



ALL INDIA FOOTBALL FEDERATION

**NOTICE INVITING TENDER (NIT) FOR THE CONSTRUCTION OF ROAD
WORKS FOR THE ALL INDIA FOOTBALL FEDERATION (AIFF) NATIONAL
CENTER OF EXCELLENCE KOLKATA, WEST BENGAL, INDIA**

Date of Issue: 30 October 2025

Last Date to Seek Clarifications: 04 November 2025

Last Date of Submission of Bids: 14 November 2025

CONSTRUCTION OF ROAD WORKS FOR AIFF NATIONAL CENTER OF EXCELLENCE,
KOLKATA, WEST BENGAL, INDIA

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NIT Number and Date : AIFF/SPI/NCE/RFP/002 dated 30 October 2025

Agreement Number and Date (Post award of works) : -----

Name of Work : CONSTRUCTION OF ROAD WORKS (“**NCE Road Works**”) FOR AIFF NATIONAL CENTER OF EXCELLENCE, KOLKATA, WEST BENGAL, INDIA (“**NCE**”)

Estimated Cost of Contract

(INR in figures) : ₹ 89,57,192/-

(INR in words) : Indian Rupees Eighty Nine Lakh Fifty Seven Thousand One Hundred and Ninety Two only

Period of Completion : Ninety (90) Days (including any days’ occurring during the monsoon season)

SECTION 1

NOTICE INVITING TENDER

N.I.T.NO. AIFF/SPI/NCE/RFP/002

Date: 30 October 2025

Online item rate bids for the following works are invited from qualified contractors and firms of repute fulfilling registration criteria:

Sr. No.	Name of Work	Estimated Cost of Contract (INR in Lakhs)	Bid Security (INR In Lakhs)	Period of Completion (in Days)
1.	CONSTRUCTION OF ROAD WORKS FOR AIFF NATIONAL CENTER OF EXCELLENCE, KOLKATA, WEST BENGAL, INDIA	89.57/-	8.95/-	90

Note: The 'Estimated Cost of Contract' mentioned above consists of the actual cost of construction and other taxes including Goods & Services Tax ("GST") as applicable from time to time. Therefore, all Tenderers (as defined herein) are advised to place their Bids (as defined herein) accordingly.

1. Critical Dates Sheet

Date of Issue and Bid Document Download	30 th October 2025
Last Date for Tenderers to Seek Clarifications	4 th November 2025 17:00 HRS
Last Date for Publishing of Responses to Clarifications by AIFF	7 th November 2025 17:00 HRS.
Duration for NCE inspection by prospective Tenderers	31 st October 2025 to 6 th November 2025 10:00 HRS to 16:00 HRS
Bid Submission End Date	14 th November 2025 12:00 HRS
Opening of Technical Bid	14 th November 2025 14:00 HRS
Opening of Financial Bid	15 th November 2025

Project Duration	90 Days (including any day during the monsoon season)
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2. Any persons / consortiums that are interested in submission of its Bid (as defined herein) to AIFF in response to this NIT (“**Tenderers**”) for the purpose of evaluation and shortlisting Bids shall ensure that their Bids, complete in all respect should be submitted online before the submission end date and time as indicated in the Critical Dates Sheet above by way of email. For the purposes of this NIT, “**Bid**” shall mean a bid submitted to AIFF to provide the services in accordance with the terms and conditions set out in this NIT.
3. Bids shall be submitted online only, by way of an email to: legal@the-aiff.com and as per the instructions given in Section 2 of this NIT (*Information and Instructions to the Tenderers*).
4. Tenderers shall not tamper/modify the Letter of Tender (as set out in Section 3) in any manner. In case it is found that a Tenderer has tampered with/modified the Letter of Tender in any manner, the Bid of such Tenderer shall be rejected and the Bid Security (as defined herein) deposited by the relevant Tenderer shall be forfeited in its entirety.
5. Tenderers are advised to visit the AIFF website at www.the-aiff.com, from time to time, till the Bid Submission End Date, for any corrigendum/addendum/amendment to this NIT. AIFF shall publish all corrigendum/addendum/amendment to this NIT on its website.

6. **Minimum Eligibility Criteria:**

Tenderers must meet the following minimum qualifying criteria

A. **Work Experience:**

- i. Experience of having successfully completed one or more of the following Similar Works (as defined herein) during a period of seven (7) years ending on the day before the Bid Submission End Date:

Three (3) Similar Works each cost not less than forty percent (40%) of the Estimated Cost of Contract;

OR

Two (2) Similar Works each costing not less than sixty percent (60%) of the Estimated Cost of Contract;

OR

One (1) Similar Work costing not less than eighty percent (80%) of the Estimated Cost of Contract,

For the purposes of this NIT, “**Similar Works**” shall mean civil works of any road infrastructure or site development work.

- ii. Previous experience of executing Similar Works must be supported by certificates issued in favour of the Tenderer by the clients for which such Similar Works were executed.

B. Financial Eligibility Criteria:

- i. The average annual financial turnover for the last five (5) Financial Years shall be at least fifty percent (50%) of the Estimated Cost of Contract; and .
- ii. The net worth of the Tenderer as on 31st March of the previous Financial Year must be positive; and
- iii. The Tenderer should not have incurred losses in more than two (2) years out of the last five (5) Financial Years.

The Tenderer must submit a certificate attesting to each of the criteria described in Section 6(B) above, which certificate(s) shall be duly certified by a chartered accountant along with their seal, signature, and UDIN.

- C. Note: In the event that the Tenderer has been incorporated less than five (5) years ago, such Tenderer alone may submit documents substantiating paragraphs 6(B)(i) and 6(B)(iii) above, with each being duly certified by a chartered accountant with their seal, signature, and UDIN

D. For Consortium Bidders

Consortium, joint ventures or joint bidders (each a “Consortium” and each entity in Consortium referred to as a “Consortium Member”) may submit a Bid (“Consortium Bid”) provided that:

- (a) each Consortium Member which has submitted a Consortium Bid must be a Fit and Proper Person;
- (b) each Consortium Member is jointly and severally liable for the acts of the other Consortium Member(s) forming a part of the Consortium in relation to its Bid;
- (c) in the event the Consortium is declared the Selected Bidder, it shall incorporate a special purpose vehicle (the “SPV”) under the laws of India, for entering into the Contract with AIFF and for performing all its obligations in terms of the Contract. However, it is clarified that in such case, the Selected Bidder’s obligation will commence from the date on which the LOA is signed by AIFF and the Selected Bidder.
- (d) For each Consortium:
 - (i) there must be no more than three (3) Persons who are members in the Consortium;
 - (ii) the Consortium must fully describe in its Bid the relevant Consortium agreement and all relevant arrangements in relation to the Consortium, and produce the same upon request;
 - (iii) the Consortium must nominate one (1) Consortium Member as the lead member (“Lead Member”), who shall have an equity share holding of at least 51% (fifty one per cent) of the paid up and subscribed equity of the SPV. The nomination(s) shall be supported by a Power

of Attorney, signed by all the other Consortium Member(s). Lead Member shall be the contact person for AIFF in relation to this RFP and any Bid submitted by it, and AIFF shall deal with such Lead Member in place of the remaining Consortium Member(s) in relation to this RFP and any Bid submitted by such

7. Amendments to this NIT, if any, shall be published on the AIFF website only.

All India Football Federation

DISCLAIMER

1. The information contained in this NIT or any information provided subsequently to Tenderers, whether verbally or in documentary or any other form by or on behalf of the AIFF, is provided to Tenderers under the terms and conditions set out in this NIT and such other terms and conditions subject to which such information is or may be provided.
2. This NIT is not an agreement and is neither an offer nor an invitation by AIFF to prospective Tenderers or any other person. The purpose of this NIT is to provide Tenderers with information that may assist them in the formulation of their Bids pursuant to this NIT. This NIT includes statements, which reflect various assumptions and assessments arrived at by AIFF in relation to the services required to be performed. Such assumptions, assessments and statements do not purport to contain all the information that each Tenderer may require. This NIT may not be appropriate for all persons, and AIFF cannot consider the objectives, expertise and particular needs of each party who reads this NIT or uses this NIT, except for the purposes of this NIT. The assumptions, assessments, statements and information contained in this NIT may not be complete, accurate, adequate or correct. Each Tenderer should, therefore, conduct its own investigations and analysis and should check the accuracy, adequacy, correctness, reliability and completeness of the assumptions, assessments and information contained in this NIT and obtain independent advice from appropriate sources.
3. The information provided in this NIT is not an exhaustive account of statutory requirements and should not be regarded as a complete or authoritative statement of law. AIFF accepts no responsibility for the accuracy or otherwise for any interpretation or opinion on the law expressed herein.
4. AIFF, its employees, consultants and advisers make no representation or warranty and shall have no liability to any person including any Tenderer under any law, statute, rules or regulations or tort, principles of restitution or unjust enrichment or otherwise for any loss, damages, cost or expense which may arise from or be incurred or suffered on account of anything contained in this NIT or otherwise, including the accuracy, adequacy, correctness, reliability or completeness of the NIT and any assessment, assumption, statement or information contained therein or deemed to form part of this NIT or arising in any way in the process to identify the Contractor (as defined herein) envisaged under this NIT (“**Selection Process**”).
5. AIFF also accepts no liability of any nature whether resulting from negligence or otherwise, howsoever caused, arising from reliance of any Tenderer upon the statements contained in this NIT.
6. AIFF may, in its absolute discretion, but without being under any obligation to do so, update, amend or supplement the information, assessment or assumption contained in this NIT.
7. The issuance of this NIT does not imply that AIFF is bound to select a Tenderer or to appoint a Contractor for the execution of the NCE Road Works and AIFF reserves the right to reject all or any of the Bids without assigning any reasons whatsoever.

8. The Tenderer shall bear all costs associated with or relating to the preparation and submission of its Bid including but not limited to preparation, copying, postage, delivery fees, expenses associated with any demonstrations or presentations which may be required by AIFF or any other costs incurred in connection with or relating to its Bid. All such costs and expenses will remain with the Tenderer and AIFF shall not be liable in any manner whatsoever for the same or for any other costs or other expenses incurred by a Tenderer in preparation or submission of the Bid, regardless of the conduct or outcome of the Selection Process.
9. It shall not be assumed by any prospective Tenderers that there shall be no deviation or change in any of the information mentioned herein pertaining to requirements or terms of reference or scope of work. While this document has been prepared in good faith, neither AIFF nor any of its employees, consultants or advisers make any representation or warranty or shall have any responsibility or liability whatsoever in respect of any statements or omissions here from. Any liability is accordingly and expressly disclaimed by AIFF and any of its employees, consultants or advisers even if any loss or damage is caused by any act or omission on the part of AIFF or any of its employees, consultants or advisers, whether negligent or otherwise.
10. By acceptance of this NIT, each Tenderer agrees that any information herewith will be superseded by any subsequent written information on the same subject made available to the recipient by or on behalf of AIFF by way of an amendment, corrigendum or otherwise. AIFF and any of its respective officers undertake no obligation, among others, to provide the recipient with access to any additional information or to update this document or to correct any inaccuracies therein which may become apparent, and they reserve the right, at any time and without advance notice, to change the procedure for the selection of or any part of the interest or terminate negotiations or the due diligence process prior to the signing of any binding agreement.
11. Accordingly, interested Tenderers should carry out an independent assessment and analysis of the requirements of the information, facts and observations contained herein.

SECTION 2

INFORMATION AND INSTRUCTIONS TO TENDERERS

1. INTRODUCTION

- 1.1 AIFF, the national body to develop the game of football in the country, has undertaken to further strengthen and develop the game in India by establishing the NCE.
- 1.2 The NCE is aimed at being a state-of-the-art facility which shall be the new home of AIFF national teams across age groups for men and women.
- 1.3 In this regard, AIFF had issued an NIT dated January 20, 2020, bearing NIT number AIFF/SPI/NCE/RFP/011 to invite tenders for: (i) storm water drainage works for training sites at the NCE; and (ii) construction of road works at the NCE (“**2020 NIT**”). In respect to the construction of road works, AIFF selected a qualified tenderer pursuant to the selection process set out in the 2020 NIT and entered into an agreement with such tenderer for the construction of road works at NCE. Due to delays in the construction of the road works, the agreement with such tenderer was terminated. AIFF is now desirous of engaging a Tenderer that can manage, for and on behalf of AIFF, the process of construction of the NCE Road Works.

2. ONGOING DESIGN DEVELOPMENT

Design and working drawing development will be ongoing during the Construction Period. It is therefore important that Tenderers be aware that:

- 2.1 The Bill of Quantities is provisional and is subject to re-measurement; and
- 2.2 Design and working drawing development and the calling of tenders for nominated subcontracts and supply-only contracts will nevertheless take cognizance of the Contractor’s construction of the NCE Road Works.

3. THE SITE

The fifteen (15) acre site for the **AIFF National Centre Of Excellence** is located at **Premises No. 08-0787, Plot No. AA-IIE/57/A, Action Area-IIE, New Town, Kolkata**. The site is adjacent to Eco Park on the western side in New Town, Kolkata, approximately eighteen (18) kilometres from Kolkata City and eight (8) kilometres from Netaji Subhas Chandra Bose International Airport.

NCE Coordinates:	NE	– 22.6087650, 88.4600400
	SE	– 22.6068290, 88.4611820
	SW	– 22.6061220, 88.4587680
	NW	– 22.6081530, 88.4580620

4. ACCESS TO NCE

- 4.1 Approach road towards the north is a forty (40) metre right-of-way through street number 787. Approach to NCE is through an eighteen (18) metre wide road from street number 787, towards the north-east corner.
- 4.2 Additionally, there are two (2) roads proposed, each of which are proposed to be twenty four (24) metre wide roads along the west and southern side of the NCE.

5. SERVICES

The Contractor shall be required to construct the NCE Road Works through the provision of construction and development services at the site of the NCE. The Contractor shall be required to make arrangements for water, electricity, telecommunications and temporary toilets for its personnel. Additional terms and conditions applicable to the Contractor in respect of the NCE Road Works shall be set forth in the contract between AIFF and the Contractor (“**Contract**”).

6. DOCUMENTATION

- 6.1 The conditions of Contract comprise the ‘*Conditions of Contract for Construction for Building and Engineering Works designed by the Employer, first edition 1999*’, as published by the Fédération International des Ingénieurs – Conseils (FIDIC) as amplified, modified, corrected or supplemented in the documents comprising the Contract.
- 6.2 The FIDIC writing style is to start the words and expressions defined in the FIDIC Conditions of Contract in upper case. In this document the FIDIC style of writing has been followed.
- 6.3 The documents comprising this NIT are:
- Information and instructions to Tenderers;
 - Letter of Tender with Appendix to Tender;
 - Contract Agreement; and
 - Conditions of Contract.
- 6.4 The following documents specified in this NIT shall be issued separately to the Tenderers and shall form an integral part of this NIT:
- Specifications relating to the construction of the Road Works;
 - Bill of Quantities with annexures incorporating amplifications, amendments, modifications, corrections or supplements of such other documents comprising the Contract; and
 - Drawings.
- 6.5 **The aforementioned documentation shall supersede all enquiries, proposals, agreements, negotiations and commitments, whether written or verbal, which are prior to the date of formal signature of the Contract by AIFF and the Contractor.**
- 6.6 Tenderers shall be deemed to have inspected and be fully acquainted with the abovementioned

documents prior to the submission of Bids.

7. CHECKING OF DOCUMENTS

- 7.1 Tenderers shall check the numbers of the pages of this NIT against the index provided and should any page be missing or duplicated, or the reproduction is indistinct, or if any doubt exists as to the intent or meaning of any description, or if the documentation in this NIT contain any obvious errors, the Tenderer shall notify AIFF forthwith thereof and AIFF shall promptly give a written directive in relation to the same.
- 7.2 No alterations, erasures, omissions or additions are to be made to the text of this NIT. Should any such alteration, erasure, omission or addition be made it will not be recognized and the reading of the NIT as prepared by AIFF will be adhered to.
- 7.3 Information and instructions to Tenderers shall not form part of the Tenderer's offer, nor part of the defined words "Bid" or "Contract". These instructions prescribe the procedures to be followed until AIFF either enters into a Contract with the Tenderer or advises the Tenderer that AIFF does not intend to do so.

8. PROFESSIONAL TEAM

The professional team for the construction and development of the NCE comprises the following and/or such other consultants as may be instructed in writing by AIFF from time to time:

Design & Engineering Consultant

M/s Collage Design Pvt. Ltd

*300, Sai Sampanna, Station Road
Vikhroli (E), Mumbai – 400083*

+91.22.25740844.

9. QUERIES FROM TENDERERS

- 9.1 All queries from Tenderers shall be submitted to AIFF by email addressed to <legal@the-aiff.com>.
- 9.2 Tenderers may submit any queries or seek clarifications during the period set out in the Critical Dates Sheet (Paragraph 1 of Section 1 above).
- 9.3 Clarifications, if any, shall be collectively uploaded to the AIFF website, in respect of all questions received from all prospective Tenderers which shall be deemed incorporated into this NIT by reference.

10. SITE INSPECTION

Tenderers may inspect the site of the NCE before pricing the Bill of Quantities and thoroughly acquaint themselves with the conditions under which the NCE Road Works are to be executed, including the means of access to the NCE, the condition of the roads, and generally all matters which may influence the

execution of the NCE Road Works. Tenderers must intimate and confirm any visit to the NCE with AIFF, at least twenty four (24) hours in advance of the proposed date and time of visit. The timings of visit shall be 10:00 HRS to 16:00 HRS. Tenderers can visit the NCE during the period of 'Site Inspection by Prospective Bidders' as set forth in the Critical Dates Sheet.

11. PRICED BILL OF QUANTITIES

- 11.1 It is a condition of the Bid that the Bill of Quantities, the schedule of rates for tenant installations, and a completed preliminaries schedule (if applicable) be submitted as part of the Bid, with items properly priced, extended and costed.
- 11.2 Should arithmetical errors occur, the individual prices, excluding provisional sums and AIFF's allowances, shall be adjusted by AIFF in consultation with the Tenderer to line up with the Estimated Cost of Contract, i.e., the Estimated Cost of Contract shall remain unaltered.
- 11.3 The items in this Bill of Quantities must utilize abbreviated descriptions. It is the intention that the abbreviated descriptions be fully described when read with the applicable measuring system and the relevant preambles and/or specification. However, should the full intent and meaning of any description not be clear, the Tenderer shall, before submission of its Bid, call for a written directive from AIFF, failing which it shall be assumed that the Tenderer has allowed for materials and workmanship in its pricing, in terms of international best practice.
- 11.4 The Tenderer may substitute proprietary branded products with the written approval of AIFF before submission of the Bid, in which case the same shall be clearly stated in the Bid, and the Estimated Cost of Contract shall be adjusted accordingly by the Tenderer before submission of the Bid. If the Tenderer decides to substitute proprietary branded products without the prior written approval of AIFF, the Tenderer shall ensure that it is clearly stated in the Bid, failing which it shall be assumed that the Tenderer has priced for the proprietary branded products as specified.

12. SUBMISSION OF BID

For the submission of a Bid, Tenderers must fill and submit the Letter of Tender along with the incomplete sections of the Appendix to Tender and sign the Letter of Tender where appropriate and the self-certified copy of the documents required under this NIT to be submitted with the bid

13. VALIDITY AND ACCEPTANCE OF TENDERS

The validity of Bid shall be one hundred and eighty (180) calendar days from the Bid Submission End Date.

14. EXPENSES IN PREPARATION OF TENDER

AIFF shall not be responsible or pay for any expenses or losses which the Tenderer may incur in the preparation of the Bid.

15. CONFIDENTIALITY OF BID SUBMISSIONS

The Bid documents shall be treated as private and confidential and every effort will be made to ensure that the general content shall not be disclosed or discussed with other parties.

16. BID SECURITY

- 16.1 The Tenderer shall furnish, along with its Bid, a Bid security for an amount of INR **₹8,95,719** (**Indian Rupees Eight Lakh Ninety Five Thousand Seven Hundred and Nineteen only**) (“**Bid Security**”).
- 16.2 The Bid Security is required to protect AIFF against the risk of the Tenderer’s unwarranted conduct as amplified under subsequent clauses of this NIT. Non-submission of Bid Security shall be considered as a major deviation, and hence, any Bid made without furnishing Bid Security shall not be considered valid by AIFF.
- 16.3 In the event the Tenderer is exempted from furnishing such Bid Security pursuant to any notification of the Government of India to that effect, then the Tenderer shall furnish the relevant notification along with the required documents. If no such notification or relevant documents are furnished along with the Bid, the Bid shall be treated as unresponsive and shall be summarily ignored without any further reference.
- 16.4 The Bid Security shall be furnished in one of the following forms:
- A bank transfer by any online acceptable method (NEFT/RTGS) to the following bank account (the Bidder must submit a copy of UTR No. in case the transaction is done by this method):

A/C NAME: All India Football Federation
A/C NUMBER: 10076105671
BANK NAME: IDFC First Bank
BANK BRANCH: Gurgaon Golf Course Road Branch
A/C TYPE: Savings
IFSC CODE: IDFB0021001
 - Demand draft/bankers’ cheque/fixed deposit receipt from a scheduled commercial bank drawn in favor of All India Football Federation, dated on or before the Bid Submission End Date, and a scanned copy of the same shall be submitted along with the Technical Bid submitted under this NIT.
- 16.5 The Bid Security shall be valid for a period of forty-five (45) days beyond the validity period of the Bid as mentioned in Clause 13 hereinabove.
- 16.6 The Bid Security of unsuccessful Tenderers shall be returned within one (1) month of signing of the Contract by the Contractor.
- 16.7 The Bid Security may be forfeited if a Tenderer:
- Withdraws or amends or impairs or derogates its Bid during the period of Bid validity or any extension thereof without the prior written approval of AIFF; or
 - Fails to accept orders issued in its favour for execution, and/or violates the terms and conditions of the Contract; or
 - Successfully qualifies for the Bid but fails to sign the Contract within the stipulated time; or

- If the Bidder tries to influence the Selection Process; or
- If any misrepresentation of facts is discovered in the Bid.

17. OVERVIEW OF SELECTION PROCESS

17.1 The Selection Process comprises two (2) stages:

- In the first stage, the credentials of the relevant Tenderer shall be evaluated to assess their compliance to the technical evaluation criteria specified in Clause 6 of Section 1 above (*Minimum Eligibility Criteria*), after which a technical evaluation will be carried out to determine the eligibility of the Tenderers and based on 'Technical Bids', basis which a list of pre-qualified and short-listed Tenderers shall be prepared.
- In the second stage, a financial evaluation of 'Financial Bids' will be carried out as per criteria mentioned in Clause 23.2 below to ascertain the lowest of the Bids received from eligible Tenderers for providing the services as mentioned herein ("**Financial Evaluation**").

17.2 Financial Bids of only pre-qualified and short-listed Tenderers will be opened.

17.3 The Financial Evaluation of the financial bids shall be carried out by the Tender committee appointed by AIFF. The committee, during the time of Financial Evaluation, may seek clarification from Tenderers on the amounts quoted in the Bid. In case two (2) Tenderers have the same Estimated Cost of Contract, preference shall be given to the Tenderer with the higher turnover.

18. SUBMISSION OF BID

18.1 Tenderers are required to submit encrypted electronic scanned copies of the Bid documents to the legal@the-aiff.com as mentioned in this NIT on or before the Bid Submission End Date as set forth in the Critical Dates Sheet. It is clarified that the Tenderer will be required to submit their Technical Bid and Financial Bids in separate files with no reference to one in the other document. **The Tenderer(s) are required to send forthwith (not later than 24 Hours from the time of closure of the Tender) the password of the encrypted bid document(s) strictly after the Bid Submission End Date and time to the aforementioned email address (legal@the-aiff.com).**

18.2 The Bid documents submitted must be without any overwriting, interlineations, corrections, double typing, etc. AIFF may, however, at its discretion, consider any document with any overwriting or corrections if the same has been duly initialed and dated by an authorized representative of the Tenderer.

18.3 Tenderers must ensure that their Technical Bids do not contain any financial quotations or prices.

18.4 The Bid should be unconditional. In case of any condition, the Bid shall be treated as non-responsive and may be disqualified.

18.5 The Technical Bid and Financial Bid shall be typed and signed by the authorized representative of the Tenderer.

18.6 The Tenderer should prepare the Bid Security as per the instruction specified in this NIT.

- 18.7 The time at which AIFF receives the e-mail shall be deemed to be the time at which the Tenderer's email was received by AIFF. Thus, the Tenderer's are required to send the email well within the time for bid submission, specified in the Critical Date Sheet.
- 18.8 Upon the successful and timely submission of Bids a confirmation message for successful Bid submission will be sent. Please note this confirmation shall only be for the purposes of acknowledging that the Bid has been received. The acceptance/rejection of Bid remains subject to the Selection Process.
- 18.9 The Bid submission confirmation has to be printed and kept as an acknowledgement of the submission of the Bid. This acknowledgement may be used as an entry pass for any Bid opening meetings.

19. BID DOCUMENTS TO BE SCANNED AND SUBMITTED:

19.1 to Tender as given in, and in the form prescribed in Section 3 to the NIT:

- Letter of Tender (in original and on the letterhead of the Tenderer);
- Details of Work Experience Certificates – FORM-A (As per the format enclosed with this NIT in original);
- Financial Details – FORM-B (As per the format enclosed with this NIT in original);
- General Information – Form-C;

19.2 Other Documents to be provided by the Tenderer are as given below:

- 19.3. Certificate issued by a chartered accountant in the manner specified under Clause 6(B) of Section 1 of this NIT;
- Power of Attorney of the authorized person signing/submitting the Bid. This should be supported by Board Resolution (in case of a company registered under Companies Act); In case of a Consortium Bid, an authorization letter from the Consortium Partners in favor of the lead entity;
- Valid copies of GST registration/EPF registration/PAN of the Tenderer;
- All pages of the entire corrigendum (if any) duly signed by the authorized person;
- Pre-bid clarifications, if any;
- If the Tenderer is a company registered under the Companies Act, 1956 or Companies Act, 2013, the certificate of incorporation;
- If the Tenderer is not a Company, then a Certificate of Registration with a competent authority.
- Self-certification/undertaking on Tenderer's letterhead stating that the Tenderer does not have any direct/indirect holding in any of the other Tenderers and that there is no cross

ownership between any other Tenderers; such self-certification/undertaking must be duly signed and stamped by the competent authority of the Tenderer;

- The Tenderer does not have any direct/indirect holding in any of the other bidding companies. There should be no cross ownership between any tenderers – Attach self- certification/undertaking on company letter head duly signed and stamped by the competent authority of the tenderer.
- Self-certification/undertaking on the Tenderer's letterhead stating that the Tenderer has no legal cases pending against it, in particular the Tenderer is to certify and acknowledge any pending legal cases against them with regard to Financial Malpractice/ Financial Fraud; such self-certification/undertaking must be duly signed and stamped by the competent authority of the Tenderer; and
- Self-certification/undertaking on the Tenderer's letterhead stating that the Tenderer is not blacklisted by Government of India or the State Government West Bengal or any other relevant authority or private organization; such self-certification/undertaking must be duly signed and stamped by the competent authority of the Tenderer.

20. PERFORMANCE SECURITY

- 20.1 For the due performance of the Contract in accordance with the terms and conditions specified therein, the Contractor shall, on or before the execution of the Contract (which shall be, no later than forty five (45) days of the issue of the Letter of Award), furnish a performance security/guarantee or an interest free equivalent amount transferred to AIFF in the manner prescribed in this NIT to the extent of Ten Percent (10%) of the value of Contract Price ("**Performance Security**"). The Performance Security shall remain valid for the Period of Completion plus ninety (90) days from the completion of the NCE Road Works by the Contractor. The Bid Security paid by the Contractor shall be returned to the Contractor after the receipt of Performance Security.
- 20.2 The bank guarantee, if applicable, in respect of the Performance Security shall be in favour of All India Football Federation payable at New Delhi and shall be in the format prescribed herein.
- 20.3 It is expressly understood and agreed that the Performance Security is intended to secure the performance of the Contract by the Contractor. The Performance Security shall not be construed to cover any damages detailed/stipulated in various clauses in the Contract.
- 20.4 The Performance Security will be discharged by AIFF and returned to the Contractor after successful physical completion of the NCE Road Works to the satisfaction of AIFF in accordance with the terms of the Contract.
- 20.5 AIFF reserves the right of forfeiture of the Performance Security in additions to other claims and penalties in the event of the Contractor's failure to fulfil any of its contractual obligations or in the event of termination of Contract as per terms and conditions of Contract.
- 20.6 Should the stipulated time for the Period of Completion, for whatever reason be extended, the Contractor, shall at its cost, extend the validity period of bank guarantee in respect of the Performance Security, shall furnish the extended/revised bank guarantee to AIFF before the expiry

date of the original bank guarantee that was furnished.

SECTION 3

LETTER OF TENDER WITH APPENDIX TO TENDER & FORMS

LETTER OF TENDER

NAME OF CONTRACT: CONSTRUCTION OF ROAD WORKS FOR AIFF NATIONAL CENTER OF EXCELLENCE, KOLKATA, WEST BENGAL, INDIA

TO: **ALL INDIA FOOTBALL FEDERATION (AIFF)**

Football House, Sector 19, Phase 1
Dwarka, New Delhi: 110075

We have examined the Information and Instructions to Tenderers, Conditions of Contract, Specification, Drawings, Bill of Quantities and the relevant addenda for the execution of the abovementioned NCE Road Works. We offer to execute and complete the NCE Road Works and remedy any defects therein in conformity with this Bid which includes all these documents, for the Contract Price of:

(currency and sum)

(_____)

(sum in words)

We agree to abide by this Letter of Tender for a period of one hundred and eighty (180) calendar days from the date of this Letter of Tender and it shall remain binding upon us and may be accepted at any time before that date. We acknowledge that the Appendix to Tender forms part of this Letter of Tender.

If the offer set out in this Letter of Tender is accepted, we will provide the specified Performance Security, commence the NCE Road Works as soon as is reasonably practicable after the Commencement Date and complete the NCE Road Works in accordance with the abovementioned documents within the Time for Completion.

Unless and until a formal agreement is prepared and executed, this Letter of Tender, together with your written acceptance thereof, shall constitute a binding contract between us.

A copy of a resolution of our board of directors authorizing the signatory of this Letter of Tender and/or such other person to enter into the Contract on our behalf is annexed herewith.

We understand and acknowledge that AIFF is not bound to accept the lowest Bid that it may receive, for the execution of the NCE Road Works.

Signature _____ in the capacity of _____ duly authorized to sign Bids for and on behalf of

.....
(the Tenderer)

Address:

.....
.....
.....
.....

Date:

PART 3 - APPENDIX TO TENDER

(Reference: FIDIC 1999, Conditions of Contract for Construction (Red Book))

	Item	Sub-Clause	Details
1.	AIFF Contact Details AIFF's Authorized Representative	1.1.2.2 & 1.3	All India Football Federation, Football House, Sector 19, Phase 1 Dwarka, New Delhi: 110075 Deputy Secretary General, AIFF
2.	Tenderer's Name & Address	1.1.2.3 & 1.3	<i>To be filled by the Contractor</i>

3.	Commencement Date	1.1.3.2 & 8.1	Fifteen (15) days from the date of issue of Letter of Award or issue of 'Notice to Proceed' with the commencement of work by AIFF to the Tenderer, whichever is later.
4.	Construction Period	1.1.3.3 & 8.2	Within Ninety (90) days from the Commencement Date.
5.	Defects Notification Period, Extension of Defects Notification Period	1.1.3.7 11.3	Three hundred and sixty five (365) Days applicable from the Completion Date for the NCE Road Works and additionally the following: 1. Fifteen (15) years from the Completion Date for Structural Stability; and
6.	Law and Language	1.4	Laws of Republic of India
7.	Ruling language and Language for communications	1.4	English
8.	Performance Security	4.2	Performance Security of Ten percent (10%) of the Contract Price in the form of Bank Guarantee from a scheduled / nationalized bank in a format acceptable to AIFF or an interest free equivalent amount transferred to AIFF, which shall be valid up to the end of Defects Notification Period.
9.	Rights-of-way and Facilities	4.13	The Contract Price includes costs and charges for special and/or temporary rights-of-way.
10.	Working Hours	6.5	The Tenderer's work may stretch to beyond normal working hours and also on holidays in order to meet the target and there cannot be any extra claim and Contract Price is in respect of both normal and additional working hours.
11.	Delay damages for the NCE Road Works	8.7 & 14.15(b)	Zero point two five percent (0.25%) of the Contract Price per week.
12.	Maximum amount of delay damages	8.7	Maximum amount of delay damages referred to in S. No. 13 above shall be limited to five

			percent (5%) of the Contract Price.
13.	Advance Payment	14.2	Mobilization advance of ten percent (10%) against submission of Bank Guarantee for equivalent value and valid for a period of six (6) months from the date of issue of Bank Guarantee.
14.	Percentage of Retention & Payment of Retention Money	14.3, 14.9	Cash Retention of five percent (5%) is applicable for 'Interim Payment Certificate' and 'Final Payment Certificate' valid till the successful Completion of the NCE Road Works and Defect Notification Period
15.	Plant and materials for payment on receipt at Site	14.5 (b)	Not Applicable
16.	Periods for submission of insurance: (a) Evidence of insurance (b) Relevant policies	 18.1 18.1	 Thirty (30) days Thirty (30) days
17.	"Reasonable Profit" shall be defined as	1.9, 2.1, 4.7, 7.4, 10.2, 10.3, 11.8, 12.3, 16.1, 17.4	Fifteen percent (15%) including the Tenderer's overheads and profit.
18.	Bid Security		INR ₹8,95,719/- (Indian Rupees Eight Lakh Ninety Five Thousand Seven Hundred and Nineteen only).

Tender for:

FORM – A

MANDATORY INFORMATION DOCUMENTS:

DETAILS OF WORK EXPERIENCE CERTIFICATES

S. No	Name of Work & Its Location	Name of Client	Date and No. of Completion Certificate	Date of Start	Date of Completion	Cost of Work on Completion	Reference and Page No. of Documentary Proof of the detail missing in completion certificate
1.							
2.							
3.							

1. Certified that the Completion Certificates of above works are enclosed with the Bid documents;
2. Details mentioned in the above Form are as per Completion Certificates and have not been presumed; and
3. If any detail is not mentioned in the Work Completion Certificate, documentary proof of detail is to be submitted along with Completion Certificate.

Signature of Tenderer with Seal

Tender for:.....

FORM – B

MANDATORY INFORMATION DOCUMENTS:

FINANCIAL DETAILS

		1 st FY Rs. (In Lacs)	2 nd FY Rs. (In Lacs)	3 rd FY Rs. (In Lacs)	4 th FY Rs. (In Lacs)	5 th FY Rs. (In Lacs)
		<u>a</u>	<u>b</u>	<u>c</u>	<u>d</u>	<u>e</u>
(i)	Profit / Loss					
(ii)	Gross Annual Turnover of Previous 5 Financial Years ending as on 31 st March of last FY					
(iii)	Average Annual Turnover for previous 5 financial years(Rs in Lacs) = (a+b+c+d+e) / 5					
(iv)	Net Worth (paid up capital + reserves) as on 31 st March of last FY					

1. Summarized page of Audit Profit & Loss Amount of previous five Financial Years duly certified by the chartered account, is to be submitted.
2. Summarized page of Audited Balance Sheet of last Financial Year (ending 31st March of preceding FY) duly certified by the chartered account, is to be submitted.

Note: This Form - B is to be submitted in original

Signature of Tenderer with Seal

Signature of Chartered Accountant with Seal

GENERAL INFORMATION

1.	Name of Tenderer	
2.	Address for correspondence	
3.	Official e-mail for communication	
4.	Contact Person: Telephone Nos. Fax Nos. Mobile	
5.	Type of Organization: <i>a. An individual</i> <i>b. A proprietary firm</i> <i>c. A firm in partnership</i> (Attach copy of Partnership) <i>d. A Limited Company</i> (Attach copy of Article of Association) <i>e. Any other (mention the type)</i>	
6.	Place and Year of Incorporation	
7.	Name of Directors/Partners in the Organization	
8.	Name(s) and Designation of the persons, who is authorized to deal with AIFF, (Attach copy of power of Attorney)	

9.	Bank Details: Name of Bank, Address of Bank Branch, Account No., RTGS, IFS Code	
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Signature of Tenderer with Seal

SECTION 4
CONDITIONS OF CONTRACT
(ATTACHED SEPARATELY)



Fédération Internationale des Ingénieurs-Conseils
International Federation of Consulting Engineers
Internationale Vereinigung Beratender Ingenieure
Federación Internacional de Ingenieros Consultores

Conditions of Contract for **Construction**

FOR BUILDING AND ENGINEERING WORKS DESIGNED BY THE EMPLOYER

GENERAL CONDITIONS

GUIDANCE FOR THE PREPARATION OF PARTICULAR CONDITIONS

FORMS OF LETTER OF TENDER, CONTRACT AGREEMENT AND

DISPUTE ADJUDICATION AGREEMENT



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FIRST EDITION 1999

SECTION 5

PARTICULAR CONDITIONS OF CONTRACT

These Particular Conditions of Contract, which are deemed to incorporate the Annexure to the Conditions, amend/modify/substitute the provisions of General Conditions of Contract, which form part of the Conditions of Contract for Construction (Red Book) First Edition 1999 published by Federation International des Ingenieurs-Conseils (FIDIC) as specified herein after. The General Condition of Contract shall be read in conjunction with these Particular conditions. In case of ambiguity or discrepancy between Particular Conditions and General conditions, these particular conditions shall prevail. In all cases, however, the clarification/ interpretation given by the Engineer shall be final, conclusive and binding.

Sr. No.	Headings/ Marginal Items	GCC/Sub-Clause	Amendments to the General Conditions of Contract
1.	Commencement Date	1.1.3.2	As per Appendix to Tender - Part 3, S. No. 5
2.	Time for the Completion	1.1.3.3	As per Appendix to Tender - Part 3, S. No. 6
3.	Defects Notification Period	1.1.3.7	As per Appendix to Tender - Part 3, S. No. 7
4.	Communications	1.3	Add to the end of this Sub-Clause the following: The Contractor shall submit Drawings, Methods, Programs etc. to the Engineer. The Engineer shall endeavor to issue back such feedback, consent and determinations with observations corrections etc. if any within 7 days but not later than fourteen (14) days after receipt. This shall be applicable for all materials, method statements, design and drawings
5.	Law and Language	1.4	Delete this Sub-Clause and Replace with following:] The law governing the Contract shall be Laws of Republic of India and Competent Courts in the city of Delhi, shall have the exclusive jurisdiction to decide any matter arising out of or in connection with this Contract.

6.	Confidential Details	1.12	Add following at the end of this Sub Clause: 1.12.1 AIFF's Confidential Information. The Contractor shall strictly treat and maintain the AIFF's Confidential Information as "Confidential Information. 1.12.2 Public Communications (a) Unless AIFF gives its express advance approval in each instance, which approval may be withheld at its discretion, the Contractor shall not: (1) make any communication regarding the NCE Road Works or the NCE with news media; or (2) write, present or publish papers or speeches to any organization, trade association, educational group or other entity that are about or based on processes, installation specifications or procedures unique to the NCE Road Works or the NCE. (b) The Contractor shall not allow any other party under its control to do the things in (a) (1) and (a) (2) above, which for the purposes of this paragraph expressly includes all of the Subcontractors, sub- subcontractors, suppliers and sub-suppliers. The Contractor shall promptly report to AIFF of any violation of the foregoing prohibition of which it becomes aware, regardless of the circumstances of the violation.
7.	Joint and Several Liability	1.14	Deleted The Contractor will not be allowed to form JV, etc.
8.	Severability and Enforceability		Add the following after Sub-Clause 1.14: If any term or provision of this Agreement is held by a judicial or other competent authority of competent jurisdiction to be contrary to law or becomes otherwise invalid, illegal or unenforceable in any respect after execution hereof, such provisions shall be severed from this Agreement and the other remaining provisions of this Agreement shall remain in full force and effect. Such invalidity or un-enforceability shall not affect the rights of the Parties with regard to any claim which any Party has for any activities undertaken by either Party, advantage whereof has already been taken/availed of by the other Party.

9.	Non-Waiver		Add the following after Sub-Clause 1.14: Any waiver or consent from AIFF, if any granted, shall be in writing only and no implied waiver and / or consent shall be presumed for any purpose(s) of this Agreement and/or work order(s) in relation thereto. No waiver by AIFF, if any granted, of any breach, default or violation of any term, warranty, representation, covenant, condition or provision of this Agreement shall constitute a waiver by AIFF of any subsequent breach, default or violation of any term, warranty, representation, agreement, covenant, condition or provision. Further, failure by AIFF to enforce any provision of this Agreement shall not be deemed a waiver of future enforcement of that or any other provision in this Agreement.
10.	Permit, License or Approval	2.2	Add the following to the end of this Clause: The responsibility for ensuring full and complete compliance shall include, but not limited to laws relating to labour, material, equipment, plant equipment, permissions from various authorities, independent consultants and compliance with safety, HSE norms, environmental norms, building utility services commissioning of the building, disposal of materials etc. It shall be entirely and exclusively the responsibility of the Contractor to apprise itself fully of all the requirements, applicable laws, rules, regulations, procedures to be complied with. Responsibility for any and all consequences arising from non-compliance/non-adherence to any of the applicable laws, rules and regulations or lack of permission of assisting for building execution approvals and lack of permission for building utility services commissioning of the building shall be of the Contractor entirely. In case of any non-compliance with any of the above requirements, AIFF may impose penalties of minimum INR 10,000 (Indian Rupees Ten Thousand) for each default in compliance. In case of failure to ensure compliance within seven (7) days from the date of issue of notice to this effect, AIFF may elect, but is not bound to take steps to procure such compliance at Contractor's risk and cost and all such money will become due and payable immediately. AIFF's procurement of such compliance shall not relieve

			the Contractor from any of its obligations under the Contract and the liabilities arising from any non-compliances.
11.	Engineer's Duties & Authority	3.1	Add following at the end of this Sub Clause: ‘Engineer’ means AIFF or any authorized representative appointed by AIFF.
12.	Performance Security	4.2	Add following at the end of this Sub-Clause: Before commencing the NCE Road Works, the Contractor shall provide Performance Security of 10% of the Contract Price in the form of a bank guarantee from a scheduled/nationalized bank in a format acceptable to AIFF or an interest free equivalent amount transferred to AIFF, which shall be valid up to the end of Defects Notification Period or eighteen (18) months, whichever is later. No payments shall be made to the Contractor before the said Bank Guarantee is provided to AIFF. The format of the Bank Guarantee to be provided by the Contractor is annexed.
13.	Sub-Contractors	4.4	Add following at the end of this Sub Clause: The Contractor shall submit the details of the proposed specialized Sub-Contractor to be engaged by the Contractor giving proof of the execution of similar work in past and any other details/data reasonably required by AIFF. Only the specialized Sub-Contractor who is duly approved by AIFF, which approval shall not be unreasonably withheld, shall be engaged by the Contractor for execution of the NCE Road Works. Engagement of specialized Sub-Contractors without following the process shall constitute a breach of the Contract and AIFF shall have the right to reject any and all NCE Road Works carried out by such unapproved Sub-Contractors, besides taking further actions as per Contract.

14.	Safety Procedures	4.8	Add following at the end of this Sub-Clause: In case AIFF determines that any of the safety requirements are not duly complied with, then AIFF can suspend the work at such locations and the work shall not resume unless and until the requirements are met to the entire satisfaction of AIFF. In case AIFF in its sole discretion, determines any lapse on the safety aspects as major lapse on part of the Contractor then after giving due warning, AIFF may impose penalty as follows: - On first observation – INR 10,000 (Rupees Ten Thousand Only) On second observation – INR 50,000 (Rupees Fifty Thousand Only) On third and each subsequent observation – INR 1,00,000 Rupees One Lakh Only). In case the Contractor is found to be repeatedly and persistently negligent in following the safety requirements despite repeated observations, comments and instructions then this may constitute a ground sufficient to declare the Contractor in fundamental breach and shall entitle AIFF to take appropriate recourse accordingly.
15.	Quality Assurance	4.9	Delete this Sub-Clause and Replace with following: The Contractor shall within fifteen (15) days of issue of Letter of Award submit a detailed Quality Assurance Manual (QAM) demonstrating the proposed method of achieving the required quality standards. 1. The Quality Assurance Manual should address the quality system as required by ISO 9001 – 2008. 2. The Quality Assurance Manual shall clearly list out the procedures, activities, checks, standards and any 3. Such as schedule of tests, which it proposes to carry out during the progress of the NCE Road Works and are necessary to comply with the quality objectives of AIFF. 4. The Quality Assurance Manual shall specify the Quality Control Team who is to report direct to the top management of the Contractor's organization and is

			delegated to suspend any works. The main responsibility of the Quality Control team is to carry independent site inspections on the Works as identified as Hold points in the Quality Assurance Manual to verify that the NCE Road Works is constructed in accordance with the relevant design before allowing the subsequent works can commence. 5. Quality Assurance Manual shall also list the corporate policy adopted by the Contractor's firm. Compliance with the Quality Assurance Manual System shall not relieve the Contractor of any of its duties, obligations or responsibility under the Contract.
16.	Unforeseeable physical conditions	4.12	Delete this Sub-Clause and Replace with following: The Contractor has made itself aware of all the conditions likely to be encountered and which may have impact on execution of the works and has made due allowances for any such unforeseen condition that may be encountered during the course of execution of the NCE Road Works. The Contractor shall be bound to complete whole of the NCE Road Works in accordance with the schedule and the allowable time for completion irrespective of any unforeseen condition encountered. No claim for any extension of time or additional cost shall be admissible on any such ground of encountering of unforeseen condition affecting the progress of the NCE Road Works, unless specifically allowed by AIFF.
17.	Electricity, Water and Gas	4.19	Delete this Sub-Clause and Replace with following: Water Supply The Contractor shall arrange water supply for drinking and construction at his cost. Without prejudice to the Contractor's obligation to make its own arrangement. Further the Contractor shall make his own arrangement for bore wells, storage tank, laying all the pipe lines, making connections, maintaining the same and dismantling on completion of NCE Road Works and making good any damage due to removal of such piping work.

			Electric Supply The Contractor at his cost shall arrange electric power for Construction. The Contractor shall make his own arrangement for adequate standby power. Without prejudice to the Contractor's obligation to make its own arrangements as above, the electricity for construction may be made available by AIFF on chargeable basis (As per the rules of local Electric Power Distribution Company) however Contractor at his cost shall arrange necessary infrastructure to draw Electric Supply from AIFF's substation. AIFF will provide necessary support in pursuing the same with the authorities.
18.	Employer's Equipment and Free issue Material	4.20	Deleted
19.	Rates of Wages and Conditions of Labour	6.2	Add following at the end of this Sub-Clause: The Contractor acknowledges that it is acting as an independent contractor and is solely responsible for its actions or inactions and that nothing contained herein shall be construed as establishing a relationship of master and servant or of agent and principal between AIFF and the Contractor or its representatives. The Contractor is not authorized to enter into contracts or agreements on behalf of AIFF or to otherwise create obligations of/for AIFF. The Parties hereby acknowledge and agree that any workers or personnel engaged by the Contractor and providing Services on-site at locations as required under this Agreement shall be employees of the Contractor and not of the AIFF for all purposes, including workers' compensation, taxes, compensation and employee benefits. The Contractor agrees that the Contractor shall be solely responsible for payment of all applicable workers' compensation, disability benefits, employee benefits and unemployment insurance and for withholding and paying such employment taxes and income withholding taxes as required.

20.	Health & Safety	6.7	Add following at the end of this Sub-Clause: The contractor must have safety policy based on Occupational Safety and Health Administration (OSHA) requirements. In case AIFF in its sole discretion, determines any lapse on the safety or house-keeping aspects as major lapse on part of the Contractor then after giving due warning the Contractor may impose penalty as follows: - On first observation – INR 10,000/- (Indian Rupees Ten Thousand only) On second observation – INR 50,000/- (Indian Rupees Fifty Thousand only) On third and each subsequent observation – INR 1,00,000/- (Indian Rupees One Lakh only)
21.	Samples	7.2	Delete this Sub-Clause and Replace with following: The Contractor shall furnish for approval, with reasonable promptness, samples of materials and workmanship as agreed with AIFF. AIFF shall check and confirm approval of such samples with reasonable promptness only to conform with the design concept of the NCE Road Works and for compliance with the information given in the Contract. The work shall be in accordance with approved samples. The procedure for submission and approval of samples shall be as follows: 1. All material samples of adequate numbers, sizes, shades and pattern as per specification shall be delivered to the Engineer's office at the Contractor's cost. Samples shall be properly labelled with • Name of Project • Name of Contractor • Name of Product • Name of Manufacturer • Date of Submission

			• Date of fabrication/casting - if applicable 2. Samples shall be accompanied with technical specification / manufacturer's catalogue. 3. In case the Contractor intends to keep an approved sample in its possession, it shall submit additional samples for AIFF's approval. 4. Samples shall be furnished well in advance to give AIFF reasonable time for their consideration.
22.	Rejection	7.5	Add following at the end of this Sub-Clause All rejected materials shall be clearly marked and kept separately and should be taken out of site within seven (7) days of the date of such rejection.
23.	Commencement of Works	8.1	Delete this Sub-Clause and Replace with following: The commencement date shall be as per Appendix to Tender - Part 3, S. No. 5
24.	Time for Completion	8.2	The time for Completion shall be as per Appendix to Tender - Part 3, S. No. 6
25.	Delay Damages	8.7	As per Appendix to tender -Part 3, S. No. 13
26.	Defects Liability	11.1, 11.3 and 1.1.3.7	Read Defects Notification Period as per Appendix to Tender -Part 3, S. No. 7
27.	Provisional Sums	13.5	Not Applicable

28.	Adjustments for Changes in Cost	13.8	Delete this Sub-Clause and Replace with following: The Contract rates shall remain firm for entire duration of Contract. No revision of rate or adjustment of Contract price shall be allowed on any account. The Contract rates are deemed to include the effect of all fluctuations in cost of execution of NCE Road Works during the duration of Contract and completion of NCE Road Works
29.	Contract Price	14.1	Add following at the end of this Sub-Clause: The AIFF shall be responsible for the deduction of such taxes, duties, cess, fees and other impositions as may be deductible and/or payable by it under the applicable laws.
30.	Plant & Materials intended for Works	14.5	Not Applicable
31.	Payment of Retention Money	14.9	As per Appendix to tender -Part 3, S. No. 16
32.	Currencies of Payment	14.15	Delete this Sub-Clause and Replace with following: All amount shall be paid in Indian Rupees
33.	Termination by Employer	15.2	Add following after Sub-Clause 15.2(f): (i) brings the project or AIFF or FIFA or AFC to disrepute by maligning it publicly or acting in a manner which damages the image of the project or AIFF or FIFA or AFC;
34.	Limitation of Liability	17.6	Add following at the end of this Sub-Clause: Total liability of Contract or as mentioned in second paragraph of this Sub-Clause shall be limited to 100% of Contract Price.

35.	General Requirements for Insurances	18.1	Add at the end of this Sub-Clause: The Contractor shall provide the proof of insurance and relevant insurance policies, prior to signing of this Contract. The Contractor shall provide insurance covers (under their Block policy Scheme through their regular agency) to cover Contractors men, machinery, Equipment and Materials Contractor should ensure to keep the policy in force at any point of time for full amount during Contract period and copy of the same be produced to AIFF on demand. 1. CAR Policy 2. Workmen's compensation 3. Third Party 4. Group personnel Accident Insurance 5. Professional Indemnity Insurance for Design Contractor shall comply with all statutory norms required for the Construction activity. The contractor shall however operate this CAR policy and shall be charged the premium on prorated basis.
36.	Insurance against Injury to persons and Damage to property	18.3	Add at the end of this Sub-Clause Minimum amount of third party insurance shall be up to INR 25,00,000 (Indian Rupees Twenty Five Lakhs) for a single event and there shall be no upper limit on the number of such events. Professional indemnity insurance cover for design is to be covered vide a separate policy for an amount equivalent to Contract Price.

ANNEXURE 1 – TENDER SECURITY (BID SECURITY)

1. **WHEREAS** M/s. _____ having its registered office at _____ (hereinafter called the “**Tenderer**” which expression shall include its heirs, successors, administrators and assigns) intends to submit a Bid for in response to notice inviting tender issued by All India Football Federation, vide reference no. _____ dated _____ for the construction of certain road works at the AIFF National Centre of Excellence, Kolkata, West Bengal (“**NIT**”).

2. Now, by this letter, we the undersigned (Bank’s Name and address) whose registered office is at: _____ bind ourselves unconditionally and irrevocably for payment to of the sum of (currency/amount) as ‘Bid Security’ to indemnify in case of default. The conditions of the above obligations are such that if M/s. _____ shall not keep their Bid being submitted to as set forth in the NIT valid and unaltered until six (6) months from the due date _____ of the Bid, viz. _____ refused to sign a formal agreement in accordance with the terms of the Bid or after having signed the agreement does not perform the Contract, then this obligation remains in full force and effect, otherwise to be null and void.

3. In case this obligation is effective, we, (Bank’s Name) undertake to pay to on demand any amount limited to the above indicated sum, upon written request, without any demur or protest and without reference to M/s _____ within fifteen (15) days from the date of such demand in any manner in which _____ may direct and also without the necessity of instituting and proceeding whether judicial or otherwise, at any time upon the Tenderer committing any one or more of the following:

- (a) Withdrawing its tender during the validity period or any extension sought / granted thereof, or
- (b) Varying or modifying the Bid in a manner not conforming to Contract/NIT and / or in a manner not acceptable to AIFF during the validity period or any extension of the validity duly agreed to by the Tenderer, or
- (c) Failure to furnish the Bid Security within the timeline set forth in the NIT after the issuance of the Letter of Award of or by the date mutually agreed to whichever is later.

In such events, the Bid shall be cancelled and the guarantee deposited by the Tenderer stands forfeited.

4. We, (Bank’s Name), agree that our liability to pay is not dependent on conditions on your proceedings against the Tenderer and we shall be liable to pay an amount not exceeding the aforesaid amount as and when demanded by you merely on claim being raised by you and even before any legal proceedings are taken against the Tenderer.

5. We, (Bank’s Name), undertake not to revoke this guarantee during the validity of the Contract, except with the previous consent of AIFF in writing. The guarantee herein contained shall not be revocable by notice or by reasons of dissolution or winding up of the business of the Tenderer or any change in the constitution or composition of the Tenderer.

6. This guarantee shall remain valid, in case the Tender is accepted, until the due performance of the Contract resulting from such acceptance inclusive of furnishing Bid Security in a manner specified by AIFF and in any other case until ____.

7. We, (Bank's Name), have power to issue guarantee in your favour under Memorandum and Articles of Association and the undersigned has full power to do so under the Power of Attorney dated _granted to him by the Bank.

8. After the herein above mentioned date, the Guarantee shall lapse automatically without necessity to be returned to the Bank.

Date

Signature of a person duly authorized to sign on behalf of the Bank, with Seal of the Bank

*CONTRACTORS TO SUBMIT THIS EMD ON NON_JUDICIAL STAMP PAPER OF RS. 100.00
FROM NATIONALISED BANK ONLY*

ANNEXURE 2 –BANK GUARANTEE (PERFORMANCE SECURITY)

1. **THIS DEED OF GUARANTEE** executed at ____ day of month _____ of (the year) by the Bank of (Bank's name and address) (hereinafter called the 'SURETY' which expression shall include its heirs, successors, administrators, and assigns) of the ONE PART in favor of the All India Football Federation ("AIFF") (which term shall include its heirs, successors, administrators and assigns) of the OTHER PART.
2. WHEREAS M/s. (Firm's Name) registered under __ having its Registered Office (Firm's address) (hereinafter called the 'CONTRACTOR' which expression shall include its heirs, successors, administrators and assigns) entered into a Contract vide Ref. No. _____ dated ____ (hereinafter called the said Contract) with AIFF for the construction of road works at the National Centre of Excellence, Kolkata, West Bengal, as stated in the said Contract as per the terms and conditions provided in the Contract.
3. AND WHEREAS under the said Contract the Contractor is required to furnish a Bank Guarantee for (currency / amount) (In Words) being ten percent (10%) of Contract price of (currency / amount) as specified in the said Contract for the execution of the said Contract including the Defects Notification Period.

NOW THIS DEED WITNESSES AS FOLLOWS:

4. In pursuance of the terms and conditions of the said Contract and on the request of the Contractor, we the Surety do hereby undertake to pay the amounts due and payable under this guarantee without any demur, merely on a demand from AIFF stating that the amount claimed is due by way of loss or damage caused to or would cause to or suffered by AIFF by reason of breach by the said Contractor of any of the terms or conditions contained in the said Contract or by reason of the Contractor's failure to perform the said Contract. Any such demand made to the bank shall be conclusive as regards the amount due and payable by the Bank under this guarantee.
5. We, the Surety, do hereby agree that AIFF shall be the sole judge to decide whether the Contractor has committed a breach of any of the terms or conditions of the said Contract and that the decision of AIFF will be final and binding on the Surety. AIFF and the Contractor shall be at liberty to carry out any modifications in the said Contract during the currency of the said Contract and any extensions thereof and any such modifications will be duly intimated to the Surety. Any accounts settled between the Contractor and AIFF shall be conclusive evidence against the Surety of the amount due and shall not be questioned by the Surety.
6. We, the Surety, further agree that the guarantee herein contained shall remain in full force and effect for a period up to (date, month and year) and that the guarantee shall continue to be enforceable till all the obligations under or arising by virtue of the Order / Contract have been fully discharged by the Contractor till AIFF certifies in writing that the terms and conditions of the said Contract have been fully and properly carried out by the Contractor. We, the Surety, further undertake not to revoke this guarantee during the currency of the same except with the previous consent of AIFF in writing.
7. We, the Surety, further agree that liabilities and obligations of the Surety arising under or by virtue of this bond shall not be discharged by any variation of the terms or conditions of the said Contract by any grant of time given or any indulgence shown by AIFF to the Contractor. It is agreed that the liabilities

under this guarantee shall not exceed (currency/amount) (In words).

8. This guarantee shall remain in full force till _____.

9. We (Bank's Name) have power to issue this guarantee in your favour under Memorandum and Articles of Association, and the undersigned has full power to do so under the Power of Attorney date _____ granted to him by the Bank.

Date:

Signature of a person duly authorized to sign on behalf of the Bank with Seal of the Bank

*CONTRACTORS TO SUBMIT THIS EMD ON NON_JUDICIAL STAMP PAPER OF RS. 100.00
FROM NATIONALISED BANK ONLY*

ANNEXURE 3 – BANK GUARANTEE (FOR RELEASE OF THE PERFORMANCE SECURITY)

1. **THIS DEED OF GUARANTEE** executed at Delhi ___day of month _____of (the year) by the Bank of (Bank's name and address)) (hereinafter called the 'SURETY' which expression shall include its heirs, successors, administrators, and assigns) of the ONE PART in favor of the All India Football Federation ('AIFF') (which term shall include its heirs, successors, administrators and assigns) of the OTHER PART.
2. WHEREAS M/s. (Firm's Name) registered under _____ having its Registered Office (Firm's address) (hereinafter called the 'CONTRACTOR' which expression shall include its heirs, successors, administrators and assigns) entered into a Contract vide Ref. No. _____ dated _____ (hereinafter called the said Contract) with AIFF for construction of road works at the National Centre of Excellence, Kolkata, West Bengal,, as stated in the said Contract as per the terms and conditions provided in the Contract.
3. WHEREAS the payment shall be made, after certification by AIFF for substantial completion of mobilization of equipment's at site and verification of Bank Guarantee by AIFF.
4. AND WHEREAS if the amount has not been repaid prior to the issue of taking over certificate for the works or prior to termination under clause [to be inserted] (Termination by AIFF), clause [to be inserted] (Suspension and Termination) or clause [to be inserted] (Force Majeure) (as the case may be), the whole of the balance outstanding shall immediately become due and payable by the Contractor to AIFF.

NOW THIS DEED WITNESSES AS FOLLOWS:

- A. In pursuance of the terms and conditions of the said Contract and on the request of the Contractor, we, the Surety, do hereby undertake to pay, the sum of Rs.____ (Currency/Amount) (In Words) being amount equivalent to the advance payment released by AIFF, without any demur, merely on a demand from AIFF stating that the amount claimed is due by way of loss or damage caused to or would cause to or suffered by AIFF by reason of breach by the said Contractor of any of the terms or conditions contained in the said Contract or by reason of the Contractor's failure to perform the said Contract. Any such demand made to the bank shall be conclusive as regards the amount due and payable by the Bank under this guarantee.
- B. We, the Surety, do hereby agree that AIFF shall be the sole judge to decide whether the Contractor has committed a breach of any of the terms or conditions of the said Contract and that the decision of AIFF will be final and binding on the Surety. AIFF and the Contractor (in consultation with AIFF) shall be at liberty to carry out any modifications in the said Contract during the currency of the said Contract and any extensions thereof and any such modifications will be duly intimated to the Surety. Any accounts settled between the Contractor and AIFF shall be conclusive evidence against the Surety of the amount due and shall not be questioned by the Surety.
- C. We, the Surety, further agree that the guarantee herein contained shall remain in full force and effect for a period up to (date, month and year) and that the guarantee shall continue to be enforceable till all the obligations under or arising by virtue of the said Contract have been fully discharged by the Contractor till AIFF certifies in writing that the terms and conditions of the said Contract have been fully and properly carried out by the Contractor. We, the Surety, further undertake not to revoke this guarantee during the currency of the same except with the previous consent of AIFF in writing.

D. We, the Surety, further agree that liabilities and obligations of the Surety arising under or by virtue of this bond shall not be discharged by any variation of the terms or conditions of the said Contract by any grant of time given or any indulgence shown by AIFB to the Contractor. It is agreed that the liabilities under this guarantee shall not exceed Rs. _____ (currency/amount) (In words).

E. This guarantee shall remain in full force till _____.

F. We (Bank's Name) have power to issue this guarantee in your favour under Memorandum and Articles of Association and the undersigned has full power to do so under the Power of Attorney dated _____ granted to him by the Bank.

Date:

Signature of a person duly authorized to sign on behalf of the Bank with Seal of the Bank

*CONTRACTORS TO SUBMIT THIS EMD ON NON-JUDICIAL STAMP PAPER OF RS. 100.00
FROM NATIONALISED BANK ONLY*

ANNEXURE – 4

SALIENT FEATURES OF SOME MAJOR LABOUR LAWS APPLICABLE

- (a) **Workmen Compensation Act 1923:** The Act provides for compensation in case of injury by accident arising out of and during the course of employment.
- (b) **Payment of Gratuity Act 1972:** Gratuity is payable to an employee under the Act on satisfaction of certain conditions on separation if an employee has completed the prescribed minimum years (say, five years) of service or more or on death the rate of prescribed minimum days' (say, 15 days) wages for every completed year of service. The Act is applicable to all establishments employing the prescribed minimum number (say, 10) or more employees.
- (c) **Employees P.F. and Miscellaneous Provision Act 1952:** The Act Provides for monthly contributions by the Employer plus workers at the rate prescribed (say, 10% or 8.33%). The benefits payable under the Act are:
 - (i) Pension or family pension on retirement or death as the case may be.
 - (ii) Deposit linked insurance on the death in harness of the worker.
 - (iii) Payment of P.F. accumulation on retirement/death etc.
- (d) **Maternity Benefit Act 1951:** The Act provides for leave and some other benefits to women employees in case of confinement or miscarriage etc.
- (e) **Contract Labour (Regulation & Abolition) Act 1970:** The Act provides for certain welfare measures to be provided by the Contractor to contract labour and in case the Contractor fails to provide, the same are required to be provided by the Principal Employer by Law. The principal Employer is required to take Certificate of Registration and the Contractor is required to take license from the designated Officer. The Act is applicable to the establishments or Contractor of Principal Employer if they employ prescribed minimum (say 20) or more contract labour.
- (f) **Minimum Wages Act 1948:** The Employer is to pay not less than the Minimum Wages fixed by appropriate Government as per provisions of the Act if the employment is a scheduled employment. Construction of buildings, roads, runways is scheduled employment.
- (g) **Payment of Wages Act 1936:** It lays down as to by what date the wages are to be paid, when it will be paid and what deductions can be made from the wages of the workers.
- (h) **Equal Remuneration Act 1979:** The Act provides for payment of equal wages for work of equal nature to male and female workers and for not making discrimination against female employees in the matters of transfers, training and promotions etc.
- (i) **Payment of Bonus Act 1965:** The Act is applicable to all establishments employing prescribed minimum (say 20) or more workmen. The Act provides for payments of annual bonus within the prescribed range of percentage of wages to employees drawing up to the prescribed amount of wages, calculated in the prescribed manner. The Act does not apply to certain establishments. The newly set-up establishments are exempted for five years in certain circumstances. States may

have different number of employment size.

- (j) **Industrial Disputes Act 1947:** The Act lays down the machinery and procedure for resolution of industrial disputes, in what situations a strike or lock-out becomes illegal and what are the requirements for laying off or retrenching the employees or closing down the establishment.
- (k) **Industrial Employment (Standing Orders) Act 1946:** It is applicable to all establishments employing prescribed minimum (say, 100, or 50). The Act provides laying down rules governing the conditions of employment by the Employer on matters provided in the Act and gets these certified by the designated Authority.
- (l) **Trade Unions Act 1926:** The Act lays down the procedure for registration of trade unions of workmen and Employers. The Trade Unions registered under the Act have been given certain immunities from civil and criminal liabilities.
- (m) **Child Labour (Prohibition & Regulation) Act 1986:** The Act prohibits employment of children below 14 years of age in certain occupations and processes and provides for regulations of employment of children in all other occupations and processes. Employment of child labour is prohibited in building and construction industry.
- (n) **Inter-State Migrant Workmen's (Regulation of Employment & Conditions of Service) Act 1979:-** The Act is applicable to an establishment which employs prescribed minimum (say, five) or more inter-state migrant workmen through an intermediary (who has recruited workmen in one state for employment in the establishment situated in another state). The Inter-State migrant workmen, in an establishment to which this Act becomes applicable, are required to be provided certain facilities such as Housing, Medical-Aid, Travelling expenses from home up to the establishment and back etc.
- (o) **The Building and Other Construction workers (Regulation of Employment and Conditions of Service) Act 1996 and the Cess Act of 1996:** All the establishments who carry on any building or other construction work and employs the prescribed minimum (say, 10) or more workers are covered under this Act. All such establishments are required to pay cess at the rate not exceeding 2% of the cost of construction as may be modified by the Government. The Employer of the establishment is required to provide safety measures at the building or construction work and other welfare measures such as canteens, first-aid facilities, ambulance, housing accommodations for workers near the work place etc. The Employer to whom the Act applies has to obtain a registration certificate from the Registering Officer appointed by the Government.
- (p) **Factories Act 1948:** The Act lays down the procedure for approval of plans before setting up a factory, health and safety provisions, welfare provisions, working hours, annual earned leave and rendering information regarding accidents or dangerous occurrences to designated authorities. It is applicable to premises employing the prescribed minimum (say, 10) persons or more with aid of power or another prescribed minimum (say, 20) or more persons without the aid of power engaged in manufacturing process

SECTION 6
TECHNICAL SPECIFICATION
(ATTACHED SEPARATELY)

SECTION 7

**BILL OF QUANTITIES
(ATTACHED SEPARATELY)**

SECTION 8
TENDER DRAWINGS
(ATTACHED SEPARATELY)



SECTION -7
TECHNICAL SPECIFICATION

**CONSTRUCTION OF ROAD WORKS FOR AIFF NATIONAL
CENTER OF EXCELLENCE KOLKATA, WEST BENGAL, INDIA**

FOR

ALL INDIA FOOTBALL FEDERATION(AIFF)

Football Federation, Football House, Sector 19, Phase 1

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Telephone: 91-11-25308200/201/202/203/204/205

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CIVIL WORKS

MATERIAL & WORKMANSHIP

I. GENERAL

Materials and Workmanship Specifications

The specifications listed in this Part of the Employer's Requirements may be modified by the Tenderer at the time of submitting the Tender to suit the requirements of the Tenderer's design. Any such modifications shall be submitted with the Tender.

When considering any changes, it shall be noted that the specifications given in this Part shall represent the minimum required standards for material and workmanship to be followed in the construction of the works.

Where there is any discrepancy between this Part 4 of Employer's Requirements and either Part 2 or Part 3 of the Employer's Requirements, the requirements of Part 2 and Part 3 shall take precedence.

Standard of Works

The whole of the materials employed in connection with the permanent work of the Contract shall be new and of the best quality and description of their respective kinds and, except where otherwise called for, shall be of the highest grade described in Indian or other relevant Standards for such materials and shall be tested as prescribed therein; similarly, the workmanship in every case shall be of the best character, and the whole shall be subject to the approval of the Engineer.

Standards & Code

Any Indian, British, American or other International Standard or Code of Practice referred to in the documents relating to the Contract shall be held to be the latest edition published at the time of Tender. Where alternative Standards or Codes of Practice have been published in metric units, these shall take precedence over the publication in imperial units.

Equivalent Standards

- a) Subject to the approval of the Engineer, materials may be supplied conforming with other recognized Standards which correspond closely with the relevant Specified Standards.
- b) In the event that the Contractor proposes use of an alternative Standard he shall provide to the Engineer a copy of the Standard proposed together with an authoritative translation into English where the original is in a language other than English.

Alternative Materials & Equipment

- a) In all cases where the name of a particular type or make of equipment or material is referred to on the Drawings or elsewhere in this Specification, this is intended to indicate only the acceptable standard.
- b) The Contractor may offer alternative materials to equipment to that specified and in all such cases the Contractor's offer shall be at least of equal quality. When alternatives are offered the Contractor shall submit to the Engineer for approval, a statement detailing the alternative(s) and shall include full technical descriptions, drawings, specifications, test certificates etc and shall provide such full information as is required to enable the Contractor to demonstrate to the Engineer that the

alternative(s) is (are) equivalent to the item specified. Any further information that the Engineer may require shall be produced by the Contractor when called for.

Approval of Materials & Items of Equipment

- a) As soon as possible after the Contract has been awarded, the Contractor shall submit to the Engineer a list of suppliers from whom he proposes to purchase the materials required for the Works. Each supplier must be willing to admit the Engineer, or his representative, to his premises during ordinary working hours for the purpose of obtaining samples or inspection of the works and processes. In addition, if required by the Engineer, the Contractor shall deliver samples to the offices of the Engineer or to nominated testing laboratories or to the site of the Works. The cost of such samples shall be borne by the Contractor.
- b) The Contractor shall provide at least the following information when seeking approval of materials and items of equipment.
 - A Description of the material/item
 - Name of proposed supplier
 - Indian Standard, or other approved Standard applicable
 - Test Certificates as applicable
- c) The Contractor shall use locally produced materials in preference to imported providing they comply with the requirements of the Specification.

Supply of Samples

- a) The whole cost of supplying adequate samples of any materials to be used in the Works for testing either at the Manufacturer's Works or at the site or at an independent Laboratory nominated by the Engineer, shall be deemed to be included in the rates or sums entered in the Price Schedule.
- b) Samples shall be taken at regular intervals and tested in accordance with relevant standards.

Material – General

- a) Sources of supply :
- b) The sources of supply of materials shall not be changed from those approved without the written permission of the Engineer.
- c) Quality of supply :
- d) Materials subsequently supplied shall be at least equal to the approved sample in all respects.
- e) Rejected materials :
- f) Rejected materials are to be removed promptly from the Site.
- g) Copies of orders :
- h) The Contractor shall, at the Engineer's request, forward to the Engineer copies of orders for materials to be incorporated into the Works.
- i) Manufacturers instructions :
- j) All materials, goods etc., shall be used or installed in accordance with the instructions of the Manufacturer or Supplier unless otherwise specified or instructed by the Engineer.

Testing of Samples

- a) At the Manufacturer's Works :

- b) The costs of testing at Manufacturer's Works of any materials to be used in the Works and the supply of "proof" or test certificates by the Manufacturer shall be deemed to be included in the rates or sums entered in the Price Schedule.
- c) At an Independent Laboratory:
- d) In addition to those tests required by the Employer's Requirements and relevant Standards, the Engineer may at any time instruct the Contractor to supply samples of materials to be used in the Works for test by an Independent Laboratory. The costs of transport to the Independent Laboratory and laboratory charges, fees of independent inspectors, etc, shall be paid for under the appropriate item in the Price Schedule, except where a sample is found not to be in accordance with the specified requirements, in which case the costs shall be borne by the Contractor.
- e) Sampling and Testing frequency:
The sampling and test frequencies shall be as per the relevant IS codes. Where the relevant IS code does not lay down any frequency for sampling and testing, the same shall be as given in the table below or as directed by the Engineer

II. TECHNICAL SPECIFICATIONS FOR STRUCTURE, CIVIL & FINISHING WORKS

1. TECHNICAL SPECIFICATION FOR EARTHWORK EXCAVATION

This specification covers the general requirements of earthwork. The earthwork shall consist of all works involved in site grading, excavation, shoring, filling around foundations, filling in plinths, disposal of spoils as directed by the Engineer, and such other relevant items. The area to be excavated or filled with the excavated materials shall be clearly demarcated in the field by the Contractor.

The earthwork shall also include, where required, temporary bracing and shoring to maintain excavation etc.

All excavation work shall be inspected and approved by the Engineer before any further works in excavated areas are allowed to commence.

Excavation shall be in all kinds of soils and shall include careful removal of all materials of whatever nature, whether dry or wet, necessary for the construction work, exactly in accordance with lines, levels, grades, curves etc. shown on the drawings. It shall be done to the exact length, width, depth and profile as shown in relevant drawings or as directed by the Engineer. Bottom of excavation shall be levelled both longitudinally and transverse direction and it shall be free of loose unconsolidated material. If excavated to greater length, width or depth, the contractor shall fill such extra excavation with M-10 grade concrete at his own expense and well rammed. If permitted by the Engineer, the extra length and width shall be filled in with good excavated earth or murrom and well rammed as directed. Extra excavation shall not be measured for payment. All bottom of excavation shall be lightly watered and thoroughly rammed before laying the next required material layer.

The contractor shall have full responsibility for the stability of the excavation.

The method of excavation, sheet piling and or other strutting system and methods shall be in every case be subject to the approval of the Engineer. The contractor

shall ensure the stability and safety of the excavations and protect the sides of foundation with proper strutting system.

Any dewatering, shoring, strutting and timbering or cutting of extra width of trenches required for the work and safety of workmen and equipment shall be done by the Contractor at his expense. Water from the dewatering shall be drained off in such a way that it does not cause any damage to any property or any nuisance to others.

The Contractor shall erect and maintain during progress of work temporary fences around dangerous excavations.

Excavation material required for filling shall be stacked or dumped where indicated by the Engineer. Excavated material not required for filling, unsuitable material (what is suitable and what is unsuitable is left to the sole discretion of the Engineer) and any surplus material from the stacks or dumps retained for filling, shall be removed and spread on the site where and as directed by the Engineer or carted away from the site as directed by the Engineer. Dumping of this surplus material shall be in an orderly manner and according to the levels/grades as indicated by Engineer.

Water accumulated within excavated areas from whatever causes shall be bailed or pumped out at Contractor's expense till such time, as backfilling operations are complete.

Contractor shall take necessary measures for protection and maintenance of earthwork. Any damage to the earth work shall be made good at Contractor's cost.

Backfilling around foundations in pits, trenches, plinth and under floors:

- a) All clods of earth shall be broken or removed. Material for backfilling shall generally be obtained from the spoil of excavation. But the Engineer shall have the option, in case of shortage of good, selected earth obtained from excavation, to direct the Contractor to get the filling materials from approved borrow pits within the site. The Contractor shall make necessary access roads to borrow area at his own expense and maintain the same, if such access roads do not exist.
- b) After the concrete or masonry in the foundation has fully set, the spaces around the foundation structure in pits and trenches shall be cleared of all debris, brick bats, mortar dropping etc. and filled with earth in layers not exceeding 15 cm each layer being watered, rammed and properly consolidated before the succeeding one is laid. Each layer shall be consolidated to the satisfaction of the Engineer. Back filling shall be done in such a manner as not to cause undue thrust on any part of the structures. The final surface shall be trimmed and levelled to proper profile as directed by the Engineer. Decision of the Engineer concerning proper consolidation shall be final and binding.
- c) The plinth and under floors shall be similarly filled with approved materials as described herein before in layers not exceeding 15 cm watered and consolidated with mechanical machines to the satisfaction of the Engineer. When the filling reaches finished level, the surface shall be flooded with water for at least 24 hours, allowed to dry and then rammed and consolidated, in order to avoid any settlement at a later stage. The finished level of the filling shall be trimmed to the level specified.

Site levelling

Earth for area filling and levelling shall be obtained from the cut areas of work and if necessary the balance with approved good fill material from approved quarry or from any other source outside the boundary including all lifts and leads, laying in layers of

250 mm and below breaking clods, dressing to required lines, grades and levels, watering and compacting with power roller of 10 tonnes.

Clearing site

- a) The ground over which the cutting is to be done and the ground over which filling is to be formed shall be cleared of all trees, brushwood, loose stones, vegetation, bushes, stumps and all other objectionable materials. The holes dug up for grubbing roots etc. shall be filled with suitable excavated material and compacted. Materials obtained from clearing site shall be disposed of by burning or disposal to areas outside the boundary of the project in such a way that there is no chance of their getting mixed with materials for filling.
- b) For removal of vegetation etc. crawler mounted dozer of adequate capacity shall be used. The work will be supplemented by using manual methods wherever required. The dozer shall have ripper attachment for removal of stumps, roots, etc. All trees, stumps etc. falling within excavation and fill area shall be cut to such depth below ground level that in no case these fall within 50 cm of the sub grade bottom.

Setting out

After clearing the site, the area shall be set out as shown on the plans or as directed in writing. The contractor shall provide all labour, tools, tackles, instruments and materials required for setting out and establishing bench marks and grid pillars. The contractor will be responsible for maintaining bench marks, profiles, grid pillars as long as they are required. Levels and sections shall be taken by the contractor in presence of the representative of the Main contractor before the excavation/filling is started.

Materials

The contractor shall utilise all useful and acceptable material obtained from the cutting from anywhere within the site for filling of low areas anywhere within the site. The contractor shall obtain additional good quality material from approved quarries or from any other source. The filling material should be soil, murum or a mixture of soil, sand, murum, gravel, small boulders having laboratory dry density of at least 1.44 gm/cc. Rejected material if brought to site will be ordered to be removed at contractor's cost. Any objectionable material found in the filling material shall be hand-picked and removed.

The contractor shall be responsible for payment of rents, compensation, fees, royalty etc. and these are deemed to be included in the rates. The Main contractor shall remain indemnified regarding any claims that may be made by private owners.

Equipment

Pickaxes, crowbars, phawras and pans may be used for manual work. Scrapers, dozer, graders, dumpers, shovels, trucks, trolleys etc. may be used for mechanised work. Three wheeled 10 tonne power roller or sheep foot rollers may be used for compaction. Mechanically driven tankers may be used for watering.

Construction Methods

Before any material is laid on the ground, the same shall be cleared of all rubbish etc. When the filling is to be laid on slopes, the existing slopes shall be ploughed deeply to give proper hold. The top layer of the ploughed surface shall be scarified and watered and compacted before any filling material is laid.

Whenever fill is to be deposited against the face of a natural slope, or sloping earthworks face including embankments, cuttings, other fills and excavations steeper than 1 vertical on 4 horizontals, such faces shall be benched as mentioned below immediately before placing the subsequent fill.

Continuous horizontal benches, each at least 300 mm wide, shall be cut into the old slope for ensuring adequate bond with the fresh filling material to be added.

However, when the existing slope against which the fresh material is to be placed is flatter than 1 vertical on 4 horizontals, the slope surface may only be ploughed or scarified instead of resorting to benching.

All permanent faces of side slopes of cut and fill formed areas shall, subsequent to any trimming operations, be reworked and sealed to the satisfaction of the Engineer by tracking a tracked vehicle considered suitable by the Engineer, on slope or any other method approved by the Engineer.

The finished side slopes of cut and fill formed areas shall be 2 to 1 (i.e. 2 horizontals to 1 vertical) slope or the slope required by the Engineer.

When the fill level is higher than the adjacent area outside the boundary of the project then the layers shall be laid in a suitable slope up to the ground level at the boundary line.

Laying the filling material

Filling material shall be placed in successive horizontal layers of 250 mm consolidated thickness or in thickness less than 250 mm if required by the Engineer extending to the complete area of filling. The extra loose stuff at the edges shall be trimmed after completion of earthwork without extra cost. When boulders, broken stones and hard materials are mixed up with the filling materials, care shall be taken to see that they are distributed evenly and uniformly into the earth and no hollows are left near them. No stone or hard material shall project above the top of any layer. Each layer of filling shall be levelled, watered, compacted and tested before the succeeding layer is placed. The surface of the filling at all times shall shed water and prevent ponding.

All clods, lumps, boulders, etc shall be broken to have a maximum size of 75 mm before filling and compaction.

Protection

The contractor shall take the necessary measures and precautions for the protection of the earthwork. Any damage to the earthwork shall be made good at the contractor's cost.

The contractor will have to make his own arrangements so that water is adequately and effectively drained and this arrangement may leave after completion of earthworks if so desired.

Rolling

The layers shall be compacted with Power driven rollers of 8 to 10 Tonnes capacity. The roller shall pass at least twice over the same area once in forward move and the second time in backward move.

Finishing

The filling shall be finished and dressed smooth and even in conformity with the alignment, levels, cross-sections and dimensions shown on the drawings with due allowance for shrinkage. All damages caused by rain, movement of vehicles or any other reason shall be made good in the finishing operations.

The contractor shall not excavate beyond the specified levels / dimensions on the drawings.

The finished cut and fill formation shall satisfy the permitted surface tolerances of +20 mm or -25 mm.

Where the finished surfaces fall outside the above specified tolerances, the contractor shall be liable to rectify these in the manner described below and to the satisfaction of the Engineer.

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

Maintenance

The contractor shall be responsible for maintaining the earth work satisfactorily at his cost till finally accepted including making good any damages.

Excess excavation

Any excess depth excavated below the specified levels shall be made good by dozing, grading and refilling with suitable material of similar characteristics to that removed and watered and compacted to achieve specified density.

Compaction

Only the compaction equipment approved by the Engineer shall be employed to compact the different material types encountered during execution. Smooth wheeled, vibratory, pneumatic tyred, sheep foot or pad foot rollers etc. of suitable size and capacity as approved by the Engineer shall be used for the different types and grades of materials required to be compacted either individually or in suitable combinations. The compaction shall be done with the help of vibratory roller of 8 to 10 tonne static weight with plain or pad foot drum or heavy pneumatic tyred roller of adequate capacity capable of achieving required compaction.

The contractor shall demonstrate the efficiency of the equipment he intends to use by carrying out compaction trials. The procedure to be adopted for these site trials shall first be submitted to the Engineer for approval.

Rollers of adequate capacity shall be used to achieve the required compaction by artificial watering and rolling. Subsequent layer shall be placed after each finished layer is approved. The level of compaction required is 90% of Standard Proctor Density for all areas except where Roads and Building works are to be provided. At such places the required compaction density of Standard Proctor shall be as given below:

Roads	:	95%
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Buildings

Top Layer	:	98%
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500 mm below top layer	:	95%
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Below 500 mm	:	90%
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The top layer of filling shall be brought to the specified line, levels and grade as shown in the drawings or as directed.

2.24 SAND FILLING IN PLINTH

2.24.1 Sand shall be clean and free from dust organic and foreign matter and its grading shall be within the limits of grading zone IV or V specified in Section 3 'Mortars'.

2.24.2 Filling Sand filling shall be done in a manner similar to earth filling in plinth specified in 2.23.3.2. except that consolidation shall be done by flooding with water. The surface of the consolidated sand filling shall be dressed to the required level or slope and shall not be covered till the Engineer-in-Charge has inspected and approved the sand filling.

2.24.3 Measurements The length, breadth and depth of consolidated sand shall be measured with steel tape correct to the nearest cm and cubical contents worked out in cubic metres correct to two places of decimal.

2.24.4 Rates The rates include the cost of material and labour involved in all the operations described above.

2.26.3 Clearance of Grass

Clearing and grubbing operation involving only the clearance of grass shall be measured and paid for separately and shall include removal of rubbish upto a distance of 50 m outside the periphery of the area under clearance.

2.26.4 Measurements

The length and breadth shall be measured correct to the nearest cm and area worked out in square metres correct to two places of decimal.

2.26.5 Rates

The rate includes cost of all the operation described above.

Murum Filling

Materials

1.0 Murum shall be clean, of good binding quality and of approved quality obtained from approved pots/ quarries of disintegrated rocks which contain silicon material and natural mixture of clay of clarions origin. The size of murum shall not be more than 20 mm

2.0. Workmanship

1.1 The murum to be used for filling shall be free from salts, organic or other foreign matter. All clods of earth shall be broken.

1.2. The murum shall be filled in foundations and plinth in 20 cms layer including consolidating, ramming, watering, dressing etc. complete.

3.0 Mode of Measurements & Payment

The rate includes cost of collecting and carting murum / or selected earth of approved quality with all lead and labour required for filling in trenches and plinth.

Rate shall be for a unit of one cubic meter

TECHNICAL SPECIFICATION FOR ROAD WORK

NOTE

1. Relevant clauses of Ministry of Surface Transport (**MOT**) Specifications for Roads and Bridges relevant to this tender only are reproduced.
2. In case of any variation between the reproduced specification and the original specification of **MOST** Publication, the reproduce publication shall prevail and shall be construed accordingly.
3. If MOST clauses referred to in the reproduced specifications herein are not included in the latter, the same shall be read from **MOST specifications**.

301. EXCAVATION FOR ROADWAY AND DRAINS

Please refer to the Clause/Section No. 301 of Ministry of Road Transport & Highways Specifications for Road and Bridge Works (Latest Revision) for detailed specifications for Excavation for Roadway and Drains.

304 EXCAVATIONS FOR STRUCTURES

Please refer to the Clause/Section No. 304 of Ministry of Road Transport & Highways Specifications for Road and Bridge Works (Latest Revision) for detailed specifications for Excavation for Structures.

305 EMBANKMENT CONSTRUCTION

Please refer to the Clause/Section No. 305 of Ministry of Road Transport & Highways Specifications for Road and Bridge Works (Latest Revision) for detailed specifications for Embankment Construction.

16.62. GRANULAR SUB-BASE

16.62.1. Scope

This work shall consist of laying and compacting well-graded material on prepared subgrade in accordance with the requirements of these Specifications. The material shall be laid in one or more layers as sub-base or lower sub-base and upper sub-base (termed as sub-base hereinafter) as necessary according to lines, grades and cross-sections shown on the drawings or as directed by the Engineer-in-charge.

16.62.2. Materials

16.62.2.1. The material to be used for the work shall be natural sand, crushed gravel, crushed stone, crushed slag or combination thereof depending upon the grading required.

Use of materials like brick metal, Kankar and crushed concrete shall be permitted in the lower sub-base. The material shall be free from organic or other deleterious constituents and shall conform to the grading given in Table 16.44 and physical requirement given in Table 16.45. Gradings III and IV shall preferably be used in lower sub-base. Grading V and VI shall be used as a sub-base-cum-drainage layer. The grading to be adopted for a project shall be as specified in the Contract. Where the sub-base is laid in two layers as upper sub-base and lower sub-base, the thickness of each layer shall not be less than 150 mm. 16.62.2.2 If the water absorption of the aggregate determined as per IS : 2386 (Part 3); if this value is greater than 2 per cent, the aggregate shall be tested for Wet Aggregate Impact Value (AIV) (IS: 5640). Soft aggregates like Kankar, Brick ballast and laterite shall also be tested for Wet AIV (IS: 5640).

TABLE No. 16.44
GRADING FOR GRANULAR SUB-BASE MATERIALS

IS Sieve Designation	Percent by Weight Passing the IS Sieve					
	Grading I	Grading II	Grading III	Grading IV	Grading V	Grading VI
75.0 mm	100	--	--	--	100	--
53.0 mm	80-100	100	100	100	80-100	100
26.5 mm	55-90	70-100	55-75	50-80	55-90	75-100
9.50 mm	35-65	50-80	--	--	35-65	55-75
4.75 mm	25-55	40-65	10-30	15-35	25-50	30-55
2.36 mm	20-40	30-50	--	--	10-20	10-25
0.85 mm	--	--	--	--	2-10	--
0.425 mm	10-15	10-15	--	--	0-5	0-8
0.075 mm	<5	<5	<5	<5	--	0-3

TABLE No. 16.45
PHYSICAL REQUIREMENTS FOR MATERIALS FOR GRANULAR SUB-BASE

Aggregate Impact Value (AIV)	IS:2386 (Part 4) or IS:5640	40 Maximum
Liquid Limit	IS:2720 (Part 5)	Maximum 25
Plasticity Index	IS:2720 (Part 5)	Maximum 6
CBR at 98% dry density (at IS:2720-Part 8)	IS:2720 (Part 5)	Minimum 30 unless otherwise specified in the Contract

16.62.3 Construction Operations

16.62.3.1. Preparation of Sub-Grade: The surface of the sub grade to receive the Granular Sub-base shall be prepared to the specified lines and crossfall (Camber) as necessary and made free of dust and other extraneous materials. Any ruts or soft yielding places shall be corrected in an approved manner and rolled with 80 – 100 kN smooth wheeled roller until firm surface is obtained if necessary by sprinkling water.

Weak places shall be strengthened, corrugations removed and depressions and pot holes made good with suitable materials, before spreading the aggregate for GSB. Where the existing surface over which the sub base of GSB is to be laid is black topped, to ensure effective internal drainage, furrows 50 mm x 50 mm (depth of furrows increased to reach bottom of bituminous layer where necessary) at one metre intervals shall be cut in the existing bituminous surface at 45 degrees to the central line of the carriageway at one metre intervals in the existing road before the GSB is laid.

16.62.3.2 Spreading and compacting

The sub-base material of grading specified in the Contract and water shall be mixed mechanically by a suitable mixer equipped with provision for controlled addition of water and mechanical mixing. So as to ensure homogenous and uniform mix. The required water content shall be determined in accordance with IS:2720 (Part 8). The mix shall be spread on the prepared sub-grade with the help of a motor grader of adequate capacity, its blade having hydraulic controls suitable for initial adjustment and for maintaining the required slope and grade during the operation, or other means as approved by the Engineer-in-charge. Moisture content of the mix shall be checked in accordance with IS:2720 (Part 2) and suitably adjusted so that, at the time of compaction, it is from 1 to 2 per cent below the optimum moisture content (OMC)

Immediately after spreading the mix, rolling shall be done by an approved roller. If the thickness of the compacted layer does not exceed 100 mm, a smooth wheeled roller of 80 to 100 kN weight may be used. For a compacted single layer upto 200 mm the compaction shall be done with the help of a vibratory roller of minimum 80 to 100 kN static weight capable of achieving the required compaction. Rolling shall commence at the lower edge and proceed towards the upper edge longitudinally for portions having unidirectional crossfall or on super elevation. For carriageway having crossfall on both sides, rolling shall commence at the edges and progress towards the crown.

Each pass of the roller shall uniformly overlap not less than one third of the track made in the preceding pass. During rolling, the grade and crossfall (camber) shall be checked and any high spots or depressions, which become apparent, corrected by removing or adding fresh material. The speed of the roller shall not exceed 5 km per hour.

Rolling shall be continued till the density achieved is at least 98 percent of the maximum dry density for the material determined as per IS : 2720 (Part 8). The surface of any layer of material on completion of compaction shall be well closed, free from movement under

compaction equipment and from compaction planes, ridges, cracks or loose material. All loose, segregated or otherwise defective areas shall be made good to the full thickness of layer and re-compacted.

16.62.4 Measurements

Granular sub-base shall be measured as finished work in position in cubic metres. The length and breadth shall be measured to the nearest centimetre. The depth of consolidated layer shall be computed to nearest half centimetre by taking average of depths at the centre and at 30 cm from the left and right edges at a cross section taken at 100 metre interval or less as decided by the Engineer-in-Charge by making small pits. The consolidated cubical contents shall be calculated in cubic metres correct to two places of decimal. The protection of edges of granular sub-base extended over the full formation as shown in the drawing shall be considered incidental to the work of providing granular sub-base and as such no extra payment shall be made for the same.

16.62.5. Rate

The Contract unit rate for granular sub-base shall be payment in full for carrying out the required operations including all labour, tools, equipments, machinery and incidentals to complete the work to the specifications as described above

16.57 FACTORY MADE CEMENT CONCRETE INTERLOCKING PAVER BLOCK

16.57.1

Base Interlocking paver block to be fixed on the bed 50 mm or specified otherwise thick of coarse sand of approved specification and filling the joints with the sand of approved type and quality or as specified and as directed by Engineer-in-charge.

16.57.2 Interlocking Paver Block

Factory made precast paver block of M-30 or otherwise specified grade to be used. Paver blocks to be of approved brand and manufacturer and of approved quality. Minimum strength as prescribed by manufacturer and as per direction of Engineer-in-Charge for the grade specified to be tested as per method mentioned in specification of subhead cement concrete of CPWD Specification 2019 Vol. I.

16.57.3 Measurement & Rates

Area provided with paver block to be measured in sqm. correct upto two places of decimal. The rate include the cost of the material, labour, tools etc. required in all the operations described above.

16.58 KERB STONE (PRECAST)

16.58.1 Laying

16.58.1.1 Trenches shall first be made along the edge of the wearing course of the road to receive the kerb stones of cement concrete of specified grade. The bed of the trenches shall be compacted manually with steel rammers to a firm and even surface and then the stones shall be set in cement mortar of specified proportion.

16.58.1.2 The kerb stones with top 20 cm. wide shall be laid with their length running parallel to the road edge, true in line and gradient at a distance of 30 cm. from the road edge to allow for the channel and shall project about 12.5 cm. above the latter. The channel stones with top 30 cm. wide shall be laid in position in chamber with finished road surface and with sufficient slope towards the road gully chamber. The joints of kerb and channel stones shall be staggered and shall be not more than 10 mm. Wherever specified all joints shall be filled with mortar 1:3 (1 cement : 3 coarse sand) and pointed with mortar 1:2 (1 cement: 2 fine sand) which shall be cured for 7 days. **16.58.1.3** The necessary drainage openings of specified sizes shall be made through the kerb as per drawings or as directed by the Engineer-in-Charge for connecting to storm water drains.

16.58.2 Finishing

Berms and road edges shall be restored and all surplus earth including rubbish etc. disposed off as directed by the Engineer-in-charge. Nothing extra shall be paid for this.

16.58.3 Measurements

It shall be measured in cubic meters with Length of the finished work (for specified width and height of stone) shall be measured in running metre along the edge of the road correct to a cm.

16.58.4 Rate

The rate shall include the cost of all the materials and labour involved in all the operations described above.

504.4 SURFACE FINISH AND QUALITY CONTROL OF WORK

The surface finish of construction shall conform to the requirements of Clause 902. Control on the quality of materials and works shall be exercised by the Engineer in accordance with Section 900.

504.5 The bituminous macadam shall be covered with either the next pavement course or wearing course without any delay. If there is to be any delay, the course shall be covered by a seal coat to the requirement of Clause 513 before allowing any traffic over it. The seal coat in such cases shall be considered incidental to the work and shall not be paid for separately.

504.6 ARRANGEMENTS OF TRAFFIC

During the period of Construction, arrangement of traffic shall be done to Clause 112.

504.7 MEASUREMENTS FOR PAYMENT

The work shall be measured as finished work in cubic metres or by weight in metric tonnes as per provided in the Contract.

504.8 RATE

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 except for initial treatment to verge shoulders and construction of diversions.
- ii) Preparation of base except for laying of profile corrective course but including filing of potholes.
- iii) Providing all materials to be incorporated in the work including all royalties, fees, rents where necessary and all leads and lifts,
- iv) All labour, tools, equipment, plants including installation of hot-mix plant, power supply units and all machineries incidentals to complete the work to the specifications;
- v) Carrying out the work in part widths of the road where directed;
- vi) Carrying out all tests for control of quality; and
- vii) The rate shall cover the provision of bitumen at 3.5 percent of weight of total mix, with the provision that the variation of quantity of bitumen will be assessed and the payment adjusted as per the rate of bitumen quoted.

507 DENSE GRADED BITUMINOUS MACADAM

507.1. Scope

This clause specifies the construction of Dense Graded Bituminous Macadam, (DBM), for use mainly, but not exclusively, in base/binder and profile corrective courses. DBM is also intended for use as road base material. This work shall consist of construction in a single or multiple layers of DBM on a previously prepared base or sub-base. The thickness of a single layer shall be 50 to 100 mm.

507.2. Materials

507.2.1. Bitumen: The bitumen shall be paving bitumen of Penetration Grade complying with Indian Standard Specifications for “Paving Bitumen” IS: 73, and of the penetration indicated in Table 500-10 for dense bitumen macadam, or this bitumen as modified by one of the methods specified in Clause 521, or as otherwise specified in the Contract. Guidance on the selection of an appropriate grade of bitumen is given in The Manual for Construction and Supervision of Bituminous Works.

507.2.2. Coarse aggregates: The coarse aggregates shall consist of crushed rock, crushed gravel or other hard material retained on the 2.36 mm sieve. They shall be clean, hard, durable, of cubical shape, free from dust and soft or friable matter, organic or other deleterious substances. Where the Contractor’s selected source of aggregates have poor affinity for bitumen, as a condition for the approval of that source, the bitumen shall be treated with an approved anti-stripping agent, as per the manufacturer’s recommendations, without additional payment. Before approval of the source, the aggregates shall be tested for stripping. The aggregates shall satisfy the physical requirements specified in Table 500-8, for dense bituminous macadam.

Where crushed gravel is proposed for use as aggregate, not less than 90 % by weight of the crushed material retained on the 4.75 mm sieve shall have at least two fractured faces.

507.2.3. Fine aggregates: Fine aggregates consist of crushed or naturally occurring mineral material, or a combination of the two, passing the 2.36 mm sieve and retained on 75 micron sieve. They shall be clean, hard, durable, dry and free from dust, and soft or friable matter, organic or other deleterious matter.

The fine aggregate shall have a sand equivalent value of not less than 50 when tested in accordance with the requirement of IS: 2720 (Part 37).

The plasticity index of the fraction passing the 0.425 mm sieve shall not exceed 4. When tested in accordance with IS: 2720 (Part 5)

**TABLE 500-8. PHYSICAL REQUIREMENTS FOR COARSE AGGREGATE
FOR
DENSE GRADED BITUMINOUS
MACADAM**

Property	Test	Specification
Cleanliness (dust)	Grain size analysis ¹	Max 5 % passing 0.075 mm sieve
Particle shape	Flakiness and Elongation Index (Combined) ²	Max 30 %
	Loss Angeles Abrasion Value ³	Max 35 %

Strength *	Aggregate Impact Value ⁴	Max 27 %
Durability	Soundness: Sodium Sulphate Magnesium Sulphate	Max 12 % Max 18 %
Water Absorption	Water absorption	Max 2 %
Stripping	Coating and Stripping of Bitumen Aggregate Mixtures	Minimum retained coating 95 %
Water Sensitivity**	Retained Tensile Strength	Min 80 %

Notes: 1. IS: 2386 Part 1 5. IS: 2386 Part 5

2. IS: 2386 Part 1 6. IS: 2386 Part 3

(the elongation test to be done only on non-flaky aggregates in the sample)

3. IS: 2386 Part 4* 7. IS: 6241

4. IS: 2386 Part 4* 8. AASHTO T 283**

* Aggregate may satisfy requirements of either of these two tests.

** The water sensitivity test is only required if the minimum retained coating in the stripping test is less than 95 %.

507.2.4. Filler: Filler shall consist of finely divided mineral matter such as rock dust, hydrated lime or cement approved by the Engineer.

The filler shall be graded within the limits indicated in Table 500-9.

TABLE 500-9. GRADING REQUIREMENTS FOR MINERAL FILLER

IS Sieve (mm)	Cumulative per cent passing by weight of total aggregate
0.6	100
0.3	95 – 100
0.075	85 – 100

The filler shall be free from organic impurities and have a Plasticity Index not greater than 4. The Plasticity Index requirement shall not apply if filler is cement or lime. When the coarse aggregate is gravel, 2 per cent by weight of total aggregate, shall be Portland cement or hydrated lime and the percentage of fine aggregate reduced accordingly. Cement or hydrated lime is not required when the limestone aggregate is used. Where the aggregates fail to meet the requirements of the water sensitivity test in Table 500-8, then 2 per cent by total weight of aggregate, of hydrated lime shall be added without additional coat.

507.2.5. Aggregate grading and binder content: When tested in accordance with IS: 2386 Part 1 (wet sieving method), the combined grading of the coarse and

fine aggregates and added filler for the particular mixture shall fall within the limits shown in Table 500-10, for dense bituminous macadam grading 1 or 2 as specified in the Contract. The type and quality of bitumen, and appropriate thickness, are also indicated for each mixture type.

**TABLE 500-10. COMPOSITION OF DENSE GRADED BITUMINOUS
MACADAM PAVEMENT LAYERS**

Grading	1	2
Nominal aggregate size	40 mm	25 mm
Layer Thickness	80 – 100 mm	50 – 75 mm
IS Sieve ¹ (mm)	Cumulative % by weight of total aggregate passing	
45	100	-
37.5	95 – 100	100
26.5	63 – 93	90 – 100
19	-	71 – 95
13.2	55 – 75	56 – 80
9.5	-	-
4.75	38 – 54	38 – 54
2.36	28 – 42	28 – 42
1.18	-	-
0.6	-	-
0.3	7 – 21	7 – 21
0.15	-	-
0.075	2 – 8	2 – 8

Grading	1	2
Bitumen content % by mass of total mix ²	Min 4.0	Min 4.5
Bitumen grade (pen)	65 or 90	65 or 90

Notes: 1.The combined aggregate grading shall not vary from the low limit on one sieve to the high limit on the adjacent sieve.

Determined by the Marshall method.

507.3.Mixture Design

507.3.1. Requirement for the mixture: Apart from conformity with the grading and quality requirements for individual ingredients, the mixture shall meet the requirements set out in Table 500-11.

**TABLE 500-11. REQUIREMENTS FOR DENSE GRADED
BITUMINOUS MACADAM**

Minimum stability (kN at 60 ⁰ C)	9.0
Minimum flow (mm)	2
Maximum flow (mm)	4
Compaction level (Number of blows)	75 blows on each of the two faces of the specimen
Per cent air voids	3 – 6
Per cent voids in mineral aggregate (VMA)	See Table 500-12 below.
Per cent voids filled with bitumen (VFB)	65 – 75

The requirements for minimum per cent voids in mineral aggregate (VMA) are set out in Table 500-12.

**TABLE 500-12. MINIMUM PER CENT VOIDS IN MINERAL AGGREGATE
(VMA)**

Nominal Maximum Particle Size ¹ (mm)	Minimum VMA, Per cent Related to		
	3.0	4.0	5.0
9.5	14.0	15.0	16.0
12.5	13.0	14.0	15.0
19.0	12.0	13.0	14.0
25.0	11.0	12.0	13.0
37.5	10.0	11.0	12.0

Notes:

1. The nominal maximum particle size is one size larger than the first sieve to retain more than 10 per cent.
2. Interpolate minimum voids in the mineral aggregate (VMA) for design air voids values between those listed.

507.3.2. Binder content: The binder content shall be optimised to achieve the requirements of the mixture set out in Table 500-11 and the traffic volume specified in the Contract. The Marshall method for determining the optimum binder content shall be adopted as described in The Asphalt Institute Manual MS-

2, replacing the aggregates retained on the 26.5 mm sieve by the aggregates passing the 26.5 mm sieve and retained on 22.4 mm sieve, where approved by the Engineer.

Where 40 mm dense bituminous macadam mixture is specified, the modified Marshall method described in MS-2 shall be used. This method requires modified equipment and procedures; particularly the minimum stability values in Table 500-11 shall be multiplied by 2.25, and the minimum flow shall be 3 mm.

507.3.3. Job mix formula: The Contractor shall inform Engineer in writing, at least 20 days before the start of the work, of the job mix formula proposed for be used in the works, and shall give the following details:

- (i) Source and location of all materials;
- (ii) Proportions of all materials expressed as follows where each is applicable:
- (iii) Binder type, and percentage by weight of total mixture;
- (iv) Coarse aggregate/Fine aggregate/Mineral filler as percentage by weight of total aggregate including mineral filler;
- (v) A single definite percentage passing each sieve for the mixed aggregate; (vi) The individual gradings of the individual aggregate fractions, and the proportion of each in the combined grading.
- (vii) The results of tests enumerated in Table 500-11 as obtained by the Contractor;
- (viii) Where the mixer is a batch mixer, the individual weights of each type of aggregate, and binder per batch,
- (ix) Test results of physical characteristics of aggregates to be used; (x) Mixing temperature and compacting temperature.

While establishing the job mix formula, the Contractor shall ensure that it is based on a correct and truly representative sample of the materials that will actually be used in the work and that the mixture and its different ingredients satisfy the physical and strength requirements of these Specifications.

Approval of the job mix formula shall be based on independent testing by the Engineer for which samples of all ingredients of the mix shall be furnished by the Contractor as required by the Engineer.

The approved job mix formula shall remain effective unless and until a revised Job Mix Formula is approved. Should a change in the source of materials be proposed, a new job mix formula shall be forwarded to the Engineer for approval before the placing of the material.

507.3.4. Plant trials - permissible variation in job mix formula: Over the laboratory job mix formula is approved, the Contractor shall carry out plant trials at the mixer to establish that the plant can be set up to produce a uniform mix conforming to the approved job mix formula. The permissible variations of the individual percentages of the various ingredients in the actual mix from the job mix formula to be used shall be within the limits as specified in Table 500-13. These variations are intended to apply to individual specimens taken for quality control tests in accordance with Section 900.

TABLE 500-13. PERMISSIBLE VARIATIONS FROM THE JOB MIX FORMULA

Description	Permissible variation	
	Base/binder course	Wearing course
Aggregate passing 19 mm sieve or larger	$\pm 8 \%$	$\pm 7 \%$
Aggregate passing 13.2 mm, 9.5 mm	$\pm 7 \%$	$\pm 6 \%$
Aggregate passing 4.75 mm	$\pm 6 \%$	$\pm 5 \%$
Aggregate passing 2.36 mm, 1.18 mm, 0.6 mm	$\pm 5 \%$	$\pm 4 \%$
Aggregate passing 0.3 mm, 0.15 mm	$\pm 4 \%$	$\pm 3 \%$
Aggregate passing 0.075 mm	$\pm 2 \%$	$\pm 1.5 \%$
Binder content	$\pm 0.3 \%$	$\pm 0.3 \%$
Mixing temperature	$\pm 10^0\text{C}$	$\pm 10^0\text{C}$

Once the plant trials have demonstrated the capability of the plant, and the trials are approved, the laying operation may commence. Over the period of the first month of production for laying on the works, the Engineer shall require additional testing of the product to establish the reliability and consistency of the plant.

507.3.5. Laying Trials: Once the plant trials have been successfully completed and approved, the Contractor shall carry out laying trials, to demonstrate that the proposed mix can be successfully laid, and compacted all in accordance with Clause 501. The laying trial shall be carried out on a suitable area which is not to form part of the works, unless specifically approved in writing, by the Engineer. The area of the laying trials shall be a minimum of 100 sq. m. of construction similar to that of the project road, and it shall be in all respects, particularly compaction, the same as the project construction, on which the bituminous material is to be laid.

The Contractor shall previously inform the Engineer of the proposed method for laying and compacting the material. The plant trials shall then establish if the

proposed laying plant, compaction plant, and methodology is capable of producing satisfactory results. The density of the finished paving layer shall be determined by taking cores, no sooner than 24 hours after laying, or by other approved method.

Once the laying trials have been approved, the same plant and methodology shall be applied to the laying of the material on the project, and no variation of either shall be acceptable, unless approved in writing by the Engineer, who may at his discretion required further laying trials.

507.4. Construction Operations

507.4.1. Weather and seasonal limitations: The provisions of Clause 501.5.1 shall apply.

507.4.2. Preparation of base: The base on which Dense Graded Bituminous Material is to be laid shall be prepared in accordance with Clauses 501 and 902 as appropriate, or as directed by the Engineer. The surface shall be thoroughly swept clean by a mechanical broom, and the dust removed by compressed air. In locations where mechanical broom cannot access, other approved methods shall be used as directed by the Engineer.

507.4.3. Geosynthetics: Where Geosynthetics are specified in the Contract this shall be in accordance with the requirements stated in Clause 703.

507.4.4. Stress absorbing layer: Where a stress absorbing layer is specified in the Contract, this shall be applied in accordance with the requirements of Clause 522.

507.4.5. Prime coat: Where the material on which the dense bituminous macadam is to be laid is other than a bitumen bound layer, a prime coat shall be applied, as specified, in accordance with the provisions of Clause 502, or as directed by the Engineer.

507.4.6. Tack coat: Where the material on which the dense bituminous macadam is to be placed is a bitumen bound surface, a tack coat shall be applied as specified, in accordance with the provisions of Clause 503, or as directed by the Engineer.

507.4.7. Mixing and transportation of the mixture: The provisions as specified in Clauses 501.3 and 501.4 shall apply.

507.4.8. Spreading: The provisions of Clauses 501.5.3 and 501.5.4 shall apply.

507.4.9. Rolling: The general provisions of Clauses 501.6 and 501.7 shall apply, as modified by the approved laying trails. The compaction process shall be carried out by the same plant, and using the same method, as approved in the laying trials, which may be varied only with the express approval of the Engineer in writing.

507.5. Opening to Traffic

The newly laid surface shall not be open to traffic for at least 24 hrs after laying and completion of compaction, without the express approval of the Engineer in writing.

507.6. Surface Finish and Quality Control of Work

The surface finish of the completed construction shall conform to the requirements of Clause 902. All materials and workmanship shall comply with the provisions set out in Section 900 of this Specification.

507.7. Arrangements for Traffic

During the period of construction, arrangements for traffic shall be made in accordance with the provisions of Clause 112.

507.8. Measurement for Payment

Dense Graded Bituminous Materials shall be measured as finished work either in cubic metres, tons or by the square metre at a specified thickness as detailed on the Contract drawings, or documents, or as directed by the Engineer.

507.9. Rate

The contract unit rate for Dense Graded Bituminous Macadam shall be payment in full for carrying out the all required operations as specified, and shall include, but not necessarily limited to all components listed in Clause 501.8.8.2 (i) to (xi). The rate shall include the provision of bitumen, 4.25 per cent by weight of the total mixture.

The variance in actual percentage of bitumen used will be assessed and the payment adjusted, up or down, accordingly.

508 SEMI-DENSE BITUMINOUS CONCRETE

508.1. Scope

This clause specifies the construction of Semi Dense Bituminous Concrete, for use in wearing/binder and profile corrective courses. This work shall consist of construction in a single or multiple layers of semi dense bituminous concrete on a previously prepared bituminous bound surface. A single layer shall be 25mm to 100 mm in thickness.

508.2. Materials

508.2.1.Bitumen: The bitumen shall be paving bitumen of Penetration Grade complying with Indian Standard Specifications for Paving Bitumen, IS: 73 and of the penetration indicated in Table 500-15, for semi dense bituminous concrete, or this bitumen as modified by one of the methods specified in Clause 521, or as otherwise specified in the Contract. Guidance on the selection of an appropriate grade of bitumen is given in The Manual for Construction and Supervision of Bituminous Works.

508.2.2.Coarse aggregates: The coarse aggregates shall be generally as specified in Clause 507.2.2, except that the aggregates shall satisfy the physical requirements of Table 500-14.

508.2.3.Fine aggregates: The fine aggregates shall be all as specified in Clause 507.2.3.

508.2.4.Filler: Filler shall be generally as specified in Clause 507.2.4. Where the aggregates fail to meet the requirements of the water sensitivity test in Table

500-14 then 2 per cent by total weight of aggregate, of hydrated lime shall be added without additional cost.

508.2.5.Aggregate grading and binder content: When tested in accordance with IS: 2386 Part 1 (wet sieving method), the combined grading of the coarse and fine aggregates and added filler shall fall within the limits shown in Table 500-15 for gradings 1 or 2 as specified in the Contract.

508.3. Mixture Design

508.3.1.Requirement for the mixture: Apart from conformity with the grading and quality requirements for individual ingredients the mixture shall meet the requirements set out in Table 500-16.

**TABLE 500-14 . PHYSICAL REQUIREMENTS FOR COARSE
AGGREGATE FOR SEMI DENSE BITUMINOUS CONCRETE
PAVEMENT LAYERS**

Property	Test	Specification
Cleanliness (dust)	Grain size analysis ¹	Max 5 % passing 0.075 mm sieve
Particle shape	Flakiness and Elongation Index (Combined) ²	Max 30 %
Strength *	Loss Angeles Abrasion Value ³	Max 35 %
	Aggregate Impact Value ⁴	Max 27 %
Polishing	Polished Stone Value ⁵	Min 55
Durability	Soundness: ⁶	
	Sodium Sulphate	Max 12 %
	Magnesium Sulphate	Max 18 %
Water Absorption	Water absorption ⁷	Max 2 %
Stripping	Coating and Stripping ⁹ of Bitumen Aggregate Mixtures	Minimum retained coating 95 %
Water Sensitivity**	Retained Tensile Strength ⁸	Min 80 %

Notes: 1. IS: 2386 Part 1 6. IS: 2386 Part 5

2. IS: 2386 Part 1 7. IS: 2386 Part 3 (the elongation test to be done only on non-flaky aggregates in the sample)

3. IS: 2386 Part 4* 8. AASHTO T 283**

4. IS: 2386 Part 4* 9. IS: 6241

5. BS: 812 Part 114

* Aggregate may satisfy requirements of either of these two tests.

** The water sensitivity test is only required if the minimum retained coating in the stripping test is less than 95 %.

The requirements for minimum per cent voids in mineral aggregate (VMA) are set out in Table 500-12.

508.3.2. Binder content: The binder content shall be optimised to achieve the requirements of the mixture set out in Table 500-16 and the traffic volume specified in the Contract. The Marshall method for determining the optimum binder content shall be adopted as described in The Asphalt Institute Manual MS-2, replacing the aggregates retained on the 26.5 mm sieve by the aggregates passing the 26.5 mm sieve and retained on 22.4 mm sieve, where approved by the Engineer.

**TABLE 500-15. COMPOSITION OF SEMI DENSE BITUMINOUS
CONCRETE PAVEMENT LAYERS**

Grading	1	2
Nominal aggregate size	13 mm	10 mm
Layer Thickness	35 – 40 mm	25 – 30 mm
IS Sieve ¹ (mm)	Cumulative % by weight of total aggregate passing	
45	-	-
37.5	-	-
26.5	-	-
19	100	-
13.2	90 – 100	100
9.5	70 – 90	90 – 100
4.75	35 – 51	35 – 51

2.36	24 – 39	24 – 39
1.18	15 – 30	15 – 30
0.6	-	-
0.3	9 – 19	9 – 19
0.15	-	-
0.075	3 – 8	3 – 8
Bitumen content % by mass of total mix ²	Min 4.5	Min 5.0
Bitumen grade (pen)	65*	65*

Notes: 1. The combined aggregate grading shall not vary from the low limit on one sieve to the high limit on the adjacent sieve.

2. Determined by the Marshall method.

*Only in exceptional circumstances, 80/100 penetration grade may be used, as approved by the Engineer.

**TABLE 500-16. REQUIREMENTS FOR SEMI DENSE
BITUMINOUS PAVEMENT LAYERS**

Minimum stability (kN at 60 ⁰ C)	8.2
Minimum flow (mm)	2
Maximum flow (mm)	4
Compaction level (Number of blows)	75 blows on each of the two faces of the specimen
Per cent air voids	3 – 5
Per cent voids in mineral aggregate (VMA)	See Table 500-12
Per cent voids filled with bitumen (VFB)	65 – 78

508.3.3. Job mix formula: The procedure for formulating the job mix formula shall be generally as specified in Clause 507.3.3 and the results of tests enumerated in Table 500-16 as obtained by the Contractors.

508.3.4. Plant trials - permissible variation in job mix formula: The requirements for plant trials shall be all as specified in Clause 507.3.4, and permissible limits for variation as shown in Table 500-13.

508.3.5. Laying Trials: The requirements for laying trials shall be all as specified in Clause 507.3.5.

508.4. Construction Operations

508.4.1. Weather and seasonal limitations: The provisions of Clause 501.5.1 shall apply.

508.4.2. Preparation of base: The surface on which the Semi Dense Bituminous Material is to be laid shall be prepared in accordance with Clauses 501 and 902 as appropriate, or as directed by the Engineer. The surface shall be thoroughly swept clean by mechanical broom and dust removed by compressed air. In locations where a mechanical broom cannot access, other approved methods shall be used as directed by the Engineer.

508.4.3. Geosynthetics: Where Geosynthetics are specified in the Contract this shall be in accordance with the requirements stated in Clause 703.

508.4.4. Stress absorbing layer: Where a stress absorbing layer is specified in the Contract, this shall be applied in accordance with the requirements of Clause 522.

508.4.5. Tack coat: Where specified in the Contract, or otherwise required by the Engineer, a tack coat shall be applied in accordance with the provisions of Clause 503.

508.4.6. Mixing and transportation of the mixture: The provisions as specified in Clauses 501.3 and 501.4 shall apply.

508.4.7. Spreading: The general provisions of Clauses 501.5.3 and 501.5.4 shall apply.

508.4.8. Rolling: The general provisions of Clauses 501.6 and 501.7 shall apply, as modified by the approved laying trials. The compaction process shall be carried out by the same plant, and using the same method, as approved in the laying trials, which may be varied only with the express approval of the Engineer in writing.

508.5. Opening to Traffic

The newly laid surface shall not be open to traffic for at least 24 hours after laying and the completion of compaction, without the express approval of the Engineer in writing.

508.6. Surface Finish and Quality Control

The surface finish of the completed construction shall conform to the requirements of Clause 902. All materials and workmanship shall comply with the provisions set out in Section 900 of this Specification.

508.7. Arrangements for Traffic

During the period of construction, arrangements for traffic shall be made in accordance with the provisions of Clause 112.

508.8. Measurement for Payment

The work shall be measured as finished work in cubic metres as per provided in the Contract.

508.9. Rate

The contract unit rate shall be all as specified in Clause 507.9, except that the rate shall include the provision of bitumen at 4.75 per cent, by weight of the total mixture. The variance in actual percentage of bitumen used will be assessed and the payment adjusted up or down, accordingly.

512 CLOSE-GRADED PREMIX SURFACING (MIXED SEAL SURFACING)

512.1. Scope

512.1.1. This work shall consist of the preparation, laying and compaction of a close-graded premix surfacing material of 20 mm thickness composed of graded aggregates premixed with a bituminous binder on a previously prepared surface, in accordance with the requirements of these Specifications, to serve as a wearing course.

512.1.2. Close graded premix surfacing shall be of Type A or Type B as specified in the Contract documents.

512.2. Materials

512.2.1. Binder: The binder shall be a penetration bitumen of a suitable grade as specified in the Contract, or as directed by the Engineer, and satisfying the requirements of IS: 73.

512.2.2. Coarse aggregates: The provisions of Clause 511.1.2.2 shall apply.

512.2.3. Fine aggregates: The fine aggregates shall consist of crushed rock quarry sands, natural gravel/sand or a mixture of both. These shall be clean, hard, durable, un-coated, mineral particles, dry and free from injurious, soft or flaky particles and organic or deleterious substances.

512.2.4. Aggregate gradation: The coarse and fine aggregates shall be so graded or combined as to conform to one or the other gradings shown in Table 500-26, as specified in the contract.

512.2.5. Proportioning of materials: The total quantity of aggregates used for Type A or B close-graded premix surfacing shall be 0.27 cubic metre per 10 square metre area. The quantity of binder used for premixing in terms of straight-run bitumen shall be 22.0 kg and 19.0 kg per 10 square metre area for Type A and Type B surfacing respectively.

TABLE 500-26. AGGREGATE GRADATION

IS Sieve Designation (mm)	Cumulative per cent by weight of total aggregate passing	
	Type A	Type B

13.2 mm	-	100
11.2 mm	100	88 – 100
5.6 mm	52 – 88	31 – 52
2.8 mm	14 – 38	5 – 25
0.090 mm	0 – 5	0 – 5

512.3. Construction operations

512.3.1. Weather and seasonal limitations: Clause 501.5.1 shall apply.

512.3.2. Preparation of surface: The underlying surface on which the bituminous surfacing is to be laid shall be prepared, shaped and conditioned to the specified lines, grade and cross-section in accordance with Clause 501. A prime coat where needed shall be applied in accordance with Clause 502 as directed by the Engineer.

TABLE 500-23. QUANTITIES OF MATERIALS REQUIRED FOR 10 SQM OF ROAD SURFACE FOR 20 mm THICK CLOSE GRADED PREMIX SURFACING USING PENETRATION BITUMEN OR CUTBACK

Aggregates	
(a) Nominal Stone size 13.2 mm (passing 22.4 mm sieve and retained on 11.2 mm sieve)	0.18 m ³
(b) Nominal Stone size 11.2 mm (passing 13.2 mm sieve and retained on 5.6 mm sieve).	0.09 m ³
Total	2
Binder (quantities in terms of straight run bitumen)	
(a) For 0.18 m ³ of 13.2 mm nominal size stone at 52 kg bitumen per m ³	9.5 kg
(b) For 0.09 m ³ of 11.2 mm nominal size stone at 56 kg bitumen per m ³	5.1 kg
Total	14.6 kg

512.3.3. Tack coat: A tack coat complying with Clause 503, shall be applied over the base preparatory to laying of the surfacing.

512.3.4. Preparation of premix: Hot mix plant of appropriate capacity and type shall be used for the preparation of mix material. The hot mix plant shall have separate dryer arrangement for heating aggregate.

The temperature of binder at the time of mixing shall be in the range of 150⁰C to 163⁰C and that of the aggregate in the range of 155⁰C to 163⁰C provided that the difference in temperature between the binder and aggregates at no time exceeds 140⁰C. Mixing shall be thorough to ensure that a homogeneous mixture is obtained in which all particles of the aggregates are coated uniformly and the discharge temperature of mix shall be between 130⁰C and 160⁰C.

The mix shall be immediately transported from the mixer to the point of use in suitable vehicles or hand barrows. The vehicles employed for transport shall be clean and the mix being transported covered in transit if so directed by the Engineer.

- 512.3.5. Spreading and rolling: The pre mixed material shall be spread by suitable means to the desired thickness, grades and cross-fall (camber) making due allowance for any extra quantity required to fill up depressions, if any. The

cross-fall should be checked by means of camber boards and irregularities levelled out. Excessive use of blades or rakes should be avoided. As soon as sufficient length of bituminous material has been laid, rolling shall commence with 8–10 tonne rollers, smooth wheel tandem type, or other approved equipment. Rolling shall begin at the edge and progress towards the centre longitudinally, except that on the super elevated and unidirectional cambered portions, it shall progress from the lower to upper edge parallel to the centre line of the pavement.

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 premixed materials. Rolling shall then be continued until the entire surface has been rolled and all the roller marks eliminated. In each pass of the roller the preceding track shall be overlapped uniformly by at least 1/3 width. The roller wheels shall be kept damp to prevent the premix from adhering to the wheels. In no case shall fuel/lubricating oil be used for this purpose. Excess use of water for this purpose shall also be avoided.

Rollers shall not stand on newly laid material. Rolling operations shall be completed in every respect before the temperature of the mix falls below 100°C. Joints along and transverse of the surfacing laid and compacted earlier shall be cut vertically to their full depth so as to expose fresh surface which shall be painted with a thin coat of appropriate binder before the new mix is placed against it.

512.4. Opening to traffic

Traffic may be allowed after completion of the final rolling when the mix has cooled down to the surrounding temperature. Excessive traffic speeds should not be permitted.

512.5. Surface Finish and Quality Control of Work

The surface finish of construction shall conform to the requirements of Clause 902. For control on the quality of materials supplied and the works carried out, the relevant provisions of Section 900 shall apply.

512.6. Arrangements for Traffic

During the period of construction, arrangements for traffic shall be in accordance with the provisions of Clause 112.

512.7. Measurements for Payment

Close-graded premix surfacing, Type A or Type B shall be measured as finished work, for the area specified to be covered, in square metres at the specified thickness. The area will be the net area covered, and all allowances for wastage and cutting of joints shall be deemed to be included in the rate.

512.8. Rate

The contract unit rate for close-graded premix surfacing, Type A or Type B shall be payment in full for carrying out the required operations including full compensation for all components listed in Clause 501.8.8.2. (i) to (xi)

B.1 PLUM CONCRETE FOR HEAD WALLS OF PIPE DRAINS

B.1.1 GENERAL

The item shall comply with specification for ordinary cement concrete subject to the following:

B.1.2 PROPORTION

The proportion for cement concrete shall be one 50 kg bag of cement, 105 liters of sand, and 210 liters of coarse aggregate. Water content shall be within the range specified or as directed by the Engineer.

B.1.3 AGGREGATE

Coarse aggregate shall be crushed or broken from sound stones of the specified type available in the region and approved by the Engineer. The maximum size of the coarse aggregate shall be 50 mm or 6 mm. The aggregate shall be properly graded from the maximum size to 5 mm. As indicated in specification gives a dense concrete. Samples of fine and coarse aggregates approved by the Engineer shall be deposited in the Engineer's office for reference.

The plums to be used for the concrete shall be roughly cubical or rounded and shall be about 0.010 cum in volume. They may not have sharp edges and angles. The stones shall be more or less rounded without concave surfaces.

B.1.4 SLUMP

Slump as required for the suitable consistency shall be decided by the Engineer and the same shall be maintained throughout.

B.1.5 MIXING

Mixing shall be done in a mechanical mixer.

B.1.6 FORMS

The forms shall be either of timber lined with plain galvanised iron sheets or steel plates strengthened with suitable mild steel sections as may be found convenient by the contractor and shall be erected to the exact shape, dimensions, and R.L. indicated on the plans or as ordered by the Engineer. The forms shall be prepared in panels or boards with V fillets as may be found convenient to obtain easily the false V notch joints on the surface of piers, abutments etc. The pattern of joints in abutments, piers, wings etc. shall be the same and from the top downwards the corresponding joints shall be at the same level unless directed otherwise by the Engineer. The design of forms and pattern and dimensions of V fillets for false joints shall be furnished in advance by the contractor for the approval of the Engineer. An addition or replacement of different members if found necessary and suggested by the Engineer, shall be provided by the

contractor. However, the entire responsibility regarding erection and removal of form work and scaffolding, safety of work and work- people shall rest on the contractor. The forms may be stripped after 48 hours after concreting.

B.1.7 DE-WATERING

If the area of the placement is under water, cofferdams and other necessary devices shall be provided and the water pumped out and the area kept dry throughout the process of laying concrete and till such time as is required for setting of concrete in the opinion of the Engineer. Pumping shall be carried out in such a manner as to avoid damage by movement of water through green or freshly laid concrete.

If concrete is required to be laid under water it shall be done as laid down as per specifications. Water content of concrete should be adjusted in such case if necessary. Cost of de-watering shall be included in the rate of concrete.

B.1.8 SCAFFOLDING

Necessary ladders, scaffolding, etc., shall be built up to convey the concrete to the site of placement. Service bunds, paths, hoists etc., as may be necessary for carrying out the item shall be provided by the contractor at his own Cost.

B.1.9 PLACING

The concrete shall be placed in one continuous operation without break for each lift of concrete. The top of each lift be kept a little uneven to allow bond with the concrete of the upper lift. The height of the layer shall be such as to allow compacting with immersion type vibrators conveniently. The height of lift to be concreted in one operation in the case of abutments, wing walls or returns and piers shall be got approved in advance. Successive heights shall be laid after three days when the concrete has attained adequate strength or as approved by the Engineer.

No operation shall be carried out causing vibration in the concrete already laid and partially set.

B.1.10 COMPACTION

The concrete shall be compacted with mechanical vibrators of the immersion type and also with steel rods worked along the mechanical vibrators to give a dense concrete. The concrete shall be rounded in all corners, edges and angles of the forms and along the form faces while it is being vibrated to get a good surface finish without honeycombing. Over vibration shall be avoided. Sufficient number of vibrators shall be provided to compact the concrete sufficiently. The vibrators shall be applied immediately after placing concrete. The form shall not be touched by the vibrators.

B.1.11 FINISHING

Immediately after the removal of forms any undulations, depressions, cavities, honeycombing broken edge or corners, high spots and other defects shall be made good and finished with cement mortar 1:2. Such finishing is however looked upon

only as an exception and the total surface, requiring finishing shall not exceed one percent on an average. If initial experience shows that this percentage is exceeded, the entire method of working shall be changed as ordered by the, Engineer to get the cast finish, V grooves as indicated on the drawings or as ordered by the Engineer shall be neatly finished to give the appearance of panels on the piers, abutments, returns, wing wall etc.

800 TRAFFIC SIGNS, MARKINGS AND OTHER ROAD APPURTENANCES:

Please refer to the Clause/Section No. 800 of Ministry of Road Transport & Highways Specifications for Road and Bridge Works (Latest Revision) for detailed specifications for traffic signs, markings and other road appurtenances.

900 QUALITY CONTROL

901. GENERAL

901.1 All materials incorporated and all works performed shall be strictly in conformity with the Specification requirements. All works shall conform to the lines, grades, cross sections and dimensions shown on the drawings or as approved by the Engineer subject to the permitted tolerances described hereinafter. The Contractor shall be fully responsible for the quality of the work in the entire construction within the Contract. He shall, therefore, have his own independent and adequate set-up for ensuring the same.

901.3 The Contractor shall carry out quality control tests on the materials and work to the frequency specified. In the absence of clear indications about method and/or frequency of tests for any item, the approval of the Engineer shall be obtained and he shall provide necessary co-operation and assistance in obtaining the samples for test and carrying out the field test as required by the Engineer from time to time. This may include provision of Labour, attendance, assistance in packing and despatching and any other assistance considered necessary in connection with the test.

901.6 For the work of embankment, Sub-grade and construction of subsequent layer of same or other material over the finished layer shall be done after obtaining approval from the Engineer. Similar approval from the Engineer shall be obtained in respect of all other items of works prior to proceeding with the next stage of construction.

901.7 The Contractor shall carry out modification in the procedure of work, if found necessary, as approved by the Engineer during inspection. Works falling short of quality shall be rectified by the Contractor as approved by the Engineer.

The Contract rate quoted for various items of works in the Bill of Quantities or the lump sum amount tendered shall be deemed to be inclusive of all costs of the quality control tests and operations necessary for ensuring quality of the material and work so as to be in conformity with the specification requirement.

902 PERMITTED TOLERANCES

a)Horizontal Alignments

Horizontal alignments shall be reckoned with respect to the centre line of the carriage way as shown on the drawings. The edges of the carriageway as constructed shall be correct within a tolerance of ± 25 mm there from. The corresponding tolerance for edges of the roadway and lower layers of pavement shall be ± 40 mm.

b)Longitudinal Profile

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 approved by the Engineer beyond the tolerances mentioned below:

Sub-grade ± 15 mm Sub-

base ± 20 mm Base

Course ± 15 mm

Wearing Course ± 10 mm

Provided, however, that the negative tolerance for wearing course shall not be permitted in conjunction with the positive tolerance for base course if the thickness of the former is thereby reduced by more than 6 mm.

c)Surface Regularity

The surface regularity of completed Sub-grade, sub-bases, base courses and wearing surfaces in the longitudinal and transverse directions shall be within the tolerances indicated in Table 901.1

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 transverse profile shall be checked with a set of three camber boards at intervals of 10 metres.

a) Rectification

Where the surface irregularity of Sub-grade and the various courses fall outside the specified tolerances, the Contractor shall be liable to rectify these in the manner described below and to the satisfaction of the Engineer

i) Sub-grade

Where the surface is high, it shall be trimmed and suitably compacted. Where the same is low, the deficiency shall be corrected by adding fresh material. The degree of compaction and the type of material to be used shall conform to the Clauses 1.2 and 1.6

ii)Water Bound Macadam

Where the surface is high or low, the top 75 mm shall be scarified, reshaped with added material as necessary and re-compacted. The area treated at a place shall not be less than 5 metres long and 2 metres wide.

iii) Bituminous Constructions

For bituminous construction other than wearing course, where the surface is low, the deficiency shall be corrected by adding fresh material and re-compacting to Specifications. Where the surface is high, the full depth of the layer shall be removed and replaced with fresh material and compacted to Specifications.

For wearing course, where the surface is high or low, the full depth of the layer shall be removed and replaced with fresh material and compacted to Specifications. In all cases where the removal and replacement of a bituminous layer is involved, the area treated shall not be less than 5 metre long and not less than 1 lane wide.

Table 901.1 - Permitted Tolerance of Surface Regularity for Sub-grade and Pavement Courses

Sr. No	Type of Construction	Longitudinal profile with 3 metre Cross profile straight edge					
		Maximum permissible undulation mm	Maximum number of undulations permitted in any 300 metres length exceeding : mm				Maximum permissible variation from specified profile under camber template: mm
			18	12	10	6	
1	2	3	4	5	6	7	8
1	Earthen Sub-grade	24	30	-	-	-	15
2	Granular/Lime/Cement/stabilised sub base	15	-	30	-	-	12
3	Water Bound Macadam with over size metal (45-90 mm size) or Wet Mix Macadam	15	-	30	-	-	12
4	Water Bound Macadam with normal size metal (22.4-53 mm and 45-63 mm size) or Wet Mix Macadam	12	-	-	30	-	8
5	Bituminous concrete	8	-	-	-	10@	4

Notes:

1. @ These are for machine laid surfaces. If laid manually due to unavoidable reasons, tolerance up to 50 percent above these values in this column may be permitted at the discretion of the Engineer. However, this relaxation does not

apply to the values of maximum undulation for longitudinal and cross profiles mentioned in columns 3 and 8 on the Table 901.1.

2. Surface evenness requirements in respect of both the longitudinal and cross profiles should be simultaneously satisfied.

903 TESTS

903.1 GENERAL

For ensuring the requisite quality of construction, the materials and works shall be subjected to quality control tests, as described hereinafter. The testing frequencies set forth are the desirable minimum and the Engineer shall have the full authority to increase the frequencies of tests as he may deem necessary to satisfy himself that the materials and works comply with the appropriate Specifications.

Test procedures for the various quality control tests are indicated in the respective Sections of these Specifications or for certain tests within this Section. Where no specific testing procedure is mentioned, the tests shall be carried out as per the prevalent accepted engineering practice to the approval of the Engineer.

903.2 Tests on Earthwork for Embankment and Sub-grade Construction a)

Borrow material

1) Sand content [IS: 2720(Part IV)]

1-2 tests per 8000 cu. metres of soil

2) Plasticity Test [IS: 2720(Part V)]

Each type to be tested, 1-2 tests per 8000 cu. metres of soil.

3) Density Test [[IS: 2720(Part VII)].

Each soil type to be tested, 1-2 tests per 8000 cubic metres of soil.

4) Deleterious Content Test [IS: 2720(Part XXVII)]

As and when required by the Engineer

5) Moisture Content Test [IS: 2720(Part II)] One

test for every 250 cubic metres of soil

6) CBR Test on materials to be incorporated in the Sub-grade on soaked/ unsoaked samples [[IS: 2720(part XVI)]

One test for every 3000 m³ at least or closer as and when required by the Engineer

Compaction control:

Control shall be exercised by taking at least one measurement of density for each 1000 square metres of compacted area, or closer as required to yield the minimum number of test results for evaluation a day's work on statistical basis. The determination of density shall be in accordance with IS: 2720 (part XXVIII). Tests locations shall be chosen only through random sampling

techniques. Control shall not be based on the result of any one test but on the mean value of a set of 5-10 density determinations. The number of tests in one test in one set of measurements shall be 5 as long as it is felt that sufficient control over borrow material and the method of compaction is being exercised. If considerable variations are observed between individual density results, the minimum number of tests in one set of measurement shall be increased to 10. The acceptance of work shall be subject to the condition that the mean dry density equals or exceeds the specified density and the standard deviation for any set of results is below 0.08 gm/cc.

However, for earthwork in shoulders (earthen) and in top 500 mm portion of the embankment below the Sub-grade, at least one density measurement shall be taken for every 50 square metres of the compacted area provided further that the number of tests in each set of measurements shall be at least 10. In other respects, the control shall be similar to that described earlier.

903.3 Tests on Sub-bases and Bases

(Excluding bitumen bound bases)

The tests and their frequencies for the different types of bases and sub-base shall be as given in Table 900.3. The evaluation of density results for compaction control shall be on lines similar to those set out in clause 903.2

Table –900.3

**Control Tests and Their Frequencies for Sub-Bases and Bases
(Excluding Bitumen Bound Bases)**

Sr. No.	Types of Construction	Test	Frequency
1.	Granular sub-base	(i) Gradation	One test per 200m ³
		(ii) Atterberg limits	One test per 200m ³
		(iii) Moisture content prior to compaction	One test per 250m ²
		(iv) Density of compacted layer	One test per 500m ²
		(v) Deleterious constituents	As required
		(vi) C.B.R.	As required
3	Wet Mix Macadam	(i) Aggregate Impact Value	One test per 200m ³ of aggregate
		(ii) Grading	One test per 100m ³ of aggregate
		(iii) Flakiness Index and Elongation Index	One test per 200m ³ of aggregate
		(vi) Atterberg limits of portion of aggregate passing 425 micron sieve	One test per 100m ³ of aggregate
		(v) Density of compacted layer	One test per 500 m ² .

903.4 Tests on Bituminous Constructions

The tests and their frequencies for the different types of bituminous works shall be as given in Table 900.4 hereunder.

Table – 900.4 - Control Tests and Their Frequency for Bituminous Works

Sr. No	Types of Construction	Test	Frequency
1.	Prime Coat/Tack Coat	(i) Quality of binder	Number of samples per lot and tests as per IS:73,IS:217 and IS:8887 as applicable.
		(ii) Binder temperature for application	At regular close intervals
		(iii) Rate of spread of Binder	One test per 500m ² and not less than two tests per day
2	Open-graded Premix Surfacing / Close-graded Premix Surfacing	(i) Quality of binder	Same as mentioned under Serial No.1
		(ii) Aggregate Impact Value /Los Angeles Abrasion value	One test per 50m ³ of aggregate
		(iii) Flakiness Index and Elongation Index	- do-
		(iv) Stripping value	Initially one set of 3 representative specimens for each source of supply. Subsequently when warranted by changes in the quality of aggregates
		(v) Water absorption of aggregates	- do-
		(vi) Water sensitivity of mix	Initially one set of 3 representative specimens for each source of supply. Subsequently when warranted by changes in the quality of aggregates (if required)
		(vii) Grading of aggregates	One test per 25m ³ of aggregate
		(viii) Soundness (Magnesium and Sodium Sulphate)	Initially, one determination by each method for each source of supply, then as warranted by change in the quality of the aggregates.
		(ix) Polished Stone value	As required
		(x) Temperature of binder at application	At regular close intervals
		(xi) Binder content	One test per 500m ³ and not less than two tests per day.

Sr. No	Types of Construction	Test	Frequency
3	Bituminous Macadam	(xii) Rate of spread of mixed material	Regular control through checks of layer thickness
		(xiii) Percentage of fractured faces	When gravel is used, one test per 50m ³ of aggregate
		(i) Quality of binder	Same as mentioned under Serial No.1
		(ii) Aggregate Impact / Los Angeles Abrasion value	Same as mentioned under Serial No.2
		(iii) Flakiness Index and Elongation Index	Same as mentioned under Serial No.2
		(iv) Stripping value of aggregates	Same as mentioned under Serial No.2
		(v) Water sensitivity of mix	-do-
		(vi) Grading of aggregates	Two tests per day per plant both on the individual constituents and mixed aggregates from the dryer
		(vii) Water absorption of aggregates	Same as in Serial No.2
		(viii) Soundness (Magnesium and Sodium Sulphate)	Same as mentioned under Serial No.2
		(ix) Percentage of fractured faces	Same as mentioned under Serial No.2
		(x) Binder content and aggregate grading	Periodic, subject to minimum of two tests per day per plant
		(xi) Control of temperature of binder and aggregate for mixing and of the mix at the time of laying and rolling	At regular close intervals
		(xii) Rate of spread of mixed material	Regular control through checks of layer thickness
		(xiii) Density of compacted layer.	One test per 250m ² of area.
4	Dense Bituminous Macadam / Semi Dense Bituminous	(i) Quality of binder	Same as mentioned under Serial No.1
		(ii) Aggregate Impact Value /Los Angeles Abrasion value	Same as mentioned under Serial No.2

Sr. No	Types of Construction	Test	Frequency
	Concrete	(iii) Flakiness Index and Elongation Index	- do-
		(iv) Stripping value	Same as mentioned under Serial No.2
		(v) Soundness (Magnesium and Sodium Sulphate)	Same as mentioned under Serial No.2
		(vi) Water absorption of aggregates	As in Serial No. 2
		(vii) Sand equivalent test	As required
		(viii) Plasticity Index	As required
		(ix) Polished Stone value	As required, for Semi Dense Bituminous Concrete/ Bituminous Concrete
		(x) Percentage of fractured faces	Same as mentioned under Serial No.2
		(xi) Mix grading	One set of tests on the individual constituents and mixed aggregate from the dryer for each 400 tonnes of mix subject to a minimum of two tests per plant per day
		(xii) Stability of Mix	For each 400 tonnes of mix produced, a set of 3 Marshall specimens to be prepared and tested for stability, flow value, density and void content subject to a minimum of two sets being tested per plant per day.
		(xiii) Water sensitivity of mix	Same as mentioned under Serial No.2
		(xiv) Swell test on the mix	As required for the Bituminous Concrete
		(xv) Control of temperature of binder in boiler, aggregate in the dryer and mix at the time of laying and rolling	At regular close intervals
		(xvi) Control of binder content and grading of the mix	One test for each 400 tonnes of mix subject to a minimum of two tests per day per plant
		(xvii) Rate of spread of mixed material	Regular control through checks on the weight of mixed material and layer thickness
		(xviii) Density of compacted layer	One test per 250m ² area

Please refer to the Clause/Section No. 1000 of Ministry of Road Transport & Highways Specifications for Road and Bridge Works (Latest Revision) for detailed specifications for Materials for Structures.

1500 FORMWORK

Please refer to the Clause/Section No. 1500 of Ministry of Road Transport & Highways Specifications for Road and Bridge Works (Latest Revision) for detailed specifications for Formwork.

1700 STRUCTURAL CONCRETE

Please refer to the Clause/Section No. 1700 of Ministry of Road Transport & Highways Specifications for Road and Bridge Works (Latest Revision) for detailed specifications for Structural Concrete works.

2504. PITCHING/REVTMENT ON SLOPES

Please refer to the Clause/Section No. 2504 of Ministry of Road Transport & Highways Specifications for Road and Bridge Works (Latest Revision) for detailed specifications for Pitching or Revetment on slopes.

2900 PIPE DRAINS

Please refer to the Clause/Section No. 2900 of Ministry of Road Transport & Highways Specifications for Road and Bridge Works (Latest Revision) for detailed specifications for Pipe drain works.

B.2 PRECAUTIONS FOR SAFEGUARDING THE ENVIRONMENT

B.2.1 PRESERVATION OF VEGETATION

The contractor shall preserve existing trees, plants and other vegetation that are to remain within or adjacent to the works and shall use every precaution necessary to prevent damage or injury thereto.

All the works should be carried out in such a fashion that, the damage or disruption to the flora and fauna is reduced to minimum wherever possible. Trees and shrubs will only be felled or removed that impinge on the permanent works or necessary temporary works.

B.2.2 SITE CLEARANCE AFTER COMPLETION OF WORK:

On completion of works, all areas disturbed by the contractor's construction activities shall be restored to their original condition, or as may be acceptable to the Engineer. The cost of this work shall be deemed to be included in the rates generally.

B.2.3 SITE TRAINING:

If so requested by the Engineer, the contractor on two weeks notice shall make available site staff of foreman level and above for training in the environmental aspects of road constructions. The staff to be included in the training shall be chosen by the Engineer. The training shall be maximum for two working days duration and shall be held on the site. The Engineer shall arrange the training and the cost of providing personnel for the Environmental training is deemed to be included in the rates generally.

B.2.4 SITE DRAINAGE CONDITIONS:

The contractor should ensure that there is good drainage at all construction areas and there is no stagnation of water due to the construction activity.

B.2.5 POLLUTION FROM HOT-MIX PLANTS AND BATCHING PLANTS:

If contractor wishes to establish the hot mix plant (H.M.P.), then the site should be at least 500m away from the nearest habitation. The H.M.P. shall be fitted with the dust extraction unit in order that the exhaust gases comply with the requirements of the relevant current emission control legislation. All the operations at the plant shall be undertaken in accordance with all current rules and regulations protecting the environment.

B.2.6 SUBSTANCES HAZARDOUS TO HEALTH:

The use of any herbicide or other toxic chemical shall be strictly in accordance with the manufacturer's instructions. The Engineer shall be given at least 6 working day's notice of the proposed use of any herbicide or toxic chemical. A register of all herbicide and other toxic chemicals delivered to the site shall be kept and maintained up to date by the contractor. The register shall include the trade name, physical properties and characteristics, chemical ingredients, health and safety hazard information, Safe handling and storage procedures and emergency and first aid procedures for the product.

B.2.7 CONSTRUCTION VEHICLES:

The construction vehicles delivering materials to site shall be covered to avoid spillage of materials on the public roads and reduce the emission of dust. The discharge standards promulgated under the Environmental Protection Act (Latest version) shall be adhered to strictly. All the waste arising from the project shall be disposed off in manner, which is acceptable to State Pollution Control Board and the Engineer.

All the vehicles and machinery employed for the execution of the works shall be regularly maintained to ensure that pollutant emission levels comply with the relevant requirements of the current pollution control legislation. During the routine servicing operations, effectiveness of exhaust silencers must be checked and if found defective must be replaced. Notwithstanding this requirement, noise levels from any item of the plant must comply with the relevant legislation for levels of sound emission. Non-compliant plant shall be removed from site.

Vehicle maintenance and refuelling shall be carried out in such a fashion that spillage of fuels and lubricants do not contaminate the ground or nearby watercourses. An “Oil Inspector” shall be provided for wash down and refuelling areas. Fuel storage shall be in proper bounded areas. All spilt and collected petroleum product shall be disposed of in accordance with the relevant legislation.

All crushers to be used in construction shall conform to relevant dust emission control as legislated. The contractor shall obtain the necessary clearance for siting of the crushing plant from the Gujarat Pollution Control Board (GPCB). Alternatively, the Contractor shall use only crushers already licensed by GPCB.

B.2.8 TEMPORARY ACCOMMODATION AT THE SITE:

All temporary accommodation must be constructed and maintained in such a fashion that uncontaminated water is available for drinking, cooking and washing. The sewage system for the camp must be properly designed, built and operated so that no health hazard occurs and no pollution to the air, ground or adjacent watercourses takes place. Compliance with the relevant legislation must be strictly adhered to. Garbage bins must be provided in the camp and regularly emptied and garbage disposed off in hygienic manner. Construction camps should be sited away from vulnerable people and adequate health care is to be provided for the work force.

APPENDIX A
ADDITIONAL TECHNICAL SPECIFICATIONS FOR PAVER
BLOCKS

1. Raw Materials:

1.1. Cement:

The cement used in the manufacture of high quality precast concrete paving block shall be conforming to IS 12269 (53 grade) ordinary Portland cement or IS 8112 (43 grade ordinary Portland cement). The minimum cement content in concrete used for making paver blocks should be 380 kg/cu.m.

1.2. Aggregates:

The fine and coarse aggregates shall consist of naturally occurring crushed or uncrushed materials which apart from the grading requirements comply with IS 383-1970. The fine aggregates used shall contain a minimum of 25 % natural silicon sand. Lime stone aggregates shall not be used. Aggregates shall contain no more than 3 % by weight of clay and shall be free from deleterious salts and contaminants.

1.3. Water:

The water shall be clean and free from any deleterious matter. It shall meet the requirements stipulated in IS: 456-2000.

1.4. Other materials:

Any other material/ingredients used in the concrete shall conform to latest IS specifications.

2. Paver Blocks Characteristics:

- 2.1. The concrete pavers should have perpendicularities after release from the mould and the same should be retained until the laying.
- 2.2. The surface should be of anti-skid and anti-glare type.
- 2.3. The paver should have uniform chamfers to facilitate easy drainage of surface run off.
- 2.4. The pavers should have uniform interlocking space of 2 mm to 3 mm to ensure compacted sand filling after vibration on the paver surface.
- 2.5. The concrete mix design should be followed for each batch of materials separately and automatic batching plant is to be used to achieve uniformity in strength and quality.
- 2.6. The pavers shall be manufactured in single layer only.
- 2.7. Skilled labour should be employed for laying blocks to ensure line and level for laying, desired shape of the surface and adequate compaction of the sand in the joints.

- 2.8. The pavers are to be skirted all round with kerbing using solid concrete blocks of size 100 mm x 200 mm x 400 mm or as directed by the engineer. The kerbing

should be embedded for 100 mm depth. The concrete used for kerbing shall be cured properly for 7 days minimum.

3. **LAYING OF PAVER BLOCKS:**

3.1. **Priming:**

It will be the responsibilities of the contractors to ensure that the manhole/pipeline cable trenches/circular drainage system etc. raised to driveway level using the requisite materials as per instruction of Engineer. The areas of potholes/deep depressions at the isolated locations also have to be filled up before laying the paver blocks. No extra payments will be made for this purpose.

It will be the responsibility of the contractors to ensure that undulations on the paver's blocks are eliminated after the traffic is allowed on it. Proper slope for drainage of water needs to be ensured by the Contractor. All necessary materials, tools, tackles are required to be arranged by the Contractor.

3.2. **Bedding sand course:**

The bedding sand shall consist of clean well graded sand passing through 4.75 mm sieve and suitable for concrete. The bedding should be from either a single source or blended to achieve the following grading –

In sieve size % Passed

9.5 mm.	100
4.75 mm	95-100
2.36 mm	80-100
1.18 mm.	60-100
600 microns	25-60
300 microns	10-30
150 microns	5-15
75 microns	0-10

Contractor shall be responsible to ensure that single-sized, gap-graded sands or sands containing an excessive amount of fines or plastic fines are not used. The sand particles should preferably be sharp (not rounded) as sharp sand possess higher strength and resist the migration of sand from under the block to less frequency areas even though sharp sands are relatively more difficult to compact than rounded sands, the use of sharp sands is preferred for the more heavily trafficked driveways. The sand used for bedding shall be free of any deleterious soluble salts or other contaminants likely to cause efflorescence.

The sand shall be of uniform moisture content and within 4 % - 8 % when spread and shall be protected against rain when stock piled prior to spreading. Saturated sand shall not be used. The bedding sand shall be spread loose in a

uniform layer as per drawing. The compacted uniform thickness shall be of 45 mm and within +/- 5 mm. Thickness variation shall not be used to correct irregularities in the base course surface.

The spread sand shall be carefully maintained in a loose dry condition and protected against pre-compaction both prior to and following screeding. Any pre-compacted sand or screeded sand left overnight shall be loosened before further laying of paving blocks take place.

Sand shall be slightly screeded in a loose condition to the predetermined depth only slightly ahead of the laying of paving unit.

Any depressions in the screeded sand exceeding 5 mm shall be loosened, raked and rescreeded before laying of paving blocks.

3.3. Laying of interlocking paver blocks:

Paver blocks shall be laid in herringbone laying pattern throughout the pavement. Once the laying pattern has been established, it shall continue without interruption over the entire pavement surface. Cutting of blocks, the use of infill concrete or discontinuities in laying pattern is not to be permitted in other than approved locations.

Paver blocks shall be placed on the uncompacted screeded sand bed to the nominated laying pattern, care being taken to maintain the specified bond throughout the job. The first row shall be located next to an edge restraint. Specially manufactured edge paving blocks are permitted or edge blocks may be cut using a power saw, a mechanical or hydraulic guillotine, bolster or other approved cutting machine.

Paver blocks shall be placed to achieve gaps nominally 2 to 3 wide between adjacent paving joints. No joint shall be less than 1.5 mm not more than 4 mm. Frequent use of string lines shall be used to check alignment. In this regard the "laying face" shall be checked at least every two metres as the face proceeds. Should the face become out of alignment, it must be corrected prior to initial compaction and before further laying job is proceeded with.

In each row, all full blocks shall be laid first. Closure blocks shall be cut and fitted subsequently. Such closure blocks shall consist of not less than 25 % of a full blocks.

To infill spaces between 25 mm and 50 mm wide concrete having screened sand, coarse aggregate mix and strength of 45 N/sq.mm shall be used. Within such mix the nominal aggregate size shall not exceed one third the smallest dimension of the infill space. For smaller spaces dry packed mortar shall be used.

Except where it is necessary to correct any minor variations occurring in the laying bond, the paver blocks shall not be hammered into position. Where adjustment of paver blocks, necessary care shall be taken to avoid premature compaction of the sand bedding.

3.4. **Initial Compaction:**

After laying the paver blocks, they shall be compacted to achieve consolidation of the sand bedding and brought to design levels and profiles by not less than two (2) passes of a suitable plate compactor.

The difference in level (lipping) between adjacent blocks shall not exceed 3 mm with not more than 1 % in any 3 m x 3 mm area exceeding 2 mm. Pavement which is deformed beyond above limits after final compaction shall be taken out and reconstructed to the satisfaction of the Engineer.

3.6. **Edge Restraint:**

Edge restrains need to be sufficiently robust to withstand override by the anticipated traffic to withstand thermal expansion and to prevent loss of the laying course material from beneath the surface course. The edge restraint should present a vertical face down to the level of the underside on the laying course.

The surface course should not be vibrated until the edge restraint together with any bedding or concrete hunching has gained sufficient strength. It is essential that edge restraints are adequately secured.

4.0 **Concrete Block Making Machine**

4.1 The block making machine should ensure the following:

- 1) High degree of dimensional accuracy (± 3 mm)
- 2) Precast blocks with spacer nibs (23 mm to ensure uniform joints)
- 3) High compaction energy (to produce blocks with high compressive strength)

The above can be generally achieved by machine with following feature –

Block making machine should have simultaneously application of high intense vibration to moulds at 3000 V.P.M. and hydraulic pressure 800 psi

4.2 Concrete Batching & Mixing Plant

The concrete Mix design should be followed for each batch of materials. The concrete ingredient should be mixed in concrete Batching & Mixing plant with suitable capacity. The plant should be equipped with automatic control panel for maintaining water cement ratio from batch to batch to obtain concrete of uniform quality and strength. The plant should be equipped with adequate mechanism for mechanized loading on raw materials into mixer and conveyor belt for transportation of concrete from mixer to concrete block making machine.

SAMPLING AND TESTING PROCEDURES FOR PAVER

BLOCKS Sample size

Internal – Average of minimum 3 samples per 5000 blocks – for paver block manufacturers.

Internal – Minimum 9 blocks per 5000 blocks. Average of minimum 9 blocks per site –

for captioned contractors.

1. **Sampling for testing:**

Sampling for testing of paver blocks shall be done in accordance with Appendix-A.

2. **Compressive Strength:**

Testing for compressive strength shall be undertaken in accordance with Appendix-B. The average compressive strength of the 80 mm. thick paver blocks tested shall be 50 N/Sq.mm and average compressive strength of the 60 mm. thick paver blocks tested shall be 45 N/Sq.mm.

3. **Water Absorption:**

Testing for water absorption shall be in accordance with IS: 2185: 1979: Part-(Specifications for Concrete Masonry Blocks) Appendix C.

Sampling of Paver Blocks

1. **Method of sampling:**

Before laying paver blocks, each designated section comprising not more than 50,000 blocks shall be divided into ten approximately equal groups. Nine blocks shall be drawn from each group.

2. **Marking and Identification:**

All samples shall be clearly marked at the time of sampling in such a way that the designated section of part thereof and the consignment represented by the sample are clearly defined.

The sample shall be dispatched to the approved test laboratory taking precaution to avoid damage to the paving in transit. Protect the paving from damage and contamination until they have been tested. The samples shall be stored in water at $20^{\circ}\text{C} + 5^{\circ}\text{C}$ for 24 hours prior to testing.

APPENDIX – B

PROCEDURE FOR TESTING OF COMPRESSIVE STRENGTH FOR PAVER BLOCKS (Reference: BS 6717 Part-I (1993) Specification for Paver Blocks)

B-1 Testing Machine:

The testing machines shall be of suitable capacity for the test and capable of applying the load at the rate specified. It shall comply as regards repeatability and accuracy with the requirements of relevant IS Specification.

B-2 Procedure:

The sample specimens shall be tested in wet condition after being stored for at least 24 hours in water maintained at a temperature of $20 \pm 5^{\circ}\text{C}$ before the specimens are submerged in water, the necessary area shall be determined.

The plates of the testing machine shall be wiped clean and any loose girt or other material removed from the contact faces of the specimen. Plywood normally 4 mm. thick shall be used as packing between the upper and lower faces of the specimen and the machine plates and these boards shall be larger than the specimen by a margin of at least 5 mm at all points. Fresh packing shall be used for each specimen tested. The specimen shall be placed in the machine with the wearing surface in a horizontal plane and in such a way that the axes of the specimen are aligned with those of the machine plates. The load shall be applied without shock and increased continuously at the rate of Approximately 15 N/sq.mm per minute until no greater load can be sustained. The maximum load applied to the specimen shall be recorded.

B-3 Calculation of corrected strength:

The compressive strength of each block specimen shall be calculated by dividing the maximum load by full cross section area and multiplying by appropriate factors.

Thickness and chamfer correction factors

For compressive strength

Work size thickness (mm)	Correction Factors	
	Plain block	Chamfered block
60	1.00	1.06
80	1.12	1.18
100	1.18	1.24

B-4 Compressive strength calculation:

The average corrected compressive strength for the designed block section shall be calculated.

APPENDIX – C
METHOD FOR THE DETERMINATION OF WATER
ABSORPTION

1. The test specimens shall be completely immersed in water at room temperature for 24 hours.
2. The specimens shall then be weighed, while suspended by a metal wire and completely submerged in water.
3. They shall be removed from the water and allowed to drain for one minute.
4. Visible surface water should be removed with a damp cloth and immediately weighed.
5. Subsequent to saturation, all specimens shall be dried in a ventilated oven at 100 to 115 °C for not less than 24 hours and until two successive weightings at intervals of 2 hours show an increment of loss not greater than 0.2 percent of the last previously determined mass of the specimen.
6. Calculate the absorption as follows -

$$\text{Absorption, kg/cum} = \frac{A - B}{A - C} \times 1000$$

$$\text{Absorption, percent} = \frac{A - B}{B} \times 100$$

Where;

A = Wet mass of unit in Kg.

B = Dry mass of unit in Kg and

C = Suspended immersed mass of unit in Kg.

III APPROVED MAKES OF MATERIAL

APPROVED MAKES OF MATERIAL

Acceptable makes of materials to be used in the work are enclosed. In case of non-availability of these makes, after the approval of the Authority, the Contractor can use the alternative makes only BIS marked materials. Non BIS marked materials may be permitted by the Authority only when BIS marked materials are not manufactured

SR. NO.	NAME OF ITEM	MAKE APPROVED
1)	ORDINARY PORTLAND CEMENT GRADE 43/53	BIRLA, JK, ACC, ULTRATECH, JAYPEE, AMBUJA,
2)	WHITE CEMENT	JK, BIRLA, ACC, JAYPEE, AMBUJA
3)	REINFORCEMENT STEEL	TATA , SAIL, RINL, JINDAL, JSW STEEL, SHYAM STEEL
4)	PAINT/POLISH/ PRIMER/ WATER PROOFING PAINT	BERGER, ASIAN, DULUX, BRITISH PAINT
5)	SILICON / POLYURETHANE SEALANT	FOSROC / G.E. SILICONES / DOW-CORNING,/ WACHER SILICON, /HOLEX,/ DECOT, SIKA / CHOKSEY CHEMICALS
6)	PVC PIPE FOR WEEP HOLES	PRINCE, SUPREME, FINOLEX
7)	CONCRETE ADMIXTURES, OTHER CONSTRUCTION CHEMICALS	M.C.BAUCHEMIE,FOSROC,PIDILITE,CICO,SIKA,BASF,ASIAN LABORATORIES,ULTR

		ACON
8)	STRUCTURAL STEEL/MS	TATA , SAIL, RINL, JINDAL, JSW STEEL, SRMB
9)	WATERPROOFING CHEMICALS/SYSTEM	BASF,SIKA,FOSROC,PI DLIE,CARLISLE,FIRE STONE
10)	RHS/SHS CLOSED STRUCTURAL	SAIL/TISCO / RINL /JSW
11)	SHUTTERING PLY	ARCHID,CENTURY,ME RINO,KITPLY
12)	BRICKS	CLAY BRICKS,FLY ASH BRICKS
13)	COVER BLOCKS	FACTORY MADE CONCRETE COVER BLOCKS (ASTRA MAKE).
14)	READY MIX CONCRETE (RMC)	THE RMC SHALL BE PROCURED FROM THE SOURCE AS APPROVED BY ENGINEER – IN CHARGE.
15)	FOOTBALL TURF	DOMO/PLAYRITE/EQUI VALENT

CONSTRUCTION OF ROAD WORKS FOR AIFF NATIONAL CENTER OF EXCELLENCE KOLKATA, WEST BENGAL, INDIA**ROAD WORKS ABSTRACT**

SR No	DSR 2023	Item Description	UNIT	QTY	RATE	AMOUNT
						-
1	2.32	Clearing grass and removal of the rubbish upto a distance of 50m outside the periphery of the area cleared	sqm	3300.00	8.95	29,535.00
2	16.3.10	Supplying and stacking Moorum at site for filling under sub-base	cum	990.00	768.25	7,60,567.50
3	16.2	Extra for compaction of earth work in embankment under optimum moisture conditions to give at least 95% of the maximum dry density (proctor density). (compaction of moorum layer)	cum	990.00	24.85	24,601.50
4	16.78	Construction of granular sub-base by providing close graded material conforming to specifications, mixing in a mechanical mix plant at OMC, carriage of mixed material by tippers to work site, for all leads & lifts, spreading in uniform layers of specified thickness with motor grader on prepared surface and compacting with vibratory roller to achieve the desired density, complete as per specifications and directions of Engineer-in-Charge				-
	16.78.1	With material conforming to Grade-I (size range 75mm to 0.075 mm) having CBR Value - 30	Cum	693.00	2784.00	19,29,312.00
5	16.2	Extra for compaction of earth work in embankment under optimum moisture conditions to give at least 95% of the maximum dry density (proctor density).	cum	990.00	24.85	24,601.50
6	16.91.2	Providing and laying factory made chamfered edge Cement Concrete paver blocks in footpath, parks, lawns, drive ways or light traffic parking etc, of required strength, thickness & size/ shape, made by table vibratory method using PU mould, laid in required colour & pattern over 50 mm thick compacted bed of sand, compacting and proper embedding/laying of inter locking paver blocks into the sand bedding layer through vibratory compaction by using plate vibrator, filling the joints with sand and cutting of paver blocks as per required size and pattern, finishing and sweeping extra sand. complete all as per direction of Engineer-in-Charge. 80mm thick CC Paver block of M-35 grade with approved colour design and pattern including 50mm thick sand bed	sqm	4252.50	1091.50	46,41,603.75

SR No	DSR 2023	Item Description	UNIT	QTY	RATE	AMOUNT
7	16.69	Providing and laying at or near ground level factory made kerb stone of M-25 grade cement concrete in position to the required line, level and curvature, jointed with cement mortar 1:3 (1 cement: 3 coarse sand), including making joints with or without grooves (thickness of joints except at sharp curve shall not to more than 5 mm), including making drainage opening wherever required complete etc. as per direction of Engineer in-charge (length of finished kerb edging shall be measured to calculate volume for payment). (Precast C.C. kerb stone shall be approved by Engineer-in-charge).	cum	25.31	10117.60	2,56,101.75
8	4.1.5	1:3:6 (1 Cement : 3 coarse sand (zone-III) derived from natural sources : 6 graded stone aggregate 20 mm nominal size derived from natural sources)	cum	7.59	7294.70	55,394.13
					TOTAL	77,21,717.13
			Total cost after adding Kolkata cost index (116)			89,57,191.87

[illegible]

[illegible]



KEY PLAN
SCALE- 1:750

PROJECT NO.	18-P245	N 
SCALE	As Mentioned	
1 st ISSUED ON	29-10-2025	
APPROVED	RS	
CHECKED BY		
DRAWN BY	NP	

