) Pans etc. As directed by the Engineer-in-charge.
(xi) Vicat apparatus with needles, test tubes, breakers, thick glass plates etc.
(xii) Measuring cylinders 1000 ml, 500 ml.
(xiii) Wash bottles Capacity 500 ml- 2Nos.
(xiv) Sink 1 No.
(xv) Litre : Measures
(xvi) 2Lit 2 Nos.
(xvii) 4Lit 1 No.
(xviii) 0.5 Lit 1 No.
(xix) Compressive test machine of suitable capacity 1 No.

**b) Compressive strength:** 7 days compressive strength test may be carried out in addition to 28 days compressive strength test for a quicker idea of the quality of concrete. In all cases the 28 days, compressive strength alone shall be the criteria for acceptance or rejection of the concrete.

c) **Test Specimen** : Three test specimens shall be made from each sample for testing at 28 days. Additional cubes may be required for such purposes as to determine the strength of concrete at 7 days or to check the testing error.

d) **Test strength of samples:** The test strength of the sample shall be the average of the strength of three specimens. The individual variation shall not be more than +/- 15 percent of the average.

e) Cement boiling test: Accelerated compressive test as per IS-9013/78 shall be carried out to determine the quality of cement received at site in each consignment. This shall be done as per details below. The test result shall be recorded, signed and kept in a register with the Engineer-in-charge.

f) Prepare 9 cubes with cement concrete mix proposed to be used for the job. Keep the same water cement ratio that will actually be used. Slump could be a good indication.

g) After the cubes are cast, 3 moulds containing the cubes to be tested by accelerated curing method must be covered on the top with a machined plate. The plate should be of the same size as cube mould plates.

h) After 24 hours of casting, the three cubes shall be boiled with the top plates on. In the field, these could be boiled in a drum with at least 75mm water standing over the cube moulds. The boiling must be uniform and constant for exactly 3 and 1/2 hours. Thereafter, the cubes must be taken out of the boiling water, de-mould and cooled for 1 hour and tested. Exact timings are extremely important and must be followed. The anticipated 28 days compressive strength can be calculated from the regression equation given below :-

\[ Y = 8.2 + 1.609 A \]

where \( Y \) = the predicted 28 days cube result in N/mm²
A = accelerated cube result in N/mm²

2.5.6. Bearing Plaster: This shall consist of cement plaster 1:3 (1 cement : 3 fine sand) 20mm thick finished with a coat of neat cement laid on top of walls as bearing for RCC lintels, beams and slabs. When dry, a thick coat of lime wash shall be given before starting shuttering. The shuttering shall be started after minimum one day of bearing plaster so that it is set. In respect of projected balconies, projected slabs at roof level and projected verandah, the payment of the RCC work shall be made under item, of RCC slabs, the payment for centring and shuttering of such items shall similarly be paid under the item of Centering and Shuttering of RCC slab nothing extra shall be paid for the side shuttering at the edges of these projected balconies and projected verandahs. All exposed edge shall however, be finished as per specification and nothing extra shall be paid for this. In the item of RCC walls, railing and roofs etc. nothing extra shall be paid for making designs as per patterns given by Architects or thickness of sections. The rates for railing are inclusive of all the labour and the materials including execution as given description of the item, portion of railings, which is embedded in the masonry, or RCC shall not be taken for measurements. The compaction of the Pre-cast concrete shall be done by vibrating table or external vibrator, as approved by the Engineer-in-charge. The rate quoted for the item shall include the element both for form work and mechanical vibration.

2.5.7 Measurement
Measurement will be taken on the concrete surface in cubic metre.

2.6. FORM WORK
2.6.1. Materials and design
a) The form work shall be made of sufficiently rigid steel and/or ply board. Joints of the shuttering must not allow loss of liquid from concrete. In shuttering the joints shall be perfectly closed and lined with craft paper or other types of approved materials. The form work shall be constructed as to remain sufficiently rigid during placing of the concrete. All shuttering and framing must be adequately stayed and braced to the satisfaction of the Engineer in-charge for properly supporting the concrete during the period of hardening. The forms shall have sufficient strength and rigidity to hold concrete and withstand the pressure, lines and levels. The surface of all forms in contact with concrete shall be clean, rigid, watertight and smooth. Suitable devices shall be used to hold corners, adjacent ends and edged of panels of other forms together in accurate alignment.

b) The form work shall conform to the shape, lines and dimensions to suit the R.C.C members as shown on drawing. Form work shall be adequately designed to support the full weight of workers, fresh placed concrete without yielding to settlement or deflection and to ensure good and truly aligned concrete finish in accordance with the construction drawings. A camber in all direction of 6 mm for every 5 metre span in all slab and beam centering shall be given to allow for unavoidable sagging due to compression or other causes.

c) The form shall be so designed that the sides of the beams shall be first removed leaving the soffit of beams and supporting props in position. Props shall be designed to allow accurate adjustment & to permit of their being removed without jarring the concrete.

d) Temporary opening shall be provided at the base of columns forms and at other points where necessary for facilities of cleaning and observations immediately before concrete is deposited.

2.6.2 Vertical shuttering: The vertical shuttering shall be carried down to such solid surface as is sufficiently strong to afford adequate support and shall remain in position until the newly constructed work is able to support itself. Props of approved quality shall be used.
Tubular steel props shall be preferable. In case timber props and bullies are allowed to use these shall be of minimum 10 cm diameter and shall be straight and adequately strong. The spacing of such struts shall be designed to carry loads imposed on it without undue deflection of the members supported by the props and shall be approved by the Engineer in-charge. Any alterations suggested by the Engineer-in-charge shall be carried out at Contractor’s expenses. Bracing shall be provided as directed without extra cost.

2.6.3 Water tightness of shuttering: The Contractor shall ensure that the forms are checked for water tightness just before concreting operation starts and shall make good any deficiencies. If instructed by the Engineer in-charge building paper or any other approved materials will have to be used without any extra charge for the same.

2.6.4 Cleaning and treatment of forms: All rubbish, particularly wood chipping, shaving and saw dust, shall be removed from the interior of the forms before the concrete is placed and the form work in contact with the concrete shall be cleaned and thoroughly wetted. Interior of all moulds and boxes must be thoroughly washed out with hose pipe or otherwise so as to be perfectly cleaned and free from all extraneous matter before deposition of concrete. Prior approval of the form work should be taken from Engineer in-charge before placing reinforcement on the form work.

2.6.5 Stripping: Form shall be left in place until their removal is authorized by the Engineer in-charge and shall then be removed with care so as to avoid injury to concrete. Under no circumstances shall form be struck until the concrete reaches as strength of at least twice the stress to which the concrete may be subjected at the time of striking.

2.6.6 Stripping time: Stripping time shall be as follows:

<table>
<thead>
<tr>
<th>LOCATION</th>
<th>Stripping time</th>
</tr>
</thead>
<tbody>
<tr>
<td>a) Vertical formwork to columns, walls, beams</td>
<td>48 Hours</td>
</tr>
<tr>
<td>b) Soffit formwork to beams (Props to be re-fixed immediately after removal of formwork)</td>
<td>14 Days</td>
</tr>
<tr>
<td>c) Props to slabs:</td>
<td></td>
</tr>
<tr>
<td>i) Spanning up to 4.5 m</td>
<td>14 days</td>
</tr>
<tr>
<td>ii) Spanning over 4.5 m</td>
<td>21 days</td>
</tr>
<tr>
<td>d) Props to beams and arches</td>
<td></td>
</tr>
<tr>
<td>i) Spanning up to 6 m</td>
<td>21 days</td>
</tr>
<tr>
<td>ii) Spanning over 6 m</td>
<td>28 days</td>
</tr>
</tbody>
</table>

2.6.7 Formwork in Lifts for Continuous Surface:
Where forms for continuous surface are placed in successive units, (as for example in columns or R.C.C walls the forms shall fit tightly over the completed surface so as to prevent leakage of mortar from the concrete and to maintain accurate alignment of the surface.

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2.6.8. Removal of Form Work:
Form work shall be removed in such a manner as would not cause any shock or vibration that would damage the concrete surface shall be exposed to ascertain that the concrete has sufficiently hardened.

a) Where the shape of the element is such that form work has re-entrant angles, the framework shall be removed as soon as possible after the concrete has set, to avoid shrinkage cracking occurring due to the restraint imposed.

2.6.9. Measurement: Measurements shall be taken of the area of shuttering in contact with the concrete surface. Dimensions of the form work shall be measured correct to a cm. Centering and shuttering where height exceeds 4.0 meter in one floor shall be measured and paid for separately under the relevant items.

2.7 STEEL REINFORCEMENT:

2.7.1 Only Fe500 Super Ductile reinforcement steel of TATA TISCON, JINDAL PANTHER, SAIL, SHYAM STEEL or equivalent conforming to Fe500D grade of IS 1786:2008 as per item shall only be used. As and when desired by the Engineer-in-charge the contractor shall be required to produce the test certificate from the approved test house at his own cost. The mandatory tests of reinforcement shall be carried out by the contractor at his own cost in Approved laboratory.

2.7.2 Cleaning of reinforcement: Before steel reinforcement is placed in position, the surface of the reinforcement shall be cleaned out of rust, dust, grease and any other objectionable deleterious substances.

2.7.3 Bar bending schedule of reinforcement: On receipt of structural drawing, Contractor shall prepare bar bending schedule of reinforcement and shall obtain approval of the Engineer in-charge.

2.7.4 Placing and security: Reinforcement bars shall be accurately placed and secured in position by 20 gauge soft black annealed steel wire and firmly supported or wedged by pre-cast concrete blocks of suitable thickness at sufficiently close intervals so that they will not sag between the supports or get displaced during the placing of concrete or any other operation of the work. At intersection point binding of reinforcement point shall be in both the direction. Contractor shall maintain reinforcement in its correct position without displacement and correct specified cover.

2.7.5 Welding: Welding of bars shall not be carried out unless specifically authorized in writing by Engineer in-charge as per I.S. Code of Practice in place of splicing. However, no extra payment shall be allowed for the same.

2.7.6 Inspection of reinforcement: No concreting shall be commenced until Engineer in-charge has inspected the reinforcement in position and until his approval has been obtained. A notice of at least 72 hours shall be given to the Engineer in-charge by the contractor for inspection of reinforcement. If in the opinion of the Engineer in-charge, any materials are not in accordance with the specification or the reinforcement is incorrectly spaced, bent or otherwise defective, the contractor shall immediately remove such materials from the site and replace with new material and rectify any other defects in accordance with the instruction of the Engineer in-charge and to his satisfaction.

2.7.7 Cover for reinforcement: To be followed as per IS Code of practice if not specified.
2.7.8 **Net measurement:** Reinforcements shall be placed as shown on the structural drawings and payment will be made on the net measurements in accordance with the drawing and taken at the site. Only such lapse, dowels, chairs and pins in reinforcement as approved by the Engineer in-charge or shown in drawings shall be paid for. The contractor shall allow in the quoted rates for all wastage, which will not be paid separately.

2.8. **STEEL WORK:**
Steel work made of MS angle and MS flat welded built-up section, complete shall be carried out as per drawing. All steel work shall be painted with a priming coat of approved steel primer. All works shall be carried out to proper line and specifications. All welding of steel work shall be tested for the quality of weld as laid down in IS 8222-1970 before erection. Where ever it appears shall mean continuous fillet welding unless otherwise directed by Engineer-in-Charge or shown in the drawing. Machine girding at shop shall be done over the weld to remove the excess deposit and scales.

2.8.1. **Measurement**
Unit of measurement shall be given in the B.O.Q

2.9 **Road work :**

2.9.1 Dry brick on edge soiling with bricks of class designation 75 on a bed 12 mm mud mortor including filling joints with sand.

2.9.2 Laying water bound mecedam (WBM- I & II) sub-base with brick aggregate and binding materials earth etc including screening sorting and spreading to template and consolidation with light power road roller etc. complete (payment for brick aggregate and moorum etc. to made seperately).(a) Over burnt (jhama) brick aggregate 90mm to 45mm & (b) Over burnt (jhama) brick aggregate 120 mm to 65mm.

2.9.3 Tack coat using hot straight run bitumen of grade VG-10 including heating one bitumen, spreaying the bitumen with mechanically operated spray unit fitted on bitumen botter, cleaning and preparing of existing road surface as per specification. a) On WBM @ 0.75kg/Sqm

2.9.4 2 cm premix carpet surfacing with 1.8 cum and 0.90 cum of stone chippings of 13.2 mm size and 11.2 mm size respectively, per 100 sqm and 52 kg and 56 kg of hot bitumen per cum of stone chippings of 13.2 mm and 11.2 mm size respectively including a tack coat with hot straight run bitumen, including consolidation with road roller of 6 to 9 tonne capacity etc. complete (tack coat to be paid for separately). With paving Asphalt grade VG - 10 heated and then mixed with solvent at the rate of 70 grams per kg of asphalt.

2.9.5 Seal coat of premixed fine aggregate (passing 2.36 mm and retained on 180 micronsieve) with bitumen using 128 kg of bitumen of grade VG-10 bitumen per cum of fine aggregate and 0.60cum of fine aggregate per 100 sqm of road surface including rolling and finishing with road roller all complete.

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**LIST OF PREFERED MAKES FOR CIVIL WORKS**

| 1. Cement (Ordinary Portland) | ACC/ AMBUJA/ ULTRA TECH/ STAR/ TOP CEM/ AMRIT/ DALMIA |

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Note :- Sample of all item shall be got approved from Engineer In-Charge before bulk procure.

REMARKS:
1) The materials of first quality of the above preferred makes are to be used.
2) The material samples shall be got tested by Engineer-in-Charge as per provisions of tender documents for which all costs shall be borne by the contractor.

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<tr>
<td>2.</td>
<td>TMA / Tor Steel</td>
<td>SAIL/ JINDAL PANTHAR / TATA TISCON / SHYAM STEEL</td>
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<tr>
<td>3.</td>
<td>PVC Pipes / Fittings</td>
<td>SUPREME/ PRAKASH/ ORI PLAST / FINOLEX</td>
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<td>4.</td>
<td>Cement / Concrete Additives</td>
<td>CICI/CHEMISTIK/FORSOC/MBT/DEGUSSA/SIKA</td>
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<td>5.</td>
<td>Chain link Wire mesh</td>
<td>MITTAL/ SHAKTI-WELD MESH</td>
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<td>6.</td>
<td>Security Single Row/Smart fence</td>
<td>A1 Fence/ Global Technocrats Pvt. Ltd or Equivalent</td>
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PROPOSED DESIGN OF B-S FENCE ALONG INDO-PAK & IND-BD BORDER WITHIN 150 YDS

FRONT ELEVATION

NOTE: ALL DIMENSIONS ARE IN MM.

TITLE: 358 WELD MESH FENCE
COLN: ICWU
DRG. NO: WM-CPWD-0816-483
PROPOSED DESIGN OF B-S FENCE ALONG INDO-PAK & IND-BD BORDER WITHIN 150 YDS

BFL
(10M POLE)

OWN SIDE

2700

1200

13400

COUNTER PART SIDE

SIDE ELEVATION
IBB ROAD

TYPICAL CROSS SECTION

20mm THK. PREMIX CARPET
2 LAYERS—75mic THK. WBM (BRICK AGGREGATE)
1 LAYER—100mm THK. SOLING (BRICK ON EDGE)

TYPICAL CROSS SECTION
(IN EMBANKMENT)

TYPICAL CROSS SECTION
(IN CUTTING)