TENDER DOCUMENT

TENDER No: NERO/CON/ASR/SRIKONA/256 dated: 10.08.2017

FOR

TENDER FOR CONSTRUCTION OF ALIGNMENT OF NEW ROAD FOR ASSAM RIFLES AT SRIKONA, ASSAM.

VOLUME–II

NOTICE INVITING TENDER

ADDITIONAL CONDITIONS OF CONTRACT

TECHNICAL SPECIFICATIONS

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

Tender No: NERO/CON/ASR/SRIKONA/256

Date: 10.08.2017

NOTICE INVITING e-TENDER (NIT)

1.0 Tender for Construction of alignment of new road for Assam Rifles at Srikona, Assam.

Engineering Projects (India) Ltd. invites the online open e-Tenders sealed item rate tender on behalf of DGAR in two bid system through e tendering from the eligible contractors/firms who fulfill the eligibility criteria as per the brief particulars of scope for the “Construction of alignment of new road for Assam Rifles at Srikona, Assam” in single stage Two Envelope system (Technical bid & Price bid) for the following works:

<table>
<thead>
<tr>
<th>Sl. No.</th>
<th>NAME OF WORK</th>
<th>ESTIMATED COST</th>
<th>EARNEST MONEY DEPOSIT (EMD)</th>
<th>COMPLETION PERIOD</th>
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<td>1.</td>
<td>Construction of alignment of new road for Assam Rifles at Srikona, Assam.</td>
<td>Rs. 2,58,72,527.00 (Rupees Two Crores Fifty-Eight Lakhs Seventy-Two Thousand Five Hundred and Twenty-Seven only)</td>
<td>Rs. 2,58,725.00 (Rupees Two Lakhs Fifty-Eight Thousand Seven Hundred Twenty-Five only)</td>
<td>15 (Fifteen) Months</td>
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The brief scope of work in this tender shall include providing all labour, materials, tools and plant, transportation to site, storage and safe custody of the materials, construction of alignment of new road for Assam Rifles at Srikona, Assam all complete except those which are specifically mentioned to be excluded elsewhere in tender documents mentioned above. Apart from above, any other services not covered above but required as per direction of EPI are deemed to be included in the scope of work. The work is to be carried out on item rate basis as per bill of quantities and tender conditions.

The detailed scope of work is given in tender document.
Time schedule of Tender activities:

(i) Starting Date & Time for Downloading of tender documents: from 10.08.2017 (08:00 PM)

(ii) Last Date & Time for Downloading of tender documents: up to 25.08.2017 (12:00 PM)

(iii) Last Date & Time of online submission of Tenders: on or before 25.08.2017 (03:00 PM)

(iv) Date & Time of online opening of tenders (Techno-Commercial Bid): 25.08.2017 at 03:30 PM

(v) Pre-bid meeting at 4th Floor, Hindustan Tower Block-A, Jawahar Nagar, N.H.37, Beltola, Guwahati-781022 Assam on 21.08.2017 at 3.00 PM.

The tenderers shall submit his query for the pre-bid meeting on or before 18.08.2017 by 05.00 PM to neroguwahati@gmail.com or by post to the address given at sl.no 14 below.

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

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

   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” shall mean “Construction of road, culverts, infrastructural development works etc.” either singularly or as a part of any civil works. Hence, the bidder claiming to have the experience of road works, culverts, infrastructural works as part of a civil works such as buildings, bridges, irrigation etc. must furnish a self-attested copy of BOQ/SOR of the work order in his support of works done.

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.

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 shall only be accepted for assessing the eligibility of the tenderer. However, the certificates issued by Public Limited Company can be considered only if they are supported by TDS certificates in support of value of work done by the tenderer. TDS certificate for full contract value as mentioned in the work order must match falling which the same shall not be considered.

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 31.03.2016 duly supported by annual financial report (i.e. audited copies of balance sheet and profit and loss statement) or certified by Chartered Accountant along with Income Tax return for last financial year (2015-16/2016-17). Turnover means income from construction works only.

c) Should submit Sale Tax return for last quarter of financial year (2016-17).

d) Should not have incurred any loss in more than two years during the immediate last five consecutive financial years, ending 31.03.2016, Copies of balance sheet/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 for the state of incorporation as well as Assam. In case the tenderer is unable to get GST Registration for the state of Assam he shall give an undertaking to obtain it within one month of issuance of LOI or order in case he becomes the successful bidder.

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

h) 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,
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) 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:

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

Where,

- **A** = Maximum value of construction works executed in any one year during the last (05) 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 Bidder is requested to furnish the existing commitments on 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 (Enclosed).

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](http://www.epi.gov.in), CPP-Portal: [www.eprocure.gov.in](http://www.eprocure.gov.in) and as well as on TCIL portal [http://www.tcil-india-electronictender.com](http://www.tcil-india-electronictender.com).

Volume I: a) Instructions to Tenderers, General Conditions of Contract (ITT&GCC) of EPI,  
b) Addendum to Instructions to Tenderers &  
c) Special instructions to Bidders for e-Tendering  
d) Memorandum  
e) Letter of Undertaking  
f) Form of tender

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

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

5.0 Bidders can download the bid document from the portal without paying document fees in advance, any time from 08:00 PM on 10.08.2017 however, interested bidders have to pay tender fees for participating in the tendering and submitting the bid. For this purpose the interested bidders shall be required to pay ₹ 15,000/- (Rupees Fifteen Thousand only) as non-refundable document fees in the form of Demand Draft in favour of “Engineering Projects (India) Ltd.” payable at Guwahati.

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.

The bid must be accompanied by an Earnest Money Deposit (EMD) of **Rs. 2,58,725.00 (Rupees Two Lakhs Fifty-Eight Thousand Seven Hundred Twenty-Five 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.

Tender fee, EMD (In original), Power of Attorney, NSIC/MSME certificate as per Clause No.1 (h) if bidder is claiming EMD/Tender fee exemption and Pass Phrase (Both for technical and financial bid in separate envelope) to decrypt the bid must be submitted in physical form at the address given at Clause No. 14.0 below 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.

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

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

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

10.0 The intending tenderers must not have been in litigation with EPI for last three years or must not be in litigation with EPI at present. In case the participating tenderer(s) are found to have suppressed information in this respect the EMD submitted by him (they) shall be forfeited by EPI and his (their) tender shall be rejected. In case such suppression is detected after acceptance of his (their) tender i.e. on award of the works the order/LOI shall be withdrawn and his securities forfeited.
The tenderers should note that the credential such as value and volume of works completed as submitted by the tenderers along with their offers shall be forwarded by EPI to the owner, DGAR for his opinion. The offer of the tenderers against whom the Owner does not give satisfactory remarks shall be rejected by EPI.

11.0 The Price Bid of those bidders who are found to be prima-facie techno-commercially acceptable based on the documents submitted at the time of bid submission and also against fulfillment of conditions at sl. no. 10 above shall be opened 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.** However, it is made clear that the offer of the bidders shall be accepted subject to the confirmation of authenticity of the PQ documents/ EMD /Tender fee from the concerned department/ bank. In case the PQ documents such as work experience certificate, bank solvency certificate etc submitted by a bidder is found to be fake the EMD submitted by him shall be forfeited by EPI without making any reference to him. Further such a tenderer shall be at a risk of losing his right to participate in any tender called by EPI for a minimum period of one year.

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

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

14.0 All correspondence with regard to the above shall be to the following address (By Post/In Person)
   General Manager(Contract)
   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 Rajib Borah, Sr. Manager
   Engineering Projects (India) Ltd.
   Srikona,
   Phone No: +91-9774364563.
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

General Manager (Contracts)
Date: 10.08.2017
ADDITIONAL CONDITIONS OF CONTRACT (ACC)

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

2.0 DGAR (Director General Assam Rifles), the Owner, has selected Engineering Projects (India) Limited (EPI) as the “PMC” for “Construction of alignment of new road for Assam Rifles at Srikona, Assam”. The works intended to be executed under the instant contract shall include (but not limited to) providing labour, tools and plants, machineries, transport and all other components including materials (except those which are specifically excluded from scope/present tender as spelt out elsewhere in the tender documents) required for completion of the works. The works are to be executed at Assam Rifles, Srikona, Assam.

3.0 Clause no 3.0 of GCC shall stand amended as below:

The items of work given in the tender documents are for general guidance of the intending tenderers and the works shall be carried out by the successful tenderer i.e. the Contractor on item rate basis in conformity with the detailed drawing, technical specifications, additional conditions of the tender documents (including any addition/modification/alteration/deletion made from time to time therein found essential for completion of works). The work shall pertain to Construction of alignment of new road for Assam Rifles at Srikona, Assam. The Contractor shall be deemed to have satisfied himself before tendering as to the sufficiency and correctness of his tender for the works and of the rate sand prices quoted in the brief specifications, drawings, scope of work and payment (billing) schedule, which rates and prices shall, except as otherwise provided, cover all obligations under the contract and all matters and things found necessary for proper completion and maintenance of the works. It shall be responsibility of the Contractor to incorporate the changes that may be in the scope of work envisaged at the time of tendering and as actually required to be executed. The Contractor has quoted his rates after clearly studying the scope of work given in Tender Documents and getting fully satisfied with the various items and technical intricacies involved in the work under his scope of work as envisaged in the tender. EPI shall not entertain any claim of the contractor on account of error or omission by him in this respect except what is admitted by the client.

4.0 No mobilisation advance shall be paid and hence clause no. 8 shall stand deleted.

5.0 Safety Code:

General
Contractor shall adhere of safe construction practice and guard against hazardous and unsafe working conditions and shall comply with Owner's safety rules as set
forth herein. Prior to start of construction, Contractor will be furnished of Owner's—Safety Code for information and guidance, if it has been prepared.

First Aid and Industrial Injuries
(1) Contractor shall maintain first aid facilities for his employee and labours.
(2) Contractor shall make outside agreements for ambulance service and for the treatment of industrial injuries. Names of those providing these services shall be furnished to the Owner 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 Owner, and a copy of Contractor's report covering each personal injury requiring the attention of a physician shall be furnished to the Owner.

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) Contractor's employees and workmen 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 provide 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 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 may be 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 on 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 (ii) 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 cause danger 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 defence 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 precautions 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, 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 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 atleast 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 work.

(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 his own machineries, the Contractor shall notify the safe working load of the machineries 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.

6.0 The clause no. 10.0 of GCC shall stand amended as below:

An amount @5% (Five percent) of the gross value of the running bill shall be deducted from each running bill by way of retention money. In case the EMD has been deposited by the Contractor in the form of demand draft, the said amount of EMD shall be adjusted first towards the retention money and further recovery of retention money shall commence when the up to date amount of retention money exceeds the amount of EMD deposited in the form of demand draft. The retention
money shall become refundable to the Contractor at the end of the defects liability period free of any interest provided always that the Contractor has rectified all the defects arising during the defect liability period pertaining to his scope of work, EPI did not have to incur any expenditure in setting right the defects, if any, pertaining to the Contractor’s scope of work, the Contractor has demolished and removed all structures including foundations and withdrawn fully from the worksite and EPI has received the clearance certificate from the concerned Labour Enforcement Officer/RLC pertaining to the labour etc. deployed by him at the worksite or there is nothing on record against him in the local market affecting functions of EPI. In case EPI has been required to make any expenditure on any of these accounts EPI will keep the retention money till the time all these matters are settled in full including recovery of the expenses, if any, made by EPI from the retention money. Further the Contractor has to furnish a ‘No Claim’ certificate to EPI in confirmation of his having no claim on getting refunded the retention money to EPI at the time of claiming refund of retention money.

7.0 Work in monsoon and dewatering
The completion of the work may entail working in monsoon also. The Contractor must maintain minimum labour force as may be required for the job and plan and execute the construction and erection according to the prescribed schedule. No extra rate will be considered such work in monsoon.
During monsoon and other period, it shall be the responsibility of the Contractor to keep the construction work site free from water at his own cost.

8.0 Work on Sundays and holidays
For carrying our work on Sundays and holidays, the Contractor will approach the Engineer-in-Charge or his representative at least two days in advance and obtain permission in writing.

9.0 General conditions for construction and erection mark
The working time at the time of work is 48 hours per week. Over time work is permitted in cases of need and the Owner will not compensate the same. Shift working at 2 or 3 shifts per day will become necessary and the Contractor should take this aspect in to consideration for formulating his rates for quotation. No extra claims will be entertained by the EPI on this account.
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The Contractor must arrange for the placement of workers in such a way that delayed completion of the work or any part thereof for any reason whatsoever will not effect their proper employment. EPI will not entertain any claim for idle time payment whatsoever.

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

11.0 Responsibility for level and alignment

The Contractor shall be entirely and exclusively responsible for the horizontal and
vertical alignment, the levels and correctness of every part of the work and shall
rectify effectually any errors or imperfections therein. Such rectifications shall be
carried out by the Contractor, at his own cost, when instructions are issued to that
effect by the Engineer-in-Charge.
It is highly possible that there shall be more than one agency working at the same
time at the site. The Contractor shall at all times remain bound to co-ordinate with
the agencies, deployed by EPI for the above works, including providing free
access and making required provisions for them in execution of works pertaining
to their portion of works. He shall also remain bound to ensure uninterrupted
progress of work by these agencies in a peaceful and smooth manner. He shall
also remain bound to make the required changes/additions/alterations in the works
done by him to accommodate the items under the scope of work of such other
agencies deployed by EPI or the client. The Contractor is deemed to have made
the estimated allowances in this respect while quoting his rates at the tendering
stage.
All the drawings provided at the tendering stage are for general guidance only and
the works shall be carried out as per the drawings and instructions issued from
time-to time. EPI shall not entertain any claim of the Contractor on account of any
omission or any error by him on this account.
Further, even though EPI has taken all care to attach all the drawings as vetted by
the client it shall be the responsibility of the contractor to interpret the drawings for
completion of the works under this contract.
The list of minimum tools, plant and machinery to be provided by the Contractor
within the period mentioned against the respective item is given at Annexure-A.

12.0 The clause no 9.0 of GCC of EPI shall stand amended as under:
“Within 10 (ten) days from the date of issue of letter of Intent or within such
extended time as may be granted by EPI in writing, the Contractor shall submit to
EPI a Security Deposit cum Performance Bank Guarantee in the form appended,
from any Nationalised bank / Scheduled Bank equivalent to 5% (five percent only)
of the Contract Value for the due and proper execution of the contract. This bank
guarantee shall remain valid up to 90 (ninety) days after completion of works.

In case the Contractor fails to submit the Security Deposit cum Performance
Guarantee of the requisite amount within the stipulated period or extended period,
letter of intent will stand withdrawn and EMD of Contractor shall be forfeited.

13.0 The following shall stand added to the clause no 13 of GCC:
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.

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

15.0 The following shall stand added to the clause no 27.0 including its sub-clauses of
GCC of EPI:
The contractor, within 10 days of issuance of LOI (Letter of Intent) to him shall
depute at least one graduate civil engineer with 5 years of post-qualification
experience or one person having diploma in civil engineering with 10 years of
post-qualification experience and one graduate electrical engineer with 5 years of
post-qualification experience or one person having diploma5 years of post-
qualification experience or one person having diploma in electrical engineering with 10 years of post-qualification experience as and when instructed by the EIC, duly supported by adequate number of supervisors. Should the contractor fail to provide them within such period or as directed by the Engineer-in-charge, EPI shall be at liberty to recover an amount @ 30,000.00 per month from any amount including the retention money due to the contractor.

16.0 The clause no 28.3 of the GCC stands modified as under:
The Contractor at his own cost shall construct and duly maintain a furnished temporary site office measuring 200 sq ft for use of EPI and his staff. The contractor shall also provide at his cost one four wheel vehicle Maruti Alto/Eon/Kwid/EECO or equivalent with driver, fuel and lubricant for movement of EPI staff to take care of all emergent situations. The average running of the vehicle shall be 1000 kilometres per month. The contractor shall provide these facilities till completion of works on expiry of which these shall become his properties and he shall duly remove them from the work site failing which EPI will get them removed and recover the expenses from any money due to the contractor.

17.0 No secured advance shall be paid to the Contractor and hence clause no. 35.0 of GCC shall stand deleted.

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

19.0 Payments: The clause no 37.0 of the GCC stands modified as under:
Payments as and when received by EPI from the Client for the Contractor's portion of work shall be released to him within seven working days of its receipt by EPI and after making the recoveries towards facilities mentioned at clause 22.0 hereinabove and other recoveries.
All running payments shall be regarded as 'on account' payments only and not as payments for work actually done and completed and/ or accepted by EPI or Owner and shall not preclude the recovery for bad, unsound work and imperfect or unskilled work to be removed and taken away and reconstructed or re-erected or to be considered as an admission of the due performance under the agreement or the accruing of any claim nor shall it conclude, determine or affect in anyway the powers of EPI under these conditions or any of them as to the final settlement and adjustments of the accounts or otherwise or in any other way vary/affect the contract.
The final bill payment to the Contractor shall be released only after receipt of corresponding payment from client and when the Contractor submits all other clearances, approvals, certificates etc. as per agreement of EPI with the client for the “Works” and as per statutory requirement.
The Contractor shall have no claim on EPI in case the payments are delayed by the client due to any reason whatsoever.
20.0 The clause no. 43.2 shall stand amended as below:

The contractor shall execute the works so as to complete the works within the stipulated completion time. He shall remain bound to submit a programme of completion of items.

21.0 The following shall stand added to clause no 45.0 of the GCC:

The contractor shall at all-time remain bound to provide the samples in quantity and manner as instructed by EPI to be analysed or tested in an outside laboratory or in the field laboratory at site. The cost of testing charges is included in the prices of the contractor. EPI shall, however, be at liberty to get the materials tested independent of the contractor and the contractor shall remain bound to render all assistance to EPI in conductance of such tests including making available the materials in sufficient quantity and in time and payment of the testing charges. EPI/client shall at all times have full access to the works and to all workshops and places where work is being prepared or from where materials, manufactured articles or machinery. The contractor shall afford every facility and assistance and cost in obtaining the right and visit to such access.

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

22.0 The following shall be added to clause no 52.6 of GCC:

The field testing laboratory to be established by the Contractor at his cost shall be equipped with the minimum number of testing equipment as per annexure-B

23.0 The following provisions shall supersede that of clause no 69 of GCC wherever applicable:

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

24.0 Recovery for delay in completion :

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

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

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

26.0 Clause no. 76.0 of GCC shall stand amended as below:

ARBITRATION:

Clause no. 76.1: Deleted

There shall be no Arbitration Clause for this Contract except between Central Public Sector Undertakings inter se / Government of India Departments / Ministries as mentioned in the Clause No. 76.2 below:

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 dispute 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 Sector 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 11.04.2017 of Department of Public Enterprises, Ministry of Heavy Industries and Public Enterprises, Govt. of India or any modification issued in this regard.

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

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

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

a) Completion certificate issued by the Engineer-in-charge specifying the handing over of the work including list of inventories (fitting & fixtures).
b) No claim certificate by the Contractor.
c) No claim certificate from the sub-agencies/vendors engaged by the Contractor.
d) Detail required for preparing as built drawings.
e) Periodical services and measurement books.
f) Drawings for layout of underground cables and details showing location of sluice valves, electric cable joints etc.

(Signature and seal of the Tenderer)
### ANNEXURE-A

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

<table>
<thead>
<tr>
<th>Sl. No.</th>
<th>Description</th>
<th>Minimum Number Required</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Digital Theodolite</td>
<td>01</td>
</tr>
<tr>
<td>2.</td>
<td>Levelling Instruments</td>
<td>01</td>
</tr>
<tr>
<td>3.</td>
<td>Vibrators (Petrol / Electrical)</td>
<td>03</td>
</tr>
<tr>
<td>4.</td>
<td>Needles for Vibrator</td>
<td>06</td>
</tr>
<tr>
<td>5.</td>
<td>Concrete Mixer of capacity 14/10 with mechanically operated hopper</td>
<td>02</td>
</tr>
<tr>
<td>6.</td>
<td>Weigh Batcher</td>
<td>01</td>
</tr>
<tr>
<td>7.</td>
<td>DG Set (250 KVA)</td>
<td>01</td>
</tr>
<tr>
<td>8.</td>
<td>Tripper / Dumper</td>
<td>05</td>
</tr>
<tr>
<td>9.</td>
<td>Hydraulic Excavator</td>
<td>01</td>
</tr>
<tr>
<td>10.</td>
<td>Motor Grader</td>
<td>01</td>
</tr>
<tr>
<td>11.</td>
<td>Tractors with trolley</td>
<td>02</td>
</tr>
<tr>
<td>12.</td>
<td>8/10 MT Mechanical Roller</td>
<td>01</td>
</tr>
<tr>
<td>13.</td>
<td>Steel bending machine</td>
<td>01</td>
</tr>
<tr>
<td>14.</td>
<td>Steel cutting machines</td>
<td>01</td>
</tr>
<tr>
<td>15.</td>
<td>Steel shuttering plates</td>
<td>500 Sqm</td>
</tr>
<tr>
<td>16.</td>
<td>Steel props and other supports for shuttering</td>
<td>For 500 Sqm</td>
</tr>
</tbody>
</table>

**Note:**

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

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

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

(Signature and seal of the Tenderer)

### ANNEXURE-B

#### LIST OF MINIMUM TESTING EQUIPMENT

NIT NO NERO/CON/ASR/SRIKONA/256: ACC Page 13 of 14
<table>
<thead>
<tr>
<th>Sl.No.</th>
<th>Description</th>
<th>Minimum numbers required</th>
<th>Period</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Compressive Testing machine</td>
<td>One no</td>
<td>20 days</td>
</tr>
<tr>
<td>2</td>
<td>Electrically operated Digital Weighing Machine (0-5 kg)</td>
<td>One no</td>
<td>10 days</td>
</tr>
<tr>
<td>3</td>
<td>Slump test apparatus</td>
<td>One no</td>
<td>10 days</td>
</tr>
<tr>
<td>4</td>
<td>Set of sieves for grading of coarse aggregates</td>
<td>One set</td>
<td>10 days</td>
</tr>
<tr>
<td>5</td>
<td>Set of sieves for grading fine aggregates</td>
<td>One set</td>
<td>10 days</td>
</tr>
<tr>
<td>6</td>
<td>Cement consistency apparatus</td>
<td>One no</td>
<td>20 days</td>
</tr>
<tr>
<td>7</td>
<td>Electrically operated oven (300 deg Centigrade)</td>
<td>One no</td>
<td>10 days</td>
</tr>
<tr>
<td>8</td>
<td>Trays for sampling</td>
<td>One set</td>
<td>10 days</td>
</tr>
<tr>
<td>9</td>
<td>Apparatus for testing of cement</td>
<td>One set</td>
<td>30 days</td>
</tr>
<tr>
<td>10</td>
<td>150X150X150 CI Cube Moulds</td>
<td>18 nos</td>
<td>10 days</td>
</tr>
<tr>
<td>11</td>
<td>Vicat Apparatus with needles, Test Tubes, breakers, thick glass plates etc</td>
<td>One set</td>
<td>15 days</td>
</tr>
<tr>
<td>12</td>
<td>Measuring Cylinders, 1000ml, 500 ml</td>
<td>01</td>
<td>15 days</td>
</tr>
<tr>
<td>13</td>
<td>Wash Bottles, Capacity 500 ml</td>
<td>02</td>
<td>15 days</td>
</tr>
<tr>
<td>14</td>
<td>Sink</td>
<td>01</td>
<td>15 days</td>
</tr>
<tr>
<td>15</td>
<td>Litre: Measures:</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>2 Lit</td>
<td>02</td>
<td>15 days</td>
</tr>
<tr>
<td></td>
<td>0.4 Lit</td>
<td>01</td>
<td>15 days</td>
</tr>
<tr>
<td></td>
<td>0.5 Lit</td>
<td>01</td>
<td>15 days</td>
</tr>
</tbody>
</table>

Note:

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

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

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

(Signature and seal of the Tenderer)
1.0 GENERAL

1.01 The specifications and mode of measurements for all the works mentioned in this tender shall be in accordance with C.P.W.D specifications 1996 volumes I to VI.

   Unless otherwise specified in the nomenclature of individual item or in the specifications, the entire work shall be carried out as per the C.P.W.D specification with up to date correction slips up to the date of opening of tender.

1.02 For Items not covered under CPWD specifications mentioned above, the work shall be executed as per “Specifications for Road & Bridge Work” published by Ministry of surface transport, “Hill Road Manual” (IRC: SP:48-1998) published by the Indian Road Congress, and as per relevant standards/codes published by BIS (formerly ISI) inclusive of all amendments issued thereto or revision thereof, if any, up to the date of opening Tender.

1.03 In case of BIS (formerly I.S.I) codes/specifications are not available, the decision of the Engineer based on acceptable sound engineering practice and local usage shall be final and binding on the contractor.

1.04 However, in the event of any discrepancy in the description of any item as given in the schedule of quantities or specifications appended with the tender and the specifications relating to the relevant item as per CPWD specifications mentioned above or in drawings the former shall prevail.

1.05 The rates for different items of work shall be for all heights, lifts, leads and depths except where otherwise specified in the item of work or in additional conditions appended with the tender.

1.06 The work shall be carried out in accordance with the approved drawings. The drawings shall have to be properly co-related before executing the work. In case of any difference noticed between the drawings, final decision, in writing of the Engineer shall be obtained by the contractor. For items, where so required, samples shall be prepared before starting the particular items of work for prior approval of the Engineer and nothing extra shall be payable on this account.

1.07 Unless otherwise specified in the bill of quantities, the rates for the items of work shall be considered as inclusive of pumping out or bailing out water if required for which no extra payment will be made. This will include water encountered from any source such as rains, floods, sub-soil water table being high due to any other cause whatsoever.

1.08 Any cement slurry added over base surface (or) for continuation of concreting for bond is added its cost is deemed to have in built in the item unless otherwise/explicitly stated and nothing extra shall be payable or extra cement considered with consumption on this account.
1.09 The rate for all items in which the use of cement is involved shall be inclusive of charges for
    curing.

1.10 The contractor shall clear the site thoroughly of all scaffolding materials and rubbish etc.
    left out of his work and dress the side to the satisfaction of the Engineer before the work is
    considered as complete.

1.11 The rate quoted for all brick/concrete work shall be deemed to include making openings
    and making good these with the same specifications as shown in drawings and/or as directed.
    No extra payment shall be made to the contractor on this account.

1.12 The drawing(s) attached with the tender documents are for the purpose of tender only,
    giving the tenderer a general idea of the nature and the extent of works to be executed.
    The rates quoted by the tenderer shall be deemed to be for the execution of works taking
    into account the “Design Aspect” of the items and in accordance with the “Construction
    Drawings” to be supplied to the Contractor during execution of the works.

1.13 The quoted rate shall be for finished items and shall be complete in all respects including
    the cost of all materials, labour, tools & plants, machinery etc., all taxes, duties, levies,
    octroi, royalty charges, statutory levies, cess etc. applicable form time to time and any,
    other item required but not mentioned here involved in the operations described above.
    EPI shall not be supplying any materials, labour, plant etc. unless explicitly mentioned so.

1.14 Gradient of road shall be as per approved drawing and as per direction of Engineer-in-
    Charge.

1.15 Random Rubble Masonry retaining wall shall be constructed as per approved drawings
    based on different heights at different locations and payment for the same shall be made
    as per the rates of respective items available in the Bill of Quantities.

1.16 RCC culverts of larger sizes may be required to be constructed as per actual requirement
    at site. The contractor has to execute this work and payment shall be made as per the
    rates of respective items available in the Bill of Quantities.

2.0 MATERIALS

2.01 Stone Aggregate

For WBM construction stone metal grade – I & II of hard granite or equivalent as approved
by Engineer-in-Charge shall be used. River borne or weathered stone metal shall not be
used for the work. The stone metal and aggregates shall not be obtained from the rock
which has been exposed to atmosphere for a long time. They shall be clean, hard, durable
of fairly cubical shape and free from excess flat, elongated, soft & disintegrated particles,
fracture, cleavage, dirt & other deleterious materials and organic impurities. The
aggregates shall preferable be hydrophobic and low porosity. The aggregates shall satisfy
the physical requirements as set forth in Table I.
Table – I (Physical Requirement of Coarse Aggregate)

<table>
<thead>
<tr>
<th>Sl. No.</th>
<th>Type of Construction</th>
<th>Type of Construction Test</th>
<th>Test Method</th>
<th>Requirement</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Sub-Base</td>
<td>Los Angeles Abrasion Value</td>
<td>IS-2386 (Part-IV)</td>
<td>60% (Maximum)</td>
</tr>
<tr>
<td></td>
<td>60% (Maximum)</td>
<td>or Aggregate Impact Value IS-2386</td>
<td>IS-2386 (Part-IV)</td>
<td>*50% (Maximum)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>IS-5640***</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2.</td>
<td>Base</td>
<td>Los Angeles Abrasion Value</td>
<td>IS-2386 (Part-IV)</td>
<td>50% (Maximum)</td>
</tr>
<tr>
<td></td>
<td>50% (Maximum)</td>
<td>or Aggregate Impact Value IS-2386</td>
<td>IS-2386 (Part-IV)</td>
<td>*40% (Maximum)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Flakiness Index</td>
<td>IS-2386 (Part-I)</td>
<td>**15%</td>
</tr>
</tbody>
</table>

* Aggregates may satisfy requirements of either of the two tests.
** The requirements of flakiness index shall be enforced only in case of crushed / broken stone..
*** Aggregates like brick metal, kankar and laterite which get softened in presence of water, shall be tested for impact value under wet conditions in accordance with IS:5640.

2.02 Sand / Stone Dust

Sand/ Stone dust shall be clean, hard durable, uncoated, dry and free from injurious soft or flaky pieces and organic or deleterious substances. Quality of sand/ stone dust shall conform to IS: 383.

2.03 Supply and stacking of materials

Stone metal, boulder, sand, stone dust etc.

Ground where stacks are proposed to be made shall be cleared, leveled or dressed to a uniform slope and all lumps, depressions etc. shall be removed. The stacked material shall be free from vegetation and other undesirable material. All rejected materials shall be immediately removed from site.

Stone metal and boulder shall be stacked in convenient units of one meter top width, 2.2 m bottom width, 60 cm height and of length in multiples of 3 meter. Template of wood or steel shall be used for making the stack and shall always be kept at site for check measurements.

Sand or stone dust shall be stacked in convenient units of one cum. The stack shall be made with wooden boxes open at both ends and of 2 m x 2 m x 0.25 m dimensions. These boxes shall always be kept at site for stacking and check measurements.

The stacks shall be uniformly distributed along the road side and shall be numbered serially. The number plate shall be planted on each stack which shall remain in position until the stack is used in the work.
Sample of materials shall be got approved from Engineer-in-Charge before the material in bulk is brought to the site.

2.03 Measurement for Payment

Length, breadth and height shall be measured correct to a cm and volume shall be calculated in cum correct to two places of decimal. The volume of stacks shall be reduced by percentage as shown below on account of voids to arrive at the net quantity for payment.

**Earth**

i) In loose stacks such as cart loads, lorry etc. - 20%
ii) In consolidated fills - 10%
iii) In fills consolidated by heavy mechanical machinery but not under OMC - 5%
iv) In fills consolidated by heavy mechanical machinery at OMC - Nil
v) Consolidated fills in confined situation such as under floors - Nil
vi) Sand/ Stone dust - Nil
vii) Moorum - Nil
viii) Stone metal 40 mm nominal size and above - 7.5%
ix) Coarse Aggregate below 40 mm nominal size - Nil
x) Soling Stone / Boulder – 100 mm nominal size and above - 15%
xii) Excavated Rock - 50%

Unless otherwise directed, measurement shall not be taken until sufficient materials for use on the road (for a road length of minimum five hundred metre) have been colllected and stacked. Immediately after measurement the stack shall be marked by white wash or other means as directed by Engineer-in-Charge.

3.0 ROLLING

3.01 Rolling shall be done by 80 / 100 KN smooth wheeled power roller (3 wheel or tandem) or vibratory roller of 80 – 100 KN static weight. Rolling shall start as soon as possible after the materials have been spread, deploying a set of rollers as the rolling is to be completed in limited time frame. Rolling shall be done with care to avoid unduly roughening of the pavement surface. The roller shall move at a speed not more than 5 km / hour.

Rolling of longitudinal joints shall be done immediately behind the paving operation. After this the rolling shall commence at the edges and progress towards the centre longitudinally, except that on super elevated and uni-directional cambered portions, where the rolling shall proceed from inner edge to the outer parallel to the centre line of the pavement. First the edge / edges shall be compacted with roller running forward and backward. The roller shall then move inward parallel to the centre line of the road, in successive passes uniformly lapping preceedings tracks by at least one-half width of WBM.

When the roller has passed over the whole area once, any high spots or depressions which become apparent shall be corrected by removing or adding mix material. The rolling shall be continued till the entire surface has been rolled to 95% of the Proctor’s density, there is no crushing of aggregates and all roller marks have been eliminated. Roller shall not stand on newly laid material while there is a risk that surface will be deformed thereby.
3.02 Time Schedule for Rolling Operations

The minimum duration for rolling shall be governed by the guidelines set forth in Table-3. However, Engineer-in-Charge shall have the full authority to increase the duration to an extent as he may deem necessary, to satisfy himself that the compaction must comply with the specifications.

Table-3

<table>
<thead>
<tr>
<th>Sl. No.</th>
<th>Items</th>
<th>Duration</th>
<th>Surface Area / Volume</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Preparation of Sub-grade</td>
<td>1 hour</td>
<td>200 sqm</td>
</tr>
<tr>
<td>2.</td>
<td>75 mm thick WBM with Stone Metal Grade – II</td>
<td>1 hour</td>
<td>50 sqm</td>
</tr>
<tr>
<td>3.</td>
<td>150 mm thick WBM with Stone Metal Grade – I</td>
<td>1 hour</td>
<td>100 sqm</td>
</tr>
</tbody>
</table>

3.03 Rates

The contract unit rate for the work shall be payment in full for carrying out the required operations including full compensation for

(i) Making arrangements for traffic to Clause 112 of ‘Specifications for Road & Bridge Works’ published by Ministry of Surface Transport except for initial treatment to verge, shoulders and construction of diversion.

(ii) Preparation of base except for laying of profile corrective course but including filling of pot holes.

(iii) Providing all materials to be incorporated in the work including the arrangements for stockyard, all royalties, octroi, fees, cess, rents where necessary and all leads and lifts.

(iv) All labour, tools, equipment, power supply units and all machines incidental to complete the work to the specifications.

(v) Carrying out the work in part widths of the road, wherever directed.

(vi) Carrying out all tests for quality control.

4.0 SURFACE FINISH

4.01 CONTROL OF ALIGNMENT LEVEL & SURFACE REGULARITY

4.02 General

All works to be performed shall conform to the lines, grades, cross-sections and dimensions shown on the drawings or as directed by Engineer-in-Charge, subject to the permitted tolerances described hereinafter.

4.03 Horizontal Alignment
Horizontal alignment shall be reckoned with respect to the entire line of the carriageway as shown on the drawings. The edges of the carriageway as constructed shall be correct within a tolerance of +/- 10 mm there from. The corresponding tolerance for edges of the roadway and lower layers of pavement shall be +/- 25 mm.

4.04 Surface Levels

The levels of the sub-grade and different pavement courses as constructed, shall not vary from those calculated with reference to the longitudinal and cross-profile of the road shown on the drawings or as directed by the Engineer-in-Charge beyond the tolerances mentioned in Table -4.

<table>
<thead>
<tr>
<th></th>
<th>Sub-grade</th>
<th>+ 20 mm / - 25 mm</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Sub-base</td>
<td></td>
</tr>
<tr>
<td>2.</td>
<td>Sub-base</td>
<td></td>
</tr>
<tr>
<td>a)</td>
<td>Flexible Pavement</td>
<td>+ 10 mm / - 20 mm</td>
</tr>
</tbody>
</table>

Provided, however, that the negative tolerance for wearing course shall not be permitted in conjunction with positive tolerance for basic course, if the thickness of the former is thereby reduced by more than 6 mm for flexible pavement and 5 mm for concrete pavements.

4.05 Surface Regularity

The longitudinal profile shall be checked with a 3 metre long straight-edge at the middle of each traffic lane along a line parallel to the centre line of the road. The maximum allowable difference between the road surface and underside of a 3m straight-edge when placed parallel with, or at right angles to the centre line of the road at points decided by the Engineer-in-Charge shall be as under:

For WBM Sub-base / Base Course 8 mm

4.06 Rectification / Reconstruction of Defective Macadam

Where the surface regularity of sub-grade and the various pavement courses fall outside the specified tolerances, the contractor shall be liable to rectify these at their own cost in the manner described below and to the satisfaction of the Engineer-in-Charge.

4.07 Sub-Grade

Where the surface is high, it shall be trimmed and suitably compacted. Where the surface is low, the deficiency shall be corrected by scarifying the lower layer and adding fresh material and re-compacting to the required density.

4.08 WBM (Sub-base / Base Course)

Where the surface is either high or low, the course to its full thickness shall be scarified over the affected area, reshaped with added material or removed and replaced with fresh material and re-compacted to the required density. In no case shall depressions be filled up with screenings or binding material.
5.0 **EARTH WORK**

5.01a **EARTH WORK IN FILLING**

Earth work in filling in banks shall be done in layers, each layer not exceeding 20 cm in thickness and should be properly watered to maintain the optimum moisture content. Consolidation of every 3rd layer (alternate layer) and the top-most layer should be done with power roller of minimum 80-100 KN capacity and got approved by Engineer-in-Charge before compacting the next layer. Required quantity of earth should be obtained from borrow-pits, the sites of which should necessarily be approved by Engineer-in-Charge. No borrow-pits should be dug within 4.5 m of toe of the final section of the embankment. Necessary witness should be left for the purpose of measurement of quantity of earth excavated and used in embankment. Proper profiles of embankment shall be maintained. Requisite allowance in height varying from 25 – 50 mm as directed by Engineer-in-Charge shall be left for settlement. Side slopes shall be maintained strictly as per drawings.

5.01b Earthwork in filling shall be measured in compacted volume of finished work in cubic metres.

5.02 **EARTH WORK IN EXCAVATION**

**General**

All excavation shall be carried out in conformity with the lines, grades, side slopes and levels shown on the drawings or as directed by the Engineer-in-Charge. The contractor shall not excavate outside the limits of excavation. After excavation, the sides of excavated area shall be trimmed and the area contoured to minimize erosion and ponding, allowing for natural drainage to take place.

Rock, when encountered in road excavation, shall be removed upto the formation level. Rocks and large boulders which are likely to cause differential settlement and also local drainage problems should be removed to the extent of 500 mm below the formation level in full formation width.

5.03 Slope in cutting and filling at hill side and valley side shall be as per direction of Engineer-In-Charge.

5.04 **Disposal of Excavated Materials**

All the excavated materials shall be the property of the Employer. The materials obtained from excavation shall be used for filling in the adjacent embankments as directed by the Engineer-in-Charge. All hard rocks, not intended for use shall be stacked neatly on specified land as directed by the Engineer-in-Charge.

Unsuitable and surplus materials not intended for use shall be transported and disposed clear of the site as directed by the Engineer-in-Charge.

6.0 **PREPARATION OF SUB-GRADE**

The optimum moisture content should always be maintained by sprinkling requisite quantity of water in order to keep the sub-grade in established condition in accordance with the direction of Engineer-in-Charge.
with the direction of Engineer-in-Charge. The sub-grade must not be allowed to become dry and break-up for want of cohesion. The final sectioning should be done to proper camber, gradient and super elevation with the help of template and strings. The rate of preparation and consolidation of sub-grade includes earth work in cutting and filling upto 22.5 cm thickness, if necessary, in order to achieve the desired profile. The dressed surface should be properly consolidated by rolling with power road roller of minimum 80-100 KN capacity.

7.0 WATER BOUND MACADAM (SUB – BASE / BASE COURSE)

7.01 SCOPE

This work shall consist of clean, crushed aggregates mechanically interlocked by rolling and bonding together with screening, binding material where necessary and water laid on a properly prepared sub grade and finished in accordance with the requirements of these specifications and in close conformity with the lines, grades, cross-sections and thickness as per approved plans or as directed by Engineer-in-Charge.

It is not desirable to lay Water Bound Macadam on an existing thin black topped surface without providing adequate drainage facility for water that would get accumulated at the interface of exiting bituminous surface and WBM.

7.02 MATERIALS

7.021 Coarse Aggregate

Coarse Aggregates shall conform to the grading requirement as set forth in Table – 5.

<table>
<thead>
<tr>
<th>Size of Aggregate</th>
<th>IS Sieve Designation</th>
<th>% by Weight Passing IS Sieve</th>
</tr>
</thead>
<tbody>
<tr>
<td>Grade – I (45 mm to 90 mm)</td>
<td>100 mm</td>
<td>100</td>
</tr>
<tr>
<td></td>
<td>80 mm</td>
<td>65-85</td>
</tr>
<tr>
<td></td>
<td>63 mm</td>
<td>25-60</td>
</tr>
<tr>
<td></td>
<td>40 mm</td>
<td>0-15</td>
</tr>
<tr>
<td></td>
<td>20 mm</td>
<td>0-05</td>
</tr>
<tr>
<td>Grade – II (45 mm to 63 mm)</td>
<td>80 mm</td>
<td>100</td>
</tr>
<tr>
<td></td>
<td>63 mm</td>
<td>90-100</td>
</tr>
<tr>
<td></td>
<td>50 mm</td>
<td>35-70</td>
</tr>
<tr>
<td></td>
<td>40 mm</td>
<td>0-15</td>
</tr>
<tr>
<td></td>
<td>20 mm</td>
<td>0-05</td>
</tr>
</tbody>
</table>

7.022 Stone Screenings

Screening to fill voids in the coarse aggregates shall generally consist of the same material as the coarse aggregate. Screening shall conform to the grading requirements as set forth in Table – 6.
Table – 6

<table>
<thead>
<tr>
<th>Size of Screenings</th>
<th>IS Sieve Designation</th>
<th>% by Weight Passing IS Sieve</th>
</tr>
</thead>
<tbody>
<tr>
<td>13.2 mm</td>
<td>13.2 mm</td>
<td>100</td>
</tr>
<tr>
<td></td>
<td>11.2 mm</td>
<td>95-100</td>
</tr>
<tr>
<td></td>
<td>5.6 mm</td>
<td>15-35</td>
</tr>
<tr>
<td></td>
<td>180 micron</td>
<td>0-10</td>
</tr>
</tbody>
</table>

7.023 Proportioning of Materials

Approximate quantities of coarse aggregate and stone screenings required for Water Bound Macadam base / sub-base course shall be as mentioned in Table-7.

Table - 7
(Quantity for 10 Sqm Area)

<table>
<thead>
<tr>
<th>Classification</th>
<th>Size / Range</th>
<th>Compacted Thickness</th>
<th>Net Quantity</th>
<th>Stone Screening Classification &amp; Size</th>
<th>For WBM Sub-base / Base Course (Net Quantity)</th>
<th>Binding Material</th>
</tr>
</thead>
<tbody>
<tr>
<td>Grade – I</td>
<td>45 mm – 90 mm</td>
<td>100 mm</td>
<td>1.245 m³</td>
<td>Type-A (13.2 mm)</td>
<td>0.285 m³</td>
<td>0.10 m³</td>
</tr>
<tr>
<td>Grade – II</td>
<td>45 mm – 63 mm</td>
<td>75 mm</td>
<td>0.935 m³</td>
<td>Type-A (13.2 mm)</td>
<td>0.135 m³</td>
<td>0.09 m³</td>
</tr>
</tbody>
</table>

* Net quantity means – the quantity of metal measured in stacks and reduced by 7.5%.

7.03 CONSTRUCTION OPERATIONS

7.03.1 Scarifying Old WBM Surface

All dirts, dusts, cacked up mud, slush, animal droppings, vegetation and all other rubbish shall be removed from the water bound macadam surface.

The macadam surface shall be scarified to a depth of approximately 5 cm with additional picking of high parts of the road as may be necessary to the required camber and gradient as directed by the Engineer-in-Charge. Any hollows that remain after picking shall be filled with new aggregate 50 mm nominal size and well consolidated to bring the surface to template.

The scarified aggregate shall be raked to bring smaller stones on the top and surface brought to required camber and gradient with tolerance of 12 mm longitudinally as well as transversely.

All rubbish etc. shall be disposed off as directed by Engineer-in-Charge. Scarifying operation will also include consolidation with road roller the aggregate received from scarifying, although these aggregate will be consolidated along with aggregate of new wearing course.
7.03.2 Preparation of Base

The surface of the sub grade / sub-base base to receive the Water Bound Macadam course shall be prepared to the specified lines grades & camber and made free of dust and other extraneous material. Any soft yielding places shall be corrected in an approved manner and rolled until firm surface is obtained if necessary by sprinkling water. Any sub-base/base/surface irregularities, where predominant shall be made good by providing appropriate type of profile corrective course (leveling course).

7.03.3 Spreading Coarse Aggregates

The coarse aggregate shall be spread uniformly and evenly upon the prepared sub-grade to proper profile by using templates placed across the road about 6m apart in such quantities that the thickness of each compacted layer is not more than 100mm for Grade-I and 75 mm for Grade-II. Wherever possible, approved mechanical devices such as aggregate spreader shall be used to spread the aggregates uniformly so as to minimize the need for manual rectification afterwards.

The surface of the aggregates spread shall be carefully checked with templates and all high or low spots remedied by removing or adding aggregates as may be required. The surface shall be checked frequently with a straight-edge while spreading and rolling so as to ensure a finished surface as per approved drawings.

The course aggregates shall not normally be spread more than 3 days in advance of the subsequent construction operations.

7.03.4 Rolling

Immediately following the spreading of the coarse aggregates, rolling shall be started with three wheeled Power Roller of 80-100 KN capacity or Vibratory Rollers of 80-100 KN static weight. The type of roller to be used shall be approved by the Engineer-in-Charge based on trial run Rolling shall be discontinued when the aggregates are partially compacted with sufficient void space in them to permit the application of stone screenings.

The rolled surface shall be checked transversely and longitudinally, with templates and any irregularities corrected by loosening the surface, adding or removing necessary amount of aggregates and re-rolling until the entire surface conforms to desired grade and camber. In no case shall be use of screenings be permitted to make up depressions. Material which gets crushed excessively during compaction or becomes segregated shall be removed and replaced with suitable aggregates.

7.03.5 Application of Screenings

After the coarse aggregate has been rolled completely, screenings to completely fill the interstices shall be applied gradually over the surface. These shall not be damp or wet at the time of application. Dry rolling shall be done while the screenings are being spread so that vibrations of the roller cause them to settle into the voids of the coarse aggregates. The screenings shall not be dumped in piles but be spread uniformly in successive thin layers either by the spreading motions of hand shovels or by mechanical spreaders.
The screenings shall be applied at a slope and uniform rate (in three or more applications) so as to ensure filling of all voids. This shall be accompanied by dry rolling and brooming with mechanical or hand brooms.

7.03.6 Sprinkling of Water and Grouting

After the screenings have been applied the surface shall be copiously sprinkled with water swept and rolled. Hand brooms shall be used to sweep the wet screenings into voids and to distribute them evenly. The sprinkling, sweeping and rolling operations shall be continued, with additional screenings applied as necessary until the coarse aggregate has been thoroughly keyed, well bonded and firmly set in its full depth and a grout has been formed of screenings. Care shall be taken to see that the base or sub-grade does not get damaged due to the addition of excessive quantity of water during construction.

7.03.7 Application of binder Material (Moorum / Stone Dust)

After the application of stone screening in accordance with Clauses 8.034 and 8.035 the binding material where it is required to be used shall be applied successively in two or more thin layers at a slow and uniform rate. After each application, the surface shall be copiously sprinkled with water, the resulting slurry swept in with hand brooms or mechanical brooms to fill the voids properly and rolled during which water shall be applied to the wheels of the roller if necessary to wash down the binding material sticking to them. These operations shall continue until the resulting slurry after filling of voids forms a wave ahead of the wheels of the moving roller.

7.03.8 Setting and Drying

After the final compaction of Water Bound Macadam course the pavement shall be allowed to dry overnight. Next morning hungry spots shall be filled with screenings or bending materials as directed, lightly sprinkled with water if necessary and rolled. No traffic shall be allowed on the road until the macadam has set.

7.03.9 Surface Course

The surface course shall consist of 25 mm compacted thickness of semi-densed bituminous concrete with an underneath layer of 50 mm thick premixed bituminous macadam using hot mix plant, paver equipment etc. as specified in CPWD specifications.

8.0 BITUMINOUS MACADAM USING HOT MIX PLANT AND PAVER EQUIPMENT

General: This shall consists of construction of a single or more courses of compacted crushed aggregates premixed with bitumen laid immediately after application of the tack coat. The thickness of single compacted course shall not exceed 75 mm.

8.01 Materials

(a) Aggregates: These shall be crushed of broken from hard stones obtained from approved quarry. These shall be clean, strong durable of fairly cubical shape and free from disintegrated soft, friable, thin, elongated or laminated pieces. These shall also be free from dirt, organic, deleterious and any other foreign matter and adherent coatings. These shall conform to the physical requirements laid down in table under this item.
(b) Grading: Aggregates shall conform to grading specified in the following table.

<table>
<thead>
<tr>
<th>Sieve</th>
<th>Percentage of wt. passing the Sieve</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Designation IS: 460</strong></td>
<td><strong>For 75 mm compacted thickness</strong></td>
</tr>
<tr>
<td>63 mm</td>
<td>100</td>
</tr>
<tr>
<td>53 mm</td>
<td>95 – 100</td>
</tr>
<tr>
<td>45 mm</td>
<td>50 – 90</td>
</tr>
<tr>
<td>26.5 mm</td>
<td>30 – 45</td>
</tr>
<tr>
<td>22.4 mm</td>
<td>---</td>
</tr>
<tr>
<td>13.2 mm</td>
<td>10 – 25</td>
</tr>
<tr>
<td>11.2 mm</td>
<td>---</td>
</tr>
<tr>
<td>5.6 mm</td>
<td>---</td>
</tr>
<tr>
<td>2.8 mm</td>
<td>---</td>
</tr>
<tr>
<td>90 microns</td>
<td>0 – 5</td>
</tr>
</tbody>
</table>

**Bitumen:** It shall be straight run bitumen of penetration value 60 / 70 conforming to IS: 73

**8.02 Mixing**

**Weather & Seasonal Limitations:** Bitumen macadam shall not be laid during rainy weather or when the surface is damp of wet or when the temperature is less than 16 deg. C under shade.

**Hot Mix Plant:** A hot mix plant of adequate capacity not less than 30 tonne per hour capacity and capable of producing a proper and uniform quality mix shall be used for preparing the mix. The plant may be either a batch type or a continuous one, having a coordinated set of essential units such as a drier for heating the aggregates, device for batching / feeding by weight or volume the required quantities of aggregates, a binder heating and control unit for metering out the correct quantity of heated binder together with a mechanical mixer for thorough mixing of the binder and aggregates.

**Temperature:** The temperature of the binder at the time of mixing shall be in the range of 150 deg C – 177 deg. C and of aggregates in the range of 155 deg. C – 163 deg. C. At no time, however, shall the difference in temperature between the aggregates and the binder exceed 14 deg. C. At no time shall bitumen or aggregates be over heated.

The hot graded aggregates and bitumen shall be measured separately and as accurately as practicable, to the proportions in which they are to be mixed. Mixing shall be done thoroughly so that a homogenous mixture is obtained in which all the particles are uniformly coated.

If feasible, a suitable site as approved by the Engineer-in-Charge near the works site for the mixer and for the storage of materials shall be provided, free of rent to the contractor. No claim shall be entertained by the department.

**8.03 Transporting of Mixed Materials**

The mixed materials shall be transported from mixing plant to the point of use in clean vehicles. Every precaution shall be taken to avoid segregation of mixed materials and to ensure that they do not become contaminated with dust or foreign matter. In order to
maintain satisfactory temperature of materials in transit, particularly in cold weather, and to prevent undue loss of heat, adequate precautions shall be taken by covering the materials to ensure that the materials are properly protected during transportation.

The temperature of the mix in every transporting vehicle shall be checked immediately prior to discharge into the spreader. If the temperature of any batch is below the laying temperature specified in para 8.04 the mix shall be rejected and shall be removed from site immediately.

8.04 Laying

The mix transported from the hot mix plant to the site shall be spread by means of a self propelled mechanical paver with suitable screeds capable of spreading, tamping and finishing the mix true to specified width and profile without causing segregation, dragging, burning, irregularities or other surface defects. The paver shall be capable of being operated at a speed consistent with the character of the mix and the thickness of the course being laid, so as to produce a surface having a uniform density and surface texture. Where not operated on side forms, the spreader shall employ equalizing runners, evener arms or other devices to adjust the profile and confine the edges of the course to true line. The temperature of the mix at the time of laying shall be in the range of 110 deg. C to 135 deg. C.

Hand spreading is prohibited.

8.05 Rolling

After spreading of the mix, consolidation shall be done by an approved power driven road roller or rollers weighing not less than 8 / 10 tonne each. Rolling shall start as soon as possible after material has been spread. Rolling shall be done with care to keep from unduly roughening of pavement surface. Rolling shall start longitudinally at the sides and proceed towards the centre of the pavement, overlapping on each successive trip by at least one half the width of rear wheel. End stop channel boards may have to be used if the middle portion of the pavement is taken first, alternate strips of the roller shall be slightly different length.

The speed of the roller shall not exceed 5 km per hour and shall at all points be slow enough to avoid displacement of the mixture and any displacement occurring as a result of the reversing the direction of the roller, or from any other cause, shall at once be corrected by the use of rakes and addition of fresh mixture where required.

When the roller has passed over the whole area once, any high spots or depressions which become apparent shall be corrected by removing or adding fresh material. Rolling shall then proceed continuously with at least 10 passes of the roller till no further compaction if possible. To prevent adhesion of the mixture to the wheels of the roller, the wheel shall be kept damp with water, but excess of water shall not be permitted. In no case shall fuel lubricating oil be used for this purpose.

8.06 Joints

Longitudinal joints and edges shall be constructed true to the delineating line parallel to the centre line of runway. The longitudinal lane joints shall be truly vertical in straight lines.
which are continuous for the full length of the paver or in smooth curves around bends. The exposed vertical edges of the longitudinal length joints shall be carefully cut back and trimmed to firm material in the compacted length, or for a minimum of one and a half times the layer thickness, whichever is the greater. Arising from this operation shall be removed from the pavement and the underlying surface cleaned. The exposed joints then be cleaned and painted with hot bitumen immediately before the laying of lane continues. Nothing extra shall be paid on this account.

**Transverse Joints:** They shall be formed at right angles to the longitudinal joints, and truly vertical. The exposed vertical edges of the transverse joints shall be cut back and trimmed to firm, material or for a distance of not less than 1.5 times the thickness of layer whichever is greater. Arising from this operation shall be removed from the pavement and the under laying surface cleaned. The exposed joints shall then be cleaned and painted with hot bitumen immediately before the laying of the lane continues. Nothing extra shall be paid on this account.

**Pavement Edges:** Pavement shall be laid to correct width and alignment. To achieve straight and vertical edge, contractor shall either use adequate side shuttering or cut back the edges to correct with an alignment by removing extra mix spread. Nothing extra shall be paid on this account.

9.0 **SEMI-DENSE ASPHALTIC CONCRETE USING HOT MIX PLANT AND PAVER EQUIPMENTS**

9.01 **Materials**

(a) **Coarse Aggregate:** This shall be crushed or broken from hard stones of obtained from approved quarry. This shall be clean, strong, durable of fairly cubical shape and free from disintegrated soft, friable, thin, elongated or laminated pieces. These shall also be free from dirt organic, deleterious and any other foreign matter and adherent coatings. The coarse aggregates shall satisfy the physical requirements laid down in CPWD specification.

(b) **Fine Aggregate:** The fine aggregates shall be the fraction passing 2.80 mm sieve and retained on 90 micron sieve, consisting of crusher run screenings, natural sand or a mixture of both. This shall be clean, hot, durable, uncoated dry, and free from any injurious, soft or flaky pieces and organic or deleterious substances. The aggregates shall also be free from sulphates, chlorides and other materials (i/c products of decomposition) which may be liable to break down during drying or subsequently when exposed to weather.

**Bitumen:** Bitumen shall be straight run bitumen of penetration value 60 / 70 conforming to IS: 73.

Grading for combined aggregates: (mixture of coarse aggregates and fine aggregates).

In order to satisfy the design requirements for the semi dense asphaltic concrete mix laid down in CPWD specification, the mix shall contain coarse aggregates and fine aggregates in suitable proportion. True and representative samples of the aggregate likely proposed to be used on the specific job shall be tested in design laboratory and a proper
blend of the individual aggregates normally available shall be worked out so that the
gradation of the final composition shall satisfy the limits laid down in table.

<table>
<thead>
<tr>
<th>Sieve designation IS: 460</th>
<th>%age passing by weight</th>
</tr>
</thead>
<tbody>
<tr>
<td>22.4 mm</td>
<td>100</td>
</tr>
<tr>
<td>13.2 mm</td>
<td>79 – 100</td>
</tr>
<tr>
<td>11.2 mm</td>
<td>68 – 90</td>
</tr>
<tr>
<td>5.6 mm</td>
<td>33 – 55</td>
</tr>
<tr>
<td>2.8 mm</td>
<td>22 – 38</td>
</tr>
<tr>
<td>710 microns</td>
<td>6 – 22</td>
</tr>
<tr>
<td>355 microns</td>
<td>4 – 14</td>
</tr>
<tr>
<td>180 microns</td>
<td>2 – 9</td>
</tr>
<tr>
<td>90 microns</td>
<td>0 – 5</td>
</tr>
</tbody>
</table>

9.02 Bitumen Content

The bitumen content shall be determined in an approved government laboratory as
directed by the Engineer-in-Charge by the Marshall Design Method, so as to obtain the
following standards of compaction and strength using 75 blows on each end of the
specimen for compaction.

- Marshall stability not less than 900 kg
- Marshall flow value in 0.1 mm 20-35
- Voids in compacted mix 5 % to 7 %
- Percentage voids in combined aggregates filled with bitumen 60 % to 75 %

9.03 Mixing

**Weather and Seasonal Limitation**: Semi dense asphaltic concrete shall not be laid during
rainy weather or when the base course is damp, wet or when the temperature is less than
16 deg. C under shade.

**Hot Mix Plant**: As specified in clause no. 8.02.

**Temperature**: The temperature of the binder at the time of mixing shall be in the range of
150 deg. C – 170 deg. C and of aggregate in the range of 155 deg. C – 163 deg. C. At no
time, however, shall the difference in temperature between the aggregate and the binder
exceed 14 deg. C. At no time shall bitumen or aggregates be over heated.

The hot graded aggregate and bitumen shall be measured separately and as accurately
as practicable in the proportions in which they are to be mixed.

The hot aggregate and binder shall be thoroughly and intimately mixed together in the
correct proportion for at least 1.5 minutes and until every particle of aggregates is
completely coated and homogeneous mixture is obtained. The total mixing time may only
be reduced if the Engineer-in-Charge is satisfied that thorough mixing can be achieved in
less time. In such case the contractor shall obtain the prior written permission of the
Engineer-in-Charge.
9.04 Transporting Mixed Materials: Para 8.03 shall apply.

9.05 **Laying**

9.06 Para 8.04 shall apply except that the temperature of the mix at the time of laying shall be in the range of 121 deg. C to 163 deg. C.

9.07 Hand spreading is prohibited.

9.08 **Rolling**

9.09 After being spread, consolidation shall be carried out as detailed in 8.05.

9.10 The minimum number of roller passes required for maximum attainable density shall be found out at site by laying experimental strips before commencement of work. The maximum break down temperature at which rolling can commence shall be determined by field trials.

9.11 The line of rolling shall not be suddenly changed or the direction of rolling suddenly reversed thereby displacing the mix. Roller shall not be left standing on the newly laid surface.

9.12 The surface shall be carefully examined for residual marks which shall be cleanly rolled out and a neat finished surface obtained.

9.13 **Rolling Temperature**: the range of temperature during rolling shall be 80 deg. C to 120 deg. C and no rolling shall be allowed below 80 deg. C.

9.14 **Joints**: For longitudinal joints, transverse joints and pavement joints para 8.06 shall apply.

10.0 **Road Studs**

10.1 **Body**: Made of Aluminum Die Cast Matte Finish (sand Blasted), conforming to IS 617: 1994 Designation 4520. Provided with anti-twist ribs on the bottom anchor, and with embossed raised surface and water draining channels at top. Compressive strength 179 KN.

10.2 **Top Cover**: Made of clear, transparent, anti-static poly carbonate material of 4.5 mm thickness.

10.3 **PV Module**: Solar PV Module made of high efficiency crystalline silicon PV cells of conversion efficiency 13%.

10.4 **Battery**: Ni-MH Type of 1.2V

10.5 **LED**: Ultra Bright LEDS of 5 mm dia having luminous intensity approx. 6300 mcd (23 viewing angle). All LEDs covered with the poly carbonate covers on the sides. 3 LEDs on one tapering side for uni-directional solar studs and on two opposite tapering sides of bi-directional solar studs.
10.6 **Reflector:** High intensity reflective grade polymer sticker with back adhesive for additional passive reflection of head light fixed around the LED area.

10.7 **Dimension:** 125 mm x 125 mm x 90 mm

10.8 **Water Protection:** Tested as per IP 65 in accordance with IS 12063: 1987 category 2 for protection against water ingress.

10.9 **Operating Temperature:** (-) 25 degrees C to (+) 55 degrees C

10.10 **Visibility:** >800 meters at clear night conditions (straight line)

10.11 **Weight:** 700 +/- 25 grams

700 +/- 25 grams. Automatic dusk to dawn solar switching.

10.12 **Autonomy:** Battery back-up for four (4) no. – sun days.

10.13 **Flashing Rate:** Typically 1 Hz

10.14 **Thermal Cycling Test:** Tested as per IEC 1215 (between -40 to +85 degrees centigrade) found be working satisfactorily for 125 hours.

10.15 **Vibration Test:** Tested as per QM333

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**LIST OF APPROVED MAKE**

1. **Ordinary Portland Cement:**
   - ACC, JK Birla, Vikram, Raymond, Ultratech, Star, Topcem, Taj, Dalmia, Amrit, Lafarge conforming grade as applicable for design and drawing.

2. **Reinforcement Steel MS & TMT:**
   - M.S. bar shall conform to IS: 2062. TMT bar shall be as per IS: 1786 of grade Fe-415/ 500. Approved manufacturer for MS/TMT bar are SAIL/ TISCO/ ISPAT/ BISCON/ KAMDHENU or other reputed manufacturer with prior approval of the competent authority.

3. **PVC pipe for weep holes:**
   - Parag, Jindal, Supreme, Prince.

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

NIT No. & Date: NERO/CON/ASR/SRIKONA/256     Dated: 10.08.2017

Tender for Construction of alignment of new road for Assam Rifles at Srikona, Assam.

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<td>Typical section of Box Culvert</td>
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Note: The drawings enclosed are as received from the Owner for general guidance only. The works shall be executed as per the detail drawings to be prepared by the contractor and finalized during execution and as per instructions of the Owner.
TYPICAL CROSS SECTION OF ROAD

- 25 mm Thick Premix Carpet
- 2 Layers x 75 mm Thick WBM (Stone Aggregate - 63 to 45mm)
- 1 Layer x 100 mm Thick WBM (Stone Aggregate - 90 to 45mm)

NOTES
1. ALL DIMENSIONS ARE IN MM UNLESS OTHERWISE NOTED.
2. ALL LEVELS ARE IN METRE, UNLESS OTHERWISE NOTED.
3. ONLY HELD DIMENSIONS SHALL BE FOLLOWED AND NO DIMENSION SHALL BE SCALE.
TYP. SECTION OF SIDE DRAIN
50MM PCC COPING (1:3:6)

RANDOM RUBBLE MASONRY

100 DIA PVC PIPE WEEP
HOLE @ 100/C/C BOTHWAYS

SLOPE - 1 IN 10

FOUNDATION DEPTH 500

DIP OF FOUNDATION 1:6

200 THK.P.C.C. (1:3:6)

500

3000

1800

550

450

GRavel PACKING

GRavel PACKING

RETAINING WALL TYPICAL DETAIL - 3.0 MTR. HEIGHT

'RT2'
RETAINING WALL TYPICAL DETAIL - 4.5 MTR HEIGHT

'RT3'
TYP. SECTION A–A OF BOX CULVERT
RETAINING WALL TYPICAL DETAIL - 2.0MTR. HEIGHT

'RT1'