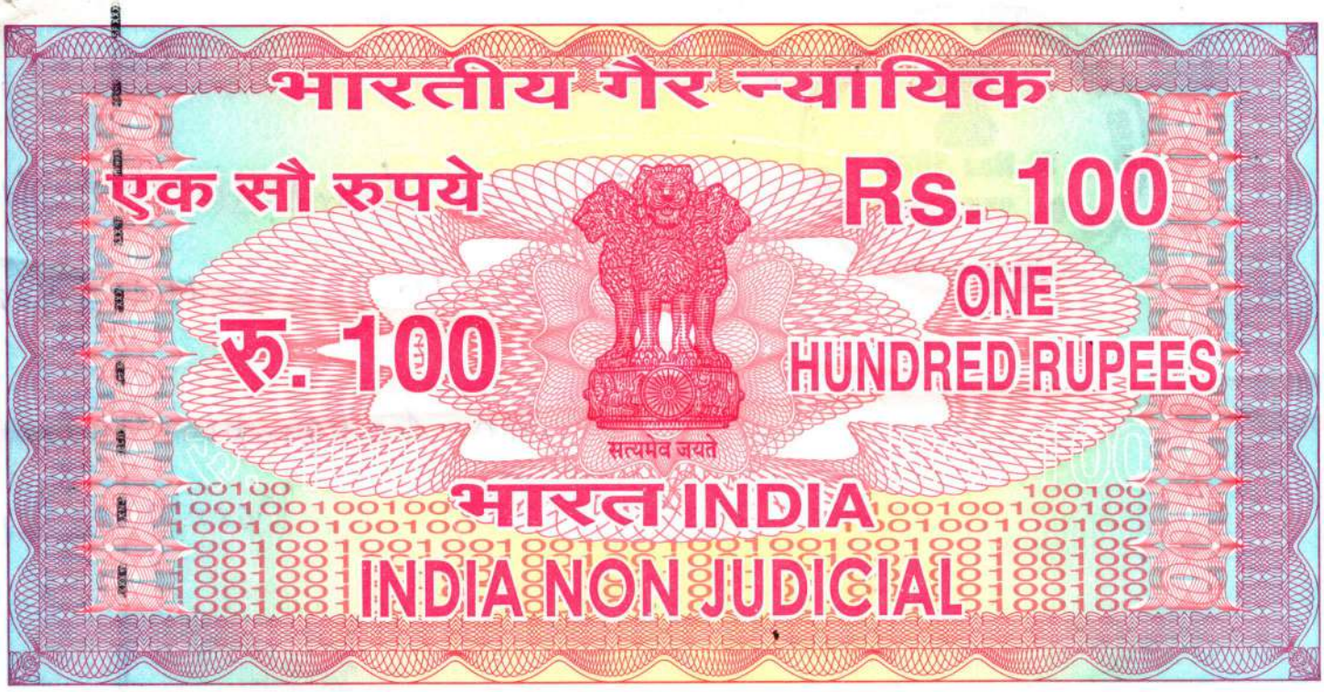

हिमाचल प्रदेश HIMACHAL PRADESH D 759611

ARTICLES OF AGREEMENT

1. This deed of agreement is made in the form of agreement on **06th day of May Month 2023,** between the **Director of Horticulture/General Manager (NMS) Directorate of Horticulture, Navbahar Shimla -171002 (H.P.)** (Employer) or his authorized representative (hereinafter referred to as the first party) and **Mr. Tushar Goel Govt Contractor, New Modern Colony Ghuggar Teh Palampur Distt-Kangra (H.P) 176061** (hereinafter referred to as the second party), to execute the work of construction of **proposed farmer training centre Part – B (C/o Site Development, Civil Work, Main Gate, water Supply & Sanitary Installation works and Electrical Installation Work etc.) at COE Palampur Distt. Kangra HP**. (hereinafter referred to as works) on the following terms and conditions.

2. **Cost of the Contract**

The total cost of the works (hereinafter referred to as the "total cost") is contract value of **INR 88,88,127.62/-(With GST & Other Charges).**

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3.1 Payments under the contract:

Payments to the second party for the construction work will be released by the first party in the following manner: -

After satisfactory completion of 40% work at site	40% payment of Contract Value will be released
After satisfactory completion of 80% work at site	40% payment of Contract Value will be released
After satisfactory completion of 100% work at site and Hand over the sites.	Remaining 20% of Contract Value will be released

3.2 Payments at each stage will be made by the first party:

(a) on the second party submitting an invoice for an equivalent amount;
(b) on certification of the invoice (except for the first instalment) by the engineer nominated/inchagre/COE Expert by the first party and In charge concerned with respect to quality of works in the format in Annexure - 2; and
(c) Item wise quantity shown in tender is tentative and quantity of works (items) may increase or decrease as per actual site conditions.
(d) Payment will be made on actual quantity installed at the sites duly verified & assessed by engineer nominated by the first party. (no payment will be released surplus material/ stock material)
(e) Statutory deduction (TDS, Labour Cess, royalty etc.) applicable as per Govt. Norms.

4. Notice by Contractor to Engineer

The second party, on the works reaching each stage of installation/construction, shall issue a notice to the first party or the Engineer nominated by the first party [who is responsible for supervising the contractor, administering the contract, certifying payments due to the contractor, issuing and valuing variations to the contract, awarding extension of time etc.) to visit the site for certification of stage completion. Within 15 days of the receipt of such notice, the first party or the engineer nominated by it, will ensure issue of stage completion certificate after due verification.

5. Completion time

The works should be completed 30th June, 2023 from the date of this Agreement. In exceptional circumstances, the time period stated in this clause may be extended in writing by mutual consent of both the parties.

6. Any willful delay on the part of the second party in completing the construction within the stipulated period will render him liable to pay liquidated damages. @ Rs. 1,000 per day per site, which will be deducted from payments due to him. The first party may cancel the contract and take recourse to such other action as deemed appropriate once the total amount of liquidated damages exceeds 5 % of the contract amount.

7. Duties and responsibilities of the first party

7.1 The first party shall be responsible for providing regular and frequent supervision and guidance to the second party for carrying out the works as per specifications. This will include written guidelines and regular site visit of the authorized personnel of the first party, for checking quality of material and construction to ensure that it is as per the norms.

7.2 The first party shall supply drawings, specifications and guidelines to the second party for the proposed works.

7.3 Possession of the site will be handed over to the second party within 10 days of signing of the agreement.

7.4 The Engineer or such other person as may be authorized by the first party shall hold meeting once in a month where the second party or his representative at site will submit the latest information including progress report and difficulties if any, in the execution of the work. The whole team may jointly inspect the site on a particular day to take stock of activities.

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7.5 The Engineer shall record his observations/instructions at the time of his site visit in a site register maintained by the second party. The second party will carry out the instructions and promptly rectify any deviations pointed out by the engineer. If the deviations are not rectified, within the time specified in the Engineer's notice, the first party as well as the engineer nominated by it, may instruct stoppage or suspension of the work. It shall thereupon be open to the first party or the engineer to have the deviations rectified at the cost of the second party.

7.6 The Engineer shall issue a Certificate of Completion of the Works on the request of the second party, and upon deciding that the whole of the Works is completed.

8. Duties and responsibilities of the second party

8.1 The second party shall:

a) take up the works and arrange for its completion within the time period stipulated in clause 5;

b) employ suitable skilled persons to carry out the works;

c) regularly supervise and monitor the progress of work;

d) abide by the technical suggestions/ direction of supervisory personnel including engineers etc. regarding building construction;

e) be responsible for bringing any discrepancy to the notice of the representative of the first party and seek necessary clarification;

f) ensure that the work is carried out in accordance with specifications, drawings and within the total of the contract amount without any cost escalation;

g) keep the first party informed about the progress of work;

h) correct the notified defects within the length of time specified by the Engineer;

i) be responsible for all security and watch and ward arrangements at site till handing over of the building to the first party;

j) maintain necessary insurance against loss of materials/cash, etc. or workman disability compensation claims of the personnel deployed on the works as well as third party claims from the start date to the end of defect liability period;

k) pay all duties, taxes and other levies payable by construction agencies as per law under the contract (First party will effect deduction from running bills in respect of such taxes as may be imposed under the law);

l) abide by the regulatory authority conditions (if any) attached to any permits or approvals for the project; and the ESHS Management Strategies and Implementation Plan and ESHS Code of Conduct, if any prescribed by the Employer.

m) abide by all labour enactments and rules made there under, regulations, notifications and bye laws of the State or Central Government or local authorities;

n) abide by all enactments on environmental protection and rules made there under, regulations, notifications and by-laws of the Sate or Central Government, or local authorities;

o) be responsible for the safety of all activities on the Site.

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9. Variations / Extra Items

The works shall be executed by the second party in accordance with the approved drawings and specifications. No variation in cost is acceptable. However, if the Engineer issues instructions for execution of extra items, the following procedure shall be followed:

a) The second party shall provide the Engineer with a bid for carrying out the extra items when requested to do so by the Engineer, prior approval of GM-NMS/Higher authority is to be obtained. The Engineer shall assess the bid, which shall be given within seven days of the request before the extra items are ordered.

b) If the bid given by the second party is unreasonable, the Engineer may order the extra items and make a change to the Contract Price which shall be based on Engineer's own forecast of the effects of the extra items on the Contractor's costs.

c) The second party shall not be entitled to additional payment for costs, which could have been avoided by giving early warning.

10. Securities

Within 15 days of receiving letter of acceptance, the successful bidder shall deliver to the Managing Director (Employer) the performance security (either a bank guarantee or a FDR pledged in favor of the Managing Director (NMS), Nurseries Management Society Director of Horticulture H.P. Shimla -2) for an amount equivalent of 5% of the contract price. The Performance Security shall be valid till the expiry of the defect liability period. The "Defect Liability Period" for the work is one year from the date of taking over possession. During the defect liability period, the contractor will be responsible for rectifying any defects in work free of cost to the Employer.

11. Termination

11.1 The Employer may terminate the Contract if the other party causes a fundamental breach of the Contract.

11.2 Fundamental breaches of Contract include, but shall not be limited to the following:

(a) the contractor stops work for 28 days and the stoppage has not been authorized by the Officer;

(b) the Contractor has become bankrupt or goes into liquidation other than for a reconstruction or amalgamation;

(c) the Engineer gives Notice that failure to correct a particular Defect is a fundamental breach of Contract and the Contractor fails to correct it within a reasonable period of time determined by the Engineer;

(d) the Contractor does not maintain a security which is required;

(e) the Contractor has engaged in corrupt, fraudulent, collusive, coercive or obstructive practices, in competing for or in executing the Contract; and

(f) the contractor has delayed the completion of the Works by the number of days for which the maximum amount of liquidated damages can be paid

11.3 Notwithstanding the above, the Employer may terminate the Contract for convenience.

11.4 If the Contract is terminated, the Contractor shall stop work immediately, make the Site safe and secure and leave the Site as soon as reasonably possible.

12. Payment upon Termination

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12.1 If the Contract is terminated because of a fundamental breach of Contract by the Contractor, the Engineer shall issue a certificate for the value of the work done less advance payments received up to the date of the issue of the certificate, less other recoveries due in terms of the contract, less taxes due to be deducted at source as per applicable law.

12.2 If the Contract is terminated at the Employer's convenience, the Engineer shall issue a certificate for the value of the work done, the reasonable cost of removal of Equipment, repatriation of the Contractor's personnel employed solely on the Works, and the Contractor's costs of protecting and securing the Works and less advance payments received up to the date of the certificate, less other recoveries due in terms of the contract and less taxes due to be deducted at source as per applicable law.

13. Dispute settlement

If over the works, any dispute arises between the two parties, relating to any aspects of this Agreement, the parties shall first attempt to settle the dispute through mutual and amicable consultation.

In the event of agreement not being reached, the matter will be referred for arbitration by a Sole Arbitrator not below the level of retired Chief Engineer / Superintending Engineer, (not connected in part or whole with this Project in his service) to be appointed by the first party. The Arbitration will be conducted in accordance with the Arbitration and Conciliation Act, 1996. The decision of the Arbitrator shall be final and binding on both the parties. Only Court of Law in Shimla will have to Jurisdiction cover any dispute.

14. Corrupt and Fraudulent Practices

The World Bank requires compliance with its policy in regard to corrupt and fraudulent practices as set forth in Section C. In further pursuance of this policy, Bidders shall permit and shall cause its agents (whether declared or not), sub-contractors, sub-consultants, service providers, or suppliers and any personnel thereof, to permit the Bank to inspect all accounts, records and other documents relating to any prequalification process, bid submission, and contract performance (in the case of award), and to have them audited by auditors appointed by the Bank.

Director of Horticulture
Himachal Pradesh Shimla-2

Director of Horticulture, Himachal Pradesh-cum- Chief Nodal Officer,/General Manager HPNMS Directorate of Horticulture, Navbahar Shimla. PIN (ZIP) Code: 171002 (INDIA)

in the presence of:

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For and on behalf of the Contractor/Firm

Tushar Goel Govt. Contractor
Near New Bus Stand, Palampur
Distt. Kangra H.P.-176061
GSTIN 02AHWPG3948G1Z6

Mr. _____

Mr. Tushar Goel Govt Contractor, New Modern Colony Ghuggar,Teh Palampur Distt-Kangra (H.P) 176061

in the presence of:

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Section C. World Bank Policy on Corrupt and Fraudulent Practices

Guidelines for Procurement of Goods, Works, and Non-Consulting Services under IBRD Loans and IDA Credits & Grants by World Bank Borrowers, dated January 2011.

"Fraud and Corruption:

1.16 It is the Bank's policy to require that Borrowers (including beneficiaries of Bank loans), bidders, suppliers, contractors and their agents (whether declared or not), sub-contractors, sub-consultants, service providers or suppliers, and any personnel thereof, observe the highest standard of ethics during the procurement and execution of Bank-financed contracts. In pursuance of this policy, the Bank:

(a) defines, for the purposes of this provision, the terms set forth below as follows:

(i) "corrupt practice" is the offering, giving, receiving, or soliciting, directly or indirectly, of anything of value to influence improperly the actions of another party;

(ii) "fraudulent practice" is any act or omission, including a misrepresentation, that knowingly or recklessly misleads, or attempts to mislead, a party to obtain a financial or other benefit or to avoid an obligation;

(iii) "collusive practice" is an arrangement between two or more parties designed to achieve an improper purpose, including to influence improperly the actions of another party;

(iv) "coercive practice" is impairing or harming, or threatening to impair or harm, directly or indirectly, any party or the property of the party to influence improperly the actions of a party;

(v) "obstructive practice" is

(aa) deliberately destroying, falsifying, altering, or concealing of evidence material to the investigation or making false statements to investigators in order to materially impede a Bank investigation into allegations of a corrupt, fraudulent, coercive or collusive practice; and/or threatening, harassing or intimidating any party to prevent it from disclosing its knowledge of matters relevant to the investigation or from pursuing the investigation, or

(bb) acts intended to materially impede the exercise of the Bank's inspection and audit rights provided for under paragraph 1.16(e) below.

(b) will reject a proposal for award if it determines that the bidder recommended for award, or any of its personnel, or its agents, or its sub-consultants, sub-contractors, service providers, suppliers and/or their employees, has, directly or indirectly, engaged in corrupt, fraudulent, collusive, coercive, or obstructive practices in competing for the contract in question;

(c) will declare misprocurement and cancel the portion of the loan allocated to a contract if it determines at any time that representatives of the Borrower or of a recipient of any part of the proceeds of the loan engaged in corrupt, fraudulent, collusive, coercive, or obstructive practices during the procurement or the implementation of the contract in question, without the Borrower having taken timely and appropriate action satisfactory to the Bank to address such practices when they occur, including by failing to inform the Bank in a timely manner at the time they knew of the practices;

(d) will sanction a firm or individual, at any time, in accordance with the prevailing Bank's sanctions procedures, including by publicly declaring such firm or individual ineligible, either indefinitely or for a stated period of time: (i) to be awarded a Bank-financed contract; and (ii) to be a nominated sub-contractor, consultant, supplier, or service provider of an otherwise eligible firm being awarded a Bank-financed contract;

(e) will require that a clause be included in bidding documents and in contracts financed by a Bank loan, requiring bidders, suppliers and contractors, and their sub-contractors, agents,

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personnel, consultants, service providers, or suppliers, to permit the Bank to inspect all accounts, records, and other documents relating to the submission of bids and contract performance, and to have them audited by auditors appointed by the Bank.

Specifications

1 GENERAL

1.1 Scope

This part deals with the requirements of materials for use in construction work with regard to quality, testing, approval and storage, before they are used on work. This part is supplementary to Part-II: Workmanship and Other requirements of the Technical Specifications for civil works.

1.2 Standard

A high standard of quality is required for all materials used in construction work. They shall be the best of the kind obtainable indigenously in each case and shall be procured from manufacturers of repute in order to ensure uniformity of quality and assurance of timely supply.

1.3 Approval and Tests

1.3.1 All materials to be used in construction shall be subject to approval of the Engineer. The Contractor shall apply sufficiently in advance with samples of the materials including the supporting test results from the approved laboratory and other documentary evidence from the manufacturer wherever applicable and indicating the types of materials and their respective sources. The delivery of materials at site shall commence only after the approval of the quality, grading and sources of the materials by the Engineer.

1.3.2 The quality of all materials once approved shall be maintained throughout the period of construction and periodical tests shall be carried out to ensure that it is maintained. Such routine tests shall be listed under the different materials and/or as may be ordered by the Engineer from time to time.

1.3.3 Where a particular "Brand" or "Make" of material is specified in the Schedule of Items or Technical Specifications, such "Brand" or "Make" of material alone shall be used on the work. Should it become necessary for any reason (such as non-availability/ceased to be produced), to use any material other than the specified "Brand" or "Make", the Contractor shall submit sample of the same to the Engineer for approval together with test certificates and other documents necessary for examining and giving approval thereof. Should such change or substitution of materials, subsequently approved, results in use of material of price lower than that of the material specified in the Schedule of Items or Technical Specifications, the rates of work affected by the substitution shall be proportionately reduced. Similarly, in case the substitution results in use of material of price higher than that specified in the Schedule of Items or Technical Specifications, the rates of work affected by the substitution shall be proportionately increased.

1.4 Codes

1.4.1 The years of publication against various standards, referred in this specification, correspond to the latest standards as on date of preparation of this specification. During use of this specification in future, the latest publication as on date shall be referred to. Where standards are not yet published by the BIS or IRC, adoptable British Standards or other International Standards shall apply.

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1.4.2 In case of any conflict in meaning between these specifications and those of BIS or IRC, or British /International Standard; the provisions of these specifications shall prevail.

1.5 Rejection of Materials

1.5.1 Any material brought to site which, in the opinion of the Engineer is damaged, contaminated, deteriorated or does not comply with the requirement of this specification shall be rejected.

1.5.2 If the routine tests or random site tests show that any of the materials, brought to site, do not comply in any way with the requirements of this specification or of I.S. Codes as applicable, then that material shall be rejected.

1.5.3 The Contractor at his own cost shall remove from site any and all such rejected material within the time specified by the Engineer.

2 MATERIALS FOR CONCRETE

2.1.1 Aggregates

Aggregates shall comply with the requirements of IS: 383-1970 "Coarse and Fine Aggregates for Concrete". They shall be hard, strong, dense, durable, clean and free from veins and adherent coating, vegetable matter and other deleterious substances; and shall be obtained from approved sources. Aggregates shall not contain any harmful material such as pyrites, coal, lignite, shale or similar laminated material, clay, alkali, soft fragments, sea shells and organic impurities in such quantity as to affect the strength or durability of concrete. Aggregates which are chemically reactive with alkalies of cement shall not be used. Aggregates which are not sufficiently clean shall be washed in clean fresh water to the satisfaction of the Engineer.

2.1.2 Testing

All aggregates shall be subject to inspection and testing. The Contractor shall submit samples for testing as may be required by the Engineer. Sampling and testing shall be carried out in accordance with IS: 2386-1963 "Methods of Test for Aggregates for concrete".

2.1.3 Grading

The Contractor shall ensure that the full range of aggregate used for making concrete is graded in such a way as to ensure a dense workable mix. The delivery of aggregates will commence only when the Engineer has approved the samples and the quality and grade shall be maintained consistent and equal to the approved sample. Before construction commences, the Contractor shall carry out a series of tests on the aggregates and on the concrete made therefrom to determine the most suitable grading of the available aggregates. Once the most suitable grading has been found, the grading shall be adopted for the construction of the works and periodic tests shall be carried out to ensure that it is maintained.

2.1.3.1 Size and grading of fine aggregates

The grading shall conform to IS: 383-1970 and shall be within the limits of Grading ZoneIII. The maximum size of particle shall be 4.75mm and shall be graded down. Sand containing more than 10% of fine grains passing through 150 micron sieve or having the fineness modulus less than 2 shall not be used for concrete work.

2.1.3.2 Size and grading of coarse aggregates

2.1.3.3 The nominal maximum size of the aggregates for each mark of concrete or for each type of work shall depend upon the description of the particular item in the Schedule of Items and in according to relevant clauses of IS: 456-1978. The aggregates shall be well graded and the grading shall

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conform to relevant requirements of IS: 383-1970 depending upon the maximum nominal size as specified or as required.

2.1.3.4 Fine aggregate for mortar and grout

The grading of fine aggregate for mortar and grout shall be within the limits of grading zone III and IV as defined in IS: 383-1970.

2.1.3.5 Storage & stacking

Care shall be taken in the storage to avoid intrusion of any foreign materials into the aggregates and where two types of aggregates are stored close to each other, they shall be separated by a wall or plate. In case of stockpiling, care shall be taken to avoid forming pyramids resulting in segregation of different sized materials. The height of the stacks shall be generally limited to 150 cm.

2.2 Coarse Aggregates

2.2.1 Types

The type of coarse aggregate viz., stone chips, gravel or broken brick shall be as described in the Schedule of Items. Unless otherwise specified in the Schedule of Items, stone chips shall be used as coarse aggregate.

2.2.2 Stone chips

It shall be crushed or broken from hard stone obtained from approved quarries of igneous or metamorphic origin. The stone chips shall be hard, strong, dense, durable and angular in shape. It shall be free from soft, friable, thin, flat, elongated or laminated and flaky pieces and free from dirt, clay lumps, and other deleterious materials like coal, lignites, silt, soft fragments, and other foreign materials which may affect adversely the strength & durability of concrete. The total amount of deleterious /foreign materials shall not exceed 5% by weight according to relevant clause of IS: 383-1970. If found necessary the stone chips shall be screened and washed before use.

2.2.3 Gravel

It can be either river bed shingle or pit gravel. It shall be sound, hard, clean, irregular in shape and suitably graded in size with or without some broken fragments. It shall be free from flat particles, powdered clay, silt, loam and other impurities. Before using, the gravel shall be screened and washed to the satisfaction of the Engineer. However, the foreign/deleterious materials shall not exceed 5% by weight.

2.3 Fine Aggregates

2.3.1 Unless specified otherwise it shall either be natural river sand or pit sand.

2.3.2 Sand shall be clean, sharp, strong, angular and composed of hard siliceous material. It shall not contain harmful organic impurities in such form or quantities as to affect adversely the strength and durability of concrete. Sand for reinforced concrete shall not contain any acidic or other impurities which is likely to attack steel reinforcement. The percentage of all deleterious materials including silt, clay etc., shall not exceed 5% by weight. If directed, sand shall be screened or washed before use to the satisfaction of Engineer.

2.3.3 Crusher dust

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Crusher stone dust (that is retained on 300 micron sieve) only to be used under floors or at locations where ever sand filling is generally used. In this project sand filling is not to be used.In cases wherever sand filling is specified / indicated ,the same is to be replaced with crusher dust.

2.4 Lime

Lime for mortars and concrete shall conform to IS: 712-1984 The total of CaO and MgO content in quick lime shall not be less than 85% (MgO shall not exceed 5%). Quicklime, after slaking, shall leave a residue of not more than 5% by weight on IS sieve 85.

2.5 Cement

Ordinary Portland cement / Portland slag cement complying with the requirements of IS:269-1989 and I.S. 455-1989 respectively shall be used for making plain and reinforced concrete, cement grout and mortar.

Other types of cement may be used depending upon the requirements of certain jobs with the approval of the Engineer. These shall conform to the following standards:

Portland Pozzolana Cement	IS:1489-1991
Rapid Hardening Portland Cement	IS:8041-1990
43 Grade Ordinary Portland Cement	IS:8112-1989
53 Grade Ordinary Portland Cement IS: 12269-1987	IS:12269-1987
Hydrophobic Portland Cement .. IS: 8043-1991	IS: 8043-1991
High alumina cement for structural work	IS:6452-1989
White portland cement	IS:8043-1989
Sulphate Resisting Portland Cement IS: 12330-1988	IS: 12330-1988

2.5.1 Testing of samples

The Contractor shall supply a copy of the manufacturer's test certificate for each consignment of cement supplied by him and consignments shall be used on work in the order of delivery. The Contractor shall supply samples of cement to the Engineer as frequently as he may require for testing. The sampling of cement for testing shall be according to IS: 3535-1986. All tests shall be in accordance with the relevant clauses of IS: 4031 (Part-I to Part-15) 1988 to 1991 & IS: 4032-1985.

2.5.2 Contractor's responsibility

From the time a consignment of cement is delivered at site and tested and approved by the Engineer until such time as the cement is used on the works, the Contractor shall be responsible for keeping the same in sound and acceptable condition and at his expense and risk. Any cement which deteriorates while in the Contractor's charge and is rejectedas unsuitable by the Engineer, shall be removed from the site to outside the limits of work at the cost of contractor within two days of ordering such removal by the Engineer.

2.5.3 Stock of cement

In order to ensure due progress, the Contractor shall at all times maintain on the site at least such stock of cement as the Engineer may from time to time consider necessary. No cement shall be used upon the works until it has been accepted as satisfactory by the Engineer.

2.5.4 Storage of cement

The cement shall be stored in such manner as to permit easy access for proper inspection and in a suitable weather-tight, well ventilated building to protect it from dampness caused by ingress of moisture from any source. Different types of cementshall be stored separately. Cement bags shall be stacked at least 15 to 20 cm clear of the floor leaving a space of 60 cm around the exterior

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walls. The cement shall not be stacked more than 10 bags high. Each consignment of cement shall be stacked separately to permit easy access for inspection.

2.6 Water

Water used for mixing concrete and mortar and for curing shall be clean and free from injurious amounts of oil, acid, alkali, salts, sugar, organic materials or other substances that may be deleterious to concrete or steel. The pH value of water shall generally be not less than '6'. Water has to meet the requirements mentioned in clause 4.3 of IS: 456- 1978. Water shall be obtained from an approved source. Where it is obtained from a source other than a supply main, it shall be tested to establish its suitability. Water for construction purpose shall be stored in proper storage tanks to prevent any organic impurities getting mixed up with it.

2.7 Admixture for Concrete

2.7.1 Approval

Admixtures to concrete shall not be used without the written consent of the Engineer. When permitted, the Contractor shall furnish full details from the manufacturer and shall carry out such test as the Engineer may require before any admixture is used in the work.

2.7.2 Types

2.7.2.1 **Integral water proofer**

Admixtures used as integral water proofer shall be free of chlorides and sulphates and shall conform to IS: 2645-1975. The application and doses shall be as per manufacturer's specification.

2.8 Interval of Routine Test

The routine tests of materials, delivered at site, shall be at the following intervals:

Aggregates	Fortnightly or for every 200 m3 for eachaggregate whichever is earlier and in other respects generally as per IS : 2386 (Part 1 to 8)-1963.
Cement	Fortnightly or for each consignment, within 4 days of delivery and in other respects generally as per IS : 4031-1988.
Water	Once in two months for each source of supply and in other respects generally as per IS : 456-1978
Reinforcement	For each consignment within 4 days of delivery in accordance with I.S. 1786-1985, I.S. 1599-1985 and I.S. 1608-1972.

3 STEEL

3.1 For Reinforcement

Reinforcing bars for concrete shall be round steel bars of the following types as may be shown on the drawing:

i) Plain mild steel bars conforming to Grade-I of IS : 432-1982 "Mild Steel & Medium Tensile Steel for Concrete Reinforcement".

ii) "High strength deformed steel bars conforming to IS : 1786-1985 for Concrete Reinforcement".

iii) Reinforcement fabrics conforming to IS:1566-1982 "Hard Drawn Steel Wire Fabric for Concrete Reinforcement"

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All reinforcement bars shall be of uniform cross sectional area and be free from loose mill scales, dust, loose rust, coats of paint, oil or other coatings which may destroy or reduce bond. Further all diameters supplied in coils need to be straightened by mechanical means using straightening machines as required.Unit weight of reinforcement bars conforming to I.S. 1786-1985 is as given below.

Nominal Size (Dia) (mm)	Mass Per Metre Run(Kg)
6	0.222
8	0.395
10	0.617
12	0.888
16	1.580
18	2.000
20	2.470
22	2.980
25	3.850
28	4.830
32	6.310

3.2 Binding wire

Binding wire for reinforcement shall be annealed steel wire 20 BWG conforming to IS : 280 - 1978 "Specification for Mild Steel Wire".

3.3 Light structural work and inserts

Steel for light structural work and for preparation of inserts and embedment's shall conform to IS: 2062-1992 "Steel for general structural purposes - Specification.

3.4 Steel Tubes

Steel tubes for use in light structural work and inserts shall be of light or medium class (as may be specified in drawings or the schedule of items) and of grade YST 25 conforming to IS : 1161 - 1979 "Specification for Steel Tubes for Structural Purposes".

3.5 Foundation Bolts

3.5.1 Bolts to be embedded in concrete shall, unless otherwise detailed in drawings, conform to IS : 5624-1970 "Specification for Foundation Bolts". Material for bolts, shall, be of steel conforming to IS : 2062-1992 or as per details provided in drawings based on Technical requirement

3.5.2 Nuts and locknuts shall conform to IS : 1363 (Part 1 to 3) -1992 "Specification for Black Hexagon Bolts, Nuts and Lock Nuts (Diameter 6-39 mm) and Black Hexagon Screws "Specification for Hexagon Bolts and Nuts (M-42 to M-150)".

3.5.3 Plain washers shall conform to IS : 2016 -1967 "Specification for Plain Washers and springwashers shall conform to IS : 3063 -1972 "Spring Washers for Bolts, Nuts & Screws".

3.6 Steel Tubes for Non-structural use

3.6.1 Steel tubes for non-structural use shall conform to IS: 1239 (Part-I) -1990 "Specification for Mild Steel Tubes, Tubular and Other Wrought Steel fittings, Part-I : Mild Steel Tubes".

3.6.2 Fittings for steel tubes used for non-structural purposes shall conform to IS: 1239 (Part-II)-1992 "Specification for Mild Steel Tubular and Other Wrought Steel Pipe Fittings".

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3.7 Threaded Fasteners

Bolts and nuts for fastening shall conform to IS:1367 (Part 1)-1980 "Technical Supply Conditions for Threaded Fasteners".

3.8 Testing

Test certificates from manufacturer shall be submitted for each consignment. Anyadditional test which the Engineer may require shall be done according to IS : 1786-1985,1566-1982, 280-1978, 2062-1992, 1161-1979, 2614-1969, 3063-1972, 1239 (Part 1 and2)-1990 and 1992 and 1367-1980.

3.9 Cast Steel

3.9.1 Quality

Cast steel shall conform to IS: 1030-1989 "Carbon Steel Casting for General Engineering Purpose". Unless otherwise specified, it shall conform to Grade2.

3.10 Conduits

3.10.1 Steel for electrical wiring

Rigid steel conduits for electrical use shall conform to IS : 9537 (Part 2) - 1981 for rigidpipes and to IS : 3480-1966 for flexible conduits. Fittings for conduits shall conform to IS :2667-1988. All conduit pipes shall be finished with galvanized or stove-enameled surface. All accessories shall be of threaded type and pipes shall be joined by means of screwedcouplers only. Bend in conduits shall be made to the dimension shown in drawing, but a minimum of 12 times the diameter. Where shown in drawing they shall be treated with anticorrosive preservative as specified.

3.10.2 Non-metallic conduit for electrical wiring

Non-metallic conduits for electrical use shall conform to IS: 9537 (Part 3) -1983 for rigid pipes and to IS: 6946 -1973 for flexible pipes. Fittings shall conform to IS: 3419-1989. Bends shall be achieved by bending the pipes by inserting suitable solid or inspection type normal bends, elbows or similar fittings.

4 ASBESTOS CEMENT PRODUCTS

4.1 General

Asbestos cement products shall be free from visible defects, uniform in color, of required density, length, thickness and diameter within the allowable tolerance. They shall be obtained from an approved source of manufacture and stored safely. Methods of test shall be according to IS:5913-1989 "Method of Test for Asbestos Cement Products."

4.2 Building Boards

These shall be of Class A, B and C with board thickness being 6.5mm, 5mm and 4mm respectively. The length shall be 2400, 1800 and 1200mm and width in all cases 1200 mm. Building boards shall conform to IS : 2098 - 1964 "Asbestos Cement Building Boards". They shall, when tested in two perpendicular directions, take a load of not less than 15 kgf for Class-A and 10 Kgf for Class-B and Class-C boards.The boards shall show water absorption of not more than 40% of their dry weight.

4.3 Flat Sheets

Flat sheets shall conform to IS : 2096-1992 "Asbestos Cement Flat Sheets". They shall have a bending stress of not less than 225 kgf/cm2 & a density of 1.6 kg/dm3 forcompressed sheets & a

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bending stress of not less than 160 kgf/cm2 and a density of 1.2Kg/ dm3 for uncompressed sheets. Nominal thickness shall be 5,6,8,10 and 15 mm, length 2400, 1800 and 1200mm and width 1200mm. Water absorption shall not exceed 28% of dry wt.

4.4 Pipes and fittings

Pressure pipes shall conform to IS : 1592-1989 "Asbestos Cement Pressure Pipes" and to IS : 9627 -1980 "Asbestos Cement Pressure Pipes (Light Duty)". Pipes for sewerage and drainage shall conform to IS : 6908 -1991 "Asbestos Cement Pipes and Fittings for Sewerage and Drainage ". Building pipes gutters and fittings shall conform to IS : 1626 - (Part 1 to 3)-1980 to 1991 "Asbestos Cement Building pipes and pipe fittings" Pressure pipes shall satisfy Hydraulic test and transverse crushing test as per IS : 5913-1989.

4.5 Corrugated and Semi-Corrugated Sheets

These shall conform to IS : 459 -1992 "Unreinforced Corrugated and Semi-Corrugated Asbestos Cement Sheets". Unless otherwise stated the sheets shall be corrugated and not less than 6mm thick. The sheets shall have a load bearing capacity of not less than 5N/mm width of specimen and shall not absorb more water than 28% of its dry weight. Overall width of corrugated sheets is 1050mm and of semi-corrugated sheet is 1100mm.

4.6 Asbestos Cement Roof fittings

4.6.1 These shall conform to IS : 1626 (Part 3)-1981. Shapes and dimensions shall be as given in the above mentioned code. All finished products shall be free from visual defects that impair appearance or serviceability. Surface of fittings shall be of uniform texture and shall have neatly trimmed edges. Mean water absorption shall not be more than 28% of dry mass of the material.

5 BRICK AND STONES

5.1 Bricks

Bricks for masonry in foundations, walls and other locations shall be common burnt clay building bricks having minimum crushing strength of 5 N/sq.mm., or such other strength as may be described in the Schedule of Items, when tested in accordance with IS : 1077-1992 "Common Burnt Clay Building Bricks". They shall be sound, hard and thoroughly well burnt, with uniform size having rectangular faces with parallel sides and sharp straight right angled edges and be of uniform colour with fine compact uniform texture. Bricks shall be of uniform deep red cherry or copper colour. They shall be free from flaws, cracks and nodules of free lime. Water absorption after 24 hours immersion in cold water shall be not more than 20% by weight. They shall not absorb more than 10% by weight of water after immersion for six hours. They shall emit a clear metallic ringing sound when struck by a mallet and shall not break when dropped on their face, from a height of 60 cm. Fractured surface shall show homogeneous, fine grained uniform texture, free from cracks, air holes laminations, grits, lumps of lime, efflorescence or any other defect which may impair their strength, durability, appearance and usefulness for the purpose intended. Underburnt or vitrified bricks shall not be used. Samples of bricks brought to the site shall be tested periodically for compression and other tests according to IS : 3495 (Parts-1 to 4) -1992 "Method of Test for Burnt Clay Building Bricks". Where the size of bricks is not specifically mentioned, it shall be taken to mean conventional sizes as is commonly available in the area. In case modular bricks are to be used, it shall be accordingly specified in Schedule of Items. The bricks shall be classified on the basis of average compressive strength as given in table 1 of IS : 1077-1992

5.2 Handling

Bricks shall be unloaded by hand and carefully stacked and all broken bricks shall be removed from the site.

5.3 Samples and Inspection

Representative samples shall be submitted by the contractor and approved samples retained by the Engineer for comparison and future reference. Bricks shall be obtained from approved manufacturer. All bricks shall be subject to inspection on the site and shall be to the approval of the Engineer who may reject such consignment as are considered by him to be inferior to the quality specified. The Contractor shall provide all labour and plant required for the inspection and conduct such test as shall be required by the Engineer without additional charges.

5.4 Stone (granite, trap, sandstone, quartzite etc.)

5.4.1 Stone used shall be strong, durable, dense, compact, close grained, homogeneous, fire resistant and shall be obtained from sources approved by Engineer. Stones shall additionally be hard, sound, free from cracks, decay and other flaws or weathering and shall be easily workable. Stones with round surfaces shall not be made use of.

5.4.2 Stones shall have a crushing strength of not less than 200 kg/cm2. Stones with lesser crushing strength may be used in works with prior approval of the Engineer. Stones shall be non-porous and when tested in accordance with IS : 1124 -1974 "Method of Test for Determination of Water Absorption Etc.," shall show water absorption of less than 5% of its dry weight when soaked in water for 24 hours. Tests for durability and wheathering shall be done in accordance with IS : 1126-1974 and IS : 1125-1974 respectively. The working of stones to required sizes and their dressing shall be as per IS : 1127-1970 "Recommendations for dimensions and workmanship of natural building stones for masonry work" and IS : 1129 -1972 "Dressing of Natural Building Stones". Stones especially limestone and sand stones shall be well seasoned by exposure to air before use in construction works.

5.4.3 Size

Normally stones shall be of size that could be lifted and placed by hand, between 20 to 30 kg per piece. The length of stones shall not exceed 3 times the height and the breadth on base shall not be greater than 3/4 of the thickness of wall or less than 15cm. The height of stone may be upto 30cm.

5.4.4 Dressing

5.4.4.1 **Random rubble**

Stones shall be hammer dressed on the face, the sides, and the beds to enable it to come into close proximity with the neighboring stone. The bushings in the face shall not project more than 4cm on all exposed faces and 2cm on a face to be plastered, nor shall it have depressions more than 1cm from the average wall surface.

5.4.4.2 **Coursed rubble - First sort**

Face stones shall be hammer dressed on all beds, and joints, so as to give them approximately rectangular block shape. These shall be squared on all joints and beds. The bed joint shall be rough chisel dressed for atleast 5cm back from the face, and side joints for atleast 4cm such that no portion of the dressed surface is more than 6mm from a straight edge placed on it. The bushing on the face shall not project more than 4cm as an exposed face and one cm on a face to

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be plastered. The hammer dressed stone shall also have a rough tooling for a minimum width of 2.5cm along the four edges of the face of the stone, when stone work is exposed.

5.4.4.3 **Coursed rubble - Second sort**

Dressing shall be as specified in 5.6.4.2 except that no portion of dressed surface shall exceed 10mm from a straight edge placed on it as against 6mm for first sort.

5.4.4.4 **Stone for veneering**

Stone lining upto 8cm shall be treated as veneering work. The stone shall be cut into slabs or required thickness along the planes parallel to the natural bed. Every stone shall be cut to the required size and shape so as to be free from any waviness and to give truly vertical and horizontal joints. Adjoining faces shall be fine chisel dressed to a depth of a 6mm, so that when checked with a 60cm straight edge, no point varies from it by more than 1mm.All edges shall be chisel dressed to be true, square and free from chippings. Top and bottom faces shall be dressed to within 3mm tolerance and vertical faces to within 6mm tolerance, when checked with a 60mm straight edge. Dressing at the back shall not be done.

5.5 Hollow and Solid Concrete Blocks

5.5.1 Cement concrete blocks used in the construction of concrete masonry load bearing as well as non-load bearing walls shall conform to the requirements of IS : 2185 (Part 1)-1979. Physical properties such as density, compressive strength, water absorption etc., shall be determined in accordance with the procedure laid down in IS : 2185 (Part 1) -1979 and shall conform to the requirement laid therein. When inspected visually all blocks shall be sound, free from cracks, broken edges, honeycombing and other defects which would interfere with the proper placing of blocks or impair strength or permanence of construction.

5.5.2 Dimensions and tolerance

The blocks shall be made in sizes and shapes to suit the particular job and shall include stretcher, corner, double corner or pier, jamb, header, bullnose and floor units.

5.5.2.1 The nominal dimensions of concrete block shall be as follows : Length 400, 500 or 600mm Height 200 or 100mm: Width : 50, 75,100, 150, 200, 250 or 300mm In addition, blocks shall be manufactured in half and other suitable lengths and shapes to suit Architectural requirements.

5.5.2.2 The maximum dimensional tolerances shall be plus or minus 5mm in length and plus or minus 3mm in height and width.

5.5.3 Hollow blocks (open and closed cavity)

5.5.3.1 The blocks having solid material about 50% to 75% of total volume of the block calculated from the overall dimensions shall be termed as hollow blocks. Grade-A blocks used as load bearing units shall have a minimum block density of 1500 kg/m3 and shall have minimum average compressive strength of 3.5, 4.5, 5.5 or 7.0 N/mm2 at 28 days as specified.

5.5.3.2 Grade-B Blocks used as load bearing units shall have block density less than 1500 kg/m3, but not less than 1000 kg/m3 and shall have compressive strength of 2.0, 3.0, or 5.0 N/ mm2 or as specified.

5.5.3.3 Grade-C blocks used as non-load bearing units shall have block density less than 1500 kg/m3, but not less than 1000 kg/m3 and compressive strength of 1.5 N/mm2 at 28 days.

5.5.4 Solid blocks

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The blocks having solid material more than 75% of the total volume of the be block shall be termed as solid block. Solid blocks (Grade-D) used as load bearing units shall have a block density of not less than 1800 kg/m3 and compressive strength of 4.0 or 5.0 N/mm2 as specified.

5.5.5 Mix proportion

The concrete mix used for blocks shall not be richer than one part by volume of cement to six parts by volume of combined aggregates before mixing

5.5.6 Surface texture and finish

Surface texture, that is, very fine closed texture or coarse open texture and finish, whether colored or not shall be according to the drawing, description in the Schedule of Items or instructions of the Engineer.

5.5.7 Marking and certificate

The blocks shall be marked permanently indicating the Grade of the unit, identification of the manufacturer and the year of manufacture. Manufacturers test certificate shall be supplied with the delivery of each lot.

5.6 Cement, Lime and Water

Cement, lime and water shall conform to the specification under the Section Concrete of this part.

5.7 Sand for Masonry Mortar

Sand for masonry mortars shall be natural sand, crushed stone sand or crushed gravel and shall comply with IS : 2116 - 1980 "Sand for Masonry Mortars". The sand shall be hard, durable, clean and free from adherent coatings and shall not contain amount of clay, silt and fine dust more than 5% by wt. Sand shall not contain any harmful impurities such as iron pyrites, alkalies, salts, coal, mica and organic matters. The particle size grading of sand for use in mortars shall be within the limits as specified in Table I of above code.

6 SAND FOR PLASTERING

Sand for use in mortars for internal wall, ceiling and external plastering and rendering shall conform to IS:1542 -1992. It shall not contain any harmful impurities such as iron pyrites, alkalis, salts, coal, mica and organic matters. Percentage of salt and dust shall not be more than 5% by weight. Grading of sand shall be within the limits specified in clause no. 5.1 of above code. Fineness modulus of naturally occurring sand shall not be less than 1.5.

7 MATERIALS FOR FLOORING & PAVING

7.1 Cement and Binders

7.1.1 Cement

Cement, fine aggregates, reinforcement and water used shall comply with the requirements of concrete as per clauses 2.1, 2.3, 2.6 and 2.7 of this part.

7.1.2 Water

7.1.3 Water for construction shall be clean, soft, free from loam, salt and organic materials. Hard water shall not be used.

7.2 Aggregates

7.2.1 Coarse Aggregate

7.2.1.1 Coarse aggregate shall conform to the requirement as per clauses 2.1 and 2.2 of this part.

7.2.1.2 For granolithic floor the screeded bed shall comprise of aggregates size 15mm and downgraded and topping shall comprise of clean fine stone chippings, size 4mm and down. For concrete floor with hardener treatment the topping shall comprise of stone chippings, size 6mm and down and

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for in-situ terrazzo flooring, chippings shall be within sizes 12mm to 6mm graded. The marble chips for topping of terrazzo floor shall be of 3-6mm size and shall conform to Grade-I of IS : 2114-1984 "CP for laying in-situ terrazo floor finish".

7.2.2 Common burnt clay bricks

Common burnt clay bricks shall conform to IS : 1077-1992 and comply with requirements under the section "Brick and Stones" of this part.

7.2.3 Rubble

Rubble of approved quality shall be used and shall be clean and free from dirt. The looseand weathered sections shall be removed before use. Rubble used as hard core shall have a least lateral dimension (thickness) between 100mm and 225mm, depending on the thickness of hardcore.

7.3 Tiles

7.3.1 Terrazzo Tiles

Terrazzo tiles shall be machine made under a minimum pressure of 140 kg/cm2. It shall have a minimum total thickness of 20mm including a minimum of 6mm thick topping. It shall be of size, texture, colour, shade and pattern as specified in schedule of item and as approved by the Engineer.

7.3.2 White Glazed Tile

White glazed tiles shall be of approved manufacture and quality and shall conform to IS:777 - 1988 "Glazed Earthenware Tiles. They shall be true in shape, free from hair cracks, crazing spot, chipped edges and corners and surface shall be perfectly flat without warps and of uniform colour. The top surface shall be glazed either gloss or matt as specified. The tiles, normally shall be 149mm x 149mm or 99mm x 99mm size and shall not be less than 5mm thick or as specified. The tolerance on average facial dimension value shall be plus or minus 0.8 and on thickness plus or minus 0.5mm. The specials such as coves, internal and external angles, beads, cornices and their corner pieces shall be of specified sizes and of thickness not less than the thickness of tiles.

7.3.3 Coloured tiles

Only glaze shall be coloured as specified. The size and specification of tiles shall be same as for the white glazed tiles.

7.3.4 Marble tiles

It shall conform to IS : 1130 -1960 "Marble (Blocks, Slabs and Tiles)". Marble for paving and facing work shall be of selected quality, hard, sound, dense and homogeneous in texture (with crystalline texture) and free from cracks, decay, weathering and flaws and shall be of kind and quality, size and thickness as specified in schedule of items. The samples of tiles shall be got approved by the Engineer before use. The tiles shall be cut to the requisite dimensions.

7.4 Pigments

Pigments incorporated in mortar or used for grouting shall be subject to approval of Engineer and as per table I of IS : 2114-1984.

7.5 Red Oxide of Iron

Red oxide of iron where used for "Red Artificial Stone Flooring" shall be of quality approved by the Engineer, and shall be of uniform tint.

7.6 Hardening Agents

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Hardening agents such as ironite used for "Cement Concrete Flooring with Hardener Treatment", shall be of quality approved by the Engineer for every work.

7.7 Dividing Strips

Dividing strips shall be of aluminium, glass, brass, copper, plastic or similar materials as specified in the schedule of item and of quality approved by the Engineer. Strips shall be1.5 mm thick unless otherwise specified penetrating to the full depth of the flooring. Aluminium strips when used shall have a protective coating of bitumen.

7.8 Marble Chips

It shall be in sizes varying from 1mm to 25mm and in different colours as per requirement. Marble chips shall be hard, sound, dense and homogeneous in texture withcrystalline and coarse grains. It shall be uniform in colour and free from cracks, stains, decay and weathering and shall be obtained from approved source.

7.9 Marble Powder

It shall be clean, free from dust and other foreign materials and of approved quality, obtained from approved source. It shall pass through sieve 300 conforming to IS: 460- (Part-1)-1985.

8 TIMBER

8.1 General

All timber used for carpentry and joinery works shall be new. It shall be well seasoned by a suitable process conforming to IS : 1141-1973 before being planned + 9 to the required sizes. It shall be sound, straight, free from sap, radial cracks, decay, fungal growth, boxed heart, pitch pockets, borer holes, splits, loose knots, flaws or any other defects and shall show a clean surface when cut. Timber shall conform to the requirements of IS : 1003 (Part 1&2)- 1983 to 1991. The finished components shall be given suitable preservative treatment wherever necessary.

8.2 Storage and Inspection

Timber shall be carefully stored and subject to inspection on site, piece by piece. The Engineer may reject such pieces as are considered by him not of the quality or meeting the requirements specified herein.

8.3 Moisture Content

Timber sha'l be accepted as well seasoned if its moisture content does not exceed the permissible limit as per IS : 287-1973.

8.4 Tolerances for Timber

For timber allowance as specified in the IS : 1003 (Part 1&2) 1983 to 1991 shall be applicable.

8.5 Flush Door Shutters, Shelves

Flush door shutters, shall be wooden, solid core or cellular and hollow core type, as may be shown in drawing or described in the Schedule of Items or directed by Engineer. They shall be obtained from an approved source of manufacture, covered on face with commercial ply, wood veneer or other finish as may be necessary. Solid core shutters shall conform to IS : 2202 (Part 1&2)-1983 to 1991 and cellular or hollow core shutters to IS : 2191 (Part 1&2)-1983. The resin used shall be phenol formaldehyde. A full size sample door shall be offered for inspection and approval.

8.6 Wood Particles Boards

Particle boards for general purposes shall be of medium density conforming to IS:3087- 1985. These are of four types, Flat pressed single layer board (FPSI), Flat pressed three layer board (FPTH), Extrusion pressed solid board (XPSO) and Extrusion pressed tubular core (XPTU).

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Adhesive shall be BWR, WWR or un-extended CWR type. High density wood particle board shall conform to IS:3478-1966 and are in flat sheets or moulded forms. These shall be of type 1 (BWR type of resin) or Type 2 (WWR or CWR type of resin). Both types of boards shall be of Grade A (resin content 20 to 50 percent) and Grade : (resin content 8-12 percent).

8.7 Veneered Particle Board

These shall conform to IS : 3097-1980 and shall be of two grades. Exterior (grade-I with BWP or BWR type adhesive) & interior (grade-II with WWR or CWR type adhesive). Each grade of boards shall be of 4 types, solid core general purpose, solid core decorative, Tubular core general purpose and Tubular core decorative and accordingly designated.

8.8 Plywood for General Purpose

Plywood for general purpose shall conform to IS:303-1989. Depending on type of adhesive used for bonding veneers, it is of 4 grades, BWP (boiling water proof), B.W.R (boiling water resistant), WWR (warm water resistant) and CWR (Cold Water resistant). Any species of timber may be used for plywood manufacture. However list of species, for the manufacture of plywood is given in Annexure 'B' of the IS : 303-1989 for guidance. Plywood is classified in 10 different types as per appearance of the surface. These are type AA,AB,AC,AD,BB, BC,BD,CC,CD and DD as detailed in IS : 303-1984. It is available from 3 ply to 11 ply with thickness from 3mm to 25mm.

8.9 Veneered Decorative Plywood

This quality of plywood shall conform to IS : 1328-1982. These plywood shall be of two types Type 1 and Type 2 as per details given in IS : 1328-1982. Species of timber for decorative face commonly used are given in Table 1 of IS : 1328-1982 but the purchaser shall specify the particular veener to be used. Timber for cores and backs shall be either class I or II as specified in IS : 303-1989. Adhesive used shall be BWR or WWR synthetic resin.

9 FITTINGS FOR DOORS, WINDOWS, ETC.

9.1 General

Fittings shall be of iron, brass, aluminium or as specified. These shall be well made, reasonably smooth and free from sharp edges, corners, flaws and other defects. Screw holes shall be countersunk to suit the head of specified wood screws. All hinge pins shall be of steel and their riveted heads shall be well formed. Iron fittings shall be finished bright or black enameled or copper oxidised or painted as specified. Brass fittings shall be finished bright, oxidised or chromium plated and aluminium fittings shall be finished bright or anodised as specified. Fittings shall be got approved by the Engineer before fixing. Screws used for fittings shall be of the same metal and finish as the fittings. However, anodised cadmium/chromium plated M.S. screws of approved quality shall be used for fixing aluminium fittings.

9.2 Hinges

9.2.1 Butt hinges

These shall be mild steel but hinge (medium), brass butt hinges, extruded aluminium alloy butt hinges or as specified. Type (light/medium/heavy weight) and size shall be as specified in the drawing or schedule of items. Brass / Aluminium and M.S butt hinges shall conform to Indian Standard Specification for butt hinges IS : 205-1992 and IS : 1341-1992 respectively. Hinges shall be finished bright or satin polished or anodised.

9.3 Sliding Door Bolts

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Mild steel sliding door bolts shall conform to IS : 281-1991 and are of 2 types, plate type and clip or bolt type. Plate type bolts shall have plates and straps stove enameled black with hasp and bolt finished bright or copper oxidized or nickel / chromium plated. Clip or bolt type are copper oxidized or plated. All screw holes in the M.S bolts shall be countersunk. Diameter of bolt for plate type is 12mm and for clip type is 16mm. Non ferrous metal sliding doors are of brass or aluminium alloy and shall conform to IS:2681-1979. Brass sliding bolts are of 150 to 450mm size with bolt dia being 16mm for 150 to 300mm and 18mm for 375 and 450 size. Aluminium alloy sliding bolts are of size 200 to 450mm with 16mm bolt dia. Brass quality is finished satin, polished or plated and aluminium alloy bolts are anodised. For both ferrous and non-ferrous metal bolts the size of the sliding bolt is determined by the length of the bolt.

9.4 Door Rim Latch

This shall be of mild steel, brass, aluminium alloy or as specified and of sizes 75, 100, 125 and 150mm denoted by overall length of the body measured from outside face of the fore end to the rear end. These are of type 1 and type 2 and shall conform to IS: 1019-1974.

9.5 Tower Bolts

Tower bolts may be of one of the following types and shall conform to IS : 204 (Part 1 and 2)-1991 and 1992.

i)Barrel tower bolts

These shall be of bright finished/stove enamelled/ black painted mild steel tower bolts, brass barrel tower bolts with cast brass barrel and rolled or drawn brass bolt/brass barrel tower bolts with barrel of extruded sections of brass and rolled or drawn brass bolt/brass barrel tower bolts with brass sheet barrel and rolled or drawn brass bolt. Aluminium barrel tower bolts with barrel and bolt of extruded section of aluminium alloy-bolts and barrel anodised.

ii).Semi-barrel tower bolts

These shall be mild steel semi barrel tower bolts full cover/open type with mild steel sheet pressed barrel and cast iron/mild steel bolt. Bolt bright finished otherparts stove enameled black.

iii) Rivetted or spot welded tower bolts

These shall be mild steel tower bolts rivetted type with black flat and mild steel/cast iron bolt and open staple.

iv) Skeleton tower bolts

These shall be of bright finished / stove enameled / black painted mild steel or brass bright finished skeleton tower bolts with cast brass/extruded sections plateand staples and rolled or drawn brass bolt or Aluminium skeleton tower bolts with plates staples and bolt or extruded sections of Aluminium alloy plate and staple anodised.

9.6 Door Handles

Door handles shall conform to IS : 208-1987 and shall be of 4 types. Type 1 is cast Iron / Brass / Aluminium or zinc alloy die casting and available in 75,100,125 150mm sizes. Type 2 is mild steel pressed oval in 75, 100,115 and 135mm sizes. Type 3 is mild steel present half oval in 75,90 and 100mm sizes. Type 4 is fabricated (brass / aluminium alloy) in 75,100 and 125mm sizes. The size of the handle shall be determined by inside (grip) size overall size and internal depth of the handles shall be as detailed in IS : 208- 1987.

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Finish for type 1 shall be satin/nickel plating, copper oxidising and bronze finish for castbrass and zinc die cast handles and stove enamelled black or copper oxidized for castiron handles. Aluminium handles shall be anodized. Type 2 and 3 handles shall be stove enamelled black. For type 4 it shall be satin finish, nickel plating, copper oxidized and bronze finish for brass handles and anodizing for aluminium handles.

9.7 Mortice Lock and Rebated Mortice lock

Mortice lock with latch and pair of lever handles shall have body of steel, Aluminium alloy or brass and shall be right or left handed as shown in the drawing or as directed by the Engineer. It shall be of the best Indian make of approved quality and shall conform to IS : 2209 / 6607-1976/1972. The shape and pattern shall be approved by the Engineer. Thesize of the lock shall be determined by its length. The lock for single leaf door shall have plain face and that for double leaf door a rebated face. Lever handles with springs shall be mounted on plates and shall weigh not less than 0.5 kg per pair. These shall be of brass, finished, bright chromium plated or oxidised. The locks shall be of 65, 75 and 100 mm sizes.

9.8 Floor Door Stopper

These are for the use of the door shutters of 30, 35,40& 45mm thickness. It is made of aluminium alloy/ brass with springs of phosphor bronze or hard drawn steel wire and tongue of aluminium/brass/nylon/ plastic. The floor door stoppers shall conform to IS : 1823-1980 and shall be best Indian make of approved quality. Width of cover plate is 40mm but its overall length is 140mm for 30 and 35mm thick shutters & 150mm for 40 and 45mm shutters. The body shall be cast in one piece and fixed to cover plate by brass or M.S screws. On the extreme end there shall be rubber cushion to absorb shocks. The extension of the door stopper shall be in flush with floor and be finished bright/satin/chromium plated or anodised.

9.9 Hooks and Eyes

These shall be of mild steel or hard drawn brass and shall generally conform to IS : 207- 1964.

9.10 Casement Window Handles

These shall be made of cast brass, steel protected against rusting, aluminium, pressed brass or as specified. Casement handles

9.11 Casement Peg Stays

These shall be made of cast brass, steel protected against rusting, aluminium, cast alloy or as specified. The stay shall be made from a channel section and shall be 300mm long with steel peg and locking bracket. The peg stay shall have three holes to open the window in three different angles. The shape and pattern of stays shall be approved by the Engineer. The peg stay shall be minimum 2mm thickness in case of brass and aluminium and 1.25 mm in case of steel.

9.12 Quadrant Stays

These shall be made of cast brass, aluminium alloy, GP iron or as specified. The shape and pattern shall be approved by the Engineer. It shall weigh as specified.

9.13 Fan Light Pivots

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These shall be made of mild steel, cast brass or aluminium alloy or as specified and shall generally conform to IS : 1837-1966. The pattern and the shape of the catch shall be as approved by the Engineer and size and finish shall be as specified.

9.14 Fan light catch

These shall be made of mild steel, cast brass, aluminium alloy or as specified and shall generally conform to IS : 364-1993. Steel springs of the catch shall be 0.90 mm dia, 6 coils, 12 mm internal diameter and 20 mm long. The pattern and the shape of the catch shall be as approved by the Engineer.

9.15 Steel Frames

These shall conform to IS:4351-1976. The frames shall be manufactured fromcommercial mild steel sheets of 1.25mm thickness and are suitable for door shutters 30to 40mm thick. The door frames are designated as per profile A, B and C.be made of cast brass, steel protected against rusting, aluminium, pressed brass or as specified. Casement handles of

Profile A Size 105x60mm :	rebated for one set of shutters
Profile B Size 125x60mm :	rebated for one set of shutters
Profile C Size 165x60mm :	rebated for two sets of shutters.

Miscellaneous Items :

9.16 Putty

The material shall be homogeneous paste and shall be free from dust and other visible impurities. Putty shall conform to IS : 419-1967 for wood work.

10 METAL DOORS, WINDOWS, VENTILATORS AND ROLLING SHUTTERS

10.1 General

Materials used in the fabrication of doors, windows, and ventilators shall be the best procurable and conforming to relevant Indian Standards.

10.2 Steel Doors, Windows and Ventilators

Steel sections used for fabrication of doors, windows and ventilators shall be standard rolled steel sections specified in IS : 1038, IS : 1977, IS : 1361 or IS : 7452 year 1983, 1975, 1978 and 1990 respectively as appropriate or as specified in drawing and Schedule of Items. Rivets shall conform to IS : 1148-1982.

10.3 Aluminiu.m Door, Windows and Ventilators

Aluminium sections for fabricating doors, windows, ventilators, partitions etc., shall be extruded sections conforming to IS : 1948-1961 & IS : 1949-1961 or as manufactured by Indian Aluminium Company Limited or approved equivalent The alloy used shall conform to Designation HE 9 - WP of IS : 733-1983. As far as possible Sliding type Aluminium windows shall be used in office buildings

10.4 Steel Rolling Shutters, Rolling Grills

Providing and fixing in position mechanical operated rolling shutter of hot rolled double dipped galvanised steel lath section of 18 SWG tested mild steel strips at 75mm rolling centres interlocked together through their entire length and jointed together at the end by end locks mounted on specially designed pipe shaft with brackets side guides and arrangements for inside and outside locking with push and pull operation including wire springs, top cover, primer & shop

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coats of approved enamel paint etc, all complete as per IS 6248 and specification of approved make of following types: The bottom lath shall be coupled to a lock plate fabricated from 3mm thick galvanised steel plate and securely rivetted with stiffening angles.(partly coiled and lath/full lath).

10.5 M.S. Bolts etc.

M.S. bolts, nuts, screws, washers, peg stays and other mild steel fittings shall be treated for corrosion. Putty for glazing shall conform to IS : 419-1967. Glass panes and glazing shall conform to the specification detailed under this series.

10.6 Hardware and fixtures shall be as specified in the drawings or Schedule of Items. All hardware and fixtures shall be able to withstand repeated use. Door closers shall be suitable for doors weighing 61 80 kg, unless otherwise stated. Each closer shall be guaranteed against manufacturing defect for one year and any defect found within this period shall be rectified or the closer replaced free of charge. Concealed door closers shall be either floor mounted or transom mounted, suitable for installation with metal doors. It shall conform to the performance requirements and endurance test stated in IS:3564 1986 Appendix-A.

10.7 The mastic for caulking shall be of best quality from a manufacturer approved by the Engineer. In general, the mastic for fixing of metal frames shall conform to IS : 1081- 1960 and/or as approved by the Engineer.

11 GLASS

11.1 General

Plain, ground, frosted or rough cast wired glass shall be used as shown on the drawing or as specified in the Schedule of Items. It shall be procured from a reputed source of manufacture and be of the best quality. All glass panes shall be free from flaws, specks, bubbles etc. Glass panes shall be of thickness 3mm or more as required. Weight of 3mmthick glass pane shall not be less than 7.5 Kg//sqm. The tolerance of glass panes, except wired glasses, in length and width shall be plus or minus 2 mm for 3 to 6.3 mm glasssheets. Tolerance in thickness of glass sheets shall be +/- 0.2mm for 3mm and 4mm thick glasses and +/- 0.3mm for 4.8, 5.5 and 6.3mm thick glasses.

11.2 Plain Transparent Glass

Plain transparent glass for glazing and framing shall conform to IS: 2835-1987. It shall be free from flaws, specks, bubbles or distortions.

11.3 Ground and Frosted Glass

Glare reducing or heat absorbing glass shall be "Calorex" or approved equivalent and special care shall be taken to grind smooth and round off the edges before fixing.

11.4 Thickness

Glass shall have the following thickness, unless otherwise stated in the Schedule of Items or drawings

Upto 60 cms x 60 cms	3 mm
do- of larger size .	4 mm and 4.8mm
Sheet glass for doors	5.5 mm
Rough cast wired	6.4 +/- 0.4 mm

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11.5 Inspection

All glasses shall be subject to inspection on the site. Glass found to suffer from defects shall be rejected. Samples submitted for inspection shall be selected so as to be representative of the consignment

12 PAINTS

12.1 General

All paints, varnishes, distemper or other surface coating materials shall be of approved quality conforming to the appropriate Indian Standard, wherever such standard is available, and be obtained from a manufacturer of repute. If there is more than one quality for one particular product, only first quality shall be used unless otherwise stated in the Schedule of Items.

12.2 Sampling and Testing

The Engineer may, at his discretion, require samples of paint to be tested. In such cases testing will be according to IS : 101 (Part 1 to 8) -1964 to 1993.

12.3 Storage

Paints, primers, distempers and varnishes shall be delivered in sealed containers. They shall be stored in cool dry condition to the satisfaction of the Engineer.

12.4 Paints for Priming

Ready mixed paints for priming coats of steel and iron work shall either comply with IS : 2074-1992 "Ready Mixed Paint", "Red Oxide Zinc Chrome Priming" or Red Oxide metal primer as specified. For wood work it shall be pink/white wood primer as specified by the manufacturer of the synthetic enamel paints, conforming to IS : 3536-1966.

12.5 Paints for finishing

Ready mixed oil synthetic enamel paint of approved manufacturers like Berger, Jenson & Nicholson, Shalimar, I.C.I., Asian, Garware and Goodlass Nerolac paints only shall beused unless otherwise specified. Paint shall be of first grade quality of the above manufacturers ie., Luxol Brolac, Superlac, Dulox gloss, Apocolite, Garcoat and Nerolac respectively. If for any other reason, thinning is necessary, the brand of the thinner recommended by the manufacturer, shall only be used with the specific permission of the Engineer. Aluminium paint for general purpose shall be in Duel Containers. It shall be of manufacturers as for synthetic enamel paints above.

12.6 White wash

White was shall be prepared from freshly burnt fat, white in colour lime slaked on spot, conforming to IS : 712-1984 mixed and stirred with sufficient water to make a thin cream. Best and approved quality gum and ultra marine blue only shall be used in lime wash.

12.7 Colour wash

Colour wash shall be prepared by adding mineral colours, not affected by lime, to white wash.

12.8 Water proofing Cement Paint

In this project exterior emulsion paints of reputed make like Berger, Jenson & Nicholson, Asian, Shalimar, Garware Goodlass Nerolac & Snowcem as per manufacturers specifications only to be used. The shade shall be approved by the Engineer before application of thepaint .and shall comply with relevant standards and specifications

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12.9 Distemper

Dry synthetic distemper shall be replaced by Acrylic washable distemper Only plastic emulsion /interior emulsion paints of of reputed make like Berger, Jenson & Nicholson, Asian, Shalimar, Garware Goodlass Nerolac & Snowcem as per manufacturers specifications only to be

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used in office and other rooms as per the requirement of Client . The shade shall be approved by the Engineer before application of the distemper. and shall comply with relevant standards and specifications

12.10 Varnish

Varnish for the finishing coat shall be copal finish or synthetic class varnish of approved brand. Varnish for the under coat shall be flatting varnish of the same make as the top coats and shall be to the satisfaction of the Engineer.

12.11 Polish

French spirit polish shall be of an approved make conforming to IS: 348-1968. In case it is to be prepared on site, the polish shall be made by dissolving 0.7 kg of best, shellac in 4.5 litres of methylated spirit without heating. To obtain required shade pigment may be added and mixed. Shallac shall conform to IS : 5467-1986.

12.11.1 Wax polish for Wood work

The polish shall consist mainly of waxes and Organic solvents with or without water and shall be of smooth consistency, homogeneous, Semi-Solid mass and free from gritty materials. It shall not flow at ordinary temperature. It may be tinted with an oil soluble colour. The polish shall not crumble or dry too rapidly and shall produce non-tacky polished surface. The polish shall be amenable to smooth spreading on the furniture surface and the gloss shall appear on gentle rubbing with a soft polishing cloth. The wax polish shall conform to IS : 8542-1977.

12.11.2 Where wax polishing is to be prepared at site, it shall be prepared by heating two parts of "Bee Wax" two parts of boiled linseed oil over a slow fire. When dissolved but still warm, one part of turpentine is to be added. The boiled linseed oil, bees wax and turpentine used shall be of approved quality and complying with IS : 77-1976, IS : 1504-1974 and IS : 533-1973 respectively.

12.12 Plastic (Acrylic) emulsion paint

Plastic emulsion paint of approved manufacturers like Jenson & Nicholson, Goodlass Nerolac, Shalimar, Berger, Asian and Garware paints only shall be used unless otherwise specified and shall comply with IS : 5411 (Part 1)-1974 & (Part 2)-1972 as applicable. Cement primer used for priming work both for oil bound distemper and plastic emulsion paint shall be of the same manufacture as that of distemper or plastic emulsion paint used. For dry distemper priming, whiting of approved quality shall be used.

12.13 Creosote oil or Coaltar Creosote

It is primarily used for preservation of wood. It shall be a homogeneous liquid and shall liquify completely on being warmed to 38 degree C with stirring and shall remain liquid on cooling down to 32 degree C and on standing at that temperature for 2 hours.

The material shall conform to IS : 218-1983. All persons handling the creosote oil should be fully aware of the hazards involved in handling . Skin should be protected from coming in direct contact and eyes should be protected by using safety goggles while handling the material.

12.14 Coal tar Black Paint

Coal tar paint film protects surfaces by serving as a barrier against the action of moisture and other corrosive agents. Coal tar black paint is generally used as a protective and anti corrosive paint of iron and steel as well as protection of other building surfaces. For this it has to be applied under proper condition and on suitably prepared surface. Coal tar should be applied by brush only and is

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not recommended for locations which are not likely to be well ventilated. Coal tar paint shall conform to IS : 290 1961.

The material is of two types : Type A Quickly drying and Type B Slow drying. It shall be a homogenous black solution type paint consisting of a base prepared by blinding suitable grades of Coltar pitch, washed free from ammoniacal liquor, tar acid bases etc. Consistency, permeability, thickness and surface preparation etc. shall be as per para 5 and A-2 of the above code.

12.15 Floor Polish – Paste

The polish shall consist mainly of waxes and organic solvents with or without water.The paste floor polish shall be of smooth consistency, homogenous, semi-solid-mass and free from gritty material. It shall not flow at ordinary temperature. It shall be so constituted and prepared that on application by means of a clear cloth, it shall spread easily and evenly and shall give with minimum buffing a firm and glossy surface free from greasiness or tackiness. The polish film after spreadng with a cloth shall not take more than 10 minutes to dry. The polished floor shall neither be slippery nor show any resistance to easy walking. Floor polish paste shall conform to IS : 8591-1977.

12.16 Exterior emulsion / acrylic paint

Exterior emulsion/acrylic paint of approved brand and manufacture like Snowcem India Limited, ICI, Asian Paints, Berger Paints. The shade shall be approved by the engineer before its application.

13 WATER PROOFING MATERIALS

13.1 Integral Cement Waterproofing Compounds

Integral cement waterproofing compounds, i.e. admixture for waterproofing purposes shall fully comply with the requirements of IS : 2645-1975. Properties like permeability, setting time, compressive strength shall be in accordance with the requirements of this code when tested as per procedure laid therein. Calcium chloride content of the product used shall be made known to Engineer before use.

13.2 Bitumen

The bitumen bonding material for waterproofing shall conform to the requirements laid down in IS : 702-1988 or IS : 93-1992 or IS : 217- 1988 or IS : 454-1961 depending upon whether industrial bitumen, paving bitumen or cutback bitumen is used. For selecting the particular type and grade of bitumen to be used the relevant item in Schedule of Items shall be referred to.

13.3 Bitumen Primer

Bitumen primer used for application to concrete and masonry surfaces and bitumen for the purpose of waterproofing shall conform to requirements given in IS : 3384-1986 and pass tests in accordance with the procedure laid down in appropriate IS mentioned in Table-I of IS : 3384-1986. Bitumen primer should be free from water and shall preferably ;be made from the same grade of bitumen as used in bonding.

13.4 Bitumen Mastic

Bitumen mastic used for water proofing of roofs shall have the physical properties as mentioned in IS : 3037-1986 when tested with the procedure laid down in appropriate IS mentioned in IS : 3037-1986.

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13.5 Bituminous Compounds

Bituminous compounds when used for waterproofing of porous masonry, concrete floors, walls and roofs shall conform to the requirements of IS : 1580-1991. Physical properties shall be governed by the requirements of this code when tested in accordance with the procedure laid therein.

13.6 Surface Application Materials

Waterproofing material for application on mortar or concrete surface shall conform to IS: 9862 1981. The primer shall be suitable for spray or brush application. It shall have properties enabling it to penetrate through pores or cracks and fill them up, making the surface impervious.

13.7 Polymer based paints

The materials used shall be high polymer based chloride and sulphide free cement and waterproofing additions and epoxy based waterproofing paints as per manufacturer's specification and approved by Engineer.

13.8 Fibre glass R. P. Tissue

The fibre glass R.P. tissue is a thin flexible uniform mat, composed of glass fibre in an open porous structure bonded with a suitable inert material compatible with coal tar, asphaltic enamel and oil plastic based wall paint. The fibrous glass mat is reinforced with continuous filament glass yard at 3/8" (10mm) pitch in the longitudinal direction.

PHYSICAL PROPERTIES

i)	Weight	The average weight of fibre glass R.P. tissue shall not be less than 50 gms/sq.sm.
ii)	Thickness	The fibre glass R.P. tissue shall have a thickness not less than 0.4mm.
iii)	Tear Strength	The tear strength shall be not less than 900 grams in the transverse direction.
iv)	Breaking Strength	This shall have a minimum breaking strength of 13 lb/in (2.32kg/cm) in the longitudinal direction.
v)	Porosity	This shall have a porosity when related to pressure difference across the sample of not less than 0.022" (0.56mm) and not more than 0.76" (1.92mm) of water guage at an air velocity of 200fpm.(100cm/sec.).
vi)	Pliability	There shall be no cracking of the tissue mat when bent over a 1/8" (3.2mm) radius after immersing for 10-15min. through a 90 degree arc.
vii)	Temperature	The fibre glass tissue shall be Resistance under a load of hot bitumen at 530 degree F (276 degree C) for one minute

13.8.1 Primer

Primer shall conform to requirements laid down in IS : 3384-1986. It is to be prepared by blending turpentine and blown grade bitumen in the ratio of 60:40 by weight.

13.8.2 Blown Materials Blown grade bitumen shall be conforming to IS : 702-1988 and residual grade bitumen conforming to IS:73 respectively. This shall be prepared by heating to correct working temperature

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13.8.3 Surface finish

Pea sized gravel/grit 6mm and down

13.9 P.V.C. Membrane/Sheets

Membrane type water proofing either PVC or APP of reputed make like CICA,CICO shall only be used in this project and applied as per manufactures specifications

Polyvinyl chloride sheets for the purpose of water proofing and other underground use are specially developed sheets made from the compounded resin of grade MP/DP/CR-02 and shall be resistant to the passage of gross water and water vapour. It shall becorrosion resistant and resistant to a wide range of acidic and alkali reagents, saltpetre action, salt water and ultra violet rays etc. PVC sheets manufactured by approved andreputed firms like Maxlok Polymer Ltd. shall only be used

The sheets shall consist of Knobs or Lugs jutting out of the sheets in a grid fashion so as to provide a perfect grip in the mortar and concrete. Sheet thickness, spacing of the knobs and their projection from the sheet shall be as specified in the item. The sheets shall be of maximum practicable length and width unless otherwise specified.

The adhesive used for jointing shall be of approved quality and of grade C-02. The sample of the material shall be got approved before use.

13.9.1 Properties

i)	Chemical Composition	Resin Plasticiser Inhibitor Stabiliser UV
ii)	Thickness	Barrier.
iii)	Rupture/Tensile Strength	Not less than 0.25 mm
iv)	Adhesive bond Strength	Not less than 225Kg/cm2
v)	[width]	Not less than 7.1 Kg/cm
	Elongation at Break	130%

14 WATER BAR

14.1 General

Water bar for use in construction/expansion joints in concrete and reinforced concrete structures shall be of copper sheet, galvanised steel sheet, rubber or PVC as shown in drawing or described in the Schedule of Items. It shall be subject to approval of Engineer.

14.2 Jointing.

The water bar shall have dimensions as shown in drawing. Where water bars are required to be lengthened or otherwise jointed the joining shall be done in such a way as to achieve a perfectly watertight joint.

15 LEAD

15.1 General

Lead for joints in cast iron spigot and socket pipes shall be melted from pure soft pig lead conforming to Type-I of IS : 782-1978. "Caulking Lead". Where lead wool is allowed for caulking, it shall be equal to or better than Type-II of IS : 782-1978. Lead flashing shall conform to IS : 405 Part I&II-1992.

16 BUILDING PAPER

16.1 Building paper shall be bitumen impregnated paper conforming to IS: 5134 1977, or such other as may be approved by the Engineer.

17 FILLING MATERIAL

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17.1 General

Filling material shall conform to what is shown in drawing, described in the Schedule of Items or otherwise directed by the Engineer. Earth or sand for filling under floors shall correspond to those described elsewhere in these specifications.

17.2 Mastic Bitumen

Mastic Bitumen shall conform to IS : 3037-1986 or IS : 5871-1987 as appropriate.

17.3 Flexible Boards

Flexible boards for use in expansion joints shall correspond to the description given in drawing or the Schedule of Items or the instruction of Engineer.

18 DRAINAGE & SANITATION (INTERNAL)

18.1 General

All materials, pipes, specials, fittings, fixtures etc., to be used in the works shall be of best quality and class specified in relevant IS Code. Where specified these shall be of specific manufacture and quality and shall be procured from manufacturer or their accredited stockists and be marked with manufacturers' names and trade mark. Contractor shall submit to the Engineer samples of all materials, pipes, specials, fittings fixtures for approval before use in the works. Such approved samples shall be retained by the Engineer till completion of works. Pipes and Specials may be any or combination of following types:-

i)	PVC -O Pipes for rain water
ii)	Stone Ware Pipes
iii)	Sand Cast Iron Pipes for soil waste & Ventilation
iv)	CI Pipes for rain water
v)	AC Pipes for rain water
vi)	R.C.C Pipes

18.2 High density PVC pipes and fittings

All rain water pipes with fittings to be used in this project shall be of High density PVC confirming to relevant standards This shall conform to IS : 4984-1987 and IS : 8008 (Part 1 to 7)-1976 unless otherwise specified.

18.3 PVC O pipe

PVC-O pipe confirming PN25 pressure class, 26.0 SDR , PVC O pipes Rubber (Seal) Ring 160 mm dia. Of approved manufacturer.

18.4 PVC Waste Pipe

This shall conform to IS : 4985-1988 unless otherwise specified.

18.5 Stoneware Pipes & Fittings

All stoneware pipes, bends, gully traps and sewer traps shall be of the best salt glazed variety inside and outside, hard burnt dark grey colour, perfectly sound, free from fire cracks and imperfection of glaze, truly circular in cross section, perfectly straight, of standard nominal length and depth of socket and barrel. These shall be of approved manufacture and shall comply with the requirement of IS: 651-1992. These pipes shall be of grade AA unless otherwise specified.

18.6 Sand Cast Iron Pipes & Fittings conforming to IS : 1729-1979

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All soil waste and vent pipes and fittings used in the work shall be cast iron and shall conform to IS: 1729-1979. The pipes shall have spigot and socket ends, with bead on spigot end and shall be with or without ears. The pipes shall be free from cracks and other flaws. The interior of the pipe and fittings shall be clean, smooth painted inside and outside with DR Angas smiths solution or other approved anti-corrosive paint.

The standard weights and thickness of pipe shall comply with the requirements of IS: 1729-1979. The tolerance on wall thickness and weight shall be minus 15 percent and minus 10 percent respectively. Pipes weighing more than the nominal weight given below may be accepted provided they comply in every other respect.

Nominal size	Weight per piece in Kg. excluding ears		
		Overall length	
	1500 mm	1800 mm	2000 mm
50	9.56	11.41	12.65
75	13.83	16.52	18.37
100	18.14	21.67	24.15
150	26.70	31.92	35.66

Specials and Fittings shall include bends, offsets, branches of various types, junctions etc., as required for the work which shall be provided according to drawings and directions of the Engineer. B.M. trap shall have water seal as per I.S. provisions. The specials and fittings shall be provided with access doors where so specified or directed by the Engineer. The access door fittings shall be of proper design so as not to form cavities in which the filth may accumulate. Doors shall be provided with 3 mm thick rubber insertion packing, and when closed and bolted they shall be water tight. The access doors shall have MS studs and bolts or screws or bolts and nuts.

18.7 Cast Iron Pipes & A.C. pipes : Rainwater pipe

18.8 Sanitary appliances

Sanitary appliances like I.W.C/E.W.C pans, wash basin, urinals and sinks etc. shall be made of vitreous china or fire clay as specified. These shall be of Hindustan Sanitary ware or Parry ware make unless otherwise specified and to be approved by the Engineer. These shall conform to A class quality of IS : 2566 (Part 1 to 15)-1972 to 1985 and IS : 771 (Part 1 to 15) –1979 & 1985 respectively

18.8.1 European Pattern W.C.

Unless otherwise specified, these shall comprise of :

a) White 'glazed earthenware wash down closet set with 'S' or 'P' trap of standard size.

b) 'Duco' spray painted 12.5 litres mosquito proof low level M.S or C.I flushing cistern with valveless siphon, 15 mm ball cock, C.P. brass unions & couplings for the 32 mm dia flush pipe, 20 mm dia overflow PVC pipe with mosquito proof cover etc.

c) 'Duco' spray painted 1 1/4" (32 mm) dia G.I. telescopic flush pipe with buffer clamp, holder bat clamp and 38mm dia PVC pipe or 35/40mm O.D. high density polythene flush pipe with buffer clamp, holder bat clamp.

d) Approved quality solid plastic W.C. seat and cover, bar hinges, screws bolt, rubber buffers conforming to IS : 2548 (Part 1&2)- 1983.

e) 15 mm PVC connection pipe with brass couplings at both ends and 15 mm brass CP cock.

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f) Hard wood wooden blocks or other suitable fixing arrangement with screws and detofix for fixing WC in floor and putty joint with flush pipe and soil pipe.

18.8.2 Indian Pattern W.C.

Unless otherwise specified these shall comprise of :-

a) White glazed earthenware WC pan back entry type.

b) White glazed earthenware 'P' or 'S' trap with or without vent.

c) 12.5 litres approved make mosquito proof M.S.high level flushing cistern with

d) valveless siphon, 15 mm ball cock, galvanized iron chain handle, cast iron brackets with wall plugs, brass unions and couplings for flush pipe, 20 mm dia overflow PVC pipe with mosquito proof cover etc.,

e) 32 mm dia GI telescopic or 35/40 mm O.D high density PVC flush pipe with holder bat clamps.

f) One pair of white glazed earthen ware foot rest set in cement mortar 1:3.

15 mm PVC connection pipe with brass couplings at both ends and 15 mm brass stop cock.

18.9 Wash Hand basin

Unless otherwise specified these shall comprise of :-

a) White glazed earthenware basin with 2 nos. Concealed Cast Iron Brackets with wall plugs.

b) 1 no. 15 mm C.P. brass pillar tap.

c) 32 mm C.P. brass waste fitting, C.P. brass chain and rubber plug.

d) 32 mm PVC waste pipe with brass couplings/32 mm C.P. bottle trap.

e) 15 mm PVC connection pipe with brass couplings and 15 mm brass stop cock.

18.10 Flat Back Lipped Urinal

Long pattern type urinals are envisaged in this project

Flat Back Large Urinal

Unless otherwise specified these shall comprises of:

i) White glazed earthenware urinal basin flat back large type

ii) Urinal flush valve auto closing system (pressmatic) with C.P. spreaders and connection pipe with wall clips & brackets

iii) 32mm C.P. brass outlets complete with PVC waste.

18.11 Mirror Frames

Mirror frame where specified shall be of fibre glass of approved shape, size, colour and make.

18.11.1 Mirror shall be of superior glass with edges rounded off or leveled as specified. It shall be free from flaws, specks or bubble and its thickness shall not be less than 5.0 mm. The glass for the mirror shall be uniformly silver plated at the back and shall be free from silvering defects. Silvering shall have a protective uniform covering of red lead paint.

18.12 Toilet Shelf

18.12.1 Glass shelf unit shall consist of an assembly of glass shelf, anodised aluminium / CP brass guard rail and supporting brackets. The shelf shall be of glass of best quality with edges rounded off and shall be free from flaws, specks, bubbles and of thickness not less than 5.0 mm. The shelf shall have guard rail, resting on rubber washers on glass plate.

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18.12.2 Ceramics shelf shall be of shape, size and design as specified in the Schedule of Items.

18.13 Towel Rail

Towel rail shall be of CP brass / anodised aluminium with two brackets of same material, diameter and length as specified.

18.14 Soap Container

Soap container shall be of C.P brass, PVC with cp brass brackets of approved make and design.

18.15 CP Flush Valves for EWC

The CP flush valve for EWC shall be of "Jaquar" brand of Jaquar & Co., 'ACCO' brand of Asia Continental Metallwaren Fabric or equivalent quality.

18.16 CP Flush Valve for Urinals

CP flush valve for urinal shall be of "Jaquar" brand of Jaquar & Co., 'ACCO' brand of Asian Continental Metallwaren Fabric or of equivalent quality.

18.17 Gully Trap

Each gully trap shall have one C.I. grating 150 mm x 150 mm and one water tight precast R.C. cover 300 x 300 x 40 mm thick with 1:1 1/2:3 mix concrete (one cement: one and half sand : 3 stone chips 20 mm down) including neat cement finish.

18.18 CI Manhole Covers & Frames

These shall be of light or medium duty (LD or MD) as specified in Schedule of Items and of cast iron with raised chequered design, lifting key and key hole and shall be coated with black bituminous base material,. Light duty covers and frames shall be of either rectangular type, single seal, pattern 1 and 2 having minimum weight of cover and frame 38 Kg and 25 Kg. respectively or with double seal, minimum weight of cover and frame being 52 Kg. These may be of square type also. Single seal with clear openings of 455 and 610 mm with minimum weight of cover and frame being 20 Kg and 38 Kg respectively, double seal of same openings shall have minimum Wt. of cover and frame 30 Kg and 55 Kg respectively. Medium duty covers and frames shall be either of circular type with 500 and 560 mm clear openings and minimum Wt. of cover and frame 116 Kg and 128 Kg respectively or of rectangular type with minimum Wt. of cover and frame 144 Kg. The C.I. manhole covers and frames shall conform to IS : 1726-1991.

18.19 Flushing Cisterns

Manually operated high level and low level flushing cisterns are of 5 litre and 10 litre capacities, both single flush and dual flush type. The cisterns shall conform to IS : 774- 1984 and be made of Cast Iron, Vitreous China or enamelled pressed steel. The cisterns shall be mosquito-proof. The thickness of the body including cover shall be not less than 5 mm for Cast Iron and 6 mm for Vitreous China Cisterns. Steel and lead flush pipe shall have internal diameter of 32 plus or minus 1 mm for high level cisterns and 38 plus or minus 1mm for low level cisterns. For high density polyethlyne and unplasticised PVC pipes the outside diameter of the pipe shall be 40 mm. In case of PVC plumbing pipes the outside diameter of the pipes shall be 40mm for high level and 50mm for low level cisterns. Steel flush pipes shall be hot dip galvanized, electroplated or vitreous

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enameled. The flush pipe shall be securely connected to the cistern outlet and made airtight by means of a coupling net. Float valve shall conform to IS : 1703-1977 or IS : 12234-1988. Polyethylene float valve shall conform to IS : 9762-1981. Cast Iron Cisterns shall be painted and finished in accordance with recommendation made in IS : 1477 (Part 1&2)-1971 or shall have a coating of enamel. In general, Materials Construction and operational and performance requirements shallbe as specified in para 3, 4 and 6 of IS : 774-1984.

18.20 Plastic Seats & Covers for Water Closets

These shall conform to IS : 2548 (Part 1&2)-1983 and shall be either of thermo-set or of thermo-plastic quality. Thermo-set Seats and Covers are moulded from phenolic plastics (Type A) or Urea Formaldehyde (Type B). Thermo-plastic Seats and Covers are also of Type A, moulded from Polystyrene or Type B, moulded from Polyprophlene. Underside of the seats may be either flat or recessed and colour shall be as agreed. Table Dimesions of the seats and covers shall be as per Table-I of the Code (both Part 1&2). Hinging device may be either of the following materials :

i)	Bronze or Brass with Nickel Chromium Plating
ii)	Mild Steel with Nickel Chromium Plating
iii)	Aluminium alloy with anodic coating
iv)	Suitable plastic with reinforcement.

19 WATER SUPPLY & PLUMBING (INTERNAL)

19.1 General

This section deals with the specification of material for pipes, fittings, fixtures etc., to be used in water supply works.

All materials, pipes, fittings, fixtures to be used in the works shall be of the best quality and of the class specified in various clauses herein under. Where specified these shall be of specific manufacture and quality and shall be procured from the manufacturer or their accredited stockist and be marked with manufacturers name and trade marks. The Contractor shall submit to the Engineer samples of all pipes, fittings, fixtures for approval before being used in the works. Such approved samples shall be retained by the Engineer till completion of works. Pipes and pipe fittings may be of any or combination of following types:

i)	Wrought iron galvanised pipe
ii)	PVC pipes
iii)	Cast iron pipes
iv)	Steel pipes coated with bitumen composition inside and galvanised outside.
v)	Reinforced concrete pipes
vi)	Asbestos cement pipes
vii)	Pre-stressed concrete pipes
viii)	Lead pipe (not to be used for potable water)

19.2 Galvanised Iron Pipes and Fittings

In this project Polyethylene -Aluminum-polyethylene pipes as per IS 15450:2004 shall be Considered

19.3 R.C.C, Asbestos, Pre stressed Pipes and Fittings

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These shall be of approved manufacture and quality and shall conform to IS : 458 1988, IS : 1592 1989, IS : 9627 1988 & IS : 784 1978 respectively.

19.4 Cast Iron Pipes and Fittings

The cast iron pipes shall be of approved manufacture and quality and shall conform to IS: 1536 1989 "Centrifugally Cast (Spun) iron pressure pipe and/or IS : 1537 1976". Vertically Cast Iron pressure pipe for water, gas and sewage. CI fittings shall conform to IS : 1538 (Part 1 to 23) 1976.

19.5 Steel Pipes

This shall conform to IS: 1239 (Part 1&2) 1990 to 1992) and IS : 3589- 1991. Steel pipes shall be coated with bituminous composition inside and galvanised outside.

19.6 Bib Tap and Stop Tap

Bib tap and stop tap for water services shall be of brass screw down type and shall conform to IS: 781. Minimum finished weight of bib and stop taps shall be as given below:

No. of size (mm)	Bib taps (kg)	Stop tap (kg)
10	0.30	0.35
15	0.40	0.40
20	0.75	0.75
25	1.25	1.30
32	-	1.80
40	-	2.25
50	-	3.85

The taps shall be tested under internal hydraulic pressure of at least 20 kgf/cm2 and maintained at the pressure for a period of at least two minutes during which period it shall neither leak nor sweat.

19.7 Valves

Unless otherwise mentioned in the Schedule of Quantities these shall be copper alloy gate, globe and check valve of nominal sizes 8 to 100mm and shall conform to IS : 778 1984. Valves shall be of class 1 and class 2, suitable upto a temp. of 45 degree C and can sustain non shock working pressure upto 1.0 and 1.6 MPA respectively. They shall have screwed or flanged ends. All the metal parts shall be of brass/brass alloy except hand wheel of Cast Iron or other approved quality.

19.8 Shower Rose

The shower rose shall be of heavy quality chromium plated brass with flat bottom, of diameter 100 mm or as specified with uniform perforations.

19.9 Storage Tank

Storage tank shall be either pressed steel, Galvanised iron, R.C.C or PVC of specified sizes, capacities, make, manufacture as specified in Schedule of Items. It shall have facilities for connecting inlet, outlet overflow and washout pipes and a top cover. Where tanks are to be fabricated by the Contractor the fabrication/R.C.C detailed drawings shall be got approved by Engineer.

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19.10 Miscellaneous items

19.10.1Half round channel

This shall be made of vitreous china channel with or without outlet/stop end as specified in Schedule of Items and shall be of approved manufacture.

19.10.2Urinal partition

This shall be made of marble or granite and shall be of approved make and quality shade and texture

20 EXTERNAL SEWERAGE & DRAINAGE

Unless otherwise specified CI pipe and specials, caulking lead, SW pipe, RCC pipe shall conform to the following.

20.1 C.I. Pipes

i)	C.I. pipe shall conform to IS : 1536 - 1989 or/and IS : 1537 – 1976 of class as
ii)	specified in Schedule of Items.
iii)	C.I. pipe fittings shall conform to IS : 1538 (Part 1 to 23) -1976 as specified in Schedule of Items.
	Bolts and nuts shall be hexagonal bolts and nuts conforming to IS : 1363 (Part 1 to 3) – 1992

20.2 Washers

Spring washers conforming to IS : 3063 - 1972 shall be used near the pumps to take care of vibration. In other places plain washers conforming to IS : 2016 - 1967 shall be used.

20.3 Gaskets

Gaskets shall be reinforced rubber sheet or compressed fibre board conforming to IS : 638 - 1979 of thickness between 1.5mm to 3mm or as specified.

20.4 Caulking Lead

Lead for the spigot and socket joints shall conform to IS : 782 - 1978.

20.5 Salt Glazed Stone Ware Pipes

Salt glazed stone-ware pipes used shall conform to IS : 651 - 1992 and shall be laid as per IS : 4127 - 1983. The pipes shall be of grade AA unless otherwise specified.

20.6 Steel Pipes

Steel pipes and fittings used for encasing shall conform to IS : 1239 (Part 1&2) - 1990 to 1992 medium Class upto 150 mm dia and as per IS : 3589 - 1991 for pipes of dia 200 mm and above. For pies of dia 200 mm and above fittings, if required shall be fabricated from pipes itself.

20.7 Cast Iron Manhole Covers & Frames

These shall be of medium or heavy duty (M.D. or H.D.) as specified in Schedule of Item and of Cast Iron with raised chequered design, lifting key and key hole and shall be coated with black bituminous base material. Medium duty covers and frames shall be either of circular type with 500 mm clear opening and minimum weight of cover and frame 116 Kg and 128 Kg respectively or of rectangular type with minimum weight of cover and frame 144 Kg. Heavy duty covers and frames

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shall be either of circular type with clear openings of 500 and 560 mm and 170 and 208 Kg weight respectively or of double triangular type with clear openings of 500 and 560 mm and 229 and 255 Kg weight respectively. The CI manhole cover and frames shall conform to IS : 1726 - 1991.

21 ROAD

21.1 General

Roads in this project shall be of RCC confirming to relevant standards.

21.2 Soling Stones

Material for soling shall be natural stone boulders or crushed blast furnace slab. Stones for soling shall be of height equal to thickness of the soling with tolerance of plus or minus 25mm and shall not have a base area of less than 250 sq.cm. nor more than 500 sq.cm. and the smallest dimension of any stone shall not be less than half the largest dimension. Stones shall be tough, angular, durable and generally free from flat, elongated, soft and disintegrated particles. They shall also be free from dirt or other objectionable matter and be obtained from quarries approved by the Engineer.

Crushed slag obtained from air-cooled blast furnaces slag shall be angular, of reasonably uniform quality and density and generally be free from any thin, elongated, and soft pieces, dirt or other objection able matter. The density of slag should not be less than 1.12 gm/cc and glassy material shall not exceed 20%. Water absorption when determined in accordance with IS:2386 (Part-III) - 1963. "Methods of Tests for Aggregates for Concrete : Specific Gravity, Density Voids, Absorption and Bulking", shall not exceed 10%.

21.3 Coarse Aggregate for Water Bound Macadam

Coarse aggregate for water bound macadam shall be natural gravel, crushed stone obtained from approved quarries or crushed blast furnace slag. Crushed stone shall be hard, durable, tough and of uniform quality, generally free from flat, elongated, soft and disintegrated particles. It shall have sharp edges and also not have excess of dirt and other objectionable matter. When tested as per IS: 2386 (Part-IV) - 1963 for Los Angeles Abrasion Value or Aggregate Impact Value, the limiting values shall be 50% and 40% respectively for base course and 40% and 30% respectively for surfacing course. The flakiness index shall not exceed 15% when tested in accordance with IS: 2386 (Part-I)-1963 "Methods of Test for Aggregates for Concrete : Particle size and Shape". Crushed slag aggregates shall meet the requirements given for soling stones from blast furnace slagSize and grading requirements of coarse aggregates shall be as specified in Table-2 of IRC : 19 - 1981, "Standard Specification and Code of Practice for Water Bound Macadam". The grading number of the table shall correspond to the following layer thicknesses :

Grading Number	Size Range	Layer Thickness
1	90 mm to 40 mm	More than 90 mm
2.	63 mm to 40 mm	90 mm to 75 mm
3.	50 mm to 20 mm	75 mm to 50 mm

21.4 Screenings

Screenings used for filling voids in coarse aggregates for water bound macadam shall generally be of the same material as the coarse aggregate. Non-plastic materials such as Kankar nodules, moorum or gravel (other than river bore rounded aggregates) may be used, provided that the liquid

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limit and plasticity index are below 20 and 6 respectively. The fraction passing 75 microns sieve shall not exceed 10%. Size and grading of screenings shall be as specified in Table-3 of IRC-19 - 1981. Type-A screening shall be used for grade number 1 coarse aggregate. Type-B screenings shall be used for grade number 3. Either Type-A or Type-B screenings may be used for grade number 2.

21.5 Stone Chips for Bituminous Surfacing

Coarse aggregate shall consist of crushed stone, crushed slag or crushed gravel (Shingle) retained on 2.36 mm sieve. The aggregates shall be clean, strong, durable and fairly cubical, free from disintegrated pieces, organic and other objectionable matter. The aggregates shall preferably by hydrophobic and of low porosity. The mechanical properties and grading shall be in accordance with IRC-29 - 1988 "Tentative Specifications for 4 cm Asphaltic Concrete Surface Course", having aggregate impact value 30%, Flakiness Index 25% and graded between 20mm and 2.36 mm.

21.6 Sand

Sand for use as fine aggregate in bituminous surfacing shall consist of crushed screenings, natural sand or a mixture of both, passing a 2.36mm sieve and retained on 75 micron sieve. It shall be clean, hard, durable, uncoated and dry, free from injurious, soft or flaky pieces and organic deleterious substances.

21.7 Binder

Binding material for water bound macadam shall consist of fine grained material such as stone dust, kankar modules or moorum. The plasticity index shall be between 4 to 9 when water bound macadam is to be used as surface course and upto 6 when used as sub/base or base course.

21.7.1 Paving Bitumen

It shall conform to IS : 73 - 1992 and shall be of the specified type and grade. The material shall be homogeneous and shall not foam when heated to 175 degree C. Various properties like specific gravity, flash point, softening point, penetration etc. shall be as given in the above code.

21.7.2 Bitumen Cut Back

Bitumen cut-back shall conform to specification given in IS : 217 - 1988. It shall be of three types, Rapid Curing (RC), Medium Curing (MC) and Slow Curing (SC). These shall comply with the requirements specified in Table - 1, 2 and 3 respectively of the above code.The above three types of cutback bitumens shall be classified into different grades on the basis of Kinematic viscosity. Rapid curing type shall be used with aggregates containing practically no fine aggregates passing through 2.36 mm sieve. Medium curing bitumen shall be used with aggregates containing less than 20 per cent of fine aggregates passing through 2.36 mm sieve. Slow curing type shall be used with aggregates containing more than 20 per cent of fine aggregate passing through 2.36 mm sieve. Medium curing bitumen of 30 grade i.e. MC 30 shall be used as primer. Manufacturer shall indicate source and type of the bitumen.

21.8 Kerbs

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Kerbs may be of stone, concrete or brick as may be shown in drawing or otherwise directed by Engineer.

21.8.1 Stone kerbs

Stones shall conform to the dimensions and shapes given in drawing. Exposed faces shall be dressed to lines.

21.8.2 Concrete kerbs

Shape and dimension shall conform to the drawing. They shall be pre-cast and the road side top corner shall be given a chamfer.

21.9 Galvanized Steel Barbed Wire for Fencing

These shall be of two types A&B. In both types Barbs shall have 4 points formed by twisting two point wires, each two turns. In type A (Iowa type) twisting is done around both line wings and in type B (Glidden type) around one line wire, in both cases making altogether four complete turns. It shall conform to IS : 278 - 1978 and shall have the diameter of line and point wire as described in schedule of item. Galvanized mild steel wire shall conform to IS : 280 - 1978.

Line and point wire shall be circular in section, free from scales and shall be uniformly galvanized. Line wire shall be in continuous length and shall not contain any welds other than those in rod before it is drawn.

21.10 Galvanized Steel Chain Link Fabric

It will conform to IS : 2721 - 1979. It shall be of width, mesh and wire dia as per description of Item. For chain link fabric having width upto 2.00 M, of all mesh sizes, two line wires shall be provided. Whereas for width of 2.40 M and mesh size exceeding 50mm three line wires shall be provided. These shall be provided at top and bottom of the fabric, but wherever three line wires have been specified, these shall be provided at top, bottom and middle of fabric. The mesh wire and line wire of the fabric shall be manufactured from Galvanised steel conforming to IS : 280 - 1978. It will have zinc coating of type medium as given in IS : 4826 - 1979. " Specification for Hot dipped galvanized coatings on round steel wires". Unless otherwise mentioned in the description of item fabric with both ends twisted shall be used. The galvanised steel pipe posts shall consists of 80 mm and 50 mm nominal diameter. The pipe posts shall conform to IS : 1161 and shall be of medium grade and galvanised.

22 DETAILED SPECIFICATIONS AND LIST OF MATERIALS OF APPROVED BRAND AND/OR MANUFACTURE

Unless otherwise specifically mentioned in the Schedule of Items, Contractor has to use materials as listed below, of only these brand names/Company's names, which are mentioned in the approved list for civil, water supply and sanitary items thereon

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DETAILED SPECIFICATIONS

NAME OF WORK : PROPOSED FARMER TRAINING CENTER AT COE PALAMPUR, DISTT. KANGRA (H.P)

COMPONENT	DETAILED SPECIFICATIONS
STRUCTURAL	• Foundation shall be laid on reasonably good strata of soil, foundation shall not be laid on loose soil or made up / filled up ground. • M25 grade of concrete mix confirming to IS:456-2000 shall be used whereever specified. • High strength deformed bars of grade fe-500 conforming should be used. • 100mm dia pipes weep holes shall be provided @ 1.5m c/c horizontally & 0.60 m c/c vertically in diaphragm wall. • 60 cm dry masonry /stone filling shall be done behind retaining walls.
WALLS	• Brick masonry in common burnt clay building bricks in cement mortar 1:4. • In exterior facade machine made (Pioneer) building bricks laid with forming horizontal and vertical grooves 10mm wide 12mm deep during laying in cement mortar 1:3.
FLOORING & PAVING	• In auction platform, staircase, shops , e-marketing office, canteen and labor rest room, corridor, chokidar room Kota stone slab flooring 20 mm (average) thick base of cement mortar 1:4 (1 cement :4 sand) laid over and jointed with grey cement slurry mixed with pigment to match the shade of the slab. Floor should be rubbed and mirror polished. • In toilets vitrified (anti-skid) tiles 5.5 mm thick in flooring (600x600) laid on a bed of 12 mm thick cement mortar 1:3 (1 cement : 3 sand) finished with flush pointing in white cement. • In M s residence ceramic vitrified (anti-skid) tiles 5.5 mm thick in flooring (600x600) laid on a bed of 12

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mm thick cement mortar 1:3 (1 cement : 3 sand) finished with flush pointing in white cement.

Marbel flooring in stair case and cooridoor

- In yard and approach road and parking heavy duty precast cement concrete inter locking paver blocks vibro compacted upto M-50 grade i/c border or kurb block grey or colored over sub-base of concrete with 25mm thick average thickness of cement mortar 1:4 (1 cement : 4 sand) to be laid over and jointed with neat cement slurry mixed with pigment to match the shade of blocks . 80mm thick inter locking blocks.

DADO & SKIRTING

- In auction platform, staircase, shops, e-marketing office, canteen and labour rest room,10 cm wide Kota stone skirting to be laid in cement mortar 1:4.
- In toilets colored glazed tiles/Dado tiles 8mm thick up to 2100mm height, laid on a bed of 12mm thick cement mortar 1:3 , finished with flush pointing in white cement. (Nitco or equivalent) (300x600mm)

FINISHING WORK

- All walls except exterior façade machine made brick wall to be plaster with15 mm thick cement plaster in two coats, backing coat 10 mm. and finishing coat 5 mm. thick. In cement mortar 1:5.
- All RCC Ceiling to be plastered with 6 mm cement plaster in cement mortar 1:3.
- Birla white wall care putty to be applied over all plaster surface after thoroughly brushing the surface free from mortar drops, dust, loose materials and other foreign matters sand papered smooth to give final matter finish to the surface.
- Plastered walls to be painted two coats with ready mixed paint (plastic emulsion).
- New steel & other metal surfaces to be painted with ready mixed paint acid resisting.

DOORS & WINDOWS

- Doors & Windows frames to be in anodized aluminum with extruded built up standard tubular and other sections of approved make conforming to IS 733 and IS

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1285frames. (hindalco renukoot TU 2364 125 mm x 37 mm).

- For shutters of doors windows & ventilators Anodized Aluminum Sections (hindalco renukoot). Glazing with 5.5 mm thick glass panes. Solid panels with pre laminated commercial board 12 mm thick.

- Door windows fittings including sliding door bolt, tower bolt and handles in anodized aluminum.

ROOFING WORK

- Roofing in 0.60mm thick prepainted steel sheet with hot dipped metallic zinc coated sheet with top coat of regular modified polyester (RNP) organic coating of 20 microns over 5 microns primer coating to back coat of polyester of 5 microns over 5 microns primer.

- Eave board & external ceiling in M.S. BP Sheet 1.66 mm to 2mm thick.

- Rain water pipe should be 110mm dia pipes
  PVC (D-Plast) of working pressure not less than 4.5 kg/sqm.

SANITARY FITTINGS

- All hot & cold water supply pipes & fittings should be Chlorinated Polyvinyl Chloride (CPVC) pipes, having thermal stability.

- P.V.C pipes & fittings D-plast/finolex pipe class "A" confirming to IS 4985-1968 complete plug of2.5 /cm 2 washing pressure should be used for soil and waste pipes.
- Viterous china fittings water closetcomplete set with cistern Hindware make/Jaguar make or equivalentto be used.
- Vitreous china wash basin Cera make Cat No. S2030108, B2020102 complete set or equivalent Hindware make/Jaguar to be used.
- All fittings and fixture in CP Hindware make/Jaguar or its equivalent to be used.

ELECTRICAL FITTINGS

- PVC insulated heat resistant flame retardant (HRFR) and low smoke single core (flexible) copper conductorcable in surface/recessed PVC conduit with modular switch,modular plates suitable G.I. box and earthing the light point to be used.

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- Earthing with copper earth plate 600 mmx600 mmx 3 mmthick, including accessories to be provided.
- Led flood/Beam light 70 watt of syska make code no SSK-HBG-70 watt or its equivalent make to be provided.
- Surface down light of syska/bajaj/havells on its equivalent make to be provided.
- Led Tube light in Aluminum housing of syska or its equivalent approved make to be provided.

MATERIAL SPECIFICATIONS

NAME OF WORK: PROPOSED FARMER TRAININGCENTER AT COE PALAMPUR, DISTT. KANGRA (H.P)

(PART – B)

The Following Brand Makes/ Manufacturer's Makes Listed Below May Be Used With Prior Approval Of The Architect. In Case It Is Established That Any Material As Listed Below Is Not Available In The Market, Approved Equivalent Materials And Finishes Of Any Other Specialized Brand Names/ Manufacture's Makes May Be Used As Per Approval Of The Architect Or Eic.

S.No.	Item Description	Make/Brand
1	Cement(Opc/ Ppc/ Portland Slag)	Acc/ Ambuja/ Ultra Tech
2	White Cement & Putty	Jk White / Birla
3	Steel, Tor Steel (Reinforcement Fe 500d) & Structural	Sail/Tata Steel/Jindal Steel
4	Structural Steel	Tata Steel/Jsw/SAIL
5	Roofing Sheet	Tata Steel/ Jsw/Tata Bluescope/Sail
8	White Cement Putty	Birla White/ Asian/ Walplast
9	Bitumen	Iocl/Tiki Tar Industries/ Juno Bitumix Pvt. Ltd
10	Cement Admixture/Plasticizer	Fosroc/Sika/Pidilite/Cico/Basf

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11	Anti-Termite Treatment Chemical	Bayer/ Gibraltar/Basf/Gibraltor
12	LGFS FRAMES	Tata Bluescope
	Floor/Wall Finishing	
13	1st Quality Acrylic Distemper, Acrylic/ Plastic Emulsion , Synthetic Enamel Paint, Acrylic Exterior Paint, Epoxy Paint	Asian Paints/ Dulux / Nerolac
14	Textured Paints -Exterior	Acro Paints/ Unistone/ Spectrum/Heritage
15	Steel Primer (Red Oxide Zinc Chromate Primer)	Asian Paints, Nerolac, Berger, Ici

16	Rectified Ceramic Tiles, Ceramic Tiles, Vitrified Tiles, Heat Resistance Tile (Vitrified Tiles To Be Double Charged Manufactured From Mother Plant)	First Quality Nitco/ Kajaria/ Somany/ Johnson/Rak Of Approved Design, Color And Shade
17	Brick Pavers	Jay Jalaram Bricks/Pioneer Bricks/Jindal Mechano Bricks
18	P.O.P	Sriram Nirman/ Birla Wall Putty/ Jk
19	Cement Primer	Nerolac/Bp White (Berger)/Decoprime-Wt (Asian)/White Primer (Ici)
20	Fire Retardant Paint	Nippon Paint/Berger/Asian Paints/Shalimar Paints

Ceiling And Panelling

21	False Ceilings	
A	Calcium Silicate	Usg Boral/Shera/Gyproc
B	Metal Ceiling (Clip-In And Lay-In)	Armstrong/ Ecotone/Usg Boral
C	Open Cell Ceiling	Armstrong/Usg Boral/Hunter Douglas
D	Calcium Silicate Boards/Tiles	Hilux (Ramco Industries Ltd.)/Aerolite/Gyproc
E	Acoustic False Ceiling	Armstrong/ Earcons/ Ecotone/Ecophon

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F	Acoustic Wall Panel	Armstrong/ Earcons/ Anutone/Ecotone/Ecophon
G	Bison Board Ceiling	NCL Industries LTD and Everest
	Wood Work	
22	Flush Door, Block Board, Plywood	Duroply Industries Ltd., Green Ply, Century,National, Kitply Products
23	Decorative Laminate	Formica/ Greenlam / Merinolam/ Duro
	Doors And Windows	
24	Fire Doors	Navair International Pvt. Ltd./ Hormann
25	Upvc Doors & Windows	Fenesta/ Aluplast/Deceuninck/ Lg Hausys
26	Aluminium Extruded Profiles	Hindalco/ Jindal/ Indal
27	Aluminium Louvred Door	Domal/ Eternia/ Agv Alfab/Aditya Birla
28	Window Turn Handles, Friction Hinges	Ipsa, Dorma, Ebco, Dorma, Hettich, Geze, Kich
29	Hermetically-Sealed Double Insulated Glass	Saint Gobain/Ais Asahi India Glass Ltd./Gsc Trutuf
30	Float Glass, Mirrors	Saintgobain /Ais Asahi India Glass Ltd/ Modiguard
31	Floor Spring, Patch Fittings For Frameless Doors	Dorma/Hettich/Ozone/Doorset/Geze/Kich/Hafele
32	Structural Glazing/ Spider Glazing	Kalco/Consolidated Group/Alumax India/Domal/Aastha Alumina Pvt. Ltd.
33	Stainless Steel Fire Rated Hardware	Dorma,Geze,Hafele
34	Ss Handles, Tower Bolts, Hinges, Aldrop, Floor Stopper, Casement Stay, Safety Chain, Magnetic Door Catcher, Magic Eye,Drawer Glides, Panic Bar/Push Bar	Hafele/ Dorma/ Geze/ Hettich/ Kich
	Misc Items	
35	Aac Block Adhesive	Pidilite/Ferrouscrete/Laticrete
36	AAC BLOCKS	Ambuja, Kansal Building Solution Ponta Sahiband Green Build Constructions Baddi

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37	Glue	Fevicol/Dunlop/Vemicol/ Araldite
38	Blinds	Vista/Decorex/Elegant Décor
39	Fire Curtain	Orient Fire Curtains India Pvt. Ltd
40	Silicon Sealant	Ge Bayer Silicone/ Sika/Becker/Dow Corning
41	Tile Adhesives/Epoxy Grout/Silicone Spray/Polysulphide Sealant	Laticrete/Roffe/Pidilite
42	Water Proofing	Soprema/Fosroc/Basf
43	Ant termite Paint	Nocil/Pyramid/Trisul/Montari Industries
44	Fasteners/Cramps	Fischer/Hilti/Bosch/Canon
45	Thermal Insulation/Rockwool/GlasS Wool/Mineral Wool/Puf	Twiga/Polyglass/Owens Corning
46	Tile Adhesives, Epoxy Grout, Silicone Spray, Polysulphide Sealant	Laticrete, Roffe, Pidilite
47	PVC Pipes And Bends	Superme Industries, Finolex and Ashirwad Pipes.

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NAME OF WORK: PROPOSED FARMER TRAINING CENTER AT COE PALAMPUR, DISTT. KANGRA (H.P)(PART – B)

LIST OF APPROVED MAKES OF EQUIPMENT & MATERIALS OF PLUMBING/FIRE FIGHTINGWORKS

The Following Brand Makes/ Manufacturer's Makes Listed Below May Be Used With Prior Approval Of The Architect. In Case It Is Established That Any MaterialAs Listed Below Is Not Available In The Market, Approved Equivalent Materials And Finishes Of Any Other Specialized Brand Names/ Manufacture's Makes May Be Used As Per Approval Of The Architect Or Eic.

S.NO.	ITEM NO.	APPROVED MAKES
1.	SANITARY FIXTURES & FITTINGS	
A)	SANITARY WARE	JAQUAR / PARRYWARE / CERA
B)	CP FITTINGS	JAQUAR / PARRYWARE / CERA
C)	BATHROOM ACCESSORIES	JAQUAR / PARRYWARE / CERA
D)	SENSOR BATHROOM ACCESSORIES	JAQUAR / PARRYWARE / CERA
2	TRAPS/ WASTES/SHOWER TRAPS	POLOPLAST/ ASTRAL / REHAU/MCALPILE
3	PAN CONNECTORS	VIEGA/ MCALPILE
4	CONCEALED CISTERN	JAQUAR / PARRYWARE / CERA
5	SHOWER DRAINS (TRAPPED/UNTRAPPED)	POLOPLAST/ ASTRAL / REHAU/MCALPILE
6	STAINLESS STEEL PIPES/FITTINGS	JINDAL / VIEGA / KANTHERM / GEBERIT
7	G.I. PIPES /M.S.PIPES IS 1239/3589	TATA/JINDAL HISSAR/PRAKASH SURYA
8	UPVC PIPES AND FITTINGS	SUPREME/AKG/PRINCE/FINOLEX
9	POLYPROPYLENE PIPES & FITTINGS	POLOPLAST/ ASTRAL / REHAU
10	G.I. FITTINGS	KS/SANT/UNIK
11	CHECK VALVES (DUAL SLIM TYPE)	AUDCO/SANT/ZOLOTO
12	BUTTERFLY VALVE	AUDCO/SANT/ZOLOTO
13	BALL VALVES (15 TO 40MM)	AUDCO/SANT/ZOLOTO
14	RCC PIPES IS 458	PRAGATI CONCRETE UDYOG/ISI APPROVED
15	C.I. /D.I. MANHOLE COVER & FRAME IS 1726	NECO/MUNICAST /SKF/RIF
16	F.R.P. MANHOLE COVER, GRATING, CATCH BASIN COVER	PRODUCTS UNLIMITED/NECO/REF
17	HOT WATER INSULATION	K-FLEX/A-FLEX/SUPREME
18	ANTI CORROSIVE TAPE FOR PIPE PROTECTION	PYPKOTE/MAKPOLYKOTE/NECO/NEER
19	ANTICORROSIVE BITUMASTIC PAINT	ISI APPROVED

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20	EPOXY PAINT	ISI APPROVED
21	HYDRO-PNEUMATIC SYSTEM	
I	PUMPS	GRUNDFOSS/XYLEM/ DP
II	PLC	AS PER MANUFACTURERS SPEC'S
III	PRESSURE VESSEL	AS PER MANUFACTURERS SPEC'S
IV	PRESSURE SENSOR	AS PER MANUFACTURERS SPEC'S
V	WATER PUMPS	GRUNDFOSS/XYLEM/ DP
VI	SUBMERSIBLE DRAINAGE PUMPS	GRUNDFOSS/XYLEM/ DP
22	FILTER/SOFTENER	THERMAX/ION EXCHANGE/PENTAIR
23	ELECTRICAL SWITCHGEAR & STARTERS	L&T/ABB/SIEMENS
24	CABLE TRAYS	SLOTCO OR EQUIVALENT
25	1100 VOLT GRADE XLPE CABLES	POLYCAB/HAVELLS/BATRA HENLEY
26	PVC INSULATED COPPER WIRES	POLYCAB/HAVELLS/BATRA HENLEY
27	VIBRATION ELIMINATOR PADS & CONNECTIONS	RESISTOFLEX/DUNLOP
28	SUCTION STRAINER/POT STRAINER	VENUS/LEADER/SANT/NVR
29	METERS, INDICATION LAMP	ENERCON OR EQUIVALENT
30	FORGED STEEL FITTINGS	VS/SAINT
31	PRESSURE GAUGE	FIEBIG/ H GURU

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NAME OF WORK: PROPOSED FARMER TRAINING CENTER AT COE PALAMPUR, DISTT. KANGRA (H.P)(PART – B)

LIST OF APPROVED MAKES OF EQUIPMENT & MATERIALS OF ELETRIC WORK

ELECTRICAL WORKS		
The Following Brand Makes/ Manufacturer's Makes Listed Below May Be Used With Prior Approval Of The Architect. In Case It Is Established That Any Material As Listed Below Is NotAvailable In The Market, Approved Equivalent Materials And Finishes Of Any Other Specialized Brand Names/ Manufacture's Makes May Be Used As Per Approval Of The Architect Or Eic.		
S.No	**Description**	**Make/manufacturer**
1.	Cable Jointing kit / HT terminationKit	Raychem/Xicon/3M
2.	Cable lugs & gland	Dowel/Jhonson/Gripwell/Comex/Hex/Comet
3.	Cable tray/ Race ways / Floor trunking / wall channels	RM CON/CTM ENGINEERING/MEM
4.	Capacitors with harmonic filters	Epcos/L&T/Neptune/Siemens/(Siepan) /Schneider/ABB/ C & S
5.	Ceiling /Exhaust/Wall fans	Crompton/Usha/Orient/Bajaj/Havells/Rallison
6.	Chemical Earthing	JMV LPS Ltd/Pragati Electrocom
7.	Coaxial wires	Finolex/Delton/Skytone/Anchor/L&T/Beldon
8.	Colour Monitor	Samsung/LG/Sony/Panasonic
9.	Compression gland and lugs/thimbles	Dowel/Comet/Gripwell
10.	Contactors	ABB/L&T/Schneider/GE/Siemens/Legrand/C & S
11.	Control Cables	Polycab/Paramount/ Havells,/ Finolex /KEI
12.	Control fuse base with HRC fuse / HRC Fuse	L&T/GE/Siemens/ABB/Alstom/ C & S
13.	Copper control cable (FRLS)	Havell's/RR/Cables/Polycab/Finolex/Skytone/NiccoRallision
14.	Crimping lugs/thimbles	Dowells/Hex/Commet
15.	CT/PT's	L&T/AEI/Kappa/C&S/CGL/Kappa/AE
16.	Cubical type Synchronizing & capacitor control panel (Bolted / Folded fabrication)	L&T/ABB/Schneider/RishControl/Shivalic
17.	Cubicle type fuse unit/RMU	Siemens/L&T/ABB/Schneider/Eaton
18.	Data/Telephone/TV Outlets	SYSTEMAX/Belden/Simone/MK/Legrand/Havells

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19.	DB's / Pre wired DB's	Havells/C&S/Indo Asian/Legrand/L&T/ Schneider/ABB/Siemens/Eaton
20.	DG Set- Alternator	Stamford/Kirlosker/Caterpillar/Crompton
21.	DG set Assembler	Koel green/Jakson Engineers/Caterpiller/Sterling generators ltd./Perkins/Sudhir Gensets
22.	Diesel engine	Kirloskar/Cummins, Mitsubishi, Perkins, Ashok Leyland, Volvo, Catterpiller
23.	Digital lighting control system	Aura dimming/Relux controls/Lightolier control/Effectron/Philips/Schneider.
24.	Digital Numerical Relays	L&T/ABB/Siemens/Schneider/GE/Areva
25.	DWC HDPE Pipe	DURA-LINE/REX/CARLON/EMTELLE
26.	Energy / Digital meters	Enercon/Socomec/L&T/Rishabh/Secur e/Trinity/Schneider Electric/Havells/HPL/GE, Siemens/ABB/Conzerv
27.	Feeder pillars, Meter cubicle Panels, Floor panels for upto 400Ai/c switchgear	ABB/L&T/Siemens/Schneider
28.	Fiber Optic Cable	Sterlite Industries/Finolex/Belden/Delton/Skyto ne/Paramount/Legrand
29.	Fire extinguisher	Ceasefire/Exflame/Minimax
30.	FRLS - PVC/Aluminum / copper 1.1KV grade /cables & wires	Havells/Polycab/KEI/RR Kable
31.	G.I./Cu. Strip & earthing material	Bharati, Indiana, Slotco
32.	Hand gloves & rubber mat	Premierpolyfim Ltd/Polyelectrosafe/Challenger/Electro mat/Safe Hold
33.	HRC Fuse	Siemens/L&T/ABB/Schneider/GE
34.	HT / LT Cables(XLPE,PVC)	Havells/Polycab/Finolex/KEI/Paramou nt/RR KABEL
35.	Indicating Lamp(LED)	BCH/L&T/Siemens/Schneider
36.	Indicating lamps	BCH/L&T/Siemens/Emco/ Schneider
37.	Industrial socket outlets	CAPE/ABB/L&T/Legrand/Siemens/Nep tune
38.	Insulated rubber Mat	Premier Polyfilm Ltd/Polyelectrosafe/Challenger/ElectroMat/Safe Hold
39.	Insulators	Jaya Shree/Modern/IEC/WSI
40.	Intelligent detectors & hooters & accessories	Notifire/Honeywell/Ravel/Eaton
41.	Intelligent fire alarm panel	Notifire/Honeywell/Ravel/Eaton
42.	Inverter	Microtek , Luminous , Su-Kam, Riello
43.	Isolators	Siemens/L&T/ABB/GE/Legrand/ C & S

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44.	Jointing kit	Reychem/Xicon/Birla 3M
45.	Light Fixtures lamps & fittings	Bajaj/Philips/Wipro/SYSKA/Havells,
46.	Lightning Arrestors	CAPE/LPI/ Indelec/Eternity Energia solution
47.	LT panels / APFC panel	NEPTUNE/RISHA CONTROL/SHIVALIC/ APPLICATIONCONTROL PANEL/ADVANCE
48.	Indicating lamps	BCH/L&T/Siemens/Emco/ Schneider
49.	Industrial socket outlets	CAPE/ABB/L&T/Legrand/Siemens/Neptune
50.	Insulated rubber Mat	Premier Polyfilm Ltd/Polyelectrosafe/Challenger/ElectroMat/Safe Hold
51.	panels / APFC panel	NEPTUNE/RISHA CONTROL/SHIVALIC/ APPLICATIONCONTROL PANEL/ADVANCE
52.	MCBs / RCCB/Isolaters / RCBO / Change over switch	Legrand/Schneider/Siemens/ABB/L&T/C& S
53.	MCCB with variable Microprocessor based (O/C, S/C, E/F) / Thermo magnetic releases	Legrand/Schneider/Siemens/ABB/L&T/C& S
54.	Measuring Instruments (Analog Meter)	L&T/AE/MECO/SOCOMEC
55.	Measuring instruments (Digital type)/ MFM/KWH meter	L&T/Ducati/Conzerv/Secure/Siemens/ Neptune
56.	Modular switches, socket outletsand wiring accessories with moulded cover plate	MK (Honeywell)/Siemens/Legrand/L&T (Oris)/Havells (Crab tree-Athena)
57.	MPCB	Legrand/Schneider/Siemens/ABB
58.	MS Conduit	RM CON/BEC/AKG
59.	MS Conduit accessories	RM CON/BEC/AKG
60.	Multi-function Meter	L&T/AB/Socomec/Siemens/Schneider/Ducati
61.	Occupancy Sensors/Lighting Control System	Phillips/Schneider/Legrand/Wipro/GE/C&G
62.	Overload relay single phase preventer	ABB/L&T/GE/Siemens/Areva
63.	Panel accessories	L&T/Rishab/Siemens/BCH
64.	Power Capacitor	L&T(Meher)/EPCOS (Siemens)/DUCATI/Schneider/Legrand
65.	Programmable timer (self-powered electronic digital)/Astronomer	L&T/Siemens/Hager/MDS/Legrand/Eaton
66.	Protective relays (Microprocessor based compatible with PC & PLC)	Siemens/L&T/ABB/GE/Areva
67.	Push buttons	Siemens/L&T/ABB/Schneider/C&S/BCH
68.	PVC conduit & Accessories	VPLIndia/Polypack/BEC/AKG/Norpac/ RMG Steel

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69.	PVC Insulated copper wire 1.1 KV grade (FRLS)	Havells/Polycab/Finolex/KEI/RR Cable/Rallison
70.	Relay / Contractors/timers / startersand Control Panel	Siemens/L&T/Schneider/ABB/Legrand
71.	Selector switch	Siemens/L&T/BCH
72.	Street Light including Poles & Light Fixtures	Philips/Bajaj/Wipro/Havells/C&S
73.	Tap-off, Splitter box	Zinwell/Novatron/Catvision
74.	Telephone tag block/Jack Panel/Face Plate	Krone/Phoenix/Wago/Beldon/Panduit/Huwaei
75.	Telephone/Data Wires	Bonton/Delton/Polycab/Legrand
76.	Terminal strip	Connect well/Phoenix/WAGO
77.	Termination Kits	Raychem/Birla/3M
78.	UPS	Emerson , Riello, Eaton
79.	Voltmeter and ammeter	AE/Meco/Universal/Rishab/Yokins

NOTES:

All other items not covered in the above list shall be got approved from the Architect before use in the project.

The actual make & manufacturer will be decided by the Architect. In case contractor has some doubt at the time of tendering, he can confirm it in writing from the Architect

In case the brand is not available, the contractor has to apply to the Architect. On the recommendation of the Architect, who after verification shall name the substituted brand.

Contractor to quote as per first make only. In case of non-availability of any material . The Contractor must seek written approval from Consultant/Architect/Project Managers for use of alternate make. The cost differential from First make to alternate make shall be reimbursed to the Client.The Contractor shall not be eligible for payment of non-approved make of material.

23 MATERIALS NOT SPECIFIED

Any materials not fully specified in these specification and which may be offered for use in the works shall be subject to approval of Engineer, without which it shall not be used anywhere in the construction works

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GENERAL TERMS AND CONDITIONS
The work should be completed within stipulated period as mentioned.
Work will have to be done as per the CPWD/HP PWD specifications.
Labour cess, Income tax & GST will be deducted as per rule inforce of the Govt.
Work shall be started within 10 days after the award of the work.
Quoted rates should include all taxes and carriage charges etc., complete in all respect and nothing will be paid extra on this account.
Guarantee:- 12 Months from the date of completion. In case any defect is found within guarantee period the same will be repaired by the contractor free of cost at the site of work. Security will be released after expiry of guarantee period.
Any damage caused shall be promptly restored by the contractor at his own expenses :- a) **Personal injury or death insurance:** - Contractor is responsible for personal injury or death of his employee and therefore, contractor shall in accordance b) **Loss or damage toConstruction Equipment: -** contractor to take all risk policy (CAR) Comprehensive All Risk Insurance policy.
No extra/substitute item shall be allowed for the completion of this work without prior approval from the competent authority.
No cement and steel shall be issued to the contractor from the department.
All the works shall be carried out in confirmation with BOQ ,specification. In case there is any conflict between different sections, decision of competent authority shall be final.
In case any mis happening the compensation will be on the contractor part & nothing will be paid by the Department.
In exceptional circumstances, the time period may be extended in writing by mutual consent of both the parties on same rate & terms & conditions , no extra amount will be payable.

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Environmental, social, health and safety requirements

Technical Specification for Environmental, Social, Health and Safety requirements

S. No	Environmental, Health & Safety and amenities	Description	Units/ Dimensions
1	Rain water harvesting structures	Rain water collection tank-1 & 2	As per working drawings
		Recharge pit-1,2,3,4, (4nos.)	1.0m x 1.0m x 1.5
		U shaped RCC drain	As per working drawing
2	Waste water treatment	Septic tank - 1	As per working drgs.
		Sewer line	As per working drawings
3	Solid waste management	MSW sorting area	As per working drawings
4	Hand appliances (Fire extinguishers)	As per IS 9337 & IS : 13386	5 Nos.
5	Sand buckets	Total 2 stands, each stand contains 5 buckets	2 Nos.
6	Safety siren/alarm	Siren at admin/control room	1Nos.
7	Construction labor amenities & labour influx management, temporary accommodation, mobile toilets, Healthcare facilities	Temporary sheds for accommodation of 30 migrant workers & crèche (All weather resistant temporary sheds accommodations for Men & Women)	Shed -2 (12.46 mx6.46m)
			Crèche (3.46m x 6.46m)
		Prefabricated Mobile toilet (on rental basis /monthly), Multi-unit prefabricated toilet, 10 seater capacity (Maintenance cost for mobile toilets is Rs.6000/month)	1 unit
		Setting up of In-premises dispensary/ health center for workers or hiring of accommodations if space is not available	Shed (3.6mx3.0m)
Provision of Safe drinking water facility for all workers at site.			

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Indicative Social Management Strategies for Palampur, Kangra (HP)

ESHS requirements, risks, & priorities	Key strategies / Actions
Code of Conduct	(i) Prepare and submit a code of conduct, and its implementation plan, compliant with the ESHS obligations under this contract; (ii) Inclusion of code of conduct in conditions of employment /engagement; (iii) Regular Orientation of all Staff, Subcontractors, Workers and local communities/stakeholders; (iv) Display ESHS Code of Conduct at Sites, Camps, Offices throughout project implementation;
Construction Labor Camp Management	(i) Temporary Accommodation, with adequate lighting (ii) Drinking Water (iii) Sanitation, with separate facilities for women (iv) Clean Cooking Fuel (v) Camp boundary, when appropriate (vi) Safe working conditions of all workers
Labor Influx Management	(i) Regular Documentation of local/migrant labor at all times; (ii) Regular Orientation of labor, drivers, workers, and local communities on code of conduct, including health issues/HIV AIDS and community context/relations (iii) Labor Transportation Vehicle
Labor, Occupational Health and Safety	(i) Use of required Protective Equipment by labor and employees (ii) Regular Training on Occupational Health & Safety, ESHS, HIV/AIDS and other health risks (iii) In-premises dispensary/health center for workers (iv) Regular Health/Medical Camps &Presence/Provision of ambulance
Stakeholder Engagement & Grievance Redress Mechanism	(i) Regular consultations with local community representatives and other stakeholders (ii) Appointment of Community Relations & Grievance Officer; (iii) Mechanisms for Registration, Resolution and Tracking Grievances for Workers and community grievances, including women;
Community Access, Health and Safety	(i) Water, Dust, Noise, Traffic and Waste Disposal and Management Activities covered under the EMP; (ii) Safety, Access and Traffic related Signage in local language (iii) Periodic Review of Community Grievances (iv) Measures to avoid adverse impacts on private and/or community lands; (v) Other Safety Requirements for Local Community
Women's Safety and Prevention of Sexual Abuse, Harassment and Violence	(i) Availability of Female Nodal Officer for Women's Issues (ii) Regular GBV/SEA sensitization & training for all employees, workers, transporters, drivers and contractors (iii) Inclusion in Code of Conduct, and dissemination (iv) Regular Consultation/Counseling of Women employees and workers, including for survivors
Children's Safety, Protection & Prevention of Child Labor	(i) Orientation on code of conduct on Children's Safety, Protection and Child Labor, including for parents; (ii) Establishment of Crèche' for workers children within facility;
Local Skills & Livelihood	(i) Skills upgradation and jobs for local youth; (ii) Opportunities for local businesses and enterprises

The Employer should use the services of a suitably qualified environmental, social, health and safety specialist/s to prepare the specifications for ESHS working with a procurement specialist/s.

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The Employer should attach or refer to the Employer's environmental, social, health and safety policies that will app'y to the project. If these are not available, the Employer should use the following guidance in drafting an appropriate policy for the Works.

SUGGESTED CONTENT FOR AN ENVIRONMENTAL AND SOCIAL POLICY (STATEMENT)

The Works' policy goal, as a minimum, should be stated to integrate environmental protection, occupational and community health and safety, gender, equality, child protection, vulnerable people (including those with disabilities),sexual harassment, gender-based violence (GBV),sexual exploitation and abuse (SEA), HIV/AIDS awareness and prevention and wide stakeholder engagement in the planning processes, programs, and activities of the parties involved in the execution of the Works. The Employer is advised to consult with the World Bank to agree the issues to be included which may also address: climate adaptation, land acquisition and resettlement, indigenous people, etc. *The policy should set the frame for monitoring, continuously improving processes and activities and for reporting on the compliance with the policy.*

The policy shall include a statement that, for the purpose of the policy and/or code of conduct, the term "child" / "children" means any person(s) under the age of 18 years.

The policy should, as far as possible, be brief but specific and explicit, and measurable, to enable reporting of compliance with the policy in accordance with the Particular Conditions of the Contract Sub-Clause 26.2 and Appendix B to the General Conditions of Contract.

As a minimum, the policy is set out to the commitments to:

1. *apply good international industry practice to protect and conserve the natural environment and to minimize unavoidable impacts;*
2. *provide and maintain a healthy and safe work environment and safe systems of work;*
3. *protect the health and safety of local communities and users, with particular concern for those who are disabled, elderly, or otherwise vulnerable;*
4. *ensure that terms of employment and working conditions of all workers engaged in the Works meet the requirements of the ILO labour conventions to which the host country is a signatory;*
5. *be intolerant of, and enforce disciplinary measures for illegal activities. To be intolerant of, and enforce disciplinary measures for GBV, inhumane treatment, sexual activity with children, and sexual harassment;*
6. *incorporate a gender perspective and provide an enabling environment where women and men have equal opportunity to participate in, and benefit from, planning and development of the Works;*
7. *work co-operatively, including with end users of the Works, relevant authorities, contractors and local communities;*
8. *engage with and listen to affected persons and organisations and be responsive to their concerns, with special regard for vulnerable, disabled, and elderly people;*
9. *provide an environment that fosters the exchange of information, views, and ideas that is free of any fear of retaliation,and protects whistleblowers;*
10. *minimise the risk of HIV transmission and to mitigate the effects of HIV/AIDS associated with the execution of the Works;*

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The policy should be signed by the senior manager of the Employer. This is to signal the intent that it will be applied rigorously.

MINIMUM CONTENT OF ESHS REQUIREMENTS

In preparing detailed specifications for ESHS requirements, the specialists should refer to and consider:

- *project reports e.g. ESIA/ESMP*
- *consent/permit conditions*
- *required standards including World Bank Group EHS Guidelines*
- *relevant international conventions or treatiesetc., national legal and/or regulatory requirements and standards (where these represent higher standards than the WBG EHS Guidelines)*
- *relevant international standards e.g. WHO Guidelines for Safe Use of Pesticides*
- *relevant sector standards e.g. EU Council Directive 91/271/EEC Concerning Urban Waste Water Treatment*
- *grievance redress mechanismincluding types of grievances to be recorded and how to protect confidentiality e.g. of those reporting allegations of GBV/SEA*
- *GBV/SEA prevention and management*

The detail specification for ESHS should, to the extent possible, describe the intended outcome rather than the method of working.

The ESHS requirements should be prepared in manner that does not conflict with the relevant General Conditions of Contract and Particular Conditions of Contract, and in particular:

General Conditions of Contract

Sub-clause 3	Language and Law
Sub-clause 7.1	Subcontracting
Sub-clause 8.1	Other Contractors
Sub-clause 9	Personnel and Equipment
Sub-clause 12	Contractor's Risks
Sub-clause 15.1	Contractor to Construct the Works
Sub-clause 18	Safety and Protection of the Environment
Sub-clause 19.1	Discoveries
Sub-clause 31	Early Warning
Sub-clause 41.3	Payments

MINIMUM REQUIREMENTS FOR THE BIDDER'S CODE OF CONDUCT

[A minimum requirement for the Code of Conduct should be set out,by the Employer taking into consideration the issues, impacts, and mitigation measures identified for example in :

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- *project reports e.g. ESIA/ESMP*
- *any particular GBV/SEA requirements*
- *consent/permit conditions(regulatory authority conditions attached to any permits or approvals for the project)*
- *required standards including World Bank Group EHS Guidelines*
- *relevant international conventions, standards or treaties, etc., national legal and/or regulatory requirements and standards (where these represent higher standards than the WBG EHS Guidelines)*
- *relevant standards e.g. Workers' Accommodation: Process and Standards (IFC and EBRD)*
- *relevant sector standards e.g. workers accommodation*
- *grievance redress mechanisms.*

The types of issues identified could include. risks associated with: labor influx, spread of communicable diseases, sexual harassment, gender based violence, illicit behavior and crime, and maintaining *a safe environment etc.]*

[Amend the following instructions to the Bidder taking into account the above considerations.]
A satisfactory code of conduct will contain obligations on all Contractor's personnel(including sub-contractors and day workers) that are suitable to address the following issues, as a minimum. Additional obligations may be added to respond to particular concerns of the region, the location and the project sector or to specific project requirements. The code of conduct shall contain a statement that the term "child" / "children"means any person(s) under the age of 18 years.

The issues to be addressed include:

1. Compliance with applicable laws, rules, and regulations
2. Compliance with applicable health and safety requirements to protect the local community (including vulnerable and disadvantaged groups), the Employer's and Project Manager's personnel, and the Contractor's personnel, including sub-contractors and day workers, (including wearing prescribed personal protective equipment, preventing avoidable accidents and a duty to report conditions or practices that pose a safety hazard or threaten the environment)
3. The use of illegal substances
4. Non-Discrimination in dealing with the local community (including vulnerable and disadvantaged groups), the Employer's and Project Manager's personnel, and the Contractor's personnel, including sub-contractors and day workers (for example on the basis of family status, ethnicity, race, gender, religion, language, marital status, age, disability (physical and mental), sexual orientation, gender identity, political conviction or social, civic, or health status)
5. Interactions with the local community(ies), members of the local community (ies), and any affected person(s) (for example to convey an attitude of respect, including to their culture and traditions)
6. Sexual harassment (for example to prohibit use of language or behavior, in particular towards women and/or children, that is inappropriate, harassing, abusive, sexually provocative, demeaning or culturally inappropriate)
7. Violence including sexual and/or gender based violence (for example acts that inflict physical, mental or sexual harm or suffering, threats of such acts, coercion, and deprivation of liberty

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8. Exploitation including sexual exploitation and abuse (for example the prohibition of the exchange of money, employment, goods, or services for sex, including sexual favors or other forms of humiliating, degrading behavior, exploitative behavior or abuse of power)
9. Protection of children (including prohibitions against sexual activity or abuse, or otherwise unacceptable behavior towards children, limiting interactions with children, and ensuring their safety in project areas)
10. Sanitation requirements (for example, to ensure workers use specified sanitary facilities provided by their employer and not open areas)
11. Avoidance of conflicts of interest (such that benefits, contracts, or employment, or any sort of preferential treatment or favors, are not provided to any person with whom there is a financial, family, or personal connection)
12. Respecting reasonable work instructions (including regarding environmental and social norms)
13. Protection and proper use of property (for example, to prohibit theft, carelessness or waste)
14. Duty to report violations of this Code
15. Non retaliation against workers who report violations of the Code, if that report is made in good faith.

The Code of Conduct should be written in plain language and signed by each worker to indicate that they have:

- received a copy of the code;
- had the code explained to them;
- acknowledged that adherence to this Code of Conduct is a condition of employment; and
- understood that violations of the Code can result in serious consequences, upto and including dismissal, or referral to legal authorities.

A copy of the code shall be displayed in a location easily accessible to the community and project affected people. It shall be provided in languages comprehensible to the local community, Contractor's personnel (including sub-contractors and day workers), Employer's and Project Manager's personnel, and affected persons.

PAYMENT FOR ESHS REQUIREMENTS

The Employer's ESHS and procurement specialists should consider how the Contractor will cost the delivery of the ESHS requirements. In the majority of cases, the payment for the delivery of ESHS requirements shall be a subsidiary obligation of the Contractor covered under the prices quoted for other Bill of Quantity items or activities. For example, normally the cost of implementing work place safe systems of work, including the measures necessary for ensuring traffic safety, shall be covered by the Bidder's rates for the relevant works. Alternatively, provisional sums could be set aside for discrete activities for example for HIV counselling service, and, GBV/SEA awareness and sensitization or to encourage the contractor to deliver additional ESHS outcomes beyond the requirement of the Contract.

1. Mitigation measures during pre-construction andconstruction

The project is construction of New Market Yard. The impacts during the pre- construction and construction on the environment would be basically of temporary nature and are expected to reduce gradually on completion of the construction activities.

1.1 Air quality mitigationmeasures

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For the proposed project site leveling and grading will be carried out if required, wherever possible to maintain the natural elevations they will not be disturbed, only leveling activity will be carried out for providing roads, sewage network, storm water system. According to the engineering assessment; most of the excavated mud generated for providing basement shall be reused within the project boundary for leveling during road formation, the excess if any will be given to local contractors for disposal in low lying areas, road constructions, etc. as per the local existing rules. Most of the construction dust will be generated from the movement of construction vehicles on unpaved roads. Unloading and removal of soil material shall also act as a potential source for dust nuisance. The control measures proposed to be taken up are given below:

- Water sprinkling on main haul roads in the project area will be done, this activity will be carried out at least twice a day, if need arises frequency will be increased on windy days, in this way around 50% reduction on the dust contribution from the exposed surface will beachieved.
- The duration of stockpiling of excavated mud will be as short as possible as most of the material will be used as backfill material for the open cut trenches for road development.
- Temporary thin sheets of sufficient height (3m) will be erected around the site of dust generation or all around the project site as barrier for dustcontrol.
- Tree plantations around the project boundary will be initiated (where ever required) at the early stages by plantation of 2 to 3 years old saplings using drip irrigation or by regular watering so that the area will be moist for most part of the day.
- All vehicles carrying raw materials will be instructed to cover with tarpaulin / plastic sheet, unloading and loading activity will be stopped during windyperiod.
- To reduce the dust movement from civil construction site to the neighborhood the external part of the building will be covered by plasticsheets

1.2 Water quality mitigation measure

During site development necessary precautions will be taken, so that the runoff water from the site gets collected to working pit and if any over flow is, will be diverted to nearby greenbelt / plantation area.

During construction activity all the equipment's washed water will be diverted to working pit to arrest the suspended solids if any and the settled water will be reused for construction purposes, and for sprinkling on roads to control the dust emission, etc. The construction workers will be using the toilets of the existingfacility.

1.3 Noise mitigation measure

Noise generating equipment will be used during day time for brief period of its requirement. Proper enclosures will be used for reduction in noise levels, where ever possible the noise generating equipment will be kept away from the human habituation. Temporary thin sheets of sufficient height (3m) will be erected around the noise generating activity or all around the project site as barrier for minimizing the noise travel to surrounding areas. Therefore, impact on noise environment due to proposed project would beinsignificant.

All vehicles entering into the project will be informed to maintain speed limits, and not blow horns unless it is required.

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Personal protective equipment like earmuffs, helmets covering ears would be provided to the workers working near noise generating equipment and would see that workers use the protective gadgets regularly.

1.4 Solid waste mitigation measure

The solid waste generated during construction period being predominantly inert in nature, construction and demolition waste does not create chemical or biochemical pollution. However maximum effort would be made to reuse and recycle them. Most of the solid waste material will be used for filling/ leveling of low-laying areas, as road construction material, if any excess given to local contractors for lifting and dumping in low lying areas. All attempts would be made to stick to the following measures:

- All construction waste shall be stored within the site itself. A proper screen will be provided so that the waste does not getscattered.
- Attempts will be made to keep the waste segregated into different heaps as far as possible so that their further gradation and reuse is facilitated.
- Materials, which can be reused for purpose of construction, leveling, making roads/ pavement will also be kept in separate heaps from those which are to be sold or landfilled.
- Construction waste generated will be deposited at collection center made by local body or handed over it to the authorized processing facilities of construction and demolition waste

1.5 Ecological aspects

During pre-construction period, there could be clearing of vegetation in order to prepare the site for construction, the top soil from the construction area will be collected, stored separately and used for greenbelt development. A comprehensive greenbelt program will be planned to improve the ecological condition of the region.

1.6 Site security

Adequate security arrangement would be made to ensure that the local inhabitants and the stray cattle are not exposed to the potential hazards of construction activities. Round the clock security personnel will be appointed to restrict entry of unwanted people to the site.

2. Mitigation measures during operation

Necessary control measures will be undertaken at the operation stage to meet the statutory requirements and towards minimizing environmental impac
ts. During operation period special emphasis will be made on measures to minimize effluent generation and dust control at source. The specific control measures related to air emissions, liquid effluent discharges, noise generation, solid waste disposal etc. are described below.

2.1 Air quality mitigation measures

The main activities from the proposed project which cause air pollution are as follows:

- Sulphur dioxide and nitrogen oxide from DGset

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- Dust particulates due to movement of vehicles and road sweepings.

The following methods of abatement will be employed for the air pollution control.

- DG set are to be provided with a stack height meeting MoEF & CC guidelines or 1m above the tallest structure in the project area for proper dispersion of Sulphur dioxide and oxides of nitrogen.
- Internal roads will be concreted / asphalted to reduce dust emissions.
- Vehicles coming into the plant will be instructed to have PUCcertificates
- Speed restriction will be followed within the project and speed breakers will be provided at entry and exit points.

2.2 Water quality mitigation measures

The source of water for the proposed project is IPH (department of Irrigation and Public Health). The wastewater generated will be collected and diverted to soak pit and domestic water is diverted to septic tank.

2.3 Noise mitigation measure

The specifications for procuring major noise generating machines/equipment would include built in design requirements of 85 dB (A) to have minimum noise levels meeting Occupational Safety and Health Assessment (OSHA) requirement. The major sources of noise pollution are DG set and pumps & motors.

Acoustic enclosures, noise barriers or shields will be provided for DG set and pumps respectively and wherever possible they will be mounted on anti-vibration pads to minimize the noise. Regular maintenance will be carried out as per the schedule prescribed by the manufacturer for smooth functioning.

2.4 Solid waste mitigation measures

The waste generated by grading and packing unit can be classified as:

- Sorting section- rejected fruits,
- Waste from utilities such as canteen waste, paper
- Packing waste during packing of apples inboxes
- Pollution control facilities- STP sludgeetc.

The solid waste generated will be collected and brought to one place, and it will be segregated into recyclable, compostable and non-compostable. The spoiled fruit waste will be sold (or given) as animal feed. The recyclables will be disposed to local vendors and compostable (spoiled fruit waste) will be converted to the normal composting or vermin-compost in the dump yard, whereas the non-compostable solid waste will be disposed into local municipal bins.

2.5 Ecology and bio diversity mitigation measures

The greenbelt development is one of the most effective environmental pollution control measure. Trees play a vital role in the environment in preventing the horizontal dispersion of the pollutants to the surrounding areas. They are very effective in trapping the pollution causing agents viz. dust and gaseous pollutants. They are also considered to be excellent indicators of excessive ground level concentrations. The placement of the plants would be designed asfollows:

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- Trees growing up to 10m or more in height with thick canopy cover and perennial foliage would be planted along theboundary.
- Planting of trees would be done in rows with minimum three rows encircling perimeter of the project (where ever there is place for planting in three rows). While planting the trees care would be taken that the buildings would be difficult to see through foliage when seen from a point outside the green envelope.
- The sensitive species which work as an indicator of pollution potential would be planted along the entire greenbelt.

3. Mitigation measures during decommissioning and closure

The proposed project is long term activity no decommissioning and closure of the unit is envisaged. The major activity will be seasonal; in non-season period the required staff will be available for carrying out day to day maintenance activities.

4. Environmental impacts of mitigation measures

The mitigation measures are to eliminate, reduce or control the adverse environmental impacts of the project. The impacts of these measures are quantifiable as the measurable parameters of air, water and soil should be meeting the standards fixed by the regulatory bodies time to time.

5. Environmental Monitoring Program

Regular monitoring of environmental parameters is very important to assess the status of environment during project operations. With the knowledge of baseline conditions, the monitoring program will serve as an indicator for any deterioration in environmental conditions due to operation of the proposed project. This shall enable taking up timely measures to mitigate any adverse impacts on the environment. Based on the predicted and assessed impacts as well as the baseline environmental status of the project area, an environmental monitoring program is suggested for implementation during various stages of the project cycle.

5.1 Establishment of Monitoring, Evaluation and ReportingMechanism

The environmental monitoring is systematic collection of samples of the environmental parameters like air, water, soil, noise in order to observe and study the environmental changes is any due to the project activity. The monitoring program will help the project on maintaining the standards as per the existing guidelines. The monitoring program also gives action plan for how to maintain the standards for each parameter.

Based on the predicted and assessed impacts as well as the baseline environmental status of the project area, an environmental monitoring program is suggested for implementation during various stages of the project cycle. All monitoring strategies and programs have reasons and justifications which are often designed to establish the current status of an environment or to establish trends in environmental parameters. In all cases, the results of monitoring will be reviewed, analyzed statistically and submitted to concerned authorities.

The project shall implement the environment monitoring program in line with the planned schedule. The proponent shall ensure that necessary requisite facilities are made available and budgetary provision is made as and when required to ensure regular efficient environmental monitoring activities. The monitoring program will have two phases:

- Construction phase
- Monitoring phase

Construction Phase

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The generic environmental measures that need to be undertaken during project construction stage are given in below Table.

Table: Environmental measures during construction phase

S. No	Potential Impact	Detailed action to be followed as per EMP	Parameters for Monitoring	Frequency of Monitoring
1.	Air Emissions	All equipment's are operated within specified design parameters.	Random checks of equipment logs/ manuals	Once in a quarter/as per CFE issued by SPCB
		Vehicle trips have to be minimized to the extent possible	Vehicle Logs	Once in a quarter/as per CFE issued by SPCB
		Any dry, dusty materials stored in sealed containers are prevented from blowing.	Stockpiles or open containers of dusty materials	Once in a quarter/as per CFE issued by SPCB
		Compaction of soil during various construction activities	Construction logs	
		DG set emissions have to meet stipulated standards	Gaseous emissions (SO_2, HC, CO, NO_x)	Once in a quarter/as per CFE issued by SPCB
		Ambient air quality within the premises and adjacent villages of the proposed unit to be monitored.	PM_{10}, $PM_{2.5}$, SO_2, NO_x, and CO	At 3-4 locations in every quarter/as per CFE issued by SPCB
2.	Noise	List of all noise generating machinery onsite has to be prepared.	Equipment logs, noise monitoring	Once in a month/as per CFE issued by SPCB
		Working during night has to be minimized.	Records of working hours	Daily till the construction activities are completed/ as per CFE issued by SPCB
		Generation of vehicular noise has to be minimized	Maintenance of records of vehicles	
		Implement good working practices (equipment selection and siting) to minimize noise and also reduce its impacts on human health (ear muffs, safe distances, and enclosures).	Maintaining records of noise levels	
		Machinery should not be run when not required.	Continuous checking	
		Acoustic mufflers/ enclosures have to be provided for large equipment	Mufflers/enclosures shall be in place.	
		Noise levels have to be monitored in ambient air within the plant premises.	Continuous recording of noise levels	
		The noise levels shall not exceed the permissible limits both during day and night		
		All equipment's shall be operated within specified design parameters.	Random checks of equipment logs/ manuals	
		Vehicle trips to be minimized to the extent possible	Vehicle logs	
3.	Soil Erosion	Minimize the area of site clearance by complying within the defined boundaries	Site boundaries not extended/ breached as per plan document.	Once in six months/ as per CFE issued by SPCB
		Protect topsoil stockpile	Effective cover in place.	
4.	Wastewater Discharge	No direct discharge of wastewater to be made into surface water, groundwater or soil.	No discharge hoses shall be in vicinity of watercourses.	Once in a quarter/ as per CFE issued by SPCB

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S. No	Potential Impact	Detailed action to be followed as per EMP	Parameters for Monitoring	Frequency of Monitoring
		The discharge point would be selected properly and sampling and analysis would be undertaken prior to discharge	Discharge norms for sewage as given in permits	
		Take care of the disposal of wastewater generated such that soil and groundwater resources are protected	Discharge norms for sewage as given in permits	
5.	Drainage and Effluent Management	Ensure drainage system and specific design measures are working effectively. They are designed to incorporate existing drainage pattern and avoid disturbing the same.	Visual inspection of drainage and records	Once in a month/ as per CFE issued by SPCB
6.	Waste Management	Implement waste management plan that identifies and characterizes every waste associated with the proposed activities Also to identify the procedures for collection, handling and disposal of each waste that arises.	Comprehensive Waste Management Plan should be in place and available for inspection onsite. Compliance with solid waste management rules	Once in a quarter/ as per CFE issued by SPCB
7.	Non-routine events and accidental releases	Plan will be drawn, considering the likely emergencies and steps required to prevent/limit consequences.	Mock drills and records of the same	Once in six months/ as per CFE issued by SPCB
8.	Health	Health check-ups for employees and migrant labour.	All relevant parameters of occupational health	Once in six months/ as per CFE issued by SPCB/as per Factories Act

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Environmental monitoring during construction phases

S.No	Potential Impact	Sampling Locations	Parameters for Monitoring	Monitoring Frequency	Reference Standards
1	Ambient Air Quality (3 samples)	Near the main gate	PM_{10}, $PM_{2.5}$, SO_2, NOx, CO	Once in a quarter/ seasonal or as per HPSPCB Conditions	National Ambient Air Quality Standards 2009
		Near DG sets			
		Near raw material loading and unloading			
2	Stack Monitoring (1 sample)	DG set stack	PM_{10}, $PM_{2.5}$, SO_2, NOx, CO, HC	Once in a quarter/ seasonal or as per HPSPCB Conditions	
3	Noise (10 samples)	Near main gate , loading and unloading platform, truck parking, process platform, DG sets, admin building, working zone ,material out gate, canteen, dumping grounds	dB(A)	Once in a quarter/ seasonal or as per HPSPCB Conditions	CPCB ambient noise standards S.O.123 (E) date. 14.02.2000 & its subsequent amendments
4	Wastewater or effluents (3 samples)	Wastewater treatment plant inlet & outlet	pH, TDS, BOD, COD, Hardness, Chlorides & Fluorides	Once in a quarter/ seasonal or as per HPSPCB Conditions	As per MoEF&CC Effluent discharge standards 13th October 2017
		Water from floor washing			
		Sludge from wastewater treatment plant			
5	Soil quality (5 samples)	Near waste dump yard	EC, bulk density, N, P, K, SAR, Ca, Mg, organic carbon, and micro nutrients	Once in six months or as per HPSPCB Conditions	Standard soil classification – Indian Council of Agricultural Research, New Delhi
		Near ground water source			
		Loading and unloading area			
		Near Compost plant			
		Compost product			

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6	Social/health aspects (for employees)	Health center	Height, weight, throat, ear, eye checkup, BP, pulse, sugar, ECG etc.,	Once in six months	-

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Salient Features of Labour & Environment Protection Laws[1]

SALIENT FEATURES OF SOME MAJOR LABOUR LAWS APPLICABLE TO ESTABLISHMENTS ENGAGED IN BUILDING AND OTHER CONSTRUCTION WORK

(a) Employees Compensation Act 1923: The Act provides for compensation in case of injury, disease or death 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 5 years' service or more or on death at the rate of 15 days wages for every completed year of service. The Act is applicable to all establishments employing 10 or more employees.

(c) Employees P.F. and Miscellaneous Provision Act 1952 (*since amended*): The Act provides for monthly contribution by the employer plus workers @ 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 1961: The Act provides for leave and some other benefits to women employees in case of confinement or miscarriage etc.

(e) Sexual Harassment of Women at the Workplace (Prevention, Prohibition and Redressal) Act, 2013: This Act defines sexual harassment in the workplace, provides for an enquiry procedure in case of complaints and mandates the setting up of an Internal Complaints Committee or a Local Complaints Committee

(f) 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 20 or more contract labour.

(g) Minimum Wages Act 1948: The Employer is supposed 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 are scheduled employments.

(h) Payment of Wages Act 1936: It lays down the mode, manner and by what date the wages are to be paid, what deductions can be made from the wages of the workers.

[1]This list is only illustrative and not exhaustive. Bidders and Contractors are responsible for checking the correctness and completeness of the list. The law as current on the date of bid opening will apply.

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(i) Equal Remuneration Act 1976: 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.

(j) Payment of Bonus Act 1965: The Act is applicable to all establishments employing 20 or more employees. Some of the State Governments have reduced this requirement from 20 to 10. The Act provides for payments of annual bonus subject to a minimum of 8.33% of the wages drawn in the relevant year. It applies to skilled or unskilled manual, supervisory, managerial, administrative, technical or clerical work for hire or reward to employees who draw a salary of Rs. 10,000/- per month or less. To be eligible for bonus, the employee should have worked in the establishment for not less than 30 working days in the relevant year. The Act does not apply to certain establishments.

(k) 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.

(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 regulation of employment of children in all other occupations and processes. Employment of Child Labour is prohibited in the 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 5 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, traveling expenses from home upto the establishment and back,etc.

(o) The Building and Other Construction Workers (Regulation of Employment and Conditions of Service) Act 1996 and the Building and Other Construction Workers Welfare Cess Act, 1996 (BOCWW Cess Act): All the establishments who carry on any building or other construction work and employ 10 or more workers are covered under these Acts. All such establishments are required to pay cess at the rate not exceeding 2% of the cost of construction as may be notified 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 engaged in manufacturing processes, 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 10 persons or more with aid of power or 20 or more persons without the aid of power.

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(q) Weekly Holidays Act -1942

(r) Bonded Labour System (Abolition) Act, 1976: The Act provides for the abolition of bonded labour system with a view to preventing the economic and physical exploitation of weaker sections of society. Bonded labour covers all forms of forced labour, including that arising out of a loan, debt or advance.

(s) Employer's Liability Act, 1938: This Act protects workmen who bring suits for damages against employers in case of injuries endured in the course of employment. Such injuries could be on account of negligence on the part of the employer or persons employed by them in maintenance of all machinery, equipment etc. in healthy and sound condition.

(t) Employees State Insurance Act 1948: The Act provides for certain benefits to insured employees and their families in case of sickness, maternity and disablement arising out of an employment injury. The Act applies to all employees in factories (as defined) or establishments which may be so notified by the appropriate Government. The Act provides for the setting up of an Employees' State Insurance Fund, which is to be administered by the Employees State Insurance Corporation. Contributions to the Fund are paid by the employer and the employee at rates as prescribed by the Central Government. The Act also provides for benefits to dependents of insured persons in case of death as a result of an employment injury.

(u) The Personal Injuries (Compensation Insurance) Act, 1963: This Act provides for the employer's liability and responsibility to pay compensation to employees where workmen sustain personal injuries in the course of employment.

(v) Industrial Employment (Standing Order) Act 1946: It is applicable to all establishments employing 100 or more workmen (employment size reduced by some of the States and Central Government to 50). The Act provides for laying down rules governing the conditions of employment by the Employer on matters provided in the Act and get the same certified by the designated Authority.

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SALIENT FEATURES OF SOME OF THE MAJOR LAWS THAT ARE APPLICABLE FOR PROTECTION OF ENVIRONMENT.

1. The Environment (Protection) Act, 1986 and as amended: This provides for the protection and improvement of environment and for matters connected therewith, and the prevention of hazards to human beings, other living creatures, plants and property. 'Environment' includes water, air and land and the inter-relationship which exists among and between water, air and land, and human beings, other living creatures, plants, micro-organism and property.

2. The Forest Conservation Act, 1980, as amended, and Forest (Conservation) Rules, 1981 as amended: These provides for protection of forests by restricting conversion of forested areas into non- forested areas and prevention of deforestation, and stipulates the procedures for cutting any trees that might be required by the applicable rules. Permissions under the Act also stipulates the norms and compliance requirements of the employer and any contractor on behalf of the employer.

3. State Tree Preservation Acts as may be in force: These provide for protection of trees of important species. Contractors will be required to obtain prior permission for full or partial cutting, uprooting, or pruning of any such trees.

4. The Wildlife (Protection) Act, 1972, and as amended: This provides for protection of wildlife through notifying National Parks and Sanctuaries and buffer areas around these zones; and to protect individuals of nationally important species listed in the Annex of the Act.

5. The Biological Diversity Act, 2002: This provides for conservation of biological diversity, sustainable use of components of biological diversity, and fair and equitable sharing of the benefits arising out of the use of biological resources, knowledge and for matters connected therewith or incidental thereto.

6. The Public Liability Insurance Act, 1991 as amended and The Public Liability Insurance Rules, 1991 as amended: These provide for public liability insurance for the purpose of providing immediate relief to the persons affected by accident occurring while handling hazardous substances and for mattes connected herewith or incidental thereto. Hazardous substance means any substance or preparation which is defined as hazardous substance under the Environment (Protection) Act 1986, and exceeding such quantity as may be specified by notification by the Central Government.

7. The Ancient Monuments and Archaeological Sites and Remains Act, 1958 and the Ancient Monuments and Archaeological Sites and Remains (Amendment and Validation) Act, 2010, the Ancient Monuments and Archaeological Sites and Remains Rules, 1959 amended 2011, the National Monuments Authority Rules, 2011 and the similar State Acts: These provide for conservation of cultural and historical remains found in India. Accordingly, area within the radii of 100m and 300m from the "protected property" are designated as "protected area" and "controlled area" respectively. No development activity (including building, mining, excavating, blasting) is permitted in the "protected area" and development activities likely to damage the protected property is not permitted in the "controlled area" without prior permission of the Archaeological Survey of India (ASI) or the State Departments of Art and Culture or Archaeology as applicable.

8. The Environmental Impact Assessment Notification, 2006 and as amended: This provides for prior environmental clearance for new, modernization and expansion projects listed in Schedule 1 of the Notification. Contractors will be required to ensure that no work starts until applicable clearances under the Notification is not available. Contractors will be responsible for implementation of any environmental

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management plan stipulated as per the permission under this Notification; and will be required to prepare and submit to the employer and compliance report stipulated in the permission under the Notification.

9. The Water (Prevention and Control of Pollution) Act, 1974 as amended, and the Water (Prevention and Control of Pollution) Rules, 1975 as amended: These provide for the prevention and control of water pollution and the maintaining and restoring of wholesomeness of water. 'Pollution' means such contamination of water or such alteration of the physical, chemical or biological properties of water or such discharge of any sewage or trade effluent or of any other liquid, gaseous or solid substance into water(whether directly or indirectly) as may, or is likely to, create a nuisance or render such water harmful or injurious to public health or safety, or to domestic, commercial, industrial, agricultural or other legitimate uses, or to the life and health of animals or plants or of aquatic organisms. Contractors will need to obtain consent for establishment and consent for operation of any item of work or installation of equipment that generates waste water, and observe the required standards of establishment and operation of these items of work or installations; as well as install and operate all required waste water treatment facilities.

10. The Water (Prevention and Control of Pollution) Cess Act, 1977 and The Water (Prevention and Control of Pollution) Cess Rules, 1978: These provide for the levy and collection of a cess on water consumed by persons carrying on certain industries and by local authorities, with a view to augment the resources of the Central Board and the State Boards for the prevention and control of water pollution under the Water (Prevention and Control of Pollution) Act, 1974.

11. The Air (Prevention and Control of Pollution) Act, 1981 as amended, and the Air (Prevention and Control of Pollution) Rules, 1982: These provides for prevention, control and abatement of air pollution. 'Air Pollution' means the presence in the atmosphere of any 'air pollutant', which means any solid, liquid or gaseous substance (including noise) present in the atmosphere in such concentration as may be or tend to be injurious to human beings or other living creatures or plants or property or environment. Contractors will need to obtain consent for establishment and consent for operation of any item of work or installation of equipment that generates air pollution such as batching plants, hot mix plants, power generators, backup power generation, material handling processes, and observe the required standards of establishment and operation of these items of work or installations.

12. Noise Pollution (Control and Regulation) Rules, 2000, and as amended: This provides for standards for noise for day and night for various land uses and specifies special standards in and around sensitive receptors of noise such as schools and hospitals. Contractors will need to ensure compliance to the applicable standards, and install and operate all required noise control devices as may be required for all plants and work processes.

13. Chemical Accidents (Emergency Planning, Preparedness and Response) Rules, 1996: This provides for Requirement of preparation of on-site and off-site Disaster Management Plans for accident-prone areas.

14. The Explosives Act 1884 and the Explosives Rules, 2008: These provide for safe manufacture, possession, sale, use, transportation and import of explosive materials such as diesel, Oil and lubricants etc.; and also for regulating the use of any explosives used in blasting and/or demolition. All applicable provisions will need compliance by the contractors.

15. The Petroleum Rules, 2002: This provides for safe use and storage of petroleum products, and will need to be complied by the contractors.

16. The Gas Cylinder Rules 2004 and amendments: This provides for regulations related to storage of gas, and possession of gas cylinder more than the exempted quantity. Contractors should comply with all the requirements of this Rule.

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17. Manufacture, Storage and Import of Hazardous Chemical Rules of 1989 and as amended: These provide for use and storage of hazardous material such as highly inflammable liquids like HSD/LPG. Contractors will need to ensure compliance to the Rules; and in the event where the storage quantity exceeds the regulated threshold limit, the contractors will be responsible for regular safety audits and other reporting requirements as prescribed in the Rules.

18. Hazardous & Other Wastes (Management and Transboundary Movement) Rules, 2016: These provide for protection of general public from improper handling storage and disposal of hazardous waste. The rules prescribe the management requirement of hazardous wastes from its generation to final disposal. Contractors will need to obtain permission from the State Pollution Control Boards and other designated authorities for storage and handling of any hazardous material; and will to ensure full compliance to these rules and any conditions imposed in the permit.

19. The Bio Medical Waste Management Rules, 2016: This provides for control, storage, transportation and disposal of bio-medical wastes. As and where the contractor has any first aid facility and dispensaries, established in either temporary or permanent manner, compliance to these Rules are mandatory.

20. Construction and Demolition Waste Management Rules, 2016: This provides for management of construction and demolition waste (such as building materials possible to be reused, rubble and debris or the like); and applies to all those waste resulting from construction, re-modelling, repair or demolition of any civil structure. Contractor will need to prepare a waste disposal plan and obtain required approval from local authorities, if waste generation is more than 20 tons in any day or 300 tons in any month during the contract period; and ensure full compliance to these rules and any conditions imposed in the regulatory approval.

21. The E-Waste (Management) Rules, 2016: This provides for management of E-wastes (but not covering lead acid batteries and radio-active wastes) aiming to enable the recovery and/or reuse of useful material from e-waste, thereby reducing the hazardous wastes destined for disposal and to ensure the environmentally sound management of all types of waste of electrical and electronic equipment. This Rule applies to every manufacturer, producer, consumer, bulk consumer, collection centers, dealers, e-retailer, refurbisher, dismantler and recycler involved in manufacture, sale, transfer, purchase, collection, storage and processing of e-waste or electrical and electronic equipment listed in Schedule I, including their components, consumables, parts and spares which make the product operational.

22. Plastic waste Management Rules, 2016: This provides for control and management of the plastic waste generated from any activity. Contractors will ensure compliance to this Rule.

23. The Batteries (Management and Handling) Rules 2001: This provides for ensuring safe disposal and recycling of discarded lead acid batteries likely to be used in any equipment during construction and operation stage. Rules require proper control and record keeping on the sale or import of lead acid batteries and recollection of the used batteries by registered recyclers to ensure environmentally sound recycling of used batteries. Contractors will ensure compliance to this Rule.

24. The Ozone Depleting Substances (Regulation and Control) Rules, 2000 and as amended: This provides for regulation of production and consumption of ozone depleting substances in the country, and specifically prohibits export to or import from countries not specified in the Rules, and prohibits unless specifically permitted, any use of ozone depleting substance.

25. The Coastal Regulation Zone Notifications, 1991 and as amended: This provides for regulation of development activities within the 500m of high tide line in coastal zone and 100m of stretches of rivers and estuaries influenced by tides. Contractors will be required to ensure that no work starts until applicable clearances under

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the Notification is not available. Contractors will be responsible for implementation of any plan stipulated as per the permission under this Notification; and will be required to prepare and submit to the employer and compliance report stipulated in the permission under the Notification.

26. The Motor Vehicle Act 1988 as amended (and State Motor Vehicle Acts as may be in force) and the Motor Vehicle Rules, 1989, and as amended (and State Motor Vehicle Rules as may be in force): To minimize the road accidents, penalizing the guilty, provision of compensation to victim and family and check vehicular air and noise pollution. Contractors will be required to ensure full compliance to these rules.

27. Easement Act, 1882: This provides for the rights of landowners on groundwater. Contractors will need to ensure that other landowners' rights under the Act is not affected by any groundwater abstraction by the contractors.

28. State Groundwater Acts and Rules as may be in force and the Guidelines for Groundwater Abstraction for drinking and domestic purposes in Notified Areas and Industry/Infrastructure project proposals in Non-Notified areas, 2012: These provide for regulating extraction of ground water for construction/industrial and drinking and domestic purposes. Contractors will need to obtain permission from Central/State Groundwater Boards prior to groundwater abstraction through digging any bore well or through any other means; and will to ensure full compliance to these rules and any conditions imposed in the permit.

29. The Mines Act, 1952 as amended; the Minor Mineral and concession Rules as amended; and the State Mineral (Rights and Taxation) Acts as may be in force: These provide for for safe and sound mining activity. The contractors will procure aggregates and other building materials from quarries and borrow areas approved under such Acts. In the event the contractors open any new quarry and/or borrow areas, appropriate prior permission from the State Departments of Minerals and Geology will need to be obtained. Contractors will also need to ensure full compliance to these rules and any conditions imposed in the permit.

30. The Insecticides Act, 1968 and Insecticides Rules, 1971 and as amended: These provide for regulates the manufacture, sale, transport, distribution, export, import and use of pesticides to prevent risk to human beings or animals, and for matters connected therewith. No one should import or manufacture; sell, stock or exhibit foe sale; distribute, transport, use: (i) any misbranded insecticides, (ii) any insecticide the sale, distribution or use of which is for the time being prohibited under the Act; and (iii) any insecticide except in accordance with the condition on which it was registered under the Act.

31. National Building Codes of India, 2005 and as amended: This provides guidelines for regulating the building construction activities in India. The code mainly contains administrative regulations, development control rules and general building requirements; stipulations regarding materials, structural design and construction; and building and plumbing services. Contractors will be required to comply with all Bureau of Indian Standards Codes dealing with: (i) use and disposal of asbestos containing materials in construction; (ii) paints containing lead; (iii) permanent and temporary ventilations in workplace; (iv) safety, and hygiene at the workplace; (v) prevention of fire; (vi) prevention of accidents from faulty electrical gadgets, equipment and accessories; and all other such codes incidental to the Contract.

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