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MILITARY ENGINEER SERVICES

BANGLADESH ARMED FORCES



MES SCHEDULE OF RATES-2016

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Published by
AHQ, E in C's Br, Wks Dte, Dhaka Cantt.

By the order of E in C



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CHAPTER – I

BUILDING AND ROAD WORKS

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CHAPTER – II

ELECTRICAL AND MECHANICAL WORKS

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CHAPTER - III

FURNITURE AND MISC

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Published by:

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Approved by

MD. SIDDIQUR RAHMAN SARKER, SGP, hdmc, ps
Major General
Engineer in Chief

April 2016

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MILITARY ENGINEER SERVICES

BANGLADESH ARMED FORCES



MES SCHEDULE OF RATES-2016

FOR

**BUILDINGS, ROADS, LANDING GROUNDS, WATER,
ELECTRIC SUPPLY, GAS, AIR CONDITION, FIRE
FIGHTING & CHLORINATION PLANT, FURNITURE,
STORES AND SUB SOIL INVESTIGATIONS.**

AHQ, E in C, Dhaka, Bangladesh

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PREFACE

1. MES Schedule of Rates 2016 (RATES AND SPECIFICATIONS) has been prepared under instructions and guidance of Engineer in Chief, Army Headquarters, Dhaka Cantonment to replace existing booklets - MES Schedule of Rates 2012 and Schedule for the Rate list of Furniture & the Rate list of conveyance of materials 2012. Besides updating the price, incorporation of modern technology was also taken into consideration to revise the schedule. Accordingly some items have been added/omitted. MKS system of measurement has been used in most of the places. Necessary conversion tables and data have been incorporated for consultation and ready reference.
2. The rates will be valid only if specifications given in the Schedule are strictly followed. However, if it is necessary to deviate from specifications, prior approval of the respective DW & CEs will be required. In case of disputes regarding application of any rate, the decision of E in C shall be final.
3. The specifications and rates will be valid till a new replacement is done. The rates will be reviewed from time to time. DW & CEs will forward proposed amendments with necessary data and analysis on 1st of January and July each year to E in C's Branch, who will arrange pre-audit, approval and will issue amendments, if considered necessary.
4. Reproduction in part or whole of this Schedule by any individual, Department, Contractor or Firm, etc. is prohibited. This Schedule may, however, be used by any individual, department, etc. provided the Contract Agreement makes a clear mention that the contract has been based on MES Schedule of Rates 2016.
5. We thank MES officers and staff who have worked whole heartedly to revise this MES Schedule of Rates 2016.
6. This schedule is supported by a programmed analysis of rates as per item of works.
7. Special thanks to E in C for his valuable guidelines to modernize the MES construction works and the furniture, who has also been kind enough to approve the MES Schedule of Rates 2016, which will be effective from 1st May 2016.

Dhaka Cantonment

April 2016

DIRECTOR OF WORKS
Works Directorate
E in C's Branch,
Army Headquarters

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SPECIFICATION-2016**

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SCHEDULE OF RATES & SPECIFICATION-2016**

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AMENDMENT RECORD SHEET

MES SCHEDULE OF RATES - 2016

Amendment List		By whom Amended	Date of Insertion	Initials
Number	Date			
(a)	(b)	(c)	(d)	(e)

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ABBREVIATIONS

ABBREVIATIONS	MEANING
AAMA	Architectural Aluminium Manufacturers Association
AC	Alternating Current
AV	Average
BDS	Bangladesh Standard
BS	British Standard

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BG	Birmingham Gauge
B/Q	Bill or Bills of Quantities
°C	Degrees Centigrade
CFL	Compact Fluorescent Lamp
cm	Centimetre
CRP	Cold Rolled Pipe
CC	Cement Concrete
CG	Cord Grip
CI	Cast Iron
CM	Cement Mortar
CMES	Commander Military Engineer Services
mm	Millimetre
km	Kilometre

ABBREVIATIONS

MEANING

LPM	Litre per minute
mg	Milligram
gm	Gram
kg	Kilogram
PCC	Plain Cement Concrete
RCC	Reinforced Cement Concrete
SDB	Sub-Distribution Board
S/F	Supply & Fixing
SDO	Sub-divisional Officer

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SO	Supplied only
SP	Single Pole
SPT	Standard Penetration Test
STA	Steel Tape Armoured
T&P	Tools and Plant
TP	Triple Pole
X	Ten
XLPE	Cross Linked Poly Ethylene
Pint	Pint
cu.cm	Cubic Centimetre

ABBREVIATIONS

MEANING

cu.m	Cubic metre
M.Nos	Thousand Nos. / Metre
MCB	Miniature circuit breaker
MCCB	Moulded case circuit breaker
MOCB	Minimum oil circuit breaker
MDB	Main distribution board
C.Nos	Hundred numbers
Dia	Diameter
DC	Direct current
DOL	Direct on line
DP	Double pole
DPC	Damp Proof Course
Drg	Drawing

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E in C	Engineer in Chief
exc.	Exceeding
EHT	Extra-High Tension
ES	Edison Screw Cap
ET	Electric Thread
GE	Garrison Engineer

ABBREVIATIONS

MEANING

GI	Galvanized Iron
SWG	Standard wire gauge
VCB	Vaccum circuit breaker
HD	Hard Drawn
HT	High Tension
RH	Relative Humanity
TPN	Triple Pole and Neutral
TR	Ton Refrigeration
sq. mm	Square millimeter
sq. cm	Square centimeter
sq. m	Square metre
IC	Iron Clad
IEE	Institute of Electrical Engineers
MES	Military Engineer Services
MGO	Master General of ordnance
MB	Measurement Book (BAFW-2261)
MOD	Ministry of Defence
LBS	Load break switch

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MS

Mild Steel

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ABBREVIATIONS

MEANING

M & S	Manufacture and supply
n.exc	Not exceeding
PFI	Power factor improvement
MDF	Medium density fibre
PILC	Paper insulated and Lead covered
PVC	Polyvinyl Chloride
UPVC	Un Plasticized Polyvinyl Chloride
Wg	Water grain

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CHAPTER – I
BUILDING & ROADS
GENERAL RULES

General

1. Where alternative materials, processes, etc are specified the selection will depend on local conditions and discretion rests with the GE/Engineer-in-charge.
2. **Approved, Directed, Ordered.** Means the approval, etc. of the GE / Engineer-in-charge, unless otherwise stated.
3. **Carriage.** Implies conveyance by any reasonable means over any negotiable surface and includes load, unload, re-load, etc.
4. **Component Parts.** The component parts of this Schedule (the Specifications, method of Measurements, Clarification or Rates, etc.) shall be read together.
5. **Definitions.**
 - a. **Ditto** wherever used in this schedule includes the whole of the work described in detail in the preceding item, but with such modifications as may be specifically mentioned.
 - b. **Materials and Labour** includes the supply of all materials, including lead for any distance, labour and workmanship necessary for the complete execution of the item as described, together with the use of all tools, plant, scaffolding and appliances that may be required.

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c. **Labour only or Except Materials** are to be understood as including the performance of all labour necessary for the proper carrying out of the particular service, complete together with the provision and use, without extra charge, of all tools, plants, scaffolding and appliances required.

d. **Except Bricks, Except Cement,** etc. include all necessary labour, plant, etc., as described in the foregoing clause, and in addition, all materials required except those specifically exempted.

e. **Fixing, Fixing only, Laying only and Setting only** include the performance of all labour necessary for the proper execution of the items as described together with the provision and use, without extra charge, of all tools, plant, scaffolding, and appliances required. In addition to the foregoing, they also include provision, including lead for any distance. Without extra charge of all materials subsidiary to and not supplied as part of the principal material but necessary for the execution of the work, e.g., nails, screws, glue, packing pieces, jointing and bedding materials and the like.

f. **Fixing only in Repairs Add to if Fixed in R/R** similarly includes all labour and subsidiary material required in fixing and in addition all necessary labour, plant, tools, etc., that may be required for taking out the old materials and removing to store. These rates include obtaining access by raising covers to fittings etc., and replacing them, breaking up large trusses, etc., into parts and, where applicable, painting one coat paint on new wood work of all and such like.

g. **Stores** used in connection with the supply of materials, or the disposal of old materials shall be held to mean any MES store or place of deposit within the area of the contract. In cases where out stations are included under a main contract, the "Store" is to be understood as referring to the MES store at that out station for all work so executed.

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6. **Rates.** The term Rates used in this schedule shall imply rates in this schedule and or contract rates based on this schedule of rates.

7. **Equal and Approved.** Where specific materials, processes, etc., are specified, the Engineer-in-Charge is at liberty to approve and accept suitable alternatives if the original is not available. This discretion does not rest with the contractor, and the necessary adjustments in price will be made under the appropriate sections of the schedule.

8. **Full Provision.** The contract rates will include every allowance necessary, without extra measurement or charge, for any or all of the following matters:

a. **Bad Work.** Remedy and make good all defective or bad work to the satisfaction of the GE/Engineer-in-charge.

b. **Complete work.** Materials, labour, tools, plant, machinery, wages, overhead charges (Business expenses which are indirect cost like rent, site office, mobilization, salary of staff, depreciation cost of equipment / machine / tools / plants, insurance, managerial / engineering services etc.) profit, carriage, delivery, erection, laying, fixing, VAT, taxes, royalties, etc.

c. **Contract Documents.** Full compliance with all matters in the contract documents including Schedules, Specifications, Drawings, particular specification, etc.

d. **Curved Work etc.** Work of any quantity, size or shape whether level, inclined, straight, curved, battered, etc.

e. **MOD Materials, Fittings, Fixtures, etc.**

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- (1) Load, remove from store, unload, unpack, assemble, prepare empty packages for return and return same to store.
 - (2) Any assumed loss or profit to the contractor for stores not supplied by him.
- f. **Difficult Position etc.** Accessibility or otherwise of site easy or difficult positions, foul, clean, wet or dry situation.
- g. **Dry Work etc.** Keep work clear of all water by pumping if required for which case extra payment shall not be admissible, extra payment shall be admissible for pumping out water (from powerful springs and subsoil water if soil test reports permits) by any means if specially ordered by the GE / Engineer in Charge.
- h. **Errors.** Rectify all errors to the satisfaction of the GE / Engineer-in-charge (e.g., when excavations are carried out deeper than ordered or required the level shall be made up with CC).
- j. **Handing Over.** Hand over the work clean, perfect and ready for use or occupation upto the general standard of all good MOD works.
- k. **Makers Instructions.** Comply with the use of proprietary articles.
- l. **Measurements.** Any contingencies (advantageous or disadvantageous) involved in the method of measurement herein set forth.
- m. **Rubbish.** Removal and disposal of rubbish:

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(i) Off MOD premises.

(ii) Anywhere on MOD premises within 4 km of site and any spreading, levelling, tacking, etc., as ordered by the Engineer-in-charge.

n. **Temporary Work, etc.** Provision of temporary roads, cart ways, fencing, handrails, lighting, watching also any cart ways, profiles, templates, gauges, measure, etc.

p. **Waste etc.** All waste, laps, seams, joints, cutting (rough or fair) straight, raking or circular and making good.

q. **Workers.** Provision of suitable skilled workers as required and all matters (accommodation, transport, sanitary services, etc.), in connection with the same.

9. **Generally.** Unless stated or specified elsewhere to the contrary these General Rules shall apply to all sections, where relevant.

10. **Identification of Items.** Items shall be identified by quoting the item number.

11. **Materials Supplied only.** The rates for "Materials Supplied only" are the rates, which have been used in composing the rates for the various Schedule items. The materials supplied only Rates, inter alia, include lead for any distance upto the site of work and the cost of containers. If the contract provides the issue of any of the materials listed under "Materials Supplied only", to the contractor on payment, the rates to be charged to the contractor shall be the same as the Materials Supplied only Rates, subject to the following conditions:

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- a. The delivery shall be made at the MES store (s) mentioned in the contract and the contractor shall, except where rates may otherwise specifically provide for removal in this Schedule (e.g., "Remove from store and fix-----") be deemed to have made due allowance in his contract price for loading and unloading transport to site, unpacking the stores, etc., as may be necessary.
 - b. The containers will become the property of the contractor and will not be taken back by the MES.
12. **Old Materials.** No extra charge shall be allowed for handling, fixing, etc., old materials as compared with new.
13. **Orders.** In writing shall be given for all approved directions. No verbal instructions shall be deemed to be binding nor shall such work be measured.
14. **Raise (Rising).** Includes any hoisting or lowering.
15. **Remove from Stores.** It shall include removal from store to site of work or, if directed, anywhere within a 4 kilometer radius.
16. **Remove off MOD Premises.** It shall include as an alternative a distance of 4 kilometer if required.
17. **Remove to Store.** It shall include removal from site of work to store or, if directed, anywhere within a 4 kilometer radius.

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18. **Specification or as Specified.** Refers to the specifications in this schedule.

19. **Store.** In Rules 11, 15 and 17 above implies :

- a. The MOD or MES store referred to in the contract.
- b. Any MES store in the contract area.

OR

- c. Any other stores or places n.exc. 4 kilometer from the site of work.

20. **Tools, Plants and Machinery.** Implies the use of all tools, plants and machinery required for the execution of the work and all charges in connection therewith.

21. **Uses.** This Schedule is intended to apply to every description or work that may be required in the construction and maintenance of buildings of all kinds belonging to or hired, or occupied by the Government of Bangladesh (MOD) also of Fortifications, roads, landing grounds, drainage, water supply, electrification, together with engineering works such as sea walls, groans, harbour and dock work, bridges, railways, etc., required by the several maintenance or special contracts.

22. **Water.** The water for the works may be obtained from MES supply system or Contractor may supply with his own arrangement with the permission of the Engineer-in-charge unless otherwise specified in the contract.

Measurements

23. **Money Unit.** The money unit (or rate) of each item is expressed in decimal coinage i.e., in Taka and paisa.

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24. **Net.** Measurements shall be net as fixed with no allowances for cutting, waste, laps for joints, risk, etc. No allowance is to be made for large or small quantities, easy or difficult positions, or other exceptional circumstances except where specifically provided for in the schedule.

25. **Other Method.** All work executed and paid for under this Schedule is to be measured in accordance with instructions and remarks detailed herein, without reference to any local custom or other practice, should these differ in any way from methods used in this schedule. Items, rates, descriptions of materials and workmanship, modes of measurements etc., contained in all previous schedules are to be considered as obsolete. They shall not constitute a precedence for purposes of comparison with (or interpretation of) the contents of this schedule.

26. **Removal.** This expression includes handle, load, convey by any means, unload, stack, weight, measure and in the case of MOD stores unpack, assemble, prepare and return empties to store in addition.

27. **Removal Distance.** This shall be measured by the shortest practicable route as approved.

28. **Tolerances.**

a. Unit of linear measurement shall be in metric system. Take dimensions to the nearest millimeter (except as otherwise indicated in the schedule) convert the measurement into meter and take two figures after the decimal. While rounding off 0.005 and below shall be ignored, 0.006 and above shall be taken as 0.01.

b. Workout the areas on the dimension mentioned in (a) above and take two figures after the decimal. Fraction 0.005 and below shall be ignored.

c. Workout cubic contents on the dimension mentioned in (a) and (b).

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Note. Measurement shall not be taken in feet and inches and converted into Metric system by utilizing the conversion table given in the schedule.

29. **Inclusive Descriptions.** The following principles will apply to the whole Schedule:

- a. Any description shall be assumed to comprehend any incidental processes.
- b. No extra measurement or description shall be made for any matter already described elsewhere.

30. The Distance refers to the distance from the place of origin to the final position in the work, irrespective of the number of processes (or stages) involved.

31. The Rates throughout this schedule shall be deemed to include everything incidental to the complete work and the satisfaction of the GE/ Engineer-in-charge and include among other matters:

- a. **Generally.** Full compliance with General Rules, etc., where relevant specially sub-rules 8 (a) to (o) inclusive.
- b. **Particularly.** All relevant matters in the particular section in which an item and rate occur.
- c. **Additionally.** Any relevant matters in any section.
- d. **Omissions.** Any matters generally necessary for the complete performance and handing over in a clear, serviceable condition of all work whether specially mentioned or not.

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32. Subject to the over-riding provisions of the Conditions of contract, payment for work not specifically mentioned herein shall be made as follows :

a. **Proportional Rates.** If there are analogous items in the Schedule for articles or workmanship of similar character, then at prices equal to the prices of such items, if the articles or workmanship are of equivalent value, or if differing in particulars and value, at prices determined by the applicable trade variations, the schedule item on which a price is based is to be stated on the order.

b. **Star prices.**

(1) If the articles or workmanship are so dissimilar as not admit direct assessment or proportionment as laid down in clause 32 (a) above, then at agreed prices, which shall be in conformity with the general standard of values in the schedule, and shall, whenever possible, be based upon suitable Schedule items.

(2) If in special cases, prices have necessarily to be determined from the amount of labour expended and the value of the materials incorporated, payment will be made as follows:

(a) Labour at Schedule Rates, given in "Labour Rate" Section, to which contractor's profit 10% + overhead expense 3.5% than VAT 5.5% is to be added as shown in separate column in labour Rate in the schedule.

(b) Rates for Materials included in the Schedule or prevailing market rates for materials not included in the schedule to which contractor's profit 10% & overhead expense 3.5% (business expense which are indirect cost like rent, site office, mobilization, salary of staff, depreciation cost of equipment / machine / tools /

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plants incurrence managerial engineering services etc) and than VAT 5.5%. is to be added

(c) PPR-2008, clause -80, sub-clause-'kha' is to be followed where applicable.

(3) Prices shall be determined before the execution of the order. If a price should depend upon particulars, which cannot be ascertained before the order is put in hand, the procedure by which the actual price is to be arrived when the necessary particulars are known shall be previously settled.

(4) Should a star price (approved by the CMES) be inserted in an order, it will be understood that agreed rate the contractor accepts it unless he objects in writing within six days from the receipt of the order.

c. Unless expressly stated in the order or agreement to be "Net" (in which case it must be so shown when billed) all special prices, other than those assessed from actual cost under (b) (2) above, shall be subject to the contract's percentage, if any.

33. The following conversion factors shall be used, unless otherwise stated elsewhere :

- | | | | |
|----|---|-------|---------------|
| a. | Mound | 37.25 | kg |
| b. | Lime (Unslaked) | 962.5 | kg. per cu.m |
| c. | Dressing Hot or cold and
cut back Bitumen. | 4.546 | kg. per litre |
| d. | M.S. rods | 7850 | kg. per cu.m |

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e.	Water at 4° Celsius	1000	kg. per cu.m
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34. GE includes independent AGE.

35. Additional cost for lifting above ground floor for major items are applicable as shown against the relevant items.

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SECTION-2

ROAD WORK, HARD STANDINGS LANDING GROUNDS

SPECIFICATION

General

1. **Aggregate.** See concrete section.
2. **Boulders.** Means hard stone round or angular exc. 75 mm but not exc. 225 mm least dimension.
3. **Cement.** The cement shall be ordinary, normal setting cement of any brand, complying in all respects with BS No. 12. Cement, unless otherwise specified to be of any particular quality, shall mean this ordinary, normal setting cement.
4. **Sand** Shall be from approved source and free from clay, salt and organic matter.
5. **Hot Dressing** (Bitumen straight run), **cold dressing** (Bitumen emulsion), **Bitumen / Cut-back** (hot application) and **plastic bitumen No. 4,** shall be of approved manufacture. These materials shall be used strictly in accordance with the instructions of the manufacturer.
6. **Formation.** Form the ground to the proper gradients, camber and super-elevation, corresponding to those to the final finished surface required. Excavate and fill in all soft places with firm soil and well rammed. Roll (dry) the formation surface with 8 to 12 ton power roller. The actual weight of the roller shall be varied at the discretion of the Engineer-in-Charge, according to the nature of the sub-soil, fill in with hard soil, depressions which may appear during rolling and

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leave the finished surface perfectly consolidated to the required gradients, camber and super elevation.

7. **Bottoming.**

- a. Use hard, suitable and approved locally used materials, unless otherwise specified. If boulders are used they shall be of full depth.
- b. Lay to full depth, hand pack on edge, fill interstices with spoils of the bottoming material.
- c. Lay to gradients, camber and super-elevation required and dry roll to a solid even finish with 8 to 12 tons power roller, the actual weight of the roller being varied at the discretion of the Engineer-in-Charge according to the nature of the sub-soil and the bottoming materials used.
- d. Make good with spoils of bottoming material, any hollows, which may appear during the process of consolidation and rolling so as to leave the finished surface solid and conforming to the required falls, levels etc.
- e. The thickness refers to the consolidated thickness after consolidation.
- f. If bricks are use, they shall be well burnt, whole bricks, closed laid flat, or on edge, spread sand to fill in voids and interstices at the following:

For 75mm thick @ 0.015 Cubic Metre per Sq. Metre.

For 125mm thick @ 0.021 Cubic Metre per Sq. Metre.

For 200mm thick @ 0.036 Cubic Metre per Sq. Metre.

8. **Water Bound Macadam Carpets.**

- a. Use approved suitable hard, tough and durable stone/bricks aggregate.

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- b. Road metal to be 50mm graded, produced from broken or crushed quarried stone or large boulders of the least dimension not less than 150mm or over burnt bricks.
- c. Lay to gradients, camber and super-elevation required and dry roll, filling in depressions, which may appear during rolling.
- d. Roll wet and adds screenings 12mm or less and rolls on leaving the finished surface solid, smooth and conforming to the required falls, levels, etc.
- e. Cover surface with 12mm layer of approved grit (gravel or shingle or bricks/stone screenings) and open road to traffic.
- f. Keep the road watered under traffic for 14 days and made good damages.
- g. Roller to be 8 to 12 ton power roller.

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9. **Pre-Mix-Carpets.**

a. Use the following materials for laying 1 Sq. Metre of 50mm thick (consolidated) carpet.

(1) Bitumen, straight run (Hot application) 0.488 kg for tack coat if the surface is bituminous and 0.976 Kg if the surface is non-bituminous.

(2) Bitumen (Hot application) for pre-mix 4.10 kg.

(3) Aggregate, 12mm gauze, consisting of broken or crushed stone, or gravel or shingle 0.061 cubic metres.

b. Rake all caked mud, dust, dirt or other deleterious matter by hand brushing with brushes and brooms and finally dust the surface with gunny bags to leave the surface perfectly clean. Allow the surface to be perfectly dry.

c. Apply tack coat of Bitumen straight run, heated to 150°C.

d. Lay the pre-mix carpet while the tack coat is still tacky. The aggregate and bitumen shall be mixed together in a suitable power driven mixer. The aggregate shall be loaded into the mixer first and coated with bitumen required for the batch. Mixing shall continue until all particles of aggregate are thoroughly coated with bitumen. The bitumen shall be maintained at a temperature of 150°C. The mixed materials when thoroughly coated shall be discharged from the mixer into wheelbarrows and transported to the site where the mixer shall be spread evenly on the base with rakes. The edges of the carpet shall be "tucked in" or protected with stone or concrete edging.

e. Consolidate the carpet thoroughly by rolling with 8 to 12 ton power roller.

f. Open the road to traffic 24 hours after consolidation.

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10. **Pot-Holes.** Before laying PRE-MIX or applying surface dressing all pot-holes shall be properly repaired and humps removed.

11. Where rolling is impracticable e.g. angles, recesses, corners, etc. Consolidation shall be done with iron rammers.

12. **Rolling.** If rolling/consolidation of various surfaces by mechanical rollers are done in a period less than that specified below with a tolerance of 10% both ways, an appropriate recovery adjusted by tendered percentage will be made from the contractor at the rates quoted against each.

Description of Surface	Area in sq.m specified per working hour for the following mechanical (Diesel) rollers		Rate of Recovery in Taka					
			Working hours with fuel		Working hours without fuel		Non-working hours	
	8 Ton	10/12 Ton	8 Ton	10/12 Ton	8 Ton	10/12 Ton	8 Ton	10/12 Ton
1. Formation surface	-	220.00	330.00	375.00	66.00	75.00	33.00	37.50
2. Soling/Bottoming 10cm	100.00	100.00	330.00	375.00	66.00	75.00	33.00	37.50
3. Do 15 cm	-	70.00	330.00	375.00	66.00	75.00	33.00	37.50
4. Do 22.5	-	46.50	330.00	375.00	66.00	75.00	33.00	37.50
5. Water bound macadam 7.5 cm	-	35.00	330.00	375.00	66.00	75.00	33.00	37.50
6. Do 10 cm	-	25.00	330.00	375.00	66.00	75.00	33.00	37.50

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7.	Do 15 cm	-	8.00	330.00	375.00	66.00	75.00	33.00	37.50
8.	Do 30 cm		4.00	330.00	375.00	66.00	75.00	33.00	37.50
9.	Premix carpet 2.5 cm	-	100.00	330.00	375.00	66.00	75.00	33.00	37.50
10.	Do 3.75 cm	-	100.00	330.00	375.00	66.00	75.00	33.00	37.50
11.	Do 5.00 cm	-	100.00	330.00	375.00	66.00	75.00	33.00	37.50
12.	Seal coat	-	150.00	330.00	375.00	66.00	75.00	33.00	37.50

13. Cement concrete paving for roads, hard standings, landing grounds etc.:

- a. Use approved suitable, hard, tough and durable stone/bricks aggregate.
- b. Use 19mm graded aggregate of broken or crushed stone or ballast or shingle or gravel or bricks.
- c. Provide sand cushion and/or bottoming as required. Where bottoming is specified fill in interstices in the bottoming with sand.
- d. Ensure that the surface, over which the concrete is to be laid, is finished to the required gradient, camber and super elevation.
- e. Immediately before laying of the concrete wet the surface over which the concrete paving is to be laid.
- f. Lay cement concrete of the mixes in one or two layers to the thickness, as required. If the work consists of two layers the second layer shall be laid directly over the first layer next day but not later than 24 hours after the bottom layer has been laid. The slabs shall be of the sizes ordered by the Engineer-in-Charge and shall be laid in alternate bays. The form work shall be of steel or timber as approved by the Engineer-in-Charge. If wooden form work is used, planks shall not be less than 25mm thick and the stays shall not be more than 30 cm apart.

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14. **Expansion Joints.** Form expansion joints between the slabs to the full depth of the concrete. The expansion joints shall be 12 mm wide.

Method of Measurements

15. **Measurements for Road Materials.**

- a. Sand, bajri, shingle, broken stones, broken bricks, or the like shall be measured net when in box form or in carts or lorries at the site of work.
- b. In measuring stacked sand, bajri, shingle, broken stone, broken bricks or the like a deduction of one-twelfth shall be made from the measurements to allow for unevenness in ground, loose stacking etc.
- c. Boulders and quarried stone for road metal will be measured after breaking as in (b) above. Boulders and quarried stone for bottoming shall be measured net after incorporation in the work. Where either of the above methods of measurement of boulders and quarried stone is impracticable these materials shall be stacked in tightly packed stacks not less than one metre in height and a deduction of 15% made from the gross measurements to allow for voids.
- d. All 'Carpeting' materials for either new work or repairs shall be stacked in regular heaps, and measurements of it taken before spreading. In the case of pre-treated materials, before deliveries may be measured in the Lorries or carts.
- e. Thickness refers to consolidated thickness after consolidation.

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16. **Pot-Holes.** Any pot-hole n.exc. 0.10 sq. metre shall be measured 0.10 sq. metre.

Clarification of Rates

17. **The rates, inter alia, include particularly following :**

- a. Rolling includes consolidating small area inaccessible to a roller, with iron rammer.
- b. Pot holes, each exceeding 0.10 sq. metre shall be paid for as new work under the relevant items.
- c. Formation surfaces and bottoming for concrete surfaces shall be paid for separately under the relevant rates in this section.
- d. Wetting surfaces before laying concrete in roads, hard standings and landing grounds etc.
- e. Premix Carpeting work by asphalt plant to be considered for at least one km length of Road(3M width)/Termac Carpeting.

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SECTION-3

CONCRETE

SPECIFICATION

General

1. Aggregate shall be of hard broken well-burnt bricks, crushed stone, gravel, shingle, ballast or bajri free from dust. For concrete work, it shall be clean, free from loam, clay, organic or other impurities and salt. All aggregate shall be known by their grade according to the following table subject to a 10 percent, excess or shortage of any materials of any gauge enumerated therein.

TABLE OF AGGREGATES

Class of aggregates	Proportional parts by volume											
	Gauges (See para 4 below)											
	60 mm	50 mm	38 mm	25 mm	19 mm	12 mm	9 mm	6 mm	3 mm	2.5 mm	2 mm	0.60 mm
Coarse aggregate												
60 mm graded	10	-	5	-	3	-	2	-	-	-	-	-
50mm graded	-	10	5	-	3	-	-	2	-	-	-	-
38mm graded	-	-	10	5	-	3	-	2	-	-	-	-
25mm graded	-	-	-	10	5	3	-	2	-	-	-	-
19mm graded	-	-	-	-	10	5	-	3	2	-	-	-
12mm graded	-	-	-	-	-	10	5	3	2	-	-	-
9mm graded	-	-	-	-	-	-	10	5	3	2	-	-
6mm graded	-	-	-	-	-	-	-	10	5	3	2	-

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Fine aggregate 3mm	-	-	-	-	-	-	-	-	10	5	3	2
graded coarse sand												
2.5mm graded fine sand	-	-	-	-	-	-	-	-	-	10	5	5

Coarse aggregate not required to be uniformly graded as shown in the above table shall be known as mixed aggregate. Its size shall be specified in term of the largest gauge required, e.g. n.exc. 60mm graded n.exc. 50mm graded etc. and shall consists of the various gauge to correspond to the sample approved by GE / Engineer-in - charge.

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2. Ballast, gravel or shingle in angular in shape naturally mixed with sand to various proportions, which will be graded as per table above. When used in substitution for a sand and stone mixture, it must be clean and must shown to the satisfaction of the inspecting officer a grading approximating to that of the mixture in lieu of which it is used, such material being added to or removed from the ballast or gravel as may be necessary to obtain the required grading.

3. Bajri is clean, round and smooth, where available ballast or gravel will be given preference over BAJRI.

4. **Gauge of Aggregates.** The following table shows what is implied by the term gauge used in this schedule, to specify the size of aggregates.

Gauge	Passing square mesh of (100%)	Retained on square mesh of (50%)
60 mm	75 mm	50 mm
50 mm	60 mm	38 mm
38 mm	50 mm	25 mm
25 mm	38 mm	19 mm
19 mm	25 mm	12 mm
12 mm	19 mm	9 mm
9 mm	12 mm	6 mm
6 mm	9 mm	3 mm
3 mm	6 mm	2.5 mm (7 mesh)
2.5 mm (7 mesh)	3 mm	1.2 mm (14 mesh)
1.2 mm (14 mesh)	2.5 mm (7 mesh)	0.6 mm (25 mesh)
0.6 mm (25 mesh)	1.2 mm (14 mesh)	0.2 mm (60 mesh)

Note : Maximum nominal size of coarse aggregate shall be the minimum of the following.

- a. $\frac{1}{5}$ the narrowest dimension between sides of forms.
- b. $\frac{1}{3}$ the depth of slabs

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c. $\frac{3}{4}$ the minimum clear spacing between individual reinforcing bars or bundles of bars or pre stressing tendons or ducts.

d. The above limitations may be relaxed if in the judgment of the Engineer, workability and methods of consolidations are such that concrete can be placed without honeycomb or voids.

5. Alternative aggregate of hard broken bricks and broken cement concrete will NOT be permitted in RCC pre-stressed concrete in any position.

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6. **Cement.** The cement shall be ordinary, normal setting cement of approved brand complying in all respect with BDS EN 1997-1: 2003 CEM-I. Cement, unless otherwise specified to be of any particular quality shall mean this ordinary, normal setting cement.

7. **Lime Terracing (Specification).**

a. **Materials & Method.**

(1) The materials surki lime and aggregate are measured in the proportion 2:2:7 and spread over a nonporous ground platform. Aggregate be soaked thoroughly in water before use. A ground platform is essential for easy mixing and storing of ingredient.

(2) Aggregate are made out 1st class bricks of 19mm grading. Lime is unslaked/stone lime. Surki is out of first class bricks and insoluble in water.

(3) All ingredients are to be mixed thoroughly. The mixer is kept for about 10 (ten) days until an adhesive/semisolid bond is developed among the ingredients. During this period whole mixer is turned twice/thrice and lime water is added as per requirement. Precaution is taken to save the materials from sun & rain.

(4) Before applying the terracing, the surface of the roof is cleaned and lime concrete is laid in single layer about 20% thicker than specified for consolidation with slope towards gutter.

(5) The lime concrete is then thoroughly consolidated by beating with wooden mallet. The beating is to be systematic by lengthwise. Movement of labourers from one end to other end on the entire width of the roof.

(6) While the beating of concrete is going on the surface of concrete is frequently sprinkled with lime water and a mixer of molasses, Catechu and boiled solution of Methi seeds for 9 sq.m surface area of 75mm (av) thickness, 50 Litre solution is taken. Solution is prepared by dissolving 4.0 kg of lime, 4.50 kg

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molasses, 0.36 kg catechu, 0.75 kg of Methi seeds boiled in 15 Litre of water. The mixer is stirred thoroughly before use with a wooden stick. Consolidation by beating with mallet continued until the mortar set fully and mallet rebound from the surface. Special care taken not to allow lime concrete to dry before it is thoroughly consolidated.

(7) The roof surface is kept wet for about 10 (Ten) days by intermittently spraying water on gunny bags.

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b. Lime terracing (2:2:7)

Materials required per cu.m

Lime un-slaked	=	172.16	kg
Surki	=	0.2727	cu.m
Brick aggregate	=	0.9545	cu.m
Molasses	=	6.667	kg
Methi seeds	=	1.111	kg
Catechu	=	0.533	kg

8. **Lime Shall be.**

- a. Moderately hydraulic for concrete, brick work or stone works, except for mixed cement and lime concrete and mortar when it will be fat.
- b. Rendered hydraulic, if required by the addition of under burnt ground surki.
- c. Properly burnt in kilns, kept dry until slacked ground screened through 3mm-mesh screen and slacked at site.
- d. Deemed to weight 962.5 Kg per Cubic Metre, before slacking for purposes of estimating the proportion specified for use.

9. Sand shall be from approved source, free from dust and salt.

10. **Surki Shall be.**

- a. Hard, well burnt insoluble in water used in lieu of sand.

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b. Under burnt and soluble in water when used for imparting hydraulicity to lime mixtures and ground to pass a 1.5mm mesh/sieve and used in the proportion of:

(i) Lime : 0.50 Surki : 1.5 Sand for 1 : 2 mix

(ii) Lime and so : 1 Surki : 2 sand for 1 : 3 mix
on

11. **Proportions.** The proportions given are by bulk. The gauge boxes shall of such dimensions that a complete bag of cement forms a unit of 0.0345 cubic metre, when cement is re-bagged it will be done by weight so that a complete bag will weight 50 Kg.

12. **Mixing.** Concrete mixed by machinery, shall be mixed for at least 2 minutes. Hand mixing shall be done on a clean platform. the lime or cement and sand shall be thoroughly mixed together dry. The aggregate shall be first soaked with the prescribed quantity of water and the other mixed ingredients added and the whole turned over three times. Sufficient water being added through a rose to make the mixture workable. Hand mixing shall only be allowed if total quantity of cement concrete for the day work does not exceed 1.50 cubic metre. No hand mixing shall be allowed for RCC work.

13. **Depositing.** Concrete shall be used as mixed, deposited and well-consolidated in layers n.exc. 15cm thick cement concrete in which the initial set has taken place shall be rejected.

14. **Working up.** Carefully work up and put concrete against surfaces and around reinforcement so that the later is not displace.

15. **Aggregate.** All aggregates for PCC/ RCC works shall be 19mm graded unless otherwise shown in the drg.

16. **Size of Coarse Aggregates.** Maximum nominal size of coarse aggregate shall be the minimum of the following.

a. 1/5 the narrowest dimension between sides of forms.

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- b. $\frac{1}{3}$ the depth of slabs
- c. $\frac{3}{4}$ the minimum clear spacing between individual reinforcing bars or bundles of bars or pre stressing tendons or ducts
- d. The above limitations may be relaxed if in the judgement of the Engineer workability and methods of consolidations are such that concrete can be placed without honeycomb or voids

17. **Form Work.** Includes rough wrought casings, forms, mould, centering of any shape, size or section all struts, supports, spikes, bolts, dogs, etc. together with erection, easing, striking, removal, use and waste up to 6 months. Form work shall be paved over with soap, grease or lime wash to prevent adhesion of concrete. Steel shuttering has been considered for RRC works.

18. **Reinforcement.** For concrete shall be measured separately as supplied and fixed under "Steel and Iron works" section.

19. Exposed faces of cast in situ pre-cast and reinforced concrete shall be brought to fair and even surface by through punning (by working the concrete against the casings and the centering) and tamping, whilst the concrete is being poured in, and also by working over the surface with a trowel immediately after the removal of the casings, or centering, in order to remove any irregularities and stop up any air holes, using where necessary, cement mortar which will give a similar appearances to the original concrete. Separate plaster after the initial set shall not be allowed.

20. **Channels.** Formed in concrete shall be finished fair to proper falls with all bends, stopped ends, etc., required.

21. **Pointing.** The joints of concrete block walling shall be raked out as the work proceeds and the surface cleaned and brushed. Flush pointing in addition shall be executed as required.

22. **Linear Girth (Small).** Refer to chamfers, splays rounded angles, coved angles, beads, grooves, rebates, n. exc. 10 cm girth, and mouldings, n.exc. 15 cm girth.

23. **Incidental Labours.** Refer to stops, returns, rounded ends, junctions, dishing, etc. in connection with linear superficial labours.

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24. **Curing and Protection.** Concrete shall be kept wet for 10 days after laying and protected with sand, sawdust, gunny bags etc., as required. Protect concrete from frost of any other damage.

25 **Unless.** Unless otherwise stated fair finish shall imply even, fair but not smooth finish.

26. **Piling.**

a. **Boring/ Drilling of Cast in Situ Pile.** Boring/ drilling for cast in situ pile up to the required depth and diameter with temporary steel casing, true to vertical, providing bentonite slurry and maintaining water level in the hole, washing the hole for at least 30 minutes, clean the bore-hole and make the bore-hole ready for placing steel cage and except concreting but including charge of rig set with winch machine, tripod stand, trimie pipe, cost of fuel, lubricant, mobilization, demobilization, maintenance, spares, stand-byes, water, electricity & other charges all complete as per design and direction of Engineer-in-Charge.

b. **Casting of Cast in Situ Pile.** Reinforced cement concrete works (1:1.5:3) in bore-hole for making cast-in-situ pile having minimum compressive strength 20 Mpa at 28 days or as shown in the drg. on standard cylinder with cement conforming to BDS 232 & ASTM standard mixed with best quality coarse sand (FM 2.5), 19 mm down well graded crushed stone chips including breaking chips, screening through proper sieves, making, placing re-bar cage in position, placing & removing tri-pod as per requirement, pouring the concrete in bore-hole, maintaining the trimie pipe immersed in concrete by at least 1 meter throughout the period of concreting, maintaining required slump etc. mixing the aggregates with mixer machine with hopper, casting in forms, all complete in water, electricity, testing of materials and concrete etc & other as per design, drawing and direction of Engineer-in-Charge.

c. **Conducting Static Load Test.** Conducting static load test for the cast-in-situ/ pre-cast pile providing required scaffolding, bracing, jacks, pressure test gauge, loading unloading, Kent ledge and other plants and equipment including staging, mobilization, demobilization, hire charge, gunny bags & sand filling sack / gunny bags for loading, record readings & preparation of results in standard forms & other incidental charges as per standard practice and procedures incl submission of load test report, furnishing all graph and chart as per standard practice & direction of the Engineer-in-Charge. Allowable settlement shall not be more than .00028 mm per kg of the test load nor 20 mm.

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d. **Pre-cast Pile.** Pre-cast driven pile with reinforced cement concrete (1:1.5:3) having minimum compressive strength 25 Mpa at 28 days or as shown in the drawing on standard cylinder with cement conforming to BDS 232 & ASTM standard mixed with best quality coarse sand (F.M. 2.5), 19 mm down well graded stone chips in mixture machine incl cost of breaking chips, screening through proper sieves, cleaning and washing, centering and shuttering with M.S sheet, M.S angle, F.I bar, nuts & bolts, preparation of bed, laying polythene, placing of reinforcement cage in position, casting, compacting by vibrators and tapered rods, curing for 28 days etc. incl cost of water, electricity & other charge, providing pile shoe as per design & drawing, test materials & concrete etc. all complete as per direction of the Engineer-in-Charge.

e. **Driving of Pre-cast Pile.** Driving the pile up to the design depth as per standard practice or specified method providing head cushion, all equipments including mobilization and hire charge of driving set.

27. **Different Type of Admixtures.** Supplying and mixing specified type chemical admixture from an authorized local agent or manufacturer, comply with the ASTM C-494 requirements, conforming the current compliance of the admixture to specification requirements like physical properties, uniformity & equivalents in composition etc., performance (water content, fresh concrete setting time and compressive strength) requirements, delivered in sealed water-tight containers having and conforming plainly marked the proprietary name of the admixture type under this specification, net weight & / or volume, manufacturing and expiry date, non aggressiveness to environment, aggregates and metals in concrete etc. and mixing the admixture in non pre-stressed cement concrete mixture in the field under the strict accordance with manufacturers recommendation and instruction, providing safety provisions in all respects etc. all complete as per instruction of Engineer-in-Charge.

Doses and specifications for different type admixtures of Baral Chemical Co. / Dr Fixit or equivalent are attached with this section.

Method of Measurements

28. **Tolerances.**

- a. Take lengths to nearest centimeter.
- b. Take widths to nearest centimeter.
- c. Take thickness (Least dimension) to nearest millimeter.

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29. **Attached Works.** In reinforced concrete (Pilasters, buttresses, string-courses, beams girders etc.)

- a. Walls: Measure all projecting portions with the walls and pay at the same rate.
- b. Floors or Roofs: Measure all projecting portions (beams, haunches, etc.) separately and pay at the rate for beams, girders, columns, etc.

30. No deductions or additions shall be made on any account for:

- a. No deduction for volume of reinforcement, ends of dissimilar materials, i.e. joists, beams posts, girders, purlins, trusses, corbels, steps, etc., n. exc. 450 Sq. cm in section.
- b. Opening n.exc 0.20 sq. metre.
- c. Joints (Locking rebated, tongued and grooved etc.,)
- d. Linear labour (Small) and incidental labour.
- e. The portions shaded in the following sketches in the page-87 (Measuring throughout as a X b where such do not exceed 37.50-sq. cm in section. If they exceed 37.50 sq. cm each, the work will be measured net.
- f. Channels shall be measured as $(axb) - \frac{3}{4} (c \times d)$. except where the shaded portion does not exceed 37.50 sq cm in section; **See fig 10 page-90.**
- g. Other sections shall be measured net.

31. **Staircases.**

- a. Measure spandrel steps net.
- b. Measure half and quarter space landings as part of stair.

32. **Channel Formed in Poured Concrete.** When over 37.50 sq cm in section the curved waterway shall be deducted at $\frac{3}{4} \times \text{width} \times \text{depth}$ (maximum dimensions).

Clarification of Rates

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33. The rates, inter alia include particularly:
- a. All matters specified which apply.
 - b. Aggregates of any grade.
 - c. Work in 15 cm (or less) layers.
 - d. Work in any position and of any thickness.
 - e. Linear and incidental labours produced by form work, cores, etc. except where a separate item exists.
 - f. Curing and protection.
 - g. Roughening surfaces of old concrete (where adjoining new) sweeping cleaning and watering.
 - h. Form work incl. using chatai under RCC roof slab.
 - j. 25 mm length of weilding has been considered as one point of weilding.
34. Walls include attached work (pilaster, buttresses, strings, cornice, plinths etc.) also partition and other work not specifically mentioned.
35. Stairs include stairs of any type, straight, doglegs, winding, open or closed, and steps of square of spandrel section, any shape or plan, strings, carriages and landings less than 1/4 space.
36. Additional cost for lifting above ground floor for major items are applicable as shown against the relevant items.

Specifications / Uses of Different Types Chemical Products of Baral Chemical Co. Ltd. / Dr Fixit or Equivalent to Prevent Salinity, Dampness of Different Structures / Members of New Buildings to Make Them Water Proof and Long Lasting

37. The uses of chemicals to prevent salinity, dampness of new buildings and make them water proof and long lasting are as follows :
- a. In the concrete of piling :
 - b. In the concrete of floor of new basement:

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- c. In the concrete of retaining walls of new basement:
- d. In the concrete of underground water reservoirs:
- e. In the concrete of over-head water reservoirs:
- f. In the plastering mortar of underground and over-head water reservoirs:
- g. In the concrete of underground footings and tie beam columns:
- h. In the concrete of beams, columns, slabs etc. of superstructures:
- j. In the concrete of top slabs:
- k. In the fair face concrete:
- l. To make Curdy-dense cement grout for the joints of concretes:
- m. In the mortar of brick-walls cladding:
- n. To prevent the salinity, Desalt-S₀₁ applied on brick-walls before plastering:
- p. In the plastering mortar of walls to create strength & to remove salinity:
- q. Anti-salinity Sealer Desalt-S₀₁ applied on plaster before painting:
- r. To prevent the dampness and salinity of walls inside of kitchens and toilet walls of new buildings:
- s. In the mortar of Tiles-Cladding :
- t. To prevent the dampness and salinity of skirts level of newly constructed buildings:
- u. Mosaic works with Foam-Lub:
- v. In the cladding-mortar of tiles, marble, stones, etc. on floors:
- w. To prevent the stigmas of mosaic and marbles caused from coffee, tea etc. :
- x. In the cladding-mortar of fair face sand stone, ceramic, and fancy bricks:
- y. To prevent the salinity, tendency of water absorption, and the birth of algae on sand stone, ceramics, sand stone and ordinary as well as fine bricks:
- z. To prevent the salinity and dampness of ground floors of newly constructed building:
- aa. Water proofing & Heat reducing treatment at roof of new buildings:
- bb. To keep away termite & insects from the ground floors & external of newly

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constructed buildings:

38. **Foam-Lub used in The Concrete of Piling.**

a. **Merits / Functions.** Creating anti rust layer by peeling off the previous layer of rust on rods; Permanent prevention of rust using chloride, sulfur and carbonation process; Effective concreting against the intruding and extruding water in the holes of piling; Prevention of segregation or bleeding caused by excessive vibration to create compaction against pores and void; The achievement of high strength (up to 0.53) from the water & cement ratio; Achievement of higher ultimate strength at all events; The discharge of excessive water; The prevention of corrosion of concrete; Acting as the Lubricant, Plasticizer, and Water reducer.

b. **Method of Chemical Mixing.** Mix 125 ml. Foam-Lub (or as per table attached) with a full-bag-cement (50 kg). Mix up Foam-Lub with the concrete generated from the mixture of water, cleaned sand and cement. Usually, a bag of cement requires 20-22 liter water for optimum mixture.

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39. **Foam-Lub used in The Concrete of Basement Floors.**

a. **Merits / Functions.** Highly Water proofing; Joint monolith bonding with the help of curdy-dense Foam-Lub grout applicable to casting of different duration; Concreting in flowing or still water; Fast achievement of resistance power of “Water and Cement Ratio (up to 0.53); Achievement of higher ultimate strength at all events; The discharge of excessive water; Concreting in the rain; Reducing and emitting *Heat of Hydration* ; Prevention of segregation and bleeding in excess water and in excess vibration for appropriate compaction to resist pores and void; Prevention of salinity and dampness; Creating anti rust layer by peeling off the previous layer of rust on rods; Permanent prevention of rust using chloride, sulphur and carbonation process; Saving concrete from the chloride and sulphur; Water reducer of concrete; The prevention of corrosion of concrete; Acting as the Lubricant, Plasticizer, water reducer of concrete; Having high workabilities; Acting as partial auto-curing and free flowing; Brings the fine brightness of concrete.

b. **The Amount of Foam-Lub in The Concrete of Basement Floors.**

300mm thickness 500 ml. Foam-Lub with one bag cement.	Thickness greater than 300mm 400 ml. Foam-Lub with one bag cement.
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c. **The Amount of Foam-Lub in The Concrete of Basement Floors (Incise of Water Intrusion).**

300mm thickness 1 Liter Foam-Lub with one bag cement.	Thickness greater than 300mm 800 ml. Foam-Lub with one bag cement.
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40. **Foam-Lub used in Concrete of Retaining Walls at New Basements.**

a. **Merits / Functions.** Highly water proofing; Joint monolith bonding with the help of curdy-dense Foam-Lub grout applicable to casting at different time; Working without Water stopper & Felt ; Concreting in flowing or still water; Fast achievement of resistance

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power of “Water and Cement Ratio (upto 0.53); Achievement of high strength early; Achievement of higher ultimate strength at all events; The discharge of excess water; Concreting in the rain; Reducing and emitting *Heat of Hydration* ; Prevention of segregation and bleeding in excess water and in excess vibration for appropriate compaction to resist pores and void; Prevention of salinity and dampness; Creating anti rust layer by peeling off the previous layer of rust on rods; Permanent prevention of rust using chloride, sulphur and carbonation process; Saving concrete from the chloride and sulphur; Water reducer of concrete; The prevention of corrosion of concrete; Acting as the Lubricant, Plasticizer, water reducer of concrete; Having high work abilities; Acting as partial auto-curing and free flowing; Brings the fine brightness of concrete.

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b. The Amount of Foam-Lub in The Concrete of Retaining Walls.

300mm thickness 500 ml. Foam-Lub with a bag of cement.	Thickness greater than 300mm 400 ml. Foam-Lub with a bag of cement.
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c. The Amount of Foam Lub in The Concrete of Retaining Walls (Incase of Water Intrusion).

300mm thickness 1 Liter Foam-Lub with a bag of cement.	Thickness greater than 300mm 800 ml. Foam-Lub with a bag of cement.
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41. Foam-Lub used in The Concrete of New Underground Water Reservoirs.

a. **Merits / Functions.** Highly Water proofing; Joint monolith bonding with the help of curdy-dense Foam Lub grout applicable to casting at different time; Working without Water stopper & Felt ; Concreting in flowing or still water; Fast achievement of resistance power of "Water and Cement Ratio (upto 0.53); Achievement of high strength early; Achievement of higher ultimate strength at all events; The discharge of excess water; Concreting in the rain; Reducing and emitting *Heat of Hydration* ; Prevention of segregation and bleeding in excess water and in excess vibration for appropriate compaction to resist pores and void; Prevention of salinity and dampness; Creating anti rust layer by peeling off the previous layer of rust on rods; Permanent prevention of rust using chloride, sulphur and carbonation process; Saving concrete from the chloride and sulphur; Water reducer of concrete; The prevention of corrosion of concrete; Acting as the Lubricant, Plasticizer, water reducer of concrete; Having high work abilities; Acting as partial auto-curing and free flowing; Brings the fine brightness of concrete.

N.B.: Foam-Lub guards concrete against the erosion caused by the chlorine of water.

b. The Amount of Foam-Lub in The Concrete Of Underground Water Reservoir (Dry Concrete).

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Thickness up to 250mm 500 ml. Foam-Lub with one bag cement.	Thickness greater than 250mm at least 400 ml. Foam-Lub with one bag cement.
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c. **The amount of Foam-Lub in The Concrete of Underground Water Reservoir (Incise of Water Intrusion).**

Thickness up to 250mm 1 Liter Foam-Lub with one bag cement.	Thickness greater 250mm at least 800 Foam-Lub with one bag cement.
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42. **Foam-Lub used in The Concrete of New Overhead Water Reservoirs.**

a. **Merits / Functions.** Prevention of segregation and bleeding in excess water and in excess vibration for appropriate compaction to resist pores and void Complete Water proofing; Achievement of higher ultimate strength at all events; Joint monolith bonding with the help of curd-dense Foam Lub grout applicable to casting at different The discharge of excess water; Permanent prevention of rust using chloride, sulfur and carbonation process; Acting as partial auto-curing and free flowing; Brings the fine brightness of concrete.

b. **Method of Chemical Mixing and Using.** Use 800ml. to 1 Liter Foam-Lub with a bag of cement to prepare the concrete of floors and walls.

N.B.: Foam-Lub guards concrete against the erosion caused by the chlorine of water.

43. **Foam-Lub used in The Plastering Mortar of Underground and Overhead Water Reservoirs.**

a. **Merits / Functions.** Prevention of Hair Crack in high temperature; Achievement of early high strength; Better creeping; Partial auto curing; Water proofing; High work abilities; Water reducer; platicizer, retarded; reducer of void and pores; Prevention against the harmful effect of acid rain; Prevention of harmful effect caused by chloride, sulphur and carbonation process; Bringing fine glazes; and other advantages.

b. **Method of Chemical Mixing.** Use 250 ml. Foam-Lub with each bag of cement to prepare plastering mortar.

c. **Preparation and use of Curdy-Dense Foam-Lub Cement Grout for Neat Finishing.**

Foam-Lub + Cement + Water = 2 Liter + 1 bag or 50 kg + 35-38 Liter.

First mix Foam-Lub with water. Then use the mixture with Cement to prepare curdy-dense Foam-Lub cement grout. Apply the grout in neat finishing within 1 hour of preparation.

44. **Foam-Lub used in The Concrete of Underground Footing, Tie Beam, Column Etc.**

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a. **Merits / Functions.** Fast achievement of resistance power of "Water and Cement Ratio (upto 0.53); Achievement of high strength early; Achievement of higher ultimate strength at all events; The discharge of excess water; Concreting in the rain; Prevention of segregation and bleeding in excess water and in excess vibration for appropriate compaction to resist pores and void; Creating anti rust layer by peeling off the previous layer of rust on rods; Permanent prevention of rust using chloride, sulfur and carbonation process; Saving concrete from the chloride and sulphur; Acting as partial Auto-curing and free flowing.

b. **Method of Chemical Mixing.** Use 200 ml. to 250 ml. Foam-Lub with each bag(50kg.) of cement to prepare concrete.

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45. **Foam-Lub used in Concrete of Casting of Super Structure Beam, Column, Slab Etc:**

a. **Merits / Functions.** Joint monolith bonding with the help of curd-dense Foam Lub grout applicable to casting at different time ;The discharge of excess water; Concreting in the rain; Prevention of salinity and dampness; Creating anti rust layer by peeling off the previous layer of rust on rods; Water reducer and water of concrete; Acting as the Lubricant, Plasticizer, water reducer of concrete; Brings the fine brightness of concrete.

b. **The Amount of Chemical Mixing.** Use 125 ml. Foam-Lub with each bag(50kg.) of cement to prepare concrete.

46. **Foam-Lub used in The Concrete of Top Slab.**

a. **Merits/Functions.** Prevention of water leakage and dampness; Fast achievement of resistance power of "Water and Cement Ratio (up to 0.53); Achievement of high strength at all events; The discharge of excess water; Concreting in the rain; Prevention of segregation and bleeding in excess water and in excess vibration for appropriate compaction to resist pores and void; Joint Monolith bonding with the help of Curd-dense Foam-Lub Grout applicable to casting at different time'Creating anti rust layer by peeling off the previous layer of rust on rods; Permanent prevention of rust using chloride, sulfur and carbonation process; Prevention of harmful effect of acid rain; Guard concrete against the harmful effect of chloride and sulphur; Act as Water reducer plasticiser, Retarder lubricant of concrete; High working abilities; Partial free flowing and Auto curing; Bringing fine fairness.

b. **The Amount of Chemical Mixing.** Use 200 ml. to 250 ml. Foam-Lub with each bag of cement to prepare concrete.

N.B.: New top slab of concrete mixed with optimum Foam-Lub mixture doesn't need any water proofing or lime tracing for at least 5 years.

47. **Foam-Lub used in The Fair Face Concrete.**

a. **Merits / Functions.** Bringing fine fairness; Prevention of segregation and bleeding in excess water and in excess vibration for appropriate compaction to resist pores and void; Permanent prevention of rust using chloride, sulfur and carbonation process; Joint

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Monolith bonding with the help of Curd-dense Foam-Lub Grout applicable to casting at different time'; Prevention of harmful effect of acid rain; Act as Water reducer plasticiser; Achievement of early high strength; Achievement of higher ultimate strength at all events; Creating anti rust layer by peeling off the previous layer of rust on rods; Concreting in the rain; Concreting in flowing or still water; and other advantages.

b. **Sequentially used Chemicals.**

- (i) Curdy-Dense Foam-Lub Cement Grout For Joints:
- (ii) Foam-Lub used in Shuttering
- (iii) Foam-Lub used in the concrete.

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c. **The Method of Preparing Curdy-Dense Foam-Lub Cement Grout.** Mix 2 Liter Foam Lub + 35-38 Liter Water + 1 bag or 50 kg cement to prepare Curdy-Dense Foam-Lub cement grout.

d. **Foam-Lub used in Shuttering.** Use Foam-Lub instead of shuttering oil. As a result it will bring the whiteness on the concrete surface.

e. **Foam-Lub Mixed in the Concrete.** Mix 250 ml. Foam Lub in each bag cement to create concrete. In mixture machine pour necessary amount of water and Foam-Lub and water, then mix Chips, Sand and Cement to prepare concrete. Usually, 20-22 Liter water is required for each bag of cement.

48. **Foam-Lub used in Concrete of Swimming Pools.**

a. **Merits/Functions.** Prevention of water leakage and dampness; Fast achievement of resistance power of "Water and Cement Ratio (up to 0.53); Achievement of high strength at all events; The discharge of excess water; Concreting in the rain; Prevention of segregation and bleeding in excess water and in excess vibration for appropriate compaction to resist pores and void; Joint Monolith bonding with the help of Curd-dense Foam-Lub Grout applicable to casting at different time Creating anti rust layer by peeling off the previous layer of rust on rods; Permanent prevention of rust using chloride, sulfur and carbonation process; Prevention of harmful effect of acid rain; Guard concrete against the harmful effect of chloride and sulphur; Act as Water reducer plasticiser, Retarder lubricant and of concrete; High working abilities; Partial free flowing and auto curing; bringing fine fairness

b. **The Amount of Chemical.** Mix 800ml. to 1 liter Foam-Lub with a bag of cement for preparing the concrete of floor and walls.

N.B.: Chlorine has no harmful effect on the concrete consists of Foam-Lub.

49. **To Prepare Curdy-Dense Foam-Lub Cement Grout for Various Joints of Concrete.**

a. **Merits / Functions.** Joint monolith bonding with the help of curdy-dense Foam-Lub Cement grout applicable to casting at different time; highly Water proofing; Work without water bar or water stopper; Work without Felt; Create High creeping between two Clayey Building-materials; Prevention of segregation and bleeding in excess water and in excess vibration for appropriate compaction to resist pores and void; and other advantages.

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b. **The Amount of Chemical.** (Foam-Lub + Water) + Cement = (2 Liter + 35-38 Liter)+50 kg. Or 1 bag of cement.

N.B.: Use this Curdy-Dense foam-Lub Cement grout within 2 hours of preparation.

Advantages of using Curdy-Dense Foam-Lub Cement Grout on The Joints of Concrete.

- Joints don't need any water bar. As a result, economy and permanence is achieved.
- Concrete from casting at different times compacts without any subtle breach; As a result there is no possibility of penetration of water.
- Bringing flexibility in casting Foam-Lub grout acts as an economical permanent bond building process.

c. **The Method of Preparing Concrete with Foam-Lub.**

(i) **Prepared Concrete by Mixer Machine.** Prepare concrete by mixing Chips, Sand, Cement and water in mixture machine. Before mixing materials firstly pour water & Foam-Lub in the mixer machine. Usually 20-22 liter water is used to prepare concrete of per bag cement.

(ii) **Manually Preparation.** Mix appropriate amount of Foam-Lub in the necessary amount of water in a bucket and then mix Chips, Sand & Cement to prepare concrete.

(iii) **Method of using Vibrator.** From the starting of casting, apply 3 times of vibration of 10 minutes after 10 minutes each. For this vibration the concrete will be highly compact, highly strong, well building and robust. Not to say that, high vibration makes the concrete strong.

50. **Foam Lub used in The Mortar of Brick Works of Wall.**

a. **Merits / Functions.** Better creeping; Early high strength; Highly Water proofing; Prevention of erosion on the mortar of brick work; Partial auto curing; and other advantages.

b. **The Amount of Chemical.** Mix 125 ml. Foam-Lub with each bag of cement (50kg.) to prepare cladding-mortar.

51. **Using Desalt-S₀₁ on Brick-Walls Before Plaster.**

a. **Merits / Functions.** Permanent prevention of salinity of bricks; tempering the bricks with resisting or erosion; Decreasing the penetration of water by blocking pores.

b. **The Amount of Chemical.** Desalt S₀₁ + Water + Catalyst = 1 Liter + 8 Liter + 25 ml. or 1 point/mark.

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N.B.: Apply a coat of mixture with a jute brush. Use the mixture within 2 hours of preparation.

52. **Foam-Lub used in Mortar of Plastering on Walls.**

a. **Merits / Functions.** Achievement of high strength early; better creeping; Prevention of segregation and bleeding in excess water and in excess vibration for appropriate compaction to resist pores and void; Saving concrete from the chloride and sulfur; Having high work abilities; Acting as partial Auto-curing and free flowing; Brings the fine brightness of concrete; .Permanent prevention of salinity of bricks;; Decreasing the penetration of water by blocking pores.

(i) **Using Foam-Lub in Plaster on Outside of Outer Walls, The Opposite Walls of Kitchen and Bathroom.**

Use 250 ml. Foam-Lub with each bag of cement (50kg.) to prepare plastering mortar.

(ii) **Using Foam Lub in Plaster on Inside of Outer Walls, and Other Walls.**

Use 125 ml. Foam-Lub with each bag of cement(50kg.) to prepare plastering mortar.

53. **Anti-Salinity Sealer Desalt-S₀₁ Applied on Plaster Before Painting.**

a. **Merits / Functions.** Prevention and cure of salinity permanently acting as a sealer; To create plain surface to for applying putty; To create the strong bond of putty; Prevention of eroding of plaster; Prevention of birth of colony; Reducing the porosity; and other advantages of Desalt-S₀₁.

b. **The Amount of Chemical.** Desalt S₀₁ + Water + Catalyst = 1 Liter + 4 Liter + 25 ml. or 1 point/mark.

N.B.: Apply one coat of mixture with a jute brush. Use the mixture within 2 hours of preparation. Don't apply on wet plaster.

54. **Chemicals used in Damp Proof Treatment on Walls of Kitchen and Bathroom.**

a. **Merits / Functions.** Usually plaster and layer of colors of outside walls is damaged by water comes outside through the joints of tiles of inner bathroom walls and still water near the walls. Usually, it takes two years to start the penetration of water from inside walls. So it is important to use sequentially Desalt S₀₁ and Curdy-dense Foam-Lub cement grout for prevention damp and salinity. It is essential to plaster the outside wall with mortar of Foam-Lub.

b. **Site Preparation: Internal Walls of Kitchen, Bathroom.** Fill up the gaps or breach of mortar or brick work, keeping the pointing intact with the Foam-Lub mixed cement mortar. Never curing the wall, before and after the plaster.

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c. **Chemicals to be used Sequentially.**

- (1) Desalt-S01.
- (2) Curdy-Dense Foam-Lub Cement Grout (2 coats)

d. **Mixing and Amount.** Desalt S₀₁ + Water + Catalyst = 1 Liter + 8 Liter + 25 ml. or 1 point.

N.B.: Apply one coat of mixture with a jute brush. Use the mixture within 2 hours of preparation.

e. **Curdy-Dense Foam-Lub Cement Grout (2 Coats).** (Foam-Lub + Water) + Cement = (2 Liter + 35-38 Liter)+50 kg. Or a bag of cement.

- (1) **1st Coat.** Apply the Curdy-Dense Foam Lub-Cement Grout on Desalt- S₀₁ wet walls. Use a jute brush to apply the Curdy-Dense Foam-Lub Cement Grout on wall.
- (2) **2nd Coat.** Apply 2nd coat within 4 –6 hours after applying 1st coat or when the 1st coat is hard enough to be attached despite of the effect of 2nd coat. Applying 2nd coat on the drenched 1st coat is undesirable.

55. **Foam Lub used in The Mortar of Tiles and Marble Cladding.**

a. **Merits / Functions.** Better creeping; Prevention of dampness; Achievement of early high strength; Auto curing; Prevention of erosion; High work abilities; Removing pores and void; Water proofing; Prevention of erosion caused by chloride, sulfur, and carbonation; and other advantages including longevity.

b. **Chemicals to be used Sequentially.**

- (1) Foam-Lub Cement Grout before Tiles, marble, etc. cladding
- (2) Foam-Lub used in Mortar

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c. **Mixture and Amount.** Foam-Lub Cement Grout Before Tiles, Marble, etc. Cladding. (Foam-Lub + Water) + Cement = (2 Liter + 35-38 Liter)+50 kg. Or a bag of cement are need to prepare Foam-Lub Cement Grout.

d. Foam-Lub used in Mortar. Mix 250 ml. Foam-Lub with each bag of cement(50kg.) to prepare cladding mortar. Mix up 250 ml. Foam Lub with necessary amount of water in a pot. After that with this Foam-Lub mixed water, prepare cladding mortar. Drench the wall with the Foam-Lub Cement grout before cladding the tiles, marble, etc. on it. If the wall is to be dry, it will be drenched with Foam-Lub Cement grout.

N.B.: Never drench the grout applied wall with water.

56. **Damp Proof Treatment at Skirt-Level.**

a. **Merits / Functions.** The water of wall and the water generated from casting tiles on skirt levels create huge dampness and salinity. To prevent this dampness and salinity it is necessary to use saline preventing Desalt-S₀₁; for generating Curdy-dense Foam Lub cement grout and plastering mortar Foam-Lub is essential.

b. **Necessary Chemicals.**

- (1) Foam-Lub used in Pointing mortar at mortar Joints.
- (2) Desalt- S₀₁
- (3) Curdy-Dense Foam-Lub Cement grout (2 coats)
- (4) Foam-Lub used in morar.

c. **Use and Mixture of Chemical.**

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- d. **Foam-Lub used in Pointing Mortar at Mortar Joints.** Generate pointing mortar by mixing 500 ml. Foam-Lub with per bag of cement (50 kg).

N.B.: Never drench the wall with water. Even don't clean the wall with water.

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(1) **Desalt- S₀₁.** Desalt- S₀₁ + Water + Catalyst = 1 liter + 6 Liter + 25 ml. or 1 point. Apply a coat of mixture with a jute brush on wall. Use the mixture within 2 hours of preparation.

e. **Curdy-Dense Foam–Lub Cement Grout.**

(1) **Mixture and Amount.** Mix (Foam Lub + Water) + Cement = (2 liter + 35-38 liter) + a bag of cement or 50 kg cement to prepare Curdy-Dense Cement Grout. Apply the materials and generate dense grout.

(2) **1st Coat.** Apply the Curdy-Dense Foam Lub-Cement Grout on Desalt- S₀₁ wet walls. Use a jute brush to apply the Curdy-Dense Foam-Lub Cement Grout on wall.

(3) **2nd Coat.** Apply 2nd coat within 4 –6 hours after applying 1st coat or when the 1st coat is hard enough to be attached despite of the effect of 2nd coat. Applying 2nd coat on the drenched 1st coat is undesirable.

f. **Foam-Lub used in Mortar.** Mix 500 ml. Foam-Lub with each bag of cement (50kg.) to prepare mortar. Mix up 500ml. Foam-Lub, a bag cement and necessary amount of water to prepare cement mortar and plaster with the mortar. Drench the wall with the Foam-Lub Cement Grout before cladding and plastering.

57. **Foam Lub used in Mosaic Casting.**

a. **Merits/Functions.** Reducing hair cracking and bringing smoothness; Achievement of high strength early; Achievement of higher ultimate strength at all events; Resisting pores and void; Acting as the Lubricant, Plasticizer, water reducer of concrete; Having high work abilities; Brings the fine brightness of concrete.

b. **Site Preparation.** Level and clean the area to be used by mosaic.

c. **Chemicals to be used Sequentially.**

(1) Curdy-Dense Foam-Lub Cement Grout.

(2) Foam-Lub used in Mosaic-Concrete.

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- (3) Foam-Lub used in Cement-Paste.

d. **Mixture and Amount.**

(1) **Curdy-Dense Foam-Lub Cement Grout.** Mix (Foam –Lub + Cement) + Cement + (2 Liter + 35-38 Liter) + 1 bag or 50 kg. of cement to prepare cement grout. Use the mixture with jute brush or broom. Then cast the mosaic after preparing mosaic concrete.

(2) **Foam-Lub used in Mosaic-Concrete.** Mix 250 ml. to 500 ml. Foam-Lub with each bag of cement (50kg.) to prepare mosaic-concrete. After preparing mosaic-concrete, mosaic will be cast. After mosaic casting, Cement Pest will be prepared with water, cement and Foam-Lub to be pest.

(3) **Foam-Lub used in Cement Paste.** Mix 2 litre Foam-Lub with per bag of Cement to prepare Foam-Lub Cement Paste.

N.B.: Use the Foam-Lub Cement-Pest within 2 hours of preparation.

58. **Foam Lub used in Cladding of Tiles, Marbles, Stones Etc. of Floors.**

a. **Merits/Functions.** Better creeping; Achievement of high strength early; Having high work abilities; Acting as partial Auto-curing; appropriate compaction to resist pores and void; Permanent prevention of rust using chloride, sulfur and carbonation process; Saving concrete from the chloride and sulphur; Water proofing;

b. **Site Preparation.** Chip and clean the floor.

c. **Necessary Chemicals.**

(1) Curdy-Dense Foam-Lub Cement Grout.

(2) Foam-Lub used in Mortar.

(3) Foam-Lub used in Pointing Mortar.

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d. **Mixture and Amount.** Mix (Foam –Lub + Cement) + Cement + (2 Liter + 35-38 Liter) + 1 bag or 50 Kg to prepare Curdy-Dense Foam-Lub cement grout. Use the mixture with jute brush or broom before tiles, marbles, stones cladding.

e. **Foam-Lub used in The Mortar of Tiles, Marbles, Stones, Etc Cladding.** Mix 125 ml. Foam-Lub with each bag of cement (50kg.) to prepare the mortar. Drench the floor with the Foam-Lub Cement grout before cladding the tiles, marble, stones, etc. on it. If the floor is to be dry, it will be drenched with Foam-Lub Cement grout. After cladding tiles, marbles, stones, etc., finally point with pointing mortar mixed with Foam-Lub.

f. **Foam-Lub used in Pointing Mortar.** Mix 2 Litre Foam-Lub with per bag of cement (50kg.) to prepare pointing mortar.

59. **Chemical used to Prevent Water Absorption, Hair Crack, and Stigma of Tea, Coffee, and Liquid of Curry Etc. on The Mosaic and Marble.**

a. **Merits / Functions.** Prevention of absorption of water without layer; Filling hair crack; Prevention of stigma caused by tea, coffee or liquid of curry; Prevention of erosion; bringing longevity of the color of mosaic and marbles keeping the original beauty. Prevention of Water Absorption, Hair Crack, and Stigma of Tea, Coffee, and Liquid of Curry Etc. on The Mosaic.

b. Site Preparation. Cast mosaic after 7-10 days of cutting, polishing and finishing on dry surface. Clean mosaic with a dry cloth before casting.

c. **Necessary Chemicals.** Mosasol.

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d. **The use of Mosasol.**

(1) **1st Coat.** Pour Mosasol in a pot. Then coat with a hair brush as 1st coat. Clean mosaic with a dry cloth before using Mosasol.

(2) **2nd Coat.** Use the same method in 2nd coat. Usually the surface will absorb less Mossasol in 2nd time than that of 1st coat. As a result the coverage of 2nd coat will be bigger than that of 1st coat. Polish the mosaic with polishing machine after 12 hours or a day of applying 2nd coat. Cleaning the surface of the stone of the polishing machine with a jute fiber is essential. Change the fiber after a few while and repeat the process again.

N.B.: Take proper caution to keep away Mosasol from the colour of brush. Otherwise the colour will create permanent points on the mosaic. As a precautionary manner, hack away the color on the handle of the brush.

e. **Prevention.** Prevention of Water Absorption, Hair Crack, and Stigma of Tea, Coffee, and Liquid of Curry Etc. on The Marble.

f. Site Preparation. Use Marbosol after 7-10 days of cutting, polishing and finishing on dry surface. Clean Marble with a dry cloth before applying marbosol.

g. **Necessary Chemicals.** Marbosol

h. **The use of Marbosol.**

(1) **1st Coat.** Pour Marbosol in a pot. Then coat with a hair brush as 1st coat. Clean marbles with a dry cloth before using Marbosol.

(2) **2nd Coat.** Use the same method in 2nd coat. Usually the surface will absorb less Marbosol in 2nd time than that of 1st coat. As a result the coverage of 2nd coat will be bigger than that of 1st coat. Polish the mosaic with polishing machine after 12 hours or a day of applying 2nd coat. Cleaning the surface of the stone of the

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polishing machine with a jute fiber is essential. Change the fiber after a few while and repeat the process again.

N.B.: Take proper caution to keep away Marbosol from the colour of brush. Otherwise the colour will create permanent points on the marble. As a precautionary manner, hack away the color on the handle of the brush.

60. **Foam-Lub used in The Mortar of Fair Face Brick, Sand Stone, Lime Stone and Ordinary Fine Bricks.**

a. **Merits/Functions.** Filling up the pores in joints of Joint Pointing Mortar; Better creeping; Permanent prevention of erosion of bricks using Anti-saline Desalt-S01; Joint Monolith bonding to resist the penetration of water with the help of Curd-dense Foam-Lub Grout applicable to casting at different time; Achievement of high strength early; Appropriate compaction to resist pores and void; Permanent prevention of rust using chloride, sulfur and carbonation process; Acting as partial Auto-curing and free flowing; Water proofing; Auto curing; Prevention of water penetration by reducing hair crack; Reducing of water penetration by reducing the on the mortar of ordinary brick-walls ; and other advantages of Foam-Lub.

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b. **Chemicals to be used Sequentially.**

- (1) Foam Lub used in pointing mortar at brick-walls.
- (2) Desalt-S01.
- (3) Curdy-Dense Foam Lub Cement-Grout.
- (4) Faom Lub used in Mortar.
- (5) Foam Lub used in pointing mortar at fair-face.

c. **Site Preparation.** Clean the wall properly. Apply above chemicals sequentially when the wall is dry.

d. **Foam-Lub used in Pointing Mortar at Brick Wall.** Use 500 ml. Foam Lub with per bag of cement to generate pointing-mortar. Then use the mortar to point.

e. **The use of Desalt-S01.** Desalt-S01 + Water + Catalyst = 1 liter + 8 liter + 25 ml. or 1 point/mark. Apply one coat of mixture with a jute brush. Use the mixture within 2 hours of preparation.

f. **Curdy-Dense Foam-Lub Cement Grout(2 coats).** Foam-Lub + Water + Cement = 2 Liter + 35-38 Liter + 1 bag or 50 kg. Cement.

(1) **1st Coat.** Apply the Curdy-Dense Foam Lub-Cement Grout on Desalt- S₀₁ wet walls. Use a jute brush to apply the Curdy-Dense Foam-Lub Cement Grout on wall.

(2) **2nd Coat.** Apply 2nd coat within 4 –6 hours after applying 1st coat or when the 1st coat is hard enough to be attached despite of the effect of 2nd coat. Applying 2nd coat on the drenched 1st coat is undesirable.

N.B.: Use up the cement grout within the 2 hours of preparation. As a result, it is better to prepare the optimum amount of cement grout.

g. **Foam-Lub used in Mortar.** Mix 250 ml. Foam-Lub with a bag of Cement (50kg.) to prepare cladding-mortar. Apply the Foam-Lub Cement Grout on the wall

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before casting ceramic, ordinary fine bricks etc. If the wall becomes dry, Foam-Lub Cement grout will be applied again.

h. **Foam-Lub used in Pointing Mortar.** Mix 2 litre Foam-Lub with a bag of cement (50 kg.) to prepare pointing-mortar. Finally, point with the mortar.

61. **Chemicals used to Prevent Salinity, Water Absorption and Growth of Algae on Sand Stones, Ceramics and Ordinary Fine Bricks.**

a. **Merits / Functions.** The annihilation of the source of white mark of Sesque-Carbonated, using the Desalt-S₀₁ at the beginning; Reducing the porosity and salinity using anti-saline Desalt-S₀₁, Keep the resplendence of materials by reducing the erosion of materials. Hydro Seal Ef-34 is a seme-transparent liquid that maintain the fine beauty of fair face, reduce the porosity, and prevents the growth of algae, moss etc.

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b. **Chemicals to be used Sequentially.**

- (1) Foam-Lub used in pointing mortar
- (2) Desalt-S₀₁
- (3) Hydro Seal Ef-34 (with water)

c. **Method of Preparing and using Chemicals.** When the casting of sand stones, ceramics, and ordinary fine bricks is finished, generate the mixture of 2 liter Foam-Lub, 50 kg cement and appropriate amount of water to generate mortar. Use the mortar to fill up the joints of mortar with the mortar so that the water can't penetrate through the joints. Clean loose materials, if any, with brush and water. After 2 or 3 days of cleaning, apply Desalt-S₀₁ in a way that it can perpetuate through the wall.

d. **The use of Desalt-S₀₁.** Desalt-S₀₁ + Water + Catalyst = 1 liter + 8 liter + 25 ml. or 1 point/mark. Apply one coat of mixture with a jute brush. Use the mixture within 2 hours of preparation. Clean the Desalt-S₀₁ applied surface after 1 day with water and brush. Let the surface dry, then after 6-7 days use 3 coats mixture Hydro-Seal, Ef-32 with water.

e. **The Mixing & using of Hydro-Seal-Ef-34.**

- (1) **1st Coat.** Hydro-Seal, Ef-34 + Water + T Catalyst = 1 Liter + 6 Liter + 25 ml. or 1 point/mark. Apply the mixture on Fair-face with a jute brush in a way that the mixture can be penetrated. Apply a 2nd coat after 1 day of 1st coat.
- (2) **2nd Coat.** Hydro-Seal, Ef-34 + Water + T Catalyst = 1 Liter + 5 Liter + 25 ml. or 1 point/mark. Apply the mixture with a jute brush in a way that the mixture can be penetrated. Apply a 3rd coat after 1 day of 2nd coat.
- (3) **3rd Coat.** Hydro-Seal, Ef-34 + Water + T Catalyst = 1 Liter + 5 Liter + 25 ml. or 1 point/mark. Apply the mixture with a jute brush in a way that the mixture can be penetrated.

62. **Chemicals used to Prevent Dampness and Salinity of Floors of New Buildings (Instead Of Bituminous Carpet).**

a. **Merits/Functions.** The permanent prevention of harmful effect of carbonation and prevention of salinity of C.C. surface using anti-saline Desalt-S₀₁; Reducing porosity; The water proofing effect of liquid of Hydro-seal, Ef-32 and Foam-Lub; Cast in-situ with the

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liquid. The liquid additionally consist of Desalt-S01 enter the pores and void of bottom surface and fill up them and the overflow of liquid felt create a water proof plasticized layer on the surface. It creates a Cement Gum when comes close to cement. Felt create permanent bonds in the pores and voids and create a thick casting by creeping two monolith bonds. Moroever, it is proof against the harmful effect of salinity, sulphur, and insects. Finally, Felt is economic, and time saving, and easy to use.

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b. **Site Preparation (The Ground Floor).** Compact the floor properly with sand. Then soling with bricks keeping 300 mm gap between each brick. Then cast C.C. From the top to the bottom of the brick including the gaps.

c. **Chemicals to be used Sequentially.**

(1) Desalt –S01.

(2) Hydro seal, Ef-32 and accessory materials i.e. Coal-tar, kerosene etc (2coats).

(3) Foam-Lub used in the concrete.

d. **The Sequential Mixture and use of Chemicals.** Desalt S₀₁ + Water + Catalyst = 1 Liter + 8 Liter + 25 ml. or 1 mark.

N.B.: Apply a coat of the mixture with a jute brush. Use the mixture within 2 hours of preparation. After applying Desalt-S01, apply Hydroseal, Ef-32 with coal-tar.

e. **The Mixer & use of Hydro-Seal,Ef-32 with Coal-tar, Kerosene (2coats).**

(1) **1st coat.** (Hydro-seal, Ef-32 + Water + T . Cat. + R. Cat) in bucket + (Coal-Tar + Kerosine) in another bucket = (4 Liter + 4 Liter + 100 ml. or 1 mark + 50 ml. or 1 mark) + (4 Liter + 1 Liter). Apply a 2nd coat after 12 hours of 1st coat:

(2) **2nd Coat.** (4 Liter + 0 Liter + 100 ml. or 1 point + 50 ml. or 1 point) + (4 Liter + 1 Liter) Mix the elements properly and use the mixture with a jute brush. After applying 2nd coat, Cast at least 50mm C.C. (1:2:4) on it.

f. **Foam-Lub used in Concrete.** For C.C. mix 250 ml. Foam-Lub with 1 bag of cement to prepare concrete.

N.B.: Mix homogeneously the elements of each bucket together. Use the mixture of Catalyst and Hydro-seal, Ef-32 within the 30 minutes of preparation.

63. **Water Proofing & Heat Reducing Treatment Instead of Lime Tracing at Roof of New Buildings.**

a. Water Proofing & Heat Reducing Treatment with Hydro-Seal, Ef-32 Instead of Lime Tracing at Roof of New Buildings.

(1) **Merits/Functions.** The permanent prevention of harmful effect of carbonation and prevention of salinity of C.C. surface using anti-saline Desalt-S01; The water proofing effect of liquid of Hydro-seal, Ef-32 and

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Foam-Lub; The liquid creates a highly creeping and monolith bonding in the C.C. on the surface above R.C.C. Foam-Lub used in C.C is a waterproof and temperature conductor. It guards against the harmful effect of sulphur, salinity and increase of hair crack. Instead of lime tracing, this method is economy, labour & time-saving.

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- (2) **Site Preparation.** Chip & clean the top slab properly.
 - (3) **Necessary Chemicals.**
 - (a) Desalt –S01.
 - (b) Hydro seal, Ef-32.(with water)
 - (c) Hydro-seal, Ef-32 with Foam-Lub before patent-stone
 - (d) Foam-Lub used in Patent Stone
 - (e) Foam-Lub used in Neat Cement Finishing.
 - (4) **The use of Desalt S₀₁.** Desalt S₀₁ + Water + Catalyst = 1 Liter + 10 Liter + 25 ml. or 1 point/mark. Apply one coat of this mixture with a jute brush on the surface of roof. Apply the mixture Hydroseal,Ef-32 with water on dry surface of roof after applying Desalt-S01
 - (5) **The use of Hydro-seal, Ef-32 with Water.** Hydro-Seal, Ef-32 + Water + T Catalyst + R Catalyst = 1 Liter + 7 Liter + 25 ml. or 1mark + 12.50 ml. Apply the mixture with a broom everywhere in the surface of top slab in way that the mixture can penetrate. Apply a 2nd coat after with Foam-Lub and cast patent stone after 1 day of 1st coat.
 - (6) **The use of Hydro-seal, Ef-32 with Foam Lub.**
 - (a) **1st coat.** (Hydro-seal, Ef-32 + Water + T . Cat. + R. Cat) in bucket + (Foam-Lub + Water) in another bucket = (4 Liter + 100 ml. or 1 point + 50 ml. or 1 point) + (4 Liter + 4 Liter). Apply this mixture with a jute brush or broom everywhere on the surface. After applying 12 hours of 1st coat, 2nd coat will be applied.
 - (b) **2nd Coat.** (4 Liter + 100 ml. or 1 point + 50 ml. or 1 point) + (4 Liter + 2 Liter)
- N.B.:** Mix homogeneously the elements of each bucket together. Use the mixture of Catalyst and Hydro-seal, Ef-32 within the 20 minutes of preparation. After applying 2nd coat Patent Stone will be cast within 12 hours.
- (7) **Foam-Lub used in Patent Stone Concrete.** Mix 500 ml. Foam-Lub with a bag of cement (50kg.)
 - (8) **Size of Chips.** Pie chips or Pea Gravels or 6mm down brick aggregates.
 - (9) **Thickness.** At least 75mm concrete (1:2:4), mix 500 ml. Foam Lub with per bag of cement.

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(10) **The method of Mixing Concrete Mixed by Foam-Lub.** Prepare concrete by mixing Chips, Sand, Cement and water in mixture machine. Before mixing materials firstly pour water & Foam-Lub in the mixer machine. Usually 20-22 liter water is used to prepare concrete of per bag cement.

(11) **Manually Preparation.** Mix appropriate amount of Foam-Lub in the necessary amount of water in a bucket and then mix Chips, Sand & Cement to prepare concrete. Fix 22 Gauge Wire Mesh or Expanding Metal Net with 12mm to 6mm gap on the middle of patent stone. Fix net horizontally after completion of plaster of 6mm and fix the border of net with the strip of nails. Then plaster 38mm over the fixed net. The lower level of plaster will be long more than 300mm than of lower level so that the next net can be fasten by wear (at least 50mm over lap and every 150mm distance) and one bond be not aligned with another. Finally, apply net finishing with Curdy-Dense Foam Lub-cement grout.

(12) **Preparation and use of Curdy-Dense Foam Lub Cement Grout (For Neat Finishing).** Foam Lub + Water + Cement = 2 Liter + 35-38 Liter + 50 kg or 1 bag. Mix the elements properly. Use the mixture for net finishing on the day of casting. Start curing for 28 days after 24 hours of neat finishing.

b. **Water Proofing & Heat Reducing Treatment With Foam-Lub Instead of Lime Tracing at Roof of New Buildings.**

(1) **Merits/Functions.** Filling up the pores in joints of Joint Pointing Mortar; Better creeping; Permanent prevention of erosion of bricks using Anti-saline Desalt-S01; Joint monolith bonding to resist the penetration of water with the help of Curd-dense Foam-Lub grout applicable to casting at different time; Achievement of high strength early; Appropriate compaction to resist pores and void; Permanent prevention of rust using chloride, sulphur and carbonation process; Acting as partial Auto-curing and free flowing; Water proofing; auto curing; Prevention of water penetration by reducing hair crack; Reducing of water penetration by reducing the on the mortar of ordinary brick-walls ; and other advantages of Foam-Lub.

(2) **Site Preparation.** Chip & clean the top slab properly.

(3) **Necessary Chemicals.**

(a) Desalt –S01.

(b) Foam-Lub.(with water).

(c) Curdy-Dense Foam-Lub Cement Grout (Before Patent-stone)

(d) Foam-Lub used in Patent Stone.

(e) Foam-Lub used in neat Cement Finishing.

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(4) **The use of Desalt-S01.** Desalt-S01 + Water + Catalyst = 1 liter + 10liter + 25 ml. or 1 point/mark. Apply one coat of mixture all over the surface of top slab with a broom. When the surface is dry then spread the mixture of water and Foam-Lub in a way enough for proper absorption of the liquid.

(5) **Method of Preparing Mixture of Foam-Lub with Water.** Foam Lub + Water = 1 Liter+ 16 Liter. Apply one coat of mixture all over the surface of top slab with a broom.

(6) **The mixer & use of Curdy-Dense Foam-Lub Cement Grout before Patent Stone.** Mix (Foam-Lub + water) + Cement = (2 lits. + 35-38 lits.) + a bag of cement (50kg) to prepare Curdy-Dense Foam-Lub Cement Grout. Apply one coat of Curdy-Dense Foam-Lub Cement Grout after 1 day of applying Desalt-S01 before patent stone. When the surface is dry drench, it with Curdy-Dense Foam-Lub Cement Grout.

(7) **Foam Lub used in Patent Stone Concrete.** Mix 500 ml. Foam Lube with a bag of cement(50kg.)

(8) **Size of Chips.** Pie chips or Pea Gravels or 6mm down bricks aggregates.

(9) **Thickness.** At least 75mm concrete (1:2:4), mix 500 ml. Foam Lub with a bag of cement (50kg.).

(10) **Prepared Concrete by Mixer Machine.** Prepare concrete by mixing Chips, Sand, Cement and water in mixture machine. Before mixing materials firstly pour water & Foam-Lub in the mixer machine. Usually 20-22 liter water is used to prepare concrete per bag cement.

(11) **Manually Preparation.** Mix appropriate amount of Foam-Lub in the necessary amount of water in a bucket and then mix Chips, Sand & Cement to prepare concrete. Fix 22 Gauge Wire Mesh or Expanding Metal Net with 12mm to 6mm gap on the middle of patent stone. Fix net horizontally after completion of plaster of 38mm and fix the border of net with the strip of nails. Then plaster 38mm over the fixed net. The lower level of plaster will be long more than 300mm than of lower level so that the next net can be fasten by wear (at least 50mm over lap and every 150mm distance) and one bond be not aligned with another. Finally, apply net finishing with Curdy-Dense Faom Lub-Cement Grout.

(12) **Preparation and use of Curdy-Dense Foam Lub Cement Grout (For Neat Finishing).** Foam Lub + Water + Cement = 2 Liter + 35-38 Liter + 50 kg or 1 bag. Mix the elements properly. Use the mixture for net finishing on the day of casting. Start curing for 28 days after 24 hours of neat finishing.

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64. **To Keep Away Termite & Insects From The Ground Floors & External Side of Newly Constructed Buildings.**

a. **Termite Controlling Treatment using Pesterthy (Termite Control Powder) with Hydro-Seal, Ef-32 Liquid Felt at Inside Ground Floor of New Building.** When Hydro seal, Ef-32 (as liquid Felt) is used for prevention of salinity and dampness, at that time Pesterthy (Termite Control Powder) to be used with Hydro seal, Ef-32.

(1) **Merits/Functions.** Permanent relief of ground floors from termite; Environment friendly treatment; Non- volatile and eternal existence in CC; Economic and easy-procedure to use.

(2) **Method of Mixing.** Mix 500 gm. Pesterthy (Termite Control Powder) with each 12 Liter Hydro Seal, Ef-32 properly and then this mixture is applied with coconut broom on whole floor properly.

b. **Mehtod of using only Pesterthy (Termite Controlling Powder).**

(1) **Merits / Functions.** Permanent relief of ground floors and the soil under the ground floors from Termite; Environment friendly treatment; Non volatile and eternal existence in CC; Economic and easy work-procedure to use.

(2) **The use of Pesterthy.** First fill the floors with sand and soil. Then spread Pesterthy (Termite Controlling Powder) equally on the surface of floor. Then cast CC and soling.

c. **Prevention of Termite Outside of New buildings.**

(1) **Merits/Functions.** The prevention of growth and penetration of termites up to 40 years; Non volatile and permanent existence in soil; Acting as Micro-nutrients of trees; Environment friendly chemicals; Economic and easy work-procedure to use.

(2) **Method of using Pesterthy (Termite Controlling Powder).** Dig canal in the soil outside and attached to the external wall and make a surrounding hole of 600mm wide and 600mm deep. Spread Pesterthy (Termite Controlling Powder) equally on the surface of the hole. Fill up half of the whole. Spread Pesterthy the half filled hole by the same way. Then fill up whole hole with soil. Spread Pesterthy again on the surface of filled up hole. Finally, cover the surface soil with brick soling, C.C. Tiles or layer of soil of 50mm thickness.

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d. **Methods of using Pesto-Clea for Destroying and Preventing of Termite on New Wooden Furniture, Windows, and Doors.**

(1) **Merits/Functions.** Pestoclea (Termite Control Liquid) can efficiently and effectively destroy and prevent the attack of white ants, coackroaches, termite etc. It is non-volatile and permanently exists in soil, environment friendly chemicals; economic and easy-work procedure to use.

(2) **The Method of mixing and preparing Pesto-clea(Termite Controlling Liquid).** Mix Pesto-clea-A 150 ml. + Pesto-clea-B 150 ml. + 5 Liter water properly. Then it sprays on whole wooden materials with a spray machine or hair-brush. Pesto-clea must be used properly before polishing.

e. **Method of using Pesto-Con on Electric Conduit.** Pesto-con can efficiently and effectively destroy and prevent the attack of white ants, coackroaches, termite etc on the surface of electric conduit. It is non- volatile, environment friendly chemicals; economic and easy-work procedure to use. Spray Pesto-con (Tube) in electric conduit infected with insects with air-compressor.

The uses of Chemicals to Prevent Salinity, Dampness of Old Building and Make Them Water Proof and Long Lasting as Follows:

- (1) Leakage, Anti-salinity & damp-proof treatment at basement floor of old buildings:
- (2) Leakage, Anti-salinity & damp-proof treatment at basement wall of old buildings:
- (3) Leakage, Anti-salinity & damp-proof treatment at under-ground & over-head water reservoirs of old building:
- (4) Anti-salinity & damp-proof treatment at Ground-floor of old buildings:
- (5) (a) Anti-salinity & damp-proof treatment with Hydro-seal,Ef-32 (Specially approved Ground-floor & outside wall of the Bath & Kitchen Room):
(b) Anti-salinity & damp-proof treatment at inside and outside of old building (Except ground-floor):
- (6) Water proofing & Heat reducing treatment at roof instead of Lime-tracing of old building:
- (7) Ceiling treatment against penetration of water through roofs and erosion caused by salinity as well as the deformation of rods from the concrete:
- (8) To prevent the dampness, salinity, tendency of water absorption, birth of algae

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on sand stone, ceramic and fine bricks of old buildings as well as the tempering the colour:

- (9) To keep away termite & insects from the ground floors & external of old building:

The Techniques to Prevent Salinity, Dampness, Other Erosions, Tendency of Water Absorption of Old Buildings and to Increase The Strength and Longevity of Structures

65. Leakage, Anti-Salinity & Damp-Proof Treatment at Basement Floor Of Old Building.

a. **Site Preparation.** Chip and clean the main concrete properly after removing the patent stone and plaster from the concrete:

b. **The Chemicals to be used Sequentially.**

- (1) Gray cementitious alloy.
- (2) Desalt- S₁₀
- (2) Hydro-seal, Ef-32 with Coal-tar & Kerosene
- (3) Lub.

c. **Sequential Methods of Mixture and Usage of Chemicals.** Group the identified leakage and removing loose concrete.

d. **The Mixing & using of Gray Cementations Alloy.** Gray Cementitious Alloy + Water = 1 Kg + 350 ml. Rub the ointment of Gray Cementitious Alloy and water on the place bearing leakages. Use a foam to pressure the area of leakage to send the ointment everywhere.

N.B.: Use the ointment as soon as possible after preparation.

e. The Mixing & using of Desalt-Sol. Desalt –Sol + Water + Catalyst = 1 Liter + 8 Liter + 25 m.l. or 1 mark.
Apply the mixer with a jute brush or a broom. After 6-12 hours of applying the mixture, Hydro seal, Ef-32 with Coal-tar & Kerosene will be applied on dry surface.

f. The mixing & using of Hydro-seal, Ef-32 with Coal-tar & Kerosene.

(1) **1st Coat.** (Hydro seal, Ef-32 + Water + T. Cat. + R. Cat) in a bucket = (Coal-tar + Kerosene) in another bucket = (4 Liter + 4 Liter + 100 ml. =+ 50 ml.) + (4 Liter + 750 ml.) After mixing of above Chemicals properly, the mixer will be applied on whole floor as first coat. Apply 2nd coat within 3 to 12 hours from 1st coat.

(2) **2nd Coat.** (4 Liter + 0 Liter + 100 m.l. =+ 50 m.l.) + (4 Liter + 750 m.l.) Apply the mixer properly with a jute brush. After applying 2nd Coat cast 75mm (1:2:4) on it. Use 250 ml. Foam-Lub with a bag of cement to prepare concrete.

N.B: Prepare a homogeneous mixture of the mixtures of two buckets. Apply the mixture of Hydro-seal, Ef-32 and catalyst within the 20 minutes after preparation.

66. Leakage, Anti-Salinity & Damp-Proof Treatment at Basement Wall of Old Buildings.

a. **Site Preparation.** After chipping and removing plaster, clean the concrete properly.

b. **The Chemicals to be used Sequentially.**

(1) Gray cementitious alloy.

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- (2) Desalt- S₁₀
- (3) Curd-dense Foam-Lub Cement Grout (2 coats)
- (4) Foam Lub used in Cement Grout before plaster.
- (5) Foam Lub used in Plaster Mortar.

c. **The Sequential Methods of Mixture and Usage of Chemicals.** Group the identified leakage and removing loose concrete.

d. **The Mixing & using of Gray Cementitious Alloy.** Gray Cementitious Alloy + Water = 1 Kg + 350 ml. Rub the ointment of Gray Cementitious Alloy and water on the place bearing leakage. Use a foam to pressure the area of leakage to send the ointment everywhere.

N.B.: Use the ointment as soon as possible after preparation.

e. **Desalt- S₀₁.** Desalt- S₀₁ + Water + Catalyst = 1 Liter + 6 Liter + 25 ml or 1 mark. Apply the mixer properly with a jute brush. Apply the mixer within 2 hours of preparation. After that use Curdy-Dense Foam-Lub Cement Grout on Desalt S₀₁ wet wall.

f. **Cardy-Dense Foam-Lub Grout (2 coats).** Method of generating Card-dense Grout of Foam-Lub: Mix Foam –Lub + Water + Cement = 2 Liter + 35-38 Liter + 1 bag or 50kg. of cement to prepare Curdy-Dense Foam-Lub Cement Grout properly.

(1) **1st coat.** Apply the Curdy-Dense Foam-Lub Cement Grout with a brush on the Desalt- S₀₁ wet wall.

(2) **2nd Coat.** Apply 2nd coat within 4 –6 hours of applying 1st coat or when the 1st coat is hard enough to be attached despite of the effect of 2nd coat. Applying 2nd coat on the drenched 1st coat is undesirable.

g. **Cardy-Dense Foam-Lub Cement Grout Before Plastering.** Foam –Lub + Water + Cement = 2 Liter + 35-38 Liter + 1 bag or 50kg cement. Apply the mixer properly with a broom . Plaster on Foam-Lub Cement Grout applied wall. If the grout dries, then apply the grout again and plaster then.

h. **Foam-Lub used in Plastering-Mortar.** Mix 500 ml. Foam-Lub with per bag of cement to prepare plastering-mortar.

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67. **Leakage, Anti-Salinity & Damp-Proof Treatment at Under-Ground & Over-Head Water Reservoirs of Old Building.**

a. **Site Preparation.** Removing plaster inside and outside walls. Then chip and clean them.

b. **The Chemicals to be used Sequentially.**

- (1) Gray cementitious alloy.
- (2) Desalt- S₁₀.
- (3) Foam-Lub Cement (For Grout).
- (4) Foam –Lub used in Plastering Mortar.
- (5) Foam Lub used in Neat-cement Finishing.

c. **The Sequential Methods of Mixture and Usage of Chemicals.** Group the identified leakage and removing loose concrete.

d. **The Mixing & using of Gray Cementitious Alloy.** Gray Cementitious Alloy + Water = 1 Kg + 350 ml. Rub the ointment of Gray Cementitious Alloy and water on the place bearing leakage. Use a foam to pressure the area of leakage to send the ointment everywhere.

N.B.: Use the ointment as soon as possible after preparation.

e. **Desalt- S₀₁.** Desalt- S₀₁ + Water + Catalyst = 1 Liter + 6 Liter + 25 ml or 1 mark. Apply the mixer properly with a jute brush. Apply the mixer within 2 hours of preparation. After that use Curdy-Dense Foam-Lub Cement Grout on Desalt S₀₁ wet wall.

f. **Curdy-Dense Foam-Lub Grout (2 coats).** Method of generating Curdy-Dense Grout of Foam-Lub: Mix Foam –Lub + Water + Cement = 2 Liter + 35-38 Liter + 1 bag or 50kg. of cement to prepare Curdy-Dense Foam-Lub Cement Grout properly.

- (1) **1st coat.** Apply the Curdy-Dense Foam-Lub Cement Grout with a brush on the Desalt- S₀₁ wet wall.

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(2) **2nd Coat.** Apply 2nd coat within 4 –6 hours of applying 1st coat or when the 1st coat is hard enough to be attached despite of the effect of 2nd coat. Applying 2nd coat on the drenched 1st coat is undesirable.

g. **Cardy-Dense Foam-Lub Cement Grout Before Plastering.** Foam –Lub + Water + Cement = 2 Liter + 35-38 Liter + 1 bag or 50kg cement. Apply the mixer properly with a broom . Plaster on Foam-Lub Cement Grout applied wall. If the grout dries, then apply the grout again and plaster then.

h. **Foam-Lub used in Plastering-Mortar.** Mix 500 ml. Foam-Lub with per bag of cement to prepare plastering-mortar.

(j) **Cardy-Dense Foam-Lub Cement Grout (For Neat Finishing).** Foam Lub + Cement + Water = 2 Liter + 1 bag or 50 kag + 35-38 Liter. First mix Foam Lub with water. Then use the mixture with Cement and prepare grout. Apply the Curdy-Dense Foam-Lub Cement Grout on plaster-surface as neat finishing.

68. **Anti-Salinity & Damp-Proof Treatment at Ground-Floor of Old Building(Instead of Bituminous Carpeting).**

a. **Site Preparation.** Peel off the patent stone. Clean after chipping properly.

b. **Chemicals to be used Sequentially.**

(1) Desalt –S01.

(2) Hydro seal, Ef-32 and accessory materials i.e. Tar, kerosene etc (2coats).

(3) Foam-Lub used in the concrete.

c. **The Sequential Mixture and use of Chemicals.** Desalt S₀₁ + Water + Catalyst = 1 Liter + 8 Liter + 25 ml. or 1 mark.

N.B.: Apply a coat of the mixture with a jute brush. Use the mixture within 2 hours of preparation. After applying Desalt-S01, apply Hydro-seal, Ef-32 with coal-tar.

(1) **1st coat.** (Hydro-seal, Ef-32 + Water + T . Cat. + R. Cat) in bucket + (Coal-Tar + Kerosene) in another bucket = (4 Liter + 4 Liter + 100 ml. or 1 mark + 50 ml. or 1 mark) + (4 Liter + 1 Liter) Apply a 2nd coat after 12 hours of 1st coat:

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(2) **2nd Coat.** (4 Liter + 0 Liter + 100 ml. or 1 point + 50 ml. or 1 point) + (4 Liter + 1 Liter) Mix the elements properly and use the mixture with a jute brush. After applying 2nd coat, Cast at least 50mm (1:2:4) on it.

d. **Foam-Lub used in Concrete.** For C.C. mix 250 ml. Foam-Lub with 1 bag of cement to prepare concrete.

N.B.: Mix homogeneously the elements of each bucket together. Use the mixture of Catalyst and Hydro-seal, Ef-32 within the 30 minutes of preparation.

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69. a. Anti-Salinity & Damp-Proof Treatment With Hydro-Seal,Ef-32 (Specially Approved in Very Important Structure and in The Bay Areas as well as Ground-Floor & Outside Wall of The Bath-Room & Kitchen Room).

(1) Site Preparation: Internal and External Walls. Hack out the plaster on the wall and create a 12mm deep pointing. Incase of holes, breaches, or gaps on the brickworks, fill up those with Foam-Lub of 4%. Never drench the wall with water before and afterwards.

(2) The Chemicals to be used Sequentially.

- (a) Desalt- S₁₀
- (b) Hydro-seal,Ef-32 with Foam-Lub (as liquid felt)
- (c) Curdy-Dense Foam-Lub Cement Grout before plaster
- (d) Foam-Lub used in plastering mortar
- (e) Desalt-S₀₁ used as sealer

(3) The use of Desalt-S₀₁. Desalt- S₀₁ + Water + Catalyst = 1 Liter + 8 Liter + 25 ml or 1 mark. Apply a coat of Desalt-S₀₁ properly with a jute brush. Apply Hydro-seal, Ef-32 with Foam-Lub after 12 hours of applying Desalt-S₀₁.

(4) Hydro-Seal, Ef-32 with Foam-Lub as liquid Felt (3 coats).

- (a) 1st Coat. (Hydro-Seal, Ef-32 + T. Cat + R. Cat) in one bucket + (Foam-Lub + Water) in another bucket = (4 Liter + 100 ml. Or 1 mark + 50 ml or 1 mark) + (1 Liter + 4 Liter)

After 12 Hours of 1st Coat.

- (b) 2nd Coat. (Hydro-Seal, Ef-32 + T. Cat + R. Cat) in one bucket + (Foam-Lub + Water) in another bucket = (4 Liter + 100 ml. Or 1 mark + 50 ml or 1 mark) + (1 Liter + 2 Liter)

After 12 Hours of 2nd Coat.

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- (c) **3rd Coat.** (Hydro-Seal, Ef-32 + T. Cat + R. Cat) in one bucket + (Foam-Lub + Water) in another bucket = (4 Liter + 100 ml. Or 1 mark + 50 ml or 1 mark) + (1 Liter + 1 Liter)

N.B.: Use the mixture of catalysts, Hydro-seal , Ef-32 within 30 minutes. Powder dry cement and apply broom to fix cement on the treated wall within 2 hours. Then plaster with Foam-Lub. Apply Curdy-Dense Foam-Lub Grout before plastering. To prepare the grout mix 50 kg cement with , 2 liter Foam-Lub with 35-38 lits of water. In the mixture of plaster, use 250 ml. Foam –Lub with per bag of cement and necessary water.

- (5) **Foam-Lub used in Plastering Mortar.** Mix 500 ml. Foam Lub with 1 bag or 50 kg cement and necessary amount of water. Use one coat of Desalt-S₀₁ as sealer before applying putty and painting.

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(6) **Method of Mixture of Desalt-S₀₁ as Sealer.** Desalt-S₀₁ + Water + Catalyst = 1 Liter + 4 Liter + 25 m.l. or 1 mark. Apply the mixture properly with a jute brush. Apply the mixer within 2 hours of preparation. Don't apply Desalt-S₀₁ on wet plaster.

b. **Anti-Salinity & Damp-Proof Treatment at Inside and Outside Wall of Old Building (Except Ground-Floor).**

(1) **Site Preparation.** Hack out the plaster on the wall and create a 12mm deep pointing. In case of holes, breaches, or gaps on the brickworks, fill up those with Foam-Lub of 4%. Never drench the wall with water before and afterwards.

(2) **The Chemicals to be used Sequentially.**

- (a) Desalt- S₀₁
- (b) Curd dense Foam Lub Cement Grout (2nd Coat)
- (c) Foam-Lub used in Cement Grout before plaster.
- (d) Foam-Lub used in Plaster Mortar.
- (e) Desalt-S₀₁ as sealer.

(3) **The Sequential Method of Mixing and using Chemicals.** Desalt- S₀₁ + Water + Catalyst = 1 Liter + 8 Liter + 25 ml or 1 mark. Apply the mixture properly with a jute brush. Apply the Mixer within 2 hours. Apply Cement Grout on the wall wet with Desalt-S₀₁.

(4) The use of Curdy-Dense Foam-Lub Cement Grout.
Foam Lub + Cement + Water = 2 Liter + 1 bag or 50 kag + 35-38 Liter.

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- (a) **1st coat.** Apply 1st coat of Curdy-Dense Foam-Lub Cement Grout with a brush on the Desalt- S₀₁wet wall.
- (b) **2nd Coat.** Apply 2nd coat within 4 –12 hours of applying 1st coat or when the 1st coat is hard enough to be attached despite of the effect of 2nd coat. Applying 2nd coat on the drenched 1st coat is undesirable. After a day of Applying 2nd coats of Curdy-Dense Foam-Lub Cement Grout, plaster will be started.
- (5) **Curdy-Dense Foam-Lub Cement Grout before Plastering.** Foam Lub + Cement + Water = 2 Liter + 1 bag or 50 kg. + 35-38 Liter. Apply the Mixer properly with broom . Plaster on Curdy-dense Foam-Lub Cement Grout wet wall. If the grout dries, then apply the grout again and plaster then.
- (6) **Foam-Lub used in Plastering Mortar.** Use 250 ml. Foam Lub. Mix 500 ml. Foam Lub with 1 bag or 50 kg cement and necessary amount of water.

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- (7) **Method of Mixture of Desalt-S₀₁ as Sealer.** Desalt-S₀₁ + Water + Catalyst = 1 Liter + 4 Liter + 25 m.l. or 1 mark. Apply the mixture properly with a jute brush. Apply the mixer within 2 hours of preparation. Don't apply Desalt-S₀₁ on wet plaster.

70. **Water Proofing & Heat Reducing Treatment Instead of Lime Tracing at Roof of Old Buildings.**

a. **Water Proofing & Heat Reducing Treatment with Hydro-Seal, Ef-32 Instead of Lime Tracing at Roof of Old Buildings.**

- (1) **Site Preparation.** Hack out the C.C. or patent stone, or lime tracing on the roof, if any. Then chip and clean the surface. Hack out the plaster up to 150mm to 300mm on parapet and chip and clean the surface. Then on the surface area of roof and parapet cast C.C. Strip of 50mm X 75mm. Then punch nail of 75mm up to 38mm after 150mm distance on the wet dressing of C.C. strip. Then clean the roof and apply the chemicals on the roof to prevent dampness and salinity by following methods:

(2) **Necessary Chemicals.**

- (a) Desalt –S₀₁.
- (b) Hydro seal, Ef-32.(with water)
- (c) Hydro-seal, Ef-32 with Foam-Lub before patent-stone
- (d) Foam-Lub used in Patent Stone
- (e) Foam-Lub used in Neat Cement Finishing.

- (3) **The use of Desalt S₀₁.** Desalt S₀₁ + Water + Catalyst = 1 Liter + 10 Liter + 25 ml. or 1 point / mark. Apply one coat of this mixture with a jute brush on the surface of roof. Apply the mixture Hydroseal,Ef-32 with water on dry surface of roof after applying Desalt-S₀₁.

- (4) **The use of Hydro-Seal, Ef-32 with Water.** Hydro-Seal, Ef-34 + Water + T Catalyst + R Catalyst = 1 Liter + 7 Liter + 25 ml. or 1mark + 12.50 ml. Apply the mixture with a broom everywhere in the surface of top slab in way that the mixture can penetrate. Apply a 2nd coat after with Foam-Lub and cast patent stone after 1 day of 1st coat.

(5) **The use of Hydro-seal, Ef-32 with Foam Lub.**

- (a) **1st coat.** (Hydro-seal, Ef-32 + Water + T . Cat. + R. Cat) in bucket + (Foam-Lub + Water) in another bucket = (4 Liter + 100 ml. or 1 point + 50 ml. or 1 point) + (1 Liter + 4 Liter) Apply this mixture with a jute brush or broom everywhere on the surface. After applying 12 hours of 1st coat, 2nd coat will be applied.

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- (b) **2nd Coat.** (4 Liter + 100 ml. or 1 point + 50 ml. or 1 point) + (1 Liter + 2 Liter)

N.B.: Mix homogeneously the elements of each bucket together. Use the mixture of Catalyst and Hydro-seal, Ef-32 within the 20 minutes of preparation. After applying 2nd coat Patent Stone will be cast within 12 hours.

- (6) **Foam-Lub used in Patent Stone Concrete.** Mix 500 ml. Foam-Lub with a bag of cement(50kg.)

- (7) **Size of Chips.** Pie chips or Pea Gravels or 6mm down bricks aggregates.

- (8) **Thickness.** At least 75mm concrete (1:2:4), mix 500 ml. Foam Lub with per bag of cement.

- (9) The Method of Mixing Concrete Mixed by Foam-Lub.

- (10) **Prepared Concrete by Mixer Machine.** Prepare concrete by mixing Chips, Sand, Cement and water in mixture machine. Before mixing materials firstly pour water & Foam-Lub in the mixer machine. Usually 20-22 liter water is used to prepare concrete of per bag cement.

- (11) **Manually Preparation.** Mix appropriate amount of Foam-Lub in the necessary amount of water in a bucket and then mix Chips, Sand & Cement to prepare concrete. Fix 22 Gauge Wire Mesh or Expanded Metal Net with 12mm to 6mm gap on the middle of patent stone. Fix net horizontally after completion of plaster of 38mm and fix the border of net with the strip of nails. Then plaster 38mm over the fixed net. The lower level of plaster will be long more than 600mm than of lower level so that the next net can be fasten by wear (at least 50mm over lap and every 150mm distance) and one bond be not aligned with another. Finally, apply net finishing with Curdy-Dense Foam Lub-cement grout.

- (12) **Preparation and use of Curdy-Dense Foam Lub Cement Grout (For Neat Finishing).** Foam Lub + Water + Cement = 2 Liter + 35-38 Liter + 50 kg or 1 bag. Mix the elements properly. Use the mixture for net finishing on the day of casting. Start curing for 28 days after 24 hours of neat finishing.

b. **Water Proofing & Heat Reducing Treatment with Foam-Lub Instead of Lime Tracing At Roof of New Buildings.**

- (1) **Site Preparation.** Hack out the C.C. or patent stone, or lime tracing on the roof, if any. Then chip and clean the surface. Hack out the plaster up to 150mm to 300mm on parapet and roof. Cheap, clean & dry the surface. Then

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on the surface area of roof and parapet cast C.C. Strip of 50mm X 75mm. Then punch nail of 75mm up to 38mm after 150mm distance on the wet dressing of C.C. strip. Then clean the roof and apply the chemicals on the roof to prevent dampness and salinity by following methods:

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(2) **Necessary Chemicals.**

- (a) Desalt –S01.
- (b) Foam-Lub.(with water).
- (c) Curdy-Dense Foam-Lub Cement Grout (Before Patent-stone)
- (d) Foam-Lub used in Patent Stone.
- (e) Foam-Lub used in neat Cement Finishing.

(3) **The use of Desalt-S01.** Desalt-S01 + Water + Catalyst = 1 liter + 10liter + 25 ml. or 1 point / mark. Apply one coat of mixture all over the surface of top slab with a broom. When the surface is dry then spread the mixture of water and Foam-Lub in a way enough for proper absorption of the liquid.

(4) **Method of Preparing Mixture of Foam Lub with Water.** Foam Lub + Water = 1 Liter+ 16 Liter. Apply one coat of mixture all over the surface of top slab with a broom.

(5) **The Mixer & use of Curdy-Dense Foam-Lub Cement Grout Before Patent Stone.** Mix (Foam-Lub + water) + Cement = (2 lits. + 35-38 lits.) + a bag of cement (50kg) to prepare Curdy-Dense Foam-Lub Cement grout. Apply one coat of Curdy-Dense Foam-Lub Cement Grout after 1 day of applying Desalt-S01 before patent stone. When the surface is dry drench, it with Curdy-Dense Foam-Lub Cement Grout.

(6) **Foam Lub used in Patent Stone Concrete.** Mix 500 ml. Foam Lube with a bag of cement(50kg.)

(7) **Size of Chips.** Pie chips or Pea Gravels or 6mm down bricks aggregates.

(8) **Thickness.** At least 75mm concrete (1:2:4), mix 500 ml. Foam Lube with a bag of cement(50kg.).

(9) **Prepared Concrete by Mixer Machine.** Prepare concrete by mixing Chips, Sand, Cement and water in mixture machine. Before mixing materials firstly pour water & Foam-Lub in the mixer machine. Usually 20-22 liter water is used to prepare concrete of per bag cement.

(10) **Manually Preparation.** Mix appropriate amount of Foam-Lub in the necessary amount of water in a bucket and then mix Chips, Sand & Cement to prepare concrete. Fix 22 Gauge Wire Mesh or Expanding Metal Net with 12mm to 6mm gap on the middle of patent stone. Fix net horizontally after completion of plaster of 38mm and fix the border of net with the strip of nails. Then plaster 38mm over the fixed net. The lower level of plaster will be long more than 300mm than of lower level so that the next net can be fasten by wear (at least 50mm over lap and every 150mm distance) and one

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bond be not aligned with another. Finally, apply net finishing with Curdy-Dense Faom Lub-Cement Grout.

(11) **Preparation and use of Curdy-Dense Foam Lub Cement Grout (For Neat Finishing).** Foam Lub + Water + Cement = 2 Liter + 35-38 Liter + 50 kg or 1 bag. Mix the elements properly. Use the mixture for net finishing on the day of casting. Start curing for 28 days after 24 hours of neat finishing.

71. **Ceiling Treatment Against Penetration of Water Through Roofs and Erosion Caused By Salinity as well as The Deformation of Rods From The Concrete.**

a. Site preparation. Apply proper chiping and clean the main concrete after peeling off the patent stone and plaster from the concrete. Clean the rust of rods if necessary.

b. **The Chemicals to be used Sequentially.**

- (1) Desalt- S₀₁
- (2) High strength Highly Liquefied Construction Epoxy
- (3) Curdy-Dense Foam–Lub Cement Grout
- (4) Foam –Lub used in Plaster Mortar for ceiling
- (5) Desalt- S₀₁ (used as sealer on the dry plaster of ceiling)

c. **Desalt- S₁₀.** Desalt- S₀₁ + Water + Catalyst = 1 Liter + 8 Liter + 25 ml or 1 mark. Apply one coat of mixture properly with jute brush.

N.B: Use the mixture within 2 hours of preparation.

d. **Method of Preparation and use of High Strength Highly Liquefied Constructional Epoxy.** There will two types of liquid: A & B. Mix same amount of both liquid in a pot. As the mixture will be used within 15 minutes, it is better to mix optimum amount of both liquids.

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N.B.: Don't keep the mouth of bottle open.

Use. Apply one coat of mixture on the rod with a hair made brush. Apply 2nd coat when the 1st coat is dry or after 12 hours.

e. **Curdy-Dense Foam-Lub Cement Grout before Plastering.** Foam-Lub + Water + Cement = 2 Liter + 35-38 Liter + 1 bag or 50 kg. Apply Curdy-Dense Foam-Lub Cement Grout on surface before plastering. If the surface dries, it will drench with Grout again.

N.B.: Use the mixture within 2 hours of preparation. Apply the 1st coat of grout properly with a jute brush. Drench the surface whenever it is dry before plastering.

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f. **Foam-Lub used in Plastering-Mortar.** Apply 500 ml. of Foam-Lub with mixture of 1 bag of cement to prepare mortar for plastering. Use the sufficiently wet mortar. Apply curing for 7 days with normal mode. Apply one coat of Desalt- S₀₁ as sealer on dry plaster before putting and painting.

g. **Method of Mixture of Desalt-S₀₁ as Sealer.** Desalt-S₀₁ + Water + Catalyst = 1 Liter + 4 Liter + 25 m.l. or 1 mark. Apply the mixture properly with a jute brush. Apply the mixer within 2 hours of preparation. Don't apply Desalt-S₀₁ on wet plaster. Any other sealer is useless after using Desalt- S₀₁.

72. **Chemicals used to Prevent Salinity, Water Absorption and Growth of Algae on Sand Stones, Ceramics and Ordinary Fine Bricks of Old Building.**

a. **Chemicals to be used Sequentially.**

- (1) Foam-Lub used in pointing mortar
- (2) Desalt-S₀₁
- (3) Hydro Seal Ef-34 (with water)

b. Method of Preparing and using Chemicals.

c. **Foam-Lub used in Pointing Mortar as Site Preparation.** When the casting of sand stones, ceramics, and ordinary fine bricks is finished, generate the mixture of 2 liter Foam-Lub, a bag of (50kg) cement and appropriate amount of water to generate mortar. Use the mortar to fill up the joints of mortar with the mortar so that the water can't penetrate through the joints. Clean loose materials, if any, with brush and water. After 2 or 3 days of cleaning, apply Desalt-S₀₁ in a way that it can perpetuate through the wall.

d. **The use of Desalt-S₀₁.** Desalt-S₀₁ + Water + Catalyst = 1 liter + 8 liter + 25 ml. or 1 point/mark. Apply one coat of mixture with a jute brush. Use the mixture within 2 hours of preparation. Clean the Desalt-S₀₁ applied surface after 1 day with water and brush. Let the surface dry, then after 6-7 days use 3 coats mixture Hydro-Sea, Ef-32 with water.

e. **The Mixing & using of Hydro-Seal-Ef-34.**

- (1) **1st Coat.** Hydro-Seal, Ef-34 + Water + T Catalyst = 1 Liter + 6 Liter + 25 ml. or 1 point/mark. Apply the mixture on Fair-face with a jute brush in way that the mixture can be penetrated. Apply a 2nd coat after 1 day of 1st coat.

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(2) **2nd Coat.** Hydro-Seal, Ef-34 + Water + T Catalyst = 1 Liter + 5 Liter + 25 ml. or 1 point/mark. Apply the mixture with a jute brush in way that the mixture can be penetrated. Apply a 3rd coat after 1 day of 2nd coat.

(3) **3rd Coat.** Hydro-Seal, Ef-34 + Water + T Catalyst = 1 Liter + 5 Liter + 25 ml. or 1 point/mark. Apply the mixture with a jute brush in way that the mixture can be penetrated.

73. **To Keep Away Termite & Insects From The Grand Floors & External Side of Old Building.**

a. **Termite Controlling Treatment using Pesterthy (Termite Control Powder) with Hydro-Seal, Ef-32 Liquid Felt at Inside Ground Floor of Old Building.** When Hydro seal, Ef-32 (as liquid Felt) is used for prevention of salinity and dampness, at that time Pesterthy (Termite Control Powder) to be used with Hydro seal, Ef-32. Mix 500 gm. Pesterthy (Termite Control Powder) with each 12 Liter Hydro Seal, Ef-32 properly and then this mixture is applied with coconut broom on whole floor properly.

b. **Prevention of Termite Outside of New Buildings.** Dig canal in the soil outside and attached to the external wall and make a surrounding hole of 600mm wide and 600mm deep. Spread Pesterthy (Termite Controlling Powder) equally on the surface of the hole. Fill up half of the whole. Spread Pesterthy the half filled hole by the same way. Then fill up whole hole with soil. Spread Pesterthy again on the surface of filled up hole. Finally, cover the surface soil with brick soling, C.C. Tiles or layer of soil of 50mm thickness.

c. **Prevention of Insects of Inside Walls and Floors of Old Buildings.**

(1) **Use of Pestonal on Walls.** Prepare a mixture with 100 ml. Pestonal-A + 100 ml. Pestonal-B + 5 Liter water. Then spray the mixture with spray machine on the infested area. After 7 days, wash the wall with water or wet cloth.

(2) **Use of Pestonal on Floors.** Dug holes with drill machine of 12mm dia, on every 600mm on C.C. floor and nearby areas of the joint of walls and floors. Prepare a mixture with 100 ml. Pestonal-A + 100 ml. Pestonal-B + 10 Liter water Use a funnel to pour above mixture of 500ml. Then seal the holes with mortar. Though , hacking up floors is the best way of prevention of this kind of problem, this is an effective method of prevention of insects.

d. **Methods of using Pesto-Clea for Destroying and Preventing of Termite on Old Wooden Furniture, Windows, and Doors.** The Method of Mixing and Preparing Pesto-Clea (Termite Controlling Liquid). Mix Pesto-clea-A 150 ml. + Pesto-clea-B 150 ml. + 5 Liter water properly. Then it sprays on whole wooden materials with a spray machine or hair-brush. Pesto-clea must be used properly before polishing.

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- e. **Method of using Pesto-con on Electric Conduit.** Spray Pesto-con (Tube) in electric conduit infected with insects with air-compressor.

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Table

74. Different Dosages of required chemical-products of BARAL Chemical Co. Ltd. / Dr Fixit or equivalent for treatments of different structures

a. Dosages in Concrete of Piling.

Name of Chemical-Products	Ratio of concrete	Quantity
Foam-Lub	1:1½:3	125ml per bag of cement.
	1: 2: 4	150ml per bag of cement.

b. Dosages in Concrete of Basement (in dry Condition).

Name of Chemical-Products	Ratio of concrete	Quantity used per bag of cement
Foam-Lub	1:1½:3	400ml.
	1: 2: 4	500ml.

c. Dosages in Concrete of Basement (in Water-Leaking Condition).

Name of Chemical-Products	Ratio of concrete	Quantity used per bag of cement

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Foam-Lub	1:1½:3	800ml.
	1: 2: 4	1Litre.

d. **Dosages in Concrete of Retaining Wall (in dry Condition).**

Name of Chemical-Products	Ratio of concrete	Quantity used per bag of cement
Foam-Lub	1:1½:3	400ml.
	1: 2: 4	500ml.

e. **Dosages in concrete of Retaining Wall (in water-leaking condition).**

Name of Chemical-Products	Ratio of concrete	Quantity used per bag of cement
Foam-Lub	1:1½:3	800ml.
	1: 2: 4	1Litre.

f. **Dosages in Concrete of Underground Water-Tank's Floor & Wall (In Dry Condition).**

Name of Chemical-Products	Ratio of concrete	Quantity used per bag of cement
	1:1½:3	400ml.

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Foam-Lub		
	1: 2: 4	500ml.

g. **Dosages in Concrete of Underground Water-Tank's Floor & Wall (In Water-Leaking Condition).**

Name of Chemical-Products	Ratio of concrete	Quantity used per bag of cement
Foam-Lub	1:1½:3	800ml.
	1: 2: 4	1Litre.

h. **Dosages in Concrete of Overhead Water-Tank's Floor & Wall.**

Name of Chemical-Products	Ratio of concrete	Quantity used per bag of cement
Foam-Lub	1:1½:3	800ml.
	1: 2: 4	1Litre.

j. **Dosages in the Mortar of Plaster of Underground & Overhead Tanks.**

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Name of Chemical-Products	Coverage	Quantity used per bag of cement
Foam-Lub	100sft	250ml.
	as per thickness	250ml.
Foam-Lub(used in curdy-dense grout for neat finishing)	800sft.	2 Litre

k. **Dosages in Concrete of Underground Footing, Tiebeam, Column Etc in Salinity Condition.**

Name of Chemical-Products	Ratio of concrete	Quantity used per bag of cement
Foam-Lub	1:1½:3	200ml.
	1: 2: 4	250ml.

l. **Dosages in Concrete of Underground Footing, Tiebeam, Column Etc at Normal Condition.**

Name of Chemical-Products	Ratio of concrete	Quantity used per bag of cement
Foam-Lub	1:1½:3	125ml.
	1: 2: 4	125ml.

m. **Dosages in Concrete of Super-Structure's Beam, Column, Slab etc.**

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Name of Chemical-Products	Ratio of concrete	Quantity used per bag of cement
Foam-Lub	1:1½:3	125ml.
	1: 2: 4	125ml.

n. **Dosages in Concrete of Top-slab's Casting.**

Name of Chemical-Products	Ratio of concrete	Quantity used per bag of cement
Foam-Lub	1:1½:3	200ml.
	1: 2: 4	250ml.

p. **Dosages in Fair-face Concrete.**

Name of Chemical-Products	Ratio of concrete	Quantity
Foam-Lub	1:1½:3	125ml per bag of cement
	1: 2: 4	250ml per bag of cement

q. **Dosages in Concrete of Swimming-Pool.**

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Name of Chemical-Products	Ratio of concrete	Quantity used per bag of cement
Foam-Lub	1:1½:3	800ml.
	1: 2: 4	1Litre.

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r. **Curdy-Dense Grout at the Joints of Concrete.**

Name of Chemical-Products	Coverage (per bag of cement grout)	Quantity used in one bag of cement
Foam-Lub	20sqm.to 40sqm.	2Litres

s. **Dosages in Cement-Sand Mortar to Build-Brick Wall.**

Name of Chemical-Products	Quantity
Foam-Lub	125ml(per bag of cement)

t. **Anti Salinity Treatment at Brick-Wall.**

Name of Chemical-Products	Coverage	Quantity
Desalt-S01	40sqm.	1Litre

u. **Dosages in the Mortar of Plaster of Inside Brick-Wall Except That of Kitchen & Bathroom.**

Name of Chemical-Products	Coverage	Quantity
Foam-Lub	10sqm.	125ml
	Per bag of cement mortar	125ml.

v. **Dosages in the Mortar of Plaster of Outside Brick-Wall of Kitchen & Bathroom.**

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Name of Chemical-Products	Coverage	Quantity
Foam-Lub	10sqm.	250ml
	Cement-mortar per bag of cement	250ml.

w. **Desalt-S01(Anti-dcoat to Salinity Come Sealer Before Painting).**

Name of Chemical-Products	Coverage	Quantity
Desalt-S01	45sqm.	1Litre

x. **Damp-Proof & Antisalinity Treatment of Inside Brick Wall of Kitchen & Bathroom.**

Name of Chemical-Products	Coverage	Qu ant ity
Desalt-S01	40sqm.	1Litre
Foam-Lub (used in curdy-dense cement grout) 2coats	30sqm.	2 Litres

y. **Dosages in the Mortar of Tiles & Marble-Stone's Cladding on Wall.**

Name of Chemical-Products	Cover age	Quantity
Foam-Lub used in curdy-dense cement grout	80sqm.	2lits/bag of cement
Foam-Lub used in mortar	as per thickness	250ml./bag of cement-mortar

z. **Damp Proof Treatment at Skirting Level.**

Name of Chemical-Products	Coverage	Quantity
Desalt-S01	40sqm/lit.	1 litre
Foam-Lub(used in curdy-dense cement grout)	30sqm. (2coats)	2 lits./bag of cement

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Foam-Lub(used in cement grout)	80sqm./2lits.	2 lits./bag of cement
Foam-Lub (used in mortar)	10sqm	500ml./bag of cement

aa. **Dosages in the Mosaic Casting.**

Name of Chemical-Products	Quantity
Foam-Lub	250ml.

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bb. **Dosages in Mortar of Tiles & Marble Cladding at Floor.**

Name of Chemical-Products	Coverage	Quantity
Foam-Lub(used in curdy-dense cement grout)	80sqm./2lits.	2 lits./bag of cement
Foam-Lub(used in Mortar)	as per thickness	125ml./bag of cement

cc. **To Protect From any Water-Soaking, Hair-Crack Filling & to Protect From any Water-Based Staining at Mosaic.**

Name of Chemical-Products	Coverage (per litre)	Quantity
Mosasol	7sqm	1Litre

dd. **To Protect From any Water-Soaking, Hair-Crack Filling & to Protect From any Water-Based Staining at Marble.**

Name of Chemical-Products	Coverage (per litre)	Quantity
Marbosol	10sqm	1Litre

ee. **Fair-Face Brick, Sand-Stone, Lime-Stone Cladding on Wall.**

Name of Chemical-Products	Coverage	Quantity
Desalt-S01	40sqm	1 litre

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Foam-Lub(used in curdy-dense cement grout)	30sqm(2coats)	2 lits./bag of cement
Foam-Lub(used in cement grout before cladding)	80sqm	2 lits./bag of cement
Foam-Lub (used in mortar)	5sqm	250ml./bag of cement
Foam-Lub (used in pointing mortar)	80sqm	2lits/bag of cement

ff. **Anti-Salinity, to Stop Water-Soaking, Anti-Algae and Colour Persisting Treatment on Fair-Face Or Weather-Exposed Surface of Sand-Stone, Ceramic & Common Brick-Walls.**

Name of Chemical-Products	Coverage (per litre)	Quantity
Desalt-S01	40sqm.	1Litre
Hydro-seal,Ef-34	25sqm.	1Litre

gg. **Anti-Salinity & Damp-Proof treatment at Ground-Floor of new Building (with Hydro-Seal,Ef-32 for Life-Long Durability).**

Name of Chemical-Products	Coverage (per litre)	Quantity
Desalt-S01	40sqm.	1Litre
Hydro-seal,Ef-32	5sqm.	1Litre
Cool-tar	50sqm.	1tin(10 lits)
Kerosin	20sqm.	1Litre

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Foam-Lub (in patent stone)	3sqm. (1:2:4), 50mm thickness	250ml./bag of cement
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hh. **Water & Heat Reducing Treatment with Hydro-Seal,Ef-32 at Roof.**

Name of Chemical-Products	Coverage	Quantity
Desalt-S01	40sqm	1 litre
Hydro-seal,Ef-32 (Raw)	10sqm.	1 litre
Hydro-seal,Ef-32	5sqm.	1 litre
Foam- Lub(to mix with Hydro-seal,Ef-32)	5sqm.	1 litre
Foam-Lub (for Patent-stone)	2.5sqm.(1:2:4), 75mm thickness	250ml./bag of cement
Foam-Lub (for neat-finishing)	60sqm.	2lits/bag of cement

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jj. **Water & Heat Reducing Treatment with Foam-Lub at Roof.**

Name of Chemical-Products	Coverage	Quantity
Desalt-S01	40sqm	1 litre
Foam-Lub (Raw)	10sqm.	1 litre
Foam-Lub(used in cement grout)	40sqm.	2 lits./ bag of cement
Foam-Lub (for Patent-stone)	2.5sqm.(1:2:4), 75mm thickness	500ml/bag of cement
Foam-Lub (for neat-finishing)	60sqm.	2lits/bag cement

kk. **Termite Controlling Treatment with Hydro-Seal,Ef-32 Liquid-Felt at Inside Ground Floor of New Building.**

Name of Chemical-Products	Coverage	Quantity
Pesterthy (termite controlling powder)	90sqm/kg	1kg.

ll. **Termite Controlling Treatment Before Soiling or C.C. at Inside Ground Floor New Building.**

Name of Chemical-Products	Coverage	Quantity
Pesterthy (termite controlling powder)	30sqm/kg	1kg.

mm. **Termite Controlling Treatment Around New Building.**

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Name of Chemical-Products	Coverage	Quantity
Pesterthy (termite controlling powder)	12mtr. or 40sqm.	1kg.

nn. **Termite Controlling Treatment on Wooden Furniture, Door, Window, Cup-Board etc.**

Name of Chemical-Products	Coverage	Quantity
Pesto-clea (termite controlling liquid)	100sqm/kg	1kg.

pp. **Termite Controlling Treatment Electric Conduit.**

Name of Chemical-Products
Pestocon Tube (used in Electric conduit)

Gray Cementitious Alloy used for stopping running water-leakages:

Name of Chemical-Products	Coverage (per kg)	Quantity
Gray Cementitious Alloy	700 cubic c.m.	1 kg

TABLE

75. Different Dosages of required chemical-products in different treatments of Old Building

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a. **Leakage, Anti-Salinity & Damp-Proof Treatment at Basement-Floor of Old Building (With Hydro-Seal,Ef-32 For Life-Long Durability).**

Name of Chemical-Products	Coverage (per litre)	Quantity
Gray Cementations Alloy	700 cubic c.m.	1 kg
Desalt-S01	40sqm.	1Litre
Hydro-seal,Ef-32	5sqm.	1Litre
Cool-tar	50sqm.	1tin(10lits)
Kerosin	20sqm.	1Litre
Foam-Lub (in patent stone)	3sqm. (1:2:4), 50mm thickness	250ml./bag of cement

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b. **Leakage, Anti-salinity & Damp-Proof Treatment at Basement-Wall of Old Building.**

Name of Chemical-Products	Coverage	Quantity
Gray Cementitious Alloy	700 cubic c.m.	1 kg
Desalt-S01	40sqm/lit.	1 litre
Foam-Lub(used in curdy-dense cement grout)	30sqm. (2coats)	2 lits./bag of cement
Foam-Lub(used in cement grout before plaster)	80sqm./2lits.	2 lits./bag of cement
Foam-Lub (used in Plaster mortar)	7sqm	500ml./bag of cement

c. **Leakage, Anti-Salinity & Damp-Proof Treatment at Under-Ground & Overhead Water-Tank of Old Building.**

Name of Chemical-Products	Coverage	Quantity
Gray Cementitious Alloy	700 cubic c.m.	1 kg
Desalt-S01	40sqm.	1 litre
Foam-Lub(used in curdy-dense cement grout)	30sqm. (2coats)	2 lits./bag of cement
Foam-Lub(used in cement grout before plaster)	80sqm.	2 lits./bag of cement
Foam-Lub (used in Plaster mortar)	7sqm	500ml./bag of cement
Foam-Lub (for neat finishing)	60sqm.	2 lits./bag of cement

d. **Anti-salinity & Damp-Proof Treatment at Ground-Floor of Old Building (with Hydro-seal, Ef-32 for Life-Long Durability).**

Name of Chemical-Products	Coverage (per litre)	Quantity
Desalt-S01	40sqm.	1Litre

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Hydro-seal,Ef-32	5sqm.	1Litre
Cool-tar	50sqm.	1tin
Kerosin	20sqm.	1Litre
Foam-Lub (in patent stone)	3sqm. (1:2:4), 50mm thickness	250ml./bag of cement

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e. **Anti-Salinity & Damp-Proof Treatment with Hydro-Seal, Ef-32(Specially Approved Ground Floor & Outside Wall of the Bath & Kitchen Room).**

Name of Chemical-Products	Coverage	Quantity
Desalt-S01	40sqm.	1Litre
Hydro-seal,Ef-32	3.5sqm.	1Litre
Foam-Lub (to mix with hydro seal Ef-32)	15sqm.	1Litre
Foam-Lub (to make curdy-dense cement grout)	80sqm	2Litre/bag of cement
Foam-Lub (used in the mortar of plaster)	10sqm.	250ml/bag of cement
Desalt-S01 (as sealer)	45sqm.	1Litre

f. **Anti-salinity & damp-proof treatment at inside and outside of old building(Except ground floor).**

Name of Chemical-Products	Coverage	Quantity
Desalt-S01	40sqm.	1 Litre
Foam-Lub curdy-dense cement grout (2 coat)	30sqm	2 Litre/bag of cement
Foam-Lub curdy-dense cement grout (before plaster)	80sqm.	2 Litre/bag of cement
Foam-Lub in mortar	10sqm.	250ml/bag of cement
Desalt-S01 (as sealer)	45sqm	1 Litre

g. **Water & Heat Proof Treatment with Hydro-Seal, Ef-32 at Roof.**

Name of Chemical-Products	Coverage	Quantity

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Desalt-S01	40sqm	1 litre
Hydro-seal,Ef-32 (Raw)	10sqm.	1 litre
Hydro-seal,Ef-32	5sqm.	1 litre
Foam- Lub(to mix with Hydro-seal,Ef-32)	20sqm.	1 litre
Foam-Lub (for Patent-stone)	2sqm.(1:2:4), 75mm thickness	250ml./bag of cement
Foam-Lub (for neat-finishing)	60sqm.	2lits/bag of cement

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h. **Water & Heat Proof Treatment with Foam-Lub at Roof.**

Name of Chemical-Products	Coverage	Quantity
Desalt-S01	40sqm	1 litre
Foam-Lub (Raw)	10sqm.	1 litre
Foam-Lub(used in cement grout)	40sqm.	2 lits./ bag of cement
Foam-Lub (for Patent-stone)	2sqm.(1:2:4), 75mm thickness	500ml./bag of cement
Foam-Lub (for neat-finishing)	60sqm.	2lits/bag cement

j. **Corrosive Ceiling Treatment of Old Building.**

Name of Chemical-Products	Coverage	Quantity
Desalt-S01	40sqm/lit.	1 litre
High Strength Highly Liquefied Constructional Epoxy(A & B)	as per condition (2coats)	as per requirement
Foam-Lub(used in curdy-dense cement grout)	60sqm.	2 lits./bag of cement
Foam-Lub (used in mortar)	7sqm	500ml./bag of cement

k. **Anti-Salinity, to Stop Water-Soaking, Anti-Algae and Colour Persisting Treatment on Face or Weather-Exposed Surface of Sand-Stone, Ceramic & Common Brick-Walls.**

Name of Chemical-Products	Coverage (per litre)	Quantity
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Desalt-S01	40sqm.	1Litre
Hydro-seal,Ef-34	25sqm.	1Litre

1. **Termite Controlling Treatment in Hydro-Seal, Ef-32 Liquid-Felt at Nside Ground Floor of Old Building.**

Name of Chemical-Products	Coverage	Quantity
Pesterthy (termite controlling powder)	90sqm/kg	1kg.

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m. **Termite Controlling Treatment Around the Old Building.**

Name of Chemical-Products	Coverage	Quantity
Pesterthy (termite controlling powder)	12 mtr. or 40sqm	1kg.

n. **Termite Controlling Treatment on Inside & Outside Wall of Old Building.**

Name of Chemical-Products	Coverage	Quantity
Pestonol (termite controlling liquid)	150sqm/kg	1kg.

p. **Termite Controlling Treatment on Wooden Furniture, Cup-Board, Door, Window, False-Ceiling etc.**

Name of Chemical-Products	Coverage	Quantity
Pesto-clea (termite controlling liquid)	100sqm/kg	1kg.

q. **Termite Controlling Treatment Electric Conduit.**

Name of Chemical-Products
Pestocon Tube (used in Electric conduit)

r. **Cement to be used BDS EN 197-1:2003 (CEM-1)**

Brand of cement section as Annex 'A'

i. **Standard strength**

The standard strength of a cement is the compressive strength determined in accordance with EN 196-1 at 28 days and shall conform to the requirements in Table

Free classes of standard strength are included: class 32,5 class 42.5 and class 52,5 (see Tab 2)

ii. **Early strength**

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The early strength of a cement is the compressive strength determined in accordance with EN 196-1 at either 2 days or 7 days and shall conform to the requirements in Table 2. Two classes of early strength are included for each class of standard strength, a class with ordinary early strength, indicated by N, and a class with high early strength, indicated by see Table 2)

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Table- Mechanical and physical requirements given as characteristic values

Strength dass	Compressive strength MPa				Intital setting time min	Sound-ness (expansion) mm
	Early strength		Standard strength			
	2 days	7 days	28 days			
32.5 N	-	> 16,0	> 32,5	< 52,5	>75	<10
32.5 R	> 10,0	-				
42.5 N	> 10,0	-	>42.5	< 62,5	>60	
42.5 R	> 20,0	-				
52.5 N	>20,0	-	> 52,5	-	>45	
52.5 R	> 30,0	-				

iii. Physical requirements

iv. Initial setting time The initial setting time, determined in accordance with EN 196-3 shall conform to the requirements in Table 2.

v. Soundness

The expansion, determined in accordance with EN 196-3, shall conform to the requirement in

vi. Chemical requirements

The properties of the cements of the cement type and strength class shown in columns 3 and 4 respectively of Table 3 shall conform to the requirements listed in column 5 of this table when tested in accordance with the standard referred to in column 2.

NOTE: Some European countries have additional requirements for the content of water-soluble hexavalent chromium (see informative annex A).

vii. Admixture of commix products:

a. Mega flow SP-402 to present day. Mixed Fegaflo-SP-402 with cement in ratio 1:25 kg : 50 kg cement or (2.50%) Megaflo with Weight of cement) where required.

b. Mega-add WL-1 for anti salinity. Mixed mega-add-WL-1 with cement in ratio 0.50kg : 50kg cement or (1.00%) Mega-Add-WL-1 with weight of cement) where required.

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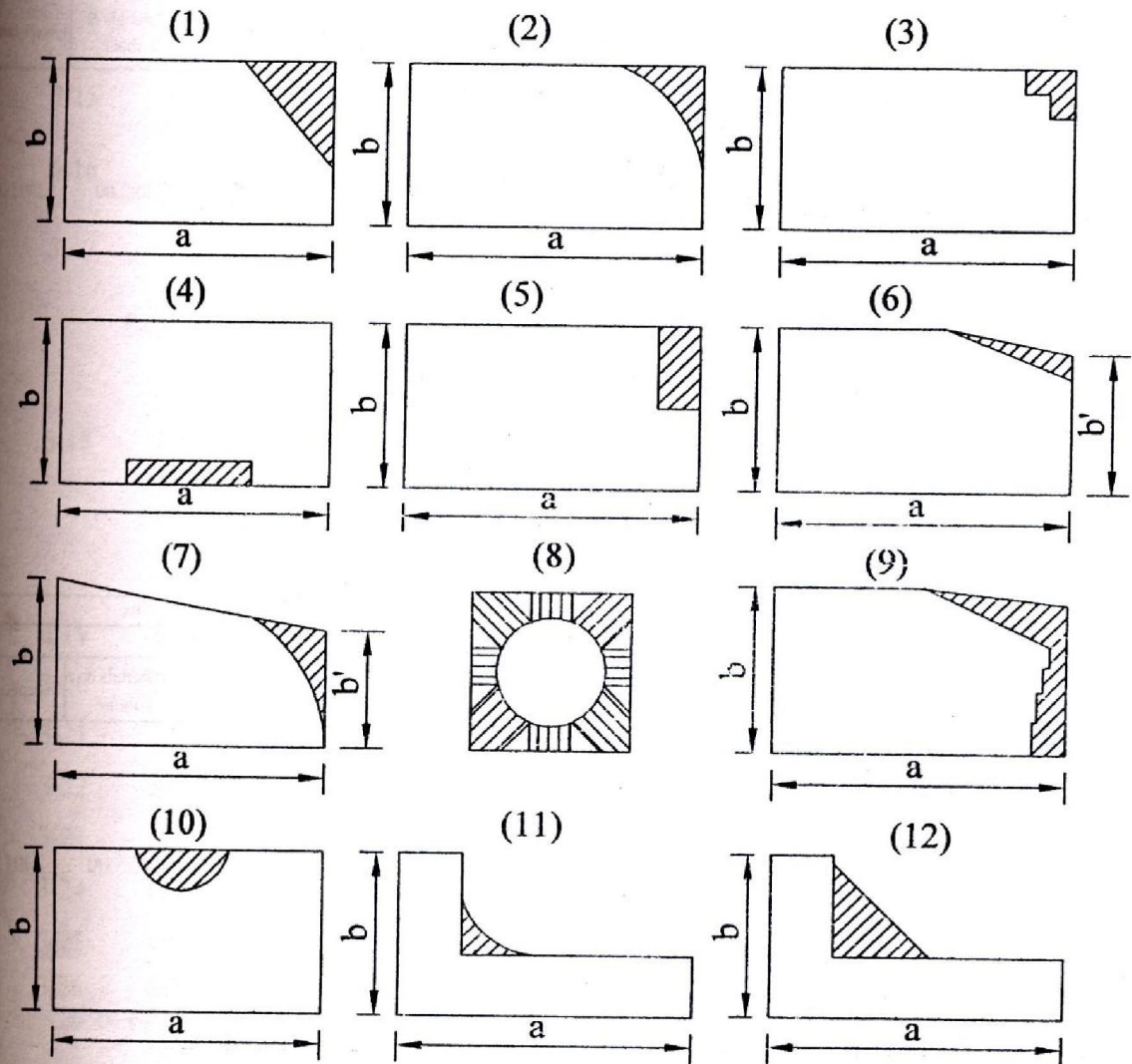
BDS EN 197-1 : 2003

Table 1 - The 27 products in the family of common cements

main	Notation of the 27 products		Composition [percentage by mass]											
			Main constituents										Minor	
			Clinker	Blast-furnace slag	silica fume	Pozzolana natural		Fly ash		Burnt	Lime			
						Natural	natural calcine	siliceous	calcareo		I	II		
			k	s	dhi,	p	q	v	w	t	I	II		
CEM I	Portland cement	CEM I	95-100	-	-	-	-	-	-	-	-	-	0 to 5	
	Portland-slag cement	CEM II/	80 to	6to20	-	-	-	-	-	-	-	-	0 to 5	
		CEM II/B-S	65to79	21to35	-			-		-			0 to 5	
	Portland-silica fume cement	CEMII/A-D	90 to	-	6 to 10	-	-	-	-	-	-	-	0 to 5	
	Portland pozzolana cement	CEM II/	80 to 94	-	-	6 to 20	-	-	-	-	-	-	0 to 5	
		CEM II/	65to79	-	-	21to35	-	-	-	-	-	-	0 to 5	
		CEM II/A-Q	80to94	-	-	-	6 to 20	-	-	-	-	-	0 to 5	
		CEMII/B-Q	65to79	-	-	-	21to35	-	-	-	-	-	0 to 5	
	Portland -fly ash cement	CEM II/A-V	80to94	-	-	-	-	6 to 20	-	-	-	-	0 to 5	
		CEM II/B-V	65to79	-	-	-	-	21to35	-	-	-	-	0 to 5	
		CEM II/A-W	80to94	-	-	-	-	-	6 to 20		-	-	0 to 5	
		CEM II/B-W	65to79	-	-	-	-	-	21to35	-	-	-	0 to 5	
	Portland-burnt shale cement	CEM II/A-T	80to94	-	-	-	-	-	-	6 to 20	-	-	0 to 5	
		CEM II/B-T	65to79	-	-	-	-	-	-	21to35	-	-	0 to 5	
	Portland-limestone cement	CEM II/A-L	80to94	-	-	-	-	-	-	-	-	6 to 20	0 to 5	
		CEMII/B-L	65to79	-	-	-	-	-	-	-	-	21to35	0 to 5	
		CEM II/A-LI	80to94	-	-	-	-	-	-	-	-	-	6 to 20	0 to 5
		CEM H/B-LI	65to79	-	-	-	-	-	-	-	-	-	21to35	0 to 5
	Portland-composite cement *	CEM II/A-M	80to94	-----6 to 20-----									0 to 5	
		CEM II/B-M	65to79	-----21 to 35-----									0 to 5	
CEM III	Blastfurnace cement	CEM III/A	35to64	36to65	-	-	-	-	-	-			0 to 5	
		CEM III/B	20to34	66to80	-	-	-	-	-	-	-	-	0 to 5	
		CEM III/C	5to19	81to95	-	-	-	-	-	-	-	-	0 to 5	
CEM IV	Pozzolanic cement "	CKMIV/A	65to89	-	-----11 to 35-----					-	-	-	0 to 5	
		CEM IV/B	45to64	-	< -----.16 to 55 ----->					-	-	-	0 to 5	
CEM V	Composite cement '"	CEM V/A	40to64	18to30	-	< -----18 to 30 ----->			-	-	-	-	0 to 5	
		CEM V/B	20to38	31to50	-	< -----.31 to 50 ----->			-	-	-	-	0 to 5	
i) The values in the table refer to the sum of the main and minor additional constituents.														
ii) The proportion of silica fume is limited to 10%														
iii) In Portland-composite cements CEM II/A-M and CEM U/B-M, in Pozzolanic cement CEM IV/A and CKM IV/B and in composite cements CEM V/A and CEM V/B the main constituents other than clinker shall <i>be</i> declared fay designation of the cement (for example see clause 8).														

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FOR NO 6&7 TAKE AVERAGE OF b & b'
FOR NO 11&12 TAKE NO ADDITIONS

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SECTION-4

BRICK WORK AND DPC

SPECIFICATION

General

1. **Bricks.**

a. A good first class brick should be sound, hard and well-brunt with uniform size, shape and colour, homogeneous in texture and free from flaws and cracks. Arises should be square, straight and sharply defined. A brick should give a metallic sound when struck with another brick. A first class dry brick should not absorb water more than 1/6th of its weight.

b. Fire bricks to be best quality country made fire bricks of same size as ordinary burnt bricks and to be of approved manufacture.

c. **Size of Bricks:**

(1) Burnt bricks shall be not less than 240mm X 120mm X 70mm.

2. **Cement.** The cement shall be ordinary, normal setting cement of approved brand complying in all respect with BDS EN 1997-1: 2003 CEM-I. Cement, unless otherwise specified to be of any particular quality shall mean this ordinary, normal setting cement.

3. Sand shall be from approved source and free from dust and salt.

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4. **Brick work.** All burnt bricks to be thoroughly soaked in water before being laid in cement. Burnt bricks built in mud mortar will only be dipped in water before use. The joints of brickwork shall be not less than 6mm or more than 9 mm in thickness. All joints to be well flushed up at every course. The wall shall be carried up regularly, not leaving any part more than 1 metre lower than another, unless special circumstances render this impracticable.

Any walls left at different levels to be raked back, courses to be properly leveled, perpend, quoins, jambs, and other angles plumbed, as the work proceeds. All brickwork shall gauge four courses to 300mm in height including joints. In alteration work the brick work shall gauge with existing work unless otherwise directed; Internal walling and backings to be in even courses with external facings, but bricks may be thicker and joints thinner, provided the courses bond with the work. All brick work to be built in English bond, unless otherwise specified. No half bricks or bats being used except where necessary to complete the bond. External facings to be of sound hard bricks of good shape and uniform colour (unless mottled or multi-coloured bricks are required) with square and sharp arises selected from the stacks deposited on site. Joints of brickwork will be struck cleaned and the same mortar pressed while the brick work proceeds using additional mortar if required. Raking out joints will NOT be done. Pointing brick work will be a separate process including raking out joints and using different mortar from that of brick work mortar. Pointing will NOT be done in the same mortar. If ordered pudlo shall be added to the pointing materials. The joints on faces which are to be plastered or pointed in mortar different to the brick work mortar should be raked 9mm deep, while the mortar is green but not later than 24 hours after the work is done.

The pointing or striking out joints will normally be adopted as follows:

- a. Flush pointing will only be used on inside surfaces where ordered.
- b. Weather stuck joints/pointing will generally be adopted for external work where the walls are not plastered.

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- c. Recessed joints/pointing will generally be adopted for pillars, fire places or other ornamental work/faces required both internally or externally where so ordered.
- d. Tuck-pointing will be done on surfaces when specially ordered by the Engineer-in-Charge.

All new work in cement mortar will be kept watered and damp for such period as directed n.exc. 14 days, and where it is to be built on to old work, the later will be kept watered for 2 days before hand.

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5. **Brick work in Arches.** Bricks to be properly made or dressed (cut and rubbed) to template as specified and joints not to exceed 6mm in thickness. Where half brick rings are permitted, header bricks or "lacing courses" will be executed as directed by the Engineer-in-Charge. Centering to be approved and struck as directed by the Engineer-in-Charge.

6. **Mortar.** The proportions given are bulk, 0.071 cubic metre shall be taken as equal to 100 kg cement. The gauge boxes shall be of such dimensions that a complete bag of cement forms a unit part of cu.m when cement is re-bagged it will be done by weight so that a complete bag will weight 50 kg. Cement mortar to be composed of one part cement to the number of parts of sand specified. The ingredients of cement mortar shall be thoroughly mixed dry, sufficient water added through a rose to make the mixture workable and then thoroughly mixed wet.

7. **Honeycomb Brick Work.** Bricks to have a bearing of not less than 25mm in the case of half brick walls and 12mm in the case of one brick walls.

8. **Cavity Walls.** The thickness of skins to be as specified. The skins to have 60mm cavity in between, and to be tied together with cranked galvanized wrought iron wall ties 19mm X 9mm with ends split and fish tailed, spaced 1 Metre apart to every third course of brick work.

9. **Watering and Protection.** All brick works after pointing shall be kept wet for such period as directed n.exc. 14 days. Cover up and protect all brickwork from damage by frost or otherwise until the work is handed over.

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Method of Measurements

10. **Thickness, Etc.** The following thickness shall be allowed when measuring:
- a. Measure length and height to nearest mm.
 - b. Thickness of walls built in burnt bricks will be measured in multiple of 125mm i.e., 125, 250, 375, 500 and 625mm. and so on, without considering the increased width on account of the mortar in the joints. In case of cavity or similar walls built in brick on edge the thickness will be measured as 75mm or multiple of 75mm.
11. **Deductions.** No deduction shall be made in brickwork for opening n.exc. 0.35 Square Meter. No deduction shall be made for plates, strings, relieving arches, lintels, sills, etc., less than 150mm deep and fireplace flues.
12. **Arches.** Arches built in cut and rubbed bricks will be measured separately and the rate includes the use and waste of shuttering. The contents of arches will be deducted from brickwork. No deduction will be made for cambers of arches.
13. **Cavity Wall.** In cavity walls the width of the cavity will not be included in the thickness of the wall.
14. **Honeycomb Brick Work.** The pattern holes shall not be deducted.
15. **Cornices, etc.** Only the girth of the actual projection shall be measured for the "extra only" payment.

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16. **Attached Work.** Measure pillars, pilaster, corbelling and similar projection as Brick work. No deductions or additions shall be made on any account for ends of dissimilar materials, i.e. joists, beams, posts, girders, rafters, purlins, trusses, corbels, steps, etc., n.exc. 450 Sq. cm.

Clarification of Rates

17. The rates, inter alia, include particularly:
- a. Rough relieving arches.
 - b. Beam filling (measured solid).
 - c. Rough and fair cutting.
 - d. Striking joints as work proceeds, or raking out joints if pointing is to be done in a mortar different to brickwork mortar.
 - e. Raking out joints for plaster and pointing in different mortar.
 - f. Forming cheeses, etc.
 - g. Levelling up and preparing walls for DPC.
 - h. Bedding wall plates in or on walls, bedding and pointing sash and door frames in mortar, bedding roof tiles and corrugated sheets in or on walls solidly in mortar and making good the same.
 - j. Building in or cutting and pinning in with mortar to ends of joists, beams, etc., and making good the same.
 - k. Holes (cut and form holes, for fixing pipes, etc.) and making good the same.
 - l. Construction and pargeting flues with weak mortar for flues, n.exc. 9000 sq. cm sectional area.
 - m. Building exposed faces fair.

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- n. Work in cavity walls.
- p. Brick work to curve exceeding inner radius 6 metre.
- q. Works in any position, in small or large quantities and in any thickness.
- r. Supplying and fixing fire brick where required.
- s. Connecting up new work and old (brickwork) in toothing to be measured with new work).
- t. Cost of 1150 Bricks per 2.83 cum. or 406 bricks per cum. (except honey comb brickwork).
- u. Re-facing with new bricks including headers and stretchers.

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18. Rates for burnt brick work apply also to reinforced brickwork (reinforcement to be measured separately).
19. Pointing with different mortar when specified or ordered will be paid for extra.
20. Brick work in cut and rubbed arches includes centering and brick work in so fits.
21. BDS EN• .197-1 : 2003 Cement manufacture company shall be Cemex, Lion brand, Engineer brand, Fresh cement, Crown cement, Seven ring cement.

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SECTION-5

WOOD WORKS

SPECIFICATIONS

General

1. **Glue Shall be.**

- a. Of good make, prepared for skins or high grade bone glue.
- b. Used in the proportion of 2 parts glue to 3 parts water.
- c. Used as much possible on dry surfaces.

2. **Nails Shall be.** Cut brads, cut clasp, oval, square or round wire of approved manufacture and lengths as required.

3. **Screws Shall be.**

- a. Of first class manufacture.
- b. Of the gauges required.
- c. Of flat or round head patterns as required.
- d. Of strong bright steel.
- e. Galvanized, etc. where ordered.

4. **Timber Shall be.**

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a. Timber and Ballies shall be of good quality well and properly seasoned, at least three months air drying for carpenter's work, preferably under cover in all cases. To be of mature growth, uniform in texture, straight in fibre, free from sapwood, loose or dead knots, aggregating more than 7.5 cm in a batten 17.5 cm wide, open shakes, borer holes, rot, dote, decay and all other defects and blemishes. Sawn die, square and holding the full sizes specified whether wrought or unwrought. The timber shall be approved by Engineer-in-Charge before incorporation in the work.

b. **Classified as follows:**

(1) **All faces Sawn and angles square:**

(a) When less than 7.5 cm wide and less than 5 cm thick i.e. under 37.5 sq. cm sectional area, as "fillet" or "battens".

(b) When 7.5 cm wide or over and 5 cm thick or over as "scantlings" - no upper limit.

(c) When less than 5 cm thick, except flooring, and the width is not less than 5 cm as "boarding".

(2) **Unswan but roughly squared.** All sections to be called "baulks".

(3) **Logs and Ballies.**

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- (a) Round unsawn timber over 20cm mean diameter (without bark) shall be called "logs".
- (b) Round unsawn timber n.exc 20cm mean diameter (without bark) shall be called "ballies".
- (c) Specified as "Hardwoods" first class; "Softwoods" first and second class.

The following shall be the subdivision of the more common timbers:

Hardwood - 1st Class:

Chittagong Teak, Shishum & Sal.

Softwoods - 1st Class:

Jessore Teak

Champaful - Tit Chamble & Telshu

Chamble, Chittagong Silkarai, Kathal & Ctg Gamar.

Softwood - 2nd Class:

Garjan.

Jarul.

All other timbers shall be classified according to the comparable grading given in "Commercial Timbers of Bangladesh". In case of disagreement the case will be referred to next higher authority whose decision shall be final and work will not commence till the dispute is dissolved.

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5. **Joints.** "Framed" means Mortise and tenon or dovetailed joints. All joints to fit truly and truly without wedging of filling, and framed joints to be coated with glue before being put together.

6. **Fixing etc.** In addition to the item detailed in definition 5(e) of the General rules, the term "fixed" shall include all taps, notching, halving scraping, etc. Wrought, splayed, rounded, notched and pointed ends of timbers, scribing, circular cutting, and boring for bolts as well as wire hoop iron, coir, hemp or other approved ropes previously dipped in antitermite or preservative solutions, for Ballies. The term "Re-secure" provides for securing fittings, etc. which have become partially loosened, but, which can be secured with hold-fasts, plugs, etc., without taking down. The expression "taking up" or "taking down" includes clearing out nails, etc. The expression "taking down existing trusses and rehoisting and refixing the same" does not include taking trusses as under but does include tightening up wedges, cotters, bolts, etc. Any work done on the trusses in addition to the forging, shall be paid for separately under the relevant rates.

7. **Plugging to Walls.** Rawl plugs or Phill plugs will invariably be used. Wooden plugs (treated with preservative) may be used in lieu when permitted by Engineer-in-Charge and in that case plugs shall be put on the twist and fixed to show narrow face on the walls. Plugging to walls shall be at intervals n.exc. 0.9 metre.

8. **Boarding.** Shall be in widths n.exc. except where in detached pieces as shelves, etc. and in length not less than 1.8 Metre unless circumstances make it impracticable.

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9. **Flooring:** Boarding in flooring, ceiling, etc. shall include cramping or wedging up, punching nails and "cleaning off" after fixing. All heading joints to be made on the centre of joist, bearers and no two heading joints to be adjacent. The boards to be nailed with steel cut brads (or oval wire brads) or fixed with screws, two to each board on every joints, of the following lengths:

For 25mm or 31mm flooring	63 mm long
For 38mm flooring	75 mm long
For 50mm flooring	100 mm long

Wrought timber means with surface plained.

Method of Measurements

10. **Timbering.**

- a. Measure the surface of excavation supported.
- b. Timbering to excavation will ONLY be carried out when specially ordered by the Engineer-in-Charge.
- c. Timbering, where ordered, includes use and waste up to 6 months and fixing and removal.

11. **Timbering Left in.** Measure the cubic contents of timber, planks, struts, etc., left in.

12. **Tolerance:**

- a. Lengths shall be measured to the nearest cm.
- b. Scantling, sawn or wrought, shall hold full dimension.
- c. Boarding shall hold the full thickness specified whether sawn or wrought.

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- d. Widths of single boards shall be measured to the nearest cm.
 - e. Widths of surfaces of 2 or more boards (width) shall be measured net surface area to the nearest cm.
13. **Framed and Unframed Timbers.** Shall be measured out to out. No extra measurement will be made for joints for lengthening of timbers.
14. **Ballies.** The mean diameter of ballies is the sum of the diameters at either end divided by two.

Clarification of Rates

15. **The rates, inter alia, include particularly:**
- a. Bevelled heading joints to boarding.
 - b. Boring for bolts as required.
 - c. Cleaning of wrought faces.
 - d. Cramping and wedging.
 - e. Fixing with hardwood or male bamboo pins, nails, spikes, hoop iron and wire in any position.
 - f. Labour and material in halving, tabling, lapping, notching, framing, straight, splay, circular or birds mouth cutting, splayed and bevelled ends, and mitres, fair or returned ends as required.
 - g. Punching and clenching nails.
 - h. Treating plugs with wood preservative.
 - j. Waste.

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- k. Boarding in any widths.
- l. Work in all types of wood except where otherwise stated.
- m. All notching, firings or squaring to ballies necessary to obtain level bedding, bearing or fixings.
- n. Rebates and chamfers to door and window frames where required.
- p. Chamfering, trimming, edging, etc., to fillets.

16. **In Addition.** The rates for "add if framed" include for framing together with mortice and tenon or dovetailed joints, as in trimmer and trimming joints, roof trusses etc., and hoisting into position as may be necessary.

17. Circular framed work cut from the solid shall be measured net and paid for at twice the rates for straight.

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SECTION-6

DOORS AND WINDOWS

SPECIFICATIONS

General

1. **Screws Shall be**

- a. Of first class manufacture.
- b. Of the gauge required.
- c. of flat or round head patterns as required.
- d. Of strong bright steel
- e. Galvanized, etc. where ordered.

2. **Timber.** For specification and classification of timber, see "WOOD WORK" section.

3. **Joints.** The joints in framed and halved joinery to be pinned with hardwood pins and put together with Glue. Framed means mortise and tenon or dovetailed joints.

4. **Frames or Chowkats.** Door and window chowkats, transoms, and mullions shall be rebated, or the dimension shown below or as per drawing of the contract and will have no horns:

Opening under 1 Sq.m	=	7.5cm x 7.5 cm
Opening 1 Sq.m and over but n.exc 2.5 Sq.m	=	7.5cm x 10cm
Opening exc. 2.5 Sq.m	=	6.25cm x 12.5 cm

Size of chowkat may vary as per drawing.

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5. **Sashes.** The terms "Sashes" includes casements, single or double, fixed, sliding or hung, and fanlights and clerestorey windows, centre, top or bottom hung, or fixed. Sashes shall be wrought, framed, square, chamfered, or moulded, with or without bars and rebated for glass, or wire gauze. Styles and rails to be 7.5 cm wide. When fixed it will be with screws.

6. **Glass.** Shall be clear glass ordinary glazing quality 3mm thick. The glass shall be fixed with oil putty well bedded, back puttied and sprigged where necessary, or with hard wood beads as directed.

7. **Wire Gauze.** Shall be of iron tinned (fly wire 4 x 4 mesh x 22 or 24 gauge, mosquito wire 7 x 7 meshes x 28 gauge) fixed in a rebate and secured with wooden fillets braded in.

8. **Doors.**

a. **Ledged and Batten Doors.** The thickness of battened doors will be the thickness of the battens, which shall be of equal width n.exc. 15cm Ledges to be 6mm thicker than the battens. Doors n.exc. 1.5 Metre high will have two ledges not less than 11.25cm width; doors exc. 1.5 metre high will have three ledges. The battens will have rebated side joints. Ledges to be chamfered or splayed if required. Doors to be fitted with 3 pintol hinges of specified size or using butt hinges as per requirement.

b. **Ledges and Braced Batten Doors.** To be all as last described with the addition of braces 11.25 cm width 6mm thicker than the battens, and birds-mouthed between the ledges. The braces to be chamfered or splayed if required. Doors to be fitted with 3 pintol hinges of specified size or using butt hinges as per requirement.

c. **Framed and Braced Doors.** To be framed with mortise and tenon joints put together with Glue and pinned, and to be framed with styles, top and bottom rails of the

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thickness of the doors, with the middle rail of less thickness. Battens to be of even width, not more than 10cm wide and to be tongued and grooved, including tonguing into styles, and tongued (cross grain) into top and bottom rails. The battens middle rail and braces to be 1.9cm thick for 3.75cm doors and 2.5cm thick for 5cm doors. The styles and top rail to be 12.5cm wide, the middle rail to be 20cm wide and the bottom rail to be 17.5cm wide, all stop chamfered on the inner edges. The braces to be 11.25cm wide, birds-mouthed and fixed as for ledged and braced doors. Doors to be fitted with 3 pintol hinges of specified size or using butt hinges as per requirement.

d. **Panelled Door.** To be wrought, square framed and flats or chamfered or moulded one or both sides. Bottom rails to be 15cm wide and other rails and styles 10cm wide. Panels to be not less than 15mm thick.

e. **Framed Panelled Partitions and Dados.** To be all as (d) above. The through styles to be not more than 1 metre apart.

f. **Half Glazed Doors.** To have styles and rails to Panelled portion as specified for Panelled doors, and top rail to be as for sashes.

g. **Matting Doors and Windows.**

(1) **Matting.** To be of split bamboo or flat leaf as specified in roofs and shall be laid single or double, as ordered on frames or boarding as described below.

(2) **Frames.** For doors, wrought frames 7.5cm x 3.75cm with centre ledge and two braces and for windows a similar frame without ledges and braces. Cover fillets size 7.5cm x 1.9cm to be centrally clench nailed at 15cm intervals to all frame members. Where the height of a window exceeds 1 metre one brace shall be provided and where the height exceeds 1.5 metre it shall be considered as a door.

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(3) **Boarding.** If so ordered, provide styles and rails of double wrought boarding 7.5cm wide, each board of the same thickness (1.25cm, 1.9 cm or 2.5cm as ordered), provide one ledge for heights above 1.5 metre. On one side the vertical boards shall "run through" to the top and bottom of the door or window and on the other side of the horizontal boards shall "run through" to each side, the butt joints being thus staggered at corners. Each such joint shall be clenched nailed in three places and the two boards shall be centrally clenched nailed at 15cm intervals. Each panel shall have two braces each of double split bamboo or wrought laths (1.9cm x 1.6cm minimum) nailed at 15cm intervals.

h. **Flush Doors.** Flush door shutters will be 3.60cm thick solid made of Partex density 400 (38 gram/cm) both sides veneered. Chowkats will be paid extra under the schedule items. Shutters and veneering to be machine pressed.

j. Plastic door shall be 25mm and 32mm thick both side flush made by well Reputed Co. The door shall be including chowkats and mongery (handle and tower bolt to be fixed with nut bolts), clamp etc. all complete.

9. **Hinges.** Doors exc. 1.5 metre high shall be fixed with 4 Nos. butt hinges to each leaf.

10. **Holdfasts.** Doors, windows and CSW frames shall be fixed with 22.5cm long hold fasts made of flat iron 2.5cm x 3mm thick with forked ends tarred and sanded "with 2 screws 6.25 long" 2 to every CSW, 4 to every windows and 6 to every door frames respectively.

11. **Treatment For Elimination On Termites From Doors & Windo ws.**

a. Wooden doors and windows frames will be treated by applying anti-termite pesticide through holes drilled along the line joining the wall and the frames. Holes will be power drilled at 90cm (appx) intervals. A typical door (2.15m x 1.05m) needs a total seven holes. However, if the sides of the frame exceeds 15cm additional holes may be required. Dursban 20 EC or equivalent diluted with kerosene at ratio of 1:9 it will be injected in to the holes. The objective is to soak the spaces between the wall and frame and eliminate

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the termites. In case of doors in ground floor, holes at the floor level will be drilled through the concrete slab allowing the diffusion of pesticide solution within the floor bed. 1.5 Litres of Dursban 20 EC or equivalent spray solution will be injected in to each hole. Five Litres will be injected to the holes made at floor level.

b. Wooden doors and windows frames will be treated by applying anti-termite pesticide through holes drilled along the line joining the wall and the frames. Holes will be power drilled at 30cm (approx) intervals. A typical door (2.15m x 1.05m) needs a total 21 holes. Pesto-clea A & B of Baral chemical Company Ltd. (BCCL diluted with water at ratio of 1:16) will be injected in to the holes. The objective is to soak the spaces between the wall and frame and eliminate the termites. In case of doors in ground floor, holes at the floor level will be drilled through the concrete slab allowing the diffusion of pesticide solution within the floor bed. 0.5 Litres of Pesto-clea A & B spray solution will be injected in to each hole.

12. **Iron / Brass Mongery.** Shall be provided to doors and windows as shown below except where otherwise described :

Description	Unit	Doors		Opening windows		
		Double Leaf	Single Leaf	Double Leaf	Single Leaf	Clare story pivot hung
10cm steel / brass butt hinges	Nos	08	04	04	02	-
6.25cm wrought iron / brass pivots & sockets	Sets	-	-	-	-	02
20 cm wrought iron / brass tower or barrel bolts	Nos	01	01	-	-	-
15 cm wrought iron / brass tower or barrel bolts	Nos	02	01	01	01	-
10 cm-ditto	Nos	-	-	02	01	-

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Door and window stops, teak or shishum with one 7.5 cm steel / brass butt hinges.	Nos	02	01	02	01	-
15 cm Iron / brass bow handle	Nos	02	02	01	01	-
White cotton sash cord 9mm girth 4 metre long with wrought iron / brass eyes	No	-	-	-	-	01
10 cm wrought iron / brass belaying cleat	No	-	-	-	-	01
12.5 cm x 5 cm x 7.5 cm softwood chocks	Nos.	02	01	02	01	-

13. **Preservative.** Backs of door and window frames or chowkats shall be treated with one coat of Tar, before fixing.

14. **Fixing etc.** In addition to the items detailed in definitions under General Rules, the term "Fixed" shall include all laps, notching, halving, scarifying, etc., and boring for bolts. The term "Re-secure" provides for securing fittings etc., which have become partially loosened, but which can be secured with hold-fasts, plugs, etc., without taking down and shall include cost of any subsidiary materials required for re-securing. The expression "taking up" or "taking down" include clearing out nails, etc. The expression "in other openings" include cutting to size and fittings in old openings.

15. **Aluminium Doors/Windows.** All as per AAMA standard aluminum door/windows frame, rails, styles etc shall be of BTA/KAI/Fu-Wang or any other brand approved by E-in-C time to time.

a. **Swing Door Frame.** Section and size of frames shall be 90-95mm x 45mm box/hollow type aluminium metal. Thickness of the frame shall not be less than 1.5mm

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single leaf door shall not be more than an opening of 1000mm and similarly double leaf door opening shall not be more than 1800mm.

b. **Aluminium Swing Glazed Door Shutter.** Swing door shutter shall be provided with top and bottom rails and two Nos. vertical styles. Both rails and styles shall be of hollow/box types aluminium section 65mm x 50mm with minimum skin thickness 1.5mm. 5mm thick distortion free best quality clear glass shall be fitted with rails and styles providing all necessary fittings and gasket of approved quality. Each of the swing shutter shall have 2 Nos. tower bolts, 2 Nos. aluminium plate handles and floor liner 100mm wide, 4mm thick.

c. **Frame For Sliding Window/Door.** Section/size of frame shall be 90-95mm wide 1.5mm thick aluminum metal having channel in vertical & top along with guide rail in bottom for sliding the shutter.

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d. **Aluminium Glazed Shutter for Sliding Window/ Doors.** Single leaf sliding door shall be provided for opening upto 1100mm and single leaf sliding window shall be provided for opening upto 700mm. Nos. of shutters/leaf to be decided by the Engineer-authority during preparation of drawing for opening larger than mentioned above. Each shutter shall be comprised of two vertical styles and two horizontal top and bottom rail. Section/size of style & rail shall be 50mm x 25mm hollow/box type aluminium metal. Shutter will run over guide rail attached with frame having all required arrangement. Each shutter shall be provided with locking device, sliding system & all the required fittings will be approved by GE/PE. 5mm thick distortion free best quality clear glass shall be fitted with rails & styles providing all necessary fittings and requirement.

e. **Aluminium Gauzed Shutter For Sliding Window.** Sliding gauzed window of single leaf shall be provided for opening upto 700mm. Nos. of shutter to be decided by the Engineer authority during preparation of drawing for opening more than 700mm. Each shutter shall be comprised with two vertical styles and two horizontal top and bottom rail. Size of style/rail shall be 38mm x 12mm hollow/box type aluminium section. Shutter will run over guide rail attached with frame having all required system. Best quality aluminium wire net mosquito proof of required mesh to be provided.

f. **Aluminium Fixed Glazed Door/ Window.** 5mm thick distortion free best quality clear glass shall be fixed with main frames providing all necessary fittings and required for fixed door/window, width of glass pane shall 600mm. Middle sash if required may be provided with section 50mm hollow/box type aluminium metal. Section and size of main frame shall be 90-95mm x 45mm box/hollow type aluminium metal, skin thickness of which shall be 1.5mm.

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Identification

16. Supplying, fitting & fixing aluminium sliding doors/windows with 75mm frames manufactured from standard extruded medium bronze/silver colour aluminium sections with all necessary standard accessories alongwith 5mm thick distortion free foreign made tinted/clear glass complete as per drawing & direction.

17. Supplying, fitting & fixing aluminium fixed composite sliding doors/windows with 75mm frames manufactured from standard extruded medium bronze/silver colour aluminium sections with all necessary standard accessories alongwith 5 mm thick distortion free foreign made tinted/clear glass complete as per drawing and direction.

18. Supplying, fitting & fixing aluminium fixed windows with 75 mm frames manufactured from standard extruded medium bronze/silver colour aluminium sections with all necessary standard accessories alongwith 5mm thick distortion free foreign made tinted/clear glass complete as per drawing and direction.

19. Supplying, fitting & fixing aluminium sliding doors/windows with 90-95 mm frames manufactured from standard extruded medium bronze/silver colour aluminium sections with all necessary standard accessories alongwith 5mm thick distortion free foreign made tinted/clear glass complete as per drawing and direction.

20. Supplying, fitting & fixing aluminium fixed composite sliding doors/windows with 90-95 mm frames manufactured from standard extruded medium bronze/silver colour aluminium sections with all necessary standard accessories alongwith 5 mm thick distortion free foreign made tinted/clear glass complete as per drawing and direction.

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21. Supplying, fitting and fixing aluminium fixed doors/windows with 90-95 mm frames manufactured from standard extruded medium bronze/silver colour aluminium sections with all necessary standard accessories alongwith 5 mm thick distortion free foreign made tinted/clear glass complete as per drawing & direction.
22. Supplying, fitting & fixing horizontally sliding insect proof shutters manufactured from standard extruded bronze/silver colour aluminium sections with all standard accessories and fiber glass aluminium insect screens all complete as per drawing & direction.
23. Supplying, fitting & fixing aluminium both way swing doors with 90-95 mm frames manufactured from standard extruded medium bronze/silver colour aluminium sections with all necessary standard accessories alongwith 5 mm thick distortion free foreign made tinted/clear glass complete all as per drawing & direction.
24. Supplying, fitting & fixing aluminium fixed composite both way swing doors with 100 mm frames manufactured from standard extruded medium bronze/silver colour aluminium sections with all necessary standard accessories alongwith 5 mm thick distortion free foreign made tinted/clear glass complete as per drawing & direction.
25. Supplying, fitting & fixing aluminium swing doors with 75 mm frames manufactured from standard extruded medium bronze/colour aluminium sections with all necessary standard accessories alongwith exposed one way door closer and 5 mm thick distortion free foreign made tinted/clear glass complete as per drawing & direction.
26. Supplying, fitting & fixing aluminium fixed composite swing doors with 75 mm frames manufactured from standard extruded medium bronze/silver colour aluminium section with all necessary standard accessories alongwith exposed one way door closer and 5 mm thick distortion free foreign made tinted/clear glass complete as per drawing & direction.

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27. Supplying, fitting & fixing aluminium fixed louver windows manufactured from standard extruded medium bronze/silver colour aluminium sections with all necessary standard accessories all complete as per drawing & direction.

28. Supplying, fitting & fixing of exposed grid 600mm x 600mm Paneled false ceiling with 12 mm thick textured nylex surface imported gypsum board of approved colour and texture suspended on standard extruded bronze/silver colour aluminium 38mm x 25mm main tee 25mm x 25mm cross tee & 25mm x 25mm angle along the side walls all around as per approved plan hang by 2-ply 14 gauze GI wire etc. complete.

29. Supplying, fitting & fixing in position from standard extruded medium bronze/silver colour aluminium stair railing as per drawing, design & specification including all standard accessories etc.

30. Supplying, fitting & fixing of aluminium partition wall with vertical and horizontal aluminium frames both sides covered with 12 mm thick fire resistant Gypsum board calded with vinyl wall fabrics. The whole partitions shall be fixed with metal stand frames insides spaced at 600mm-c/c upto 2.44 mm height etc complete as per direction.

31. Supplying, fitting & fixing aluminium casement windows manufactured from standard extruded medium bronze/silver colour aluminium sections with all necessary standard accessories alongwith 5 mm thick distortion free foreign made tinted/clear glass complete as per drawing & direction.

32. Supplying, fitting & fixing aluminium fixed windows with 90-95 mm/75 frames manufactured from standard extruded medium bronze/silver colour aluminium sections with all necessary standard accessories alongwith 5 mm thick distortion free foreign made tinted/clear glass complete as per drawing & direction.

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Method of Measurements

33. **Tolerances.** Thickness will be dead as shown in each item. No tolerance plus or minus will be admissible.

34. **Clench Nailing.** No extra allowance shall be made where clench nailing is specified (e.g., in ledged and battened door) but screws are used.

35. **Door and Windows Shutters.** Chowkats shall be measured in volume (i.e. in cubic metre) door leaf shall be measured net (i.e. in square metre) except Chowkat, Circular and curved portions shall be measured as square and paid for at twice the ordinary rates, segment only to be measured.

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36. **Mitred Pieces.** Each piece shall be measured over all
37. **Meeting Styles.** No extra width or lap shall be measured for rebated or splayed meeting styles.
38. **Open Battened Doors, Gates, etc.** With spaces 3.20 cm wide between battens shall have a 10% deduction made from the overall area.
39. **Door Partly Panelled and Partly Sashed.** The glazed portion shall be measured separately as a sash. The dividing line shall be the middle of the rail below the glazing. Frames/Chowkats to be measured net in volume.

Clarification of Rates

40. The rates, inter alia, include particularly.
- a. Work in all class of wood as defined except where otherwise stated.
 - b. Fitting and fixing or hanging as indicated.
 - c. Nails screws, wedging and keys as required.
 - d. Hardwood or bamboo pins for framed joints.
 - e. Boring for bolts.
 - f. Arises or chamfers 6mm wide as required.
 - g. Miter, stops, fair or returned ends, etc.
 - h. All cutting and waste.
 - j. Fixing gauze with wooden beads and glass with oil putty sprigs or beads and breads; or hardwood beads as directed.
 - k. Frames or chowkats to doors and windows with holdfast.

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l. Iron / brass mongery to doors and windows as listed in Specification to be paid extra as per relevant item.

41. The rates for sashes also includes.

a. Glass or wire gauze (fly or mosquito wire) on steel or wood.

b. Fixing with screws or nails, or preparing for hanging with hinges, pivots, etc.

42. Wood preservatives except as specified in para 13 of the specifications and painting will be paid extra.

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SECTION-7

MONGERY
SPECIFICATIONS

General

1. **Mongery.** All articles of mongery to be sound. Strong well finished according to the weights specified.
2. **Samples** of mongeries for each contract shall be submitted by the Contractor to the GE/Engineer-in-charge for approval before ordering.
3. The weight of articles of mongeries made from iron or brass shall be within 10% of the weights given in the following table.

Weight for size other than those given in the following table shall be pro-rata to the sizes:

WEIGHT PER TEN NOS., ARTICLES IN KG

(Including weights of necessary screws, etc.)

Size in Cm										
	10 Cm		15 Cm		20 Cm		30 Cm		45 Cm	
	Iron	Brass	Iron	Brass	Iron	Brass	Iron	Brass	Iron	Brass
Bolts Tower	.075	1.30	1.10	1.55	2.15	2.25	2.90	4.00	-	-
Bolts All drop (Plate thickness as 16th 18 gauge)	-	-	-	-	4.25	8.00	8.00	12.00	13.5	17.00

Size in Cm									
	5 Cm		7.5 Cm		10 Cm		12.5 Cm		
	Iron	Brass	Iron	Brass	Iron	Brass	Iron	Brass	

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Hinges Butt	0.34	0.40	0.80	0.86	1.45	1.50	2.20	2.40
Hinges Parliament	-	-	2.50	-	-	-	5.70	-

Rate in Taka

Size in Cm			
25	30	45	60

Hinges strap, cross garnet, etc. iron	3.20	4.10	8.25	-
Hinges, hook and ride (heavy) iron	-	12.00	17.50	-

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	Iron	Brass
Thumb lathes 20cm x 44cm	2.00	-
-Ditto- 25cmx 6cm	3.25	-
Cleats belying 10 cm	0.45	0.50
Catches spring 5 cm	0.50	1.00
Fasteners Cocksure	2.00	2.20
Fasteners and stays (Casement) 30 cm	2.80	3.20
Fasteners and stays (Casement) 37.5 cm	3.50	4.00
Pivot and sockets 5.6 cm (per 10 set)	0.80	0.85
Stays Quadrant for fanlights 25 cm	2.20	2.30
Handles, Bow 15 cm	0.60	1.20
Handles, Bow 17.5 cm	0.70	1.30
Handles, Drawer pull 10 cm	0.40	0.70
Hooks, Hat and Coat 17.5 cm	1.40	1.50
Hooks , Wardrobe 5.6 cm single	0.50	0.60

	2.5 cm	3.75 cm
Hooks, Screw (Dresser or cup) iron	0.02	0.10
Hooks, Screw (Dresser or cup) Brass	0.02	0.12

10 cm	15 cm
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	Iron	Brass	Iron	Brass
Hooks and eyes cabin or casement	0.60	0.65	0.70	0.80
Hooks screw pattern (Wire)	0.30	.035	0.68	0.70
	Iron		Brass	
Knobs, cupboard 3.12 cm	-		0.15	
Hasp and staples (Wire) 15 cm	0.70		-	
Hasp and staples (Flat bar) 5 cm	2.80		3.40	

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Method of Measurements

4. **General.** The under mentioned articles of mongery shall be measured as indicated in the table below:

Name of Article	How measured
Bolts	(a) The length of plates in flush and French casement bolts (b) The length of shoots in the case of level, tower of all other drop bolts.
Hasps and staples Hinges	The overall length of the hasp (a) The length of the joint of butt and back flaps hinges (b) Overall of parliament hinges when open. (c) The length of strap, cross garnet and hook and ride hinges, from the joint or knuckle to the point.
Latches	The overall length of the plate for mounted Suffolk latches or the handle for un-mounted Suffolk latches.
Locks	The length or width (whichever is greater)

Clarification of Rates

5. **The rates, inter alia, include particularly:**
- Fixing to softwood or hardwood.
 - Brass articles are to be fixed with brass screws. Black Japaned articles are to be fixed with black Japaned screws. Screws are to be round or flat headed as required

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- c. Keys to differ if required and 2 keys to each lock, and stamping as required.
 - d. Plugs and plugging to walls, building into walls of floors and making good.
 - f. Black Japaned finish to all wrought iron, cast and malleable cast articles (except hinges).
 - g. Varnishing and lacquering of exposed surfaces of brass fittings.
 - h. Easing, oiling leaving all iron mongery in good working condition.
6. If the brass mongeries is ordered to be finished "Copper bronze", 10% will be added to the "except fixing" rates.
7. Fixing only rates include the supply of screws.
8. The rates for "fixed in repairs" include taking off the old articles and removing to store; also for plugging up old key holes, spindle holes, screw holes, etc., where necessary.
9. The rates for taking off and refixing also include adjustment, plugging up key holes, etc., as required.

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SECTION-8

STEEL AND IRON WORKS

SPECIFICATIONS

General

1. Bolts and Nuts shall be.
 - a. Wrought iron or steel with worth standard pattern.
 - b. Forged with heads in one piece.
 - c. Threaded for required lengths.
 - d. With full, true, deep threads.
2. Cast Iron castings shall be clean, sound, and free from air holes. Cast iron pipes shall be obtained from an approved manufacturer.
3. Galvanizing shall be a through even coat of zinc free from stains. bare spots or defects, at the rate of 0.60 kg of zinc per Sq.m of materials measured on both sides.
4. Plain steel sheeting shall be of the quality specified for Corrugated Steel Sheeting.
5. Rivets shall be:
 - a. of mild steel, truly shaped and of hammer tight fit.
 - b. Provided with cheese, countersunk round etc. heads as required.

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6. Steel and iron including cast iron:

a. Steel shall.

- (1) Comply with BDS ISO-6935-2:2006.
- (2) be obtained from approved source.
- (3) be of tested quality where required without extra charge.

b. Mild steel of Wrought Iron shall be comply with the relevant BDS ISO 6935-2:2006 Attached As Annex-B

c. All bars are to be tested in materials testing Laboratory in AHQ, EinC's Br.

7. Wire netting shall be of galvanized iron in any width required from 30cm to 180cm fixed with galvanized wire staples etc. complete. For lathing it shall be 6mm mesh, 20 SWG.

8. Wrought Iron of Mild Steel: All forging shall be neatly and soundly made to the dimensions given.

Bolt and rivet holes may be punched unless ordered to be drilled.

9. XPM Shall be 9mm mesh.(short way)x22G. and weight 2.30kg per square metre.

10. **Generally.** Drilling punching, forging, screwing, riveting, bolting etc, shall be done in sound and workmanlike manner.

11. **Painting.** Steelwork which will be exposed shall be thoroughly cleaned and receive one coat of linseed oil or oxide of iron paint at works before bolting or riveting. Additional painting to be as specified.

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Steel work in contact with brick work or masonry to be grouted over with cement.

Steelwork to be buried in concrete work shall be scraped free from oil, scale of loose rust with a stiff wire brush before it is placed in position and except in the case of reinforcement bars, shall be given one coat of cement wash.

12. **Reinforcement.** All reinforcing rods shall be bent cold and tied with No.22 SWG wire to keep correct position in centering. Welded splices and other mechanical connections are allowed, except as provided in the Code, all welding shall conform to “Structural Welding Code-Reinforcing Steel” (AWS D 1.4). Unless otherwise shown in the drawing, Lap length shall be provided as per table below :-

Dia meter of the bar in mm	Compression		Tension	
	40 Grade	60 Grade	40 Grade	60 Grade
10	300	350	375	500
12	375	420	450	600
16	450	560	600	800
20	700	750	900	1000
22	850	900	1000	1100
25	1000	1100	1200	1400

13. **Standard Hooks.** Unless other wise shown in the drawing, the term “standard hook” shall mean one of the following:

- a. 180 ° bend plus an extension of at least 4 bar diameters, but not less than 60 mm at the free end of the bar.
- b. 90 ° bend plus and extension of at least 12 bar diameters at the free end of the bar.

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c. **For stirrup and tie anchorage.**

- (1) For 16 mm \varnothing bar and smaller, a 90 ° bend plus an extension of at least 6 bar diameters at the free end of the bar (As for example for 10 mm \varnothing stirrups additional length of $2 \times 6 \times 10 = 120$ mm length to be added for hook with original length).
- (2) For 20 mm and 25 mm \varnothing bar a 90 ° bend plus an extension of at least 12 bar diameters at the free end of the bar.
- (3) For 25 mm \varnothing bar and smaller a 135 ° bend plus an extension of at least 6 bar diameters at the free end of the bar.
- (4) For closed ties and continuously wound ties a 135 ° bend plus an extension of at least 6 bar diameters but not less than 75 mm.

14. The weight of mild steel round bars will be calculated at rates specified below, with a tolerance of upto 5 percent both ways.

15. If the variation due to rolling margin of steel exceeds the percentage shown in the table of conversion weight of steel shall accurately be fixed by CsMES prior to issue of steel to contractor. Excess consumption due to over weight shall be balanced proportionately by increasing the spacing of reinforcement bars shown on drawings.

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16. **The Values for the Nominal Cross-Sectional Area and Mass shall be as Under.**

CROSS- SECTIONAL AREA AND MASS (PLAIN & DEFORMED BAR)

Nominal size mm	Cross sectional area mm ²	Mass (wt) in Kg per metre run
4	12.6	0.099
5	19.6	0.154
6	28.3	0.222
7	38.5	0.302
8	50.3	0.395
10	78.5	0.616
12	113.0	0.888
16	201.0	1.579
20	314.0	2.466
22	380.0	2.98
25	491.0	3.854
28	616.0	4.83
32	804.0	6.313
40	1257.0	9.864

The mass of individual bars as given shall be subject to the tolerances as under:

17. **Tolerance on Mass.** Tolerance on Mass is as follows :

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Nominal Size (mm)	Tolerance of mass per meter run (%)
upto 7	± 8.0
8 to 12	± 6.0
over 12	± 4.5

18. **Tolerance on Diameters.** Permissible tolerance on dia for plain bars and deformed bars will be same. If the plain bars are used for other than concrete reinforcement the out of round that is the difference between minimum diameter at same section shall not exceed 2.5% for 12 mm and less sizes nor 1.8% for sizes larger than 12mm.

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19.	<u>Tor Steel</u>	<u>Area in Sq. cm</u>	<u>Weight per kg/meter</u>
	08mm	0.50	0.395
	10mm	0.78	0.617
	12mm	1.13	0.888
	16mm	2.01	1.578
	18mm	2.55	2.000
	20mm	3.14	2.466
	22mm	3.80	2.980
	25mm	4.91	3.854
	28mm	6.16	4.830
	32mm	8.40	6.313

19.A. Dimensions, masses and tolerances are given in table 1.

Table 1 — Dimensions, masses and tolerances

Nominal bar diameter ¹ mm	Nominal cross- sectional area mm ²	Mass per length	
		Requirement kg/m	Permissible deviation ²
6	28,3	0,222	±8
8	50,3	0,395	+ 8
10	78,3	0,617	±5
12	113	0,888	±5
16	201	1,58	±5
20	314	2,47	±5
25	491	3,85	±4
32	804	6,31	±4
40	1256	9,86	±4
<p>1) If diameters larger than 40 mm are required, the size increase should be in increments of 5 mm. Permissible deviation on such bars is ± 4 %.</p> <p>2) Permissible deviation refers to a single bar</p>			

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19.B Characteristic values for upper yield stress, tensile strength and percentage elongation after fracture

Steel grade	Upper yield stress ReH	Tensile strength R _{OT}	Elongation A _{s.65}
RB300	300	330	16.
RB 400 T RB 400W J	400	440	14
RB 500 RB500W	500	550	14.

No single test result shall be less than 95 % of the characteristic value given in table 4

By agreement between manufacturer and purchaser, the values in table 4 may be used as guaranteed minimum values.

The ratio of tensile strength to yield specimen for each test specimen shall be at least 1.05.

A type test of the product shall demonstrate that the total elongation at maximum force, A⁵ is equal to or larger than 2.5 %.

For steels that have no significant yield stress, the proof stress, R_{p0.2}, shall be used to define the yield stress.

Method of Measurements

20. **Tolerances.** Linear work shall be measured to the nearest cm.

- Superficial work:
- a. Length as above
 - b. Width to the nearest cm.

21. **Steel bar Reinforcement.** Shall be measured gross. Lap shall be measured and hooks girthed and the weight added to the total weight.

Patent reinforcement (expanded metal) shall be measured net with no allowance for laps.

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22. **Generally.** All work (except steel reinforcement) shall be measured net and flat (not girthed) as fixed.

23. Corrugated and plain Sheets shall be measured net and no allowance made for laps or welts. Sheets cut to shape shall be measured overall the least dimension out of which the sheets can be cut.

24. **Bolts shall be measured as follows:**

- a. Underside of head to end of shank for ordinary bolts.
- b. Overall for double ended, lewis bolts, etc.

25. Sheets, Iron pipes etc, Sheet iron eaves gutters and pipes shall be measured net length x fixed girth.

Clarification of Rates

26. **The rates, inter alia include particularly:**

- a. Reducing to size. shape, figure, etc., including rolls welts, seams and all straight cutting and waste.
- b. All holes, screws bolts, nuts, washers, rivets, connections, packing pieces, wedges require (weights to be added to main article) and grouting as necessary.
- c. True and square ends and neatly cut and fitted notches.
- d. All necessary templates, patterns, mould, etc.
- e. Jointing, etc. for pipe work.
- f. Scraping reinforcement as specified and all bends, cranks, hook, spirals, loops and tying wire, supporting and maintaining in position.

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g. Painting all Iron and steelwork (except wrought iron articles, which will be dipped in hot tar if required and the items mentioned below) with one coat of paint before fixing and one coat of paint after fixing. All steel and iron in contact with brickwork or concrete will be given a coat of cement slurry.

h. Mortises, holes, plugs, etc., in concrete brick or stone and making.

j. Hoisting, erection etc., complete as required.

k. Fixing/Erection only will also include 2 coats of paint as specified above.

Exception: Sheet steel work, sheet iron pipes reinforcement and galvanized work.

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SECTION – 9

ROOF COVERINGS FELT AND BUILDING

PAPERS, ETC

SPECIFICATION

S

General

1. **Building Paper.** Waterproof building or insulating paper shall be of approved manufacture, stout and strong and thoroughly impregnated with waterproof composition.
2. **Corrugated Steel Sheeting.**
 - a. The sheets to be made of tough mild steel well annealed, even in temper and thickness, free from holes, cracks, blisters and other defects.
 - b. The sheets to be perfectly rectangular, the corrugations paralleled with the sides and regular in curve, pitch and depth, and the weight of any ten sheets to be within 7-1/2% margin of the weights given in © below.
 - c. The weight and thickness of steel before galvanizing shall be as shown below:
 - (1) 26 BG to be 0.46 mm thick and to weight 3.80 kg. Per Sqm of girthed surface.
 - (2) 24 BG to be 0.62 mm thick and to weight 4.92 kg. Per Sqm of girthed surface.
 - (3) 22 BG to be 0.793 mm thick and to weight 6.19 kg. Per Sqm of girthed surface.
 - (4) 20 BG to be 0.995 mm thick and to weight 7.66 kg. Per Sqm of girthed surface.

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The allowance for increase in weight by galvanizing shall be 0.60 kg. Per Sq. m. of girth surface, which weight includes both sides.

- d. Galvanized steel sheets to be thoroughly and evenly coated with Zinc, and to be free from stains, bare spots and other defects.
- e. When not galvanized, all sheets are to be coated immediately after manufacture with one coat of oil-paint applied by dipping or brushing over the whole of the surface of each sheet.
- f. Unless otherwise specifically ordered the corrugations are to be of standard pattern 75mm pitch and 19mm deep.

The widths shall be as under:

- (1) 8/3 Corrugations 66cm measured straight and 76cm measured along the girth.
 - (2) 10/3 Corrugations 81cm-measured straight and 91.5 cm measured along the girth.
 - g. The diagonal distances between opposite corners of any sheet shall not differ by more than 19mm.
-
- 3. **Felt.** Shall be of approved local or imported manufacture, one, two or three ply, as specified.
 - 4. **Plain Steel Sheeting.** Shall be of the quality specified for corrugated steel sheeting.
 - 5. **Tiles (Bricks).** Tiles shall be sound, well burnt, of good colour, free from warp or twist and give a clear ring when struck, and of the best quality obtainable in the locality. The size shall be as specified.
 - 6. **Tiles (Cement).** These shall be pre-cast from the specified mix. The size shall be as specified.
 - 7. **Corrugated Sheeting.** Sheets shall be fixed with galvanized screws or bolts, fiber and galvanized curve or limpet washers at n.exc. 30 cm centers in the case of 8/3

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corrugation sheets and at n. exc. 38cm centers in the case of 10/3 corrugation sheets on every bearer.

8. **Asbestos Cement Roofing.** Shall be of approved pattern or manufacture laid in accordance with the manufacturer's instructions.

9. **Mud Roofing.** Mud shall be stiff mortar.

a. **Laying.** Apply to thickness ordered, and finish to levels, falls, dishings, etc. as required with 3mm leeping as specified in plastering. Slope of Mud Roofs Minimum 1 in 30, maximum 1 in 20.

b. **Flat Tiles.** Flat tiles shall be 30 cm x 15cm and of the required thickness, square at angles and of uniform shape and will ring clear and true, and be approved before incorporation in the work. They shall be bedded if required jointed and pointed on either lower or upper face in the appropriate mortar.

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10. **Felt Work and Building Papers.**

a. **Felts.**

(1) **Laps.** Side laps shall be 5cm and end laps 15cm.

(2) **Fixing.** The side laps shall be nailed with 3.12cm clout nails at 15cm centers. Two raw shall be used at end laps at 7.5cm centers and intermediate between the end laps nail at 22.5cm centers, in rows 75cm apart. Stuck joints shall be formed at the side and end laps be a suitable bitumastic adhesive in addition to nails, if required.

b. Building paper shall be laid with laps and fixed as specified for Felt.

Method of Measurements (Corrugated and Plain Steel Sheeting)

11. **Measurements.** The net superficial area of sheeting as fixed is to be measured on the flat (not girthed to corrugations) without any extra allowance for laps or welts.

12. **Cutting.** Sheets cut to shape (as in stepped flashing) shall be measured overall the least dimensions out of which the sheets can be cut.

13. **Openings.** No deductions shall be made for openings of any shape n.exc. 0.35 . each.

Clarification of Rates

14. The rates, inter alia, include particularly labour in reducing to size,

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**shape, figure, etc. and all straight,
raking and circular cutting, and
materials in rolls, welts, seams, etc.**

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APPROXIMATE NUMBER OF GALVANIZED
CORRUGATED SHEETS PER TON (ENGLISH)

Thickness	Corrugation	Length in feet Length in metre					
		5	6	7	8	9	10
		1.53	1.83	2.14	2.44	2.75	3.05
16BG	<u>8/3"</u>	70	58	50	44	39	35
	8/75mm						
	<u>10/3"</u>	59	49	42	37	33	29
	10/75mm						
18 BG	<u>8/3"</u>	89	74	64	56	49	44
	8/75mm						
	<u>10/3"</u>	74	62	53	46	41	37
	10/75mm						
20 BG	<u>8/3"</u>	114	95	81	71	63	57
	8/75mm						
	<u>10/3"</u>	95	79	68	59	53	47
	10/75mm						
22 BG	<u>8/3"</u>	139	116	99	87	77	69
	8/75mm						
	<u>10/3"</u>	116	97	83	73	65	58
	10/75mm						

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24 BG	<u>8/3"</u>	168	140	120	105	93	84
	8/75mm						
	<u>10/3"</u>	140	117	100	88	78	70
	10/75mm						
26 BG	<u>8/3"</u>	223	186	159	139	124	111
	8/75mm						
	<u>10/3"</u>	186	155	133	166	103	93
	10/75mm						

For calculation of number of sheets per ton the above table shall be used. For sheets which vary from standard weight shall be calculated on the basis of actual numbers received in the consignment, converting those into the Gauze for which, rates of finished job is available in the MES Schedule of Rates, payment for the finished job shall be made accordingly. For example, 24 BG 10/3 Corr. 2.14 metre long sheet should be 100 Nos./Ton as per standard weight. If more Nos. of sheets are issued per ton, additional recovery for those sheets shall be made and if less nos. of sheets are issued, credit shall also be given and payment shall be made as per Gauze of the sheets.

Method of Measurements (Asbestos Cement Sheeting)

15. **Measurement.** All measurements shall be net flat as fixed, not girthed.
16. **Cutting and Waste.** No allowance shall be made for cutting and waste.
17. **Opening.** No deductions or additions shall be made for opening of any shape n.exc. 0.35

Clarification of Rates

18. The rates, inter alia, include particularly:

- a. Fixing complete according to maker's instructions with all necessary screws, bolts and washers in any position.
- b. All cutting and waste
- c. Jointing to gutters and pipes.
- d. Laying complete
- e. Fillets against walls.

SPECIFICATIONS

General

1. Bamboo. Bamboo shall be of mature growth, free from splits weevil rot, bore holes or other defects. Bamboo's of 20cm girth and over shall be semi-solid (fiber content not less than 75 percent of cross sectional area).

2. **Matting.** Matting shall be of the best quality available and to be of the type detailed below. The samples and the weight per Sq. metre will be approved by Engineer-in-Charge. All edges to be properly bound.

Type

Details

Bamboo

Split bamboo (durma, etc.) woven as closely as possible.

3. **Bamboo works.**

Use

Requirement

S

Framing for roof, walls Partitions, trellis, jarfi etc.

Whole, unsplit bamboo 20cm girth. Split bamboos 25 mm x 6mm minimum

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Single bamboos, detached as in rafters, Whole, unsplit bamboos, girth to be 20 cm to 30
purlins posts caves, ties etc. cm as ordered.

4. **Fixing.** String for fixing bamboos shall be stout, good quality Coir or other equal and approved. All intersections of bamboos, whole or split, shall be securely tied or wired. Whole or split bamboos along side each other shall be securely tied together by string or wire at intervals n.exc. 1 metre. All bamboos shall be securely tied, wired or nailed to the supports as ordered. Joints shall be formed by laps of at least 0.80 metre tied spirally with double string.

5. **Matting.** Lay matting with side and end laps of at least 15cm and securely tie it to the supports at intervals not less than 30 cm. For door or window covering etc use fillets of split bamboos or laths at the edges and laps and as ledges and diagonal braces as directed, all such fillets being securely tied wired or nailed to the frames as ordered. If so ordered, properly bind all cut edges to prevent fraying.

6. **Girth.** The girth of bamboos is the sum of the girths at the each end divided by two.

Clarification Of Rates

7. The rates, inter alia, include particularly:

a. **Fixing.** Fixing complete with all necessary string, wire, nails, spikes, dowels and all other fixing materials except screw bolts and nut, and steel or iron strips.

b. **Framing etc.** These rates will be combined as required to cover any type of bamboo framing trellis, jafri, etc., pro-rata rates shall be paid for spacing other than those given.

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The same rates apply whether the whole or split bamboos are laid straight on diagonally and include end bamboos.

c. **Doors, Windows etc.** These rates include framing to form doors windows etc., and other fittings shall be paid extra.

d. **Single bamboos.** These rates are for whole bamboos laid detached in rafters, purlins, bressumers, posts, wind ties at eaves, etc. and include fixing to the supports as ordered.

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SECTION-11

FLOORS AND WALL TILING

SPECIFICATIONS

General

1. **Cement.** The cement shall be ordinary, normal setting cement of approved brand complying in all respect with BDS EN 1997-1: 2003 CEM-I. Cement, unless otherwise specified to be of any particular quality shall mean this ordinary, normal setting cement.

2. **Floor Finishes.** The surface of concrete floors shall be finished fair. The floors shall be laid in alternate bays with wrought wood parting slips (expansion joints) which shall be left in if required, pre-cast floor slabs shall have fair edges.

3. **Mosaic Finish (Situ).**
 - a. **Grey Mosaic.**
 - (1) **Grey Mosaic (6mm Thick).** The thickness of mosaic finish shall be 6mm (finished). It shall be consists of one part of cement (grey and white cement in proportion of 1:1) and one part of 3mm size marble chips (imported). The marble chips shall be of black and white colour in the proportion (1:6) or only white marble chips. The mosaic shall be laid within 24 hours after lying the base. Surface of the mosaic shall be rubbed with Carborandum block after 3 days of laying, beginning with the coarser grade. After first cutting, cement grouting of the same mixture of cement shall be applied on mosaic surface. The surface shall again be rubbed with Carborandum block after two days. The process shall be repeated till smooth and even surface free form any pinhole etc. is obtained. The thickness as specified shall be FINISHED, for which 3mm extra thickness to be laid to get SPECIFIED

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thickness after rubbing wastage. Finally, oxalic acid shall be applied with Linseed oil and rubbed well, till a glossy finish is obtained.

In walls, dados, skirting and the like, the mosaic finish shall be given a base of 12mm thick cement mortar (1:3). The same shall be hacked cross-hatched so as to provide strong bond between the base and the mosaic finish.

(2) **Grey Mosaic (9mm thick).** All as specified in a (1) except the size of chips which shall be of 6mm size.

b. **White Mosaic.**

(1) **White Mosaic (6mm thick).** All as specified in “a” (1) but using white cement instead of grey cement.

(2) **White Mosaic (9mm thick).** All as specified in a (1) and (2) but using white cement instead of grey cement.

c. **Silver Grey.**

(1) **Silver Grey (6mm thick).** All as specified in “a” but using mixer of grey cement, white cement in the proportion of (1:1).

(2) **Silver Grey (9mm thick).** All as specified in “a”, “b”, “c”.

4. **Mosaic Tiles.**

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a. The tiles shall be manufactured at site and will be hydraulically compressed at 140 kg. Per sq. cm. Normal size of tiles shall be 20cm x 20cm x 1.90cm.

b. The base of tiles shall be of cement mortar (1:2) 13mm thick for 6mm thick mosaic and 10mm thick for 9mm thick mosaic. The mosaic top of the tiles shall be laid as specified in mosaic finish (situ) and finished accordingly.

c. **Laying/jointing.** 2.50cm thick lime surki 1:3 padding shall be provided under the tiles. Tiles shall be fixed on the padding by spreading a thin even layer of cement slurry and the tiles shall be worked into the mortar with a wooden mallet to ensure correct slope/level and adhesion. All joints shall be as close as possible and parallel to walls and right angles to each other. After laying of tiles in a particular area the surface shall be washed down at the end of the days works and any unevenness removed. No traffic shall be allowed on tiles laid for five days. After 24 hours the tiles shall be grouted with cement mixture as in the matrix of the tiles ensuring filling of all joints. The top surface of the joints shall be lightly sprinkled with water to ensure adequate curing of the joints. After a minimum of 7 days the floor shall be rubbed with Carborandum stone. The floor shall then be washed down and grouted with cement as in the matrix of tiles ensuring filling of joints and cavities, which may appears. The process shall be continued till smooth and even surface is obtained. After drying the surface shall be rubbed with a mixture of oxalic acid and linseed oil to obtain glossy finish.

5. a. If colour chips is used the proportion of white and coloured mosaic chips shall be (1:3) colored means RED, GREEN, PINK, YELLOW, and NOT BLACK.

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b. Glazed Tiles shall be used following companies

**i) RAK ii) MIR iii) FU-WANG iv)
MADHUMATY v) ATI CERAMICKS vi) BISF
vii) China Bangla**

6. a. Glazed Wall Tiles. The glazed tiles and fittings, e.g. angles internal and external, coves, copping, corners, bends, etc., for the same shall be approved by the GE/Engineer-in-charge before incorporation. Glazed tiles shall be laid/fixed in cement mortar (1:2) screed of specified thickness. Old surface shall be well watered and the screeding left slightly rough (by being cross hatched). Tiles first well soaked in water, are bedded in cement mortar (1:2) the mortar being, “buttered” on the back of the tiles to give a bed of 6mm, after which the tiles is pressed and tapped home. The joints between the tiles shall be grouted with white or tinted cement according to the colour of tiles.

b .Glazed Floor Tiles. The glazed tiles and fittings, e.g. angles internal and external, coves, copping, corners, bends, etc., for the same shall be approved by the GE/Engineer-in-charge before incorporation. Glazed tiles shall be laid/fixed in cement mortar (1:4) screed of specified thickness. Old surface shall be well watered and the screeding left slightly rough (by being cross hatched). Tiles first well soaked in water, are bedded in cement mortar (1:4) the mortar being, “buttered” on the back of the tiles to give a bed of 19mm, after which the tiles is pressed and tapped home. The joints between the tiles shall be grouted with white or tinted cement according to the colour of tiles.

7. Stonolithic Wearing Surfaces. To be composed of 2-part cement and 3 parts aggregate. The aggregate is to be of approved hard shingle. No sand will

be used. The stonolithic wearing surface must be floated on to the under layer of ordinary concrete immediately the latter has been laid and before it has commenced to set a sufficient quantity of stonolithic being mixed at the same time as the mixing of the concrete for the under layer. Particular care is to be taken to remove any dust and to use minimum amount of water for mixing. The surface shall be well rubbed with carborandum block, 3 days after laying. No polishing will be done. The slump on a 10cm-20cm cone 30 cm high must not exceed 3.8cm in any case.

8. Channel Formed in Concrete Floors. When over 40 sq. cm. in section the curved water way shall be deducted as $\frac{3}{4}$ x width x depth (maximum dimension).

9. No deduction shall be made for glass strips from mosaic work.

Method of Measurements

10. Thicknesses etc. The following thickness shall be allowed when measuring:

For single layer floors with or without bed joint :

- a. For ordinary burnt bricks on edge allow 12.50cm.**
- b. For ordinary burnt bricks laid flat allow 7.5cm.**

Clarification of Rates

11. The rate, inter alia, include particularly:

- a. The base/rendering of skirting and dados.**

b. Lime-surki padding of mosaic tiles.

c. Carborandum blocks/cutting machine.

d. Hire charges of tile making machine.

12. Cement to be used BDS EN 197-1:2003 (CEM-1)

Brand of cement section as Annex 'A'

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SECTION-12

PLASTERING SPECIFICATION

General

1. **Cement.** The cement shall be ordinary, normal setting cement of approved brand complying in all respect with BDS EN 1997-1: 2003 CEM-I. Cement, unless otherwise specified to be of any particular quality shall mean this ordinary, normal setting cement.
2. **Lime.** Shall be
 - a. rendered hydraulic, if required, by the additions of under burnt ground surki.
 - b. pure of fat for plaster or lime whiting.
 - c. properly burnt in kilns, kept dry until slaked, ground screened through 3mm mesh screen and slaked at site.
 - d. deemed to weight 960 kg per Cu.m before slaking for purposes of estimating the proportion specified for use.
3. **Sand.** Shall be from approved source and free from dirt and salt.
4. **Surki** Shall be
 - a. Hard well burnt, insoluble in water used in lieu of sand.
 - b. Under burnt and soluble in water when used for imparting hydraulicity to lime mixtures and ground to pass a 1.5mm mesh sieve and used in the proportion of:

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1 lime: 0.50 surki: 1.50 sand for 1:2 mix.

1 lime: 1 surki: 2 sand for 1:3 mix and so on.

Under burnt surki shall not be used for plastering.

5. a. Cement plaster shall be composed of cement and washed sand, mixed in the proportions specified. The plaster shall be applied in one or two coats work, as may be ordered. The surface should be raked cleaned and brushed before plastering.
- b. **Dubbing Out.** All irregularities in walls shall be dubbed out with mortar of the same specification and consistency as the plaster coat.

Method of Measurements

6. **Measurements.** All work shall be measured net and flat (not girthed)
7. **Openings.** No deductions or additions shall be made for openings not exc. 0.35 Sq.m
8. **Ends.** No deductions shall be made for ends (joist, beams, steps posts etc.)
9. **Thickness.** Thickness of plaster specified is the thickness when dry and exclusive of any key or dubbing out sand is from face or lathing or walls.

Clarification of Rates

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10. The rates, inter alia, include particularly.

- a. Fair and even surfaces where exposed, finished with steel trowel, wood hand float.
- b. Work on ceiling, walls or other positions and in patches.
- c. Work of any widths, including coving.
- d. Straight or curved work.
- e. Small labour (chamfers, rounds, coves) n.exe. 7.50 cm wide or girth and end labour such as stops, meters, returns, etc.
- f. Dubbing out of irregular surfaces.
- g. Blocking out pieces to beam, etc. as required.
- h. All labour in rounding off internal and external angles in plaster.
- j. Rates apply to skirting also.

11. Cement to be used BDS EN 197-1:2003

Detail specification of cement section as Annex 'A'

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SECTION-13

CEILING AND WALL BOARD ETC

SPECIFICATIONS

General

1. **Clothcotton.** Shall be double warp cloth, of approved quality.
2. **Hessian Cloth.** Shall be of two qualities known as No. 1 and No. 2 It shall be tightly woven with yarn of uniform thickness. Quality No. 1 shall weigh approximately 300 grams per sqm. and quality No.2 shall weigh approximately 230 grams per Sq.m.
3. **Partex Board/Hard Board.** Partex board shall be of thickness not less than 12 mm fixed as directed by Engineer-in-charge. Screws are fixed not more than 30cm apart. The sheets shall be fixed but jointed, a joint stopped and sheets drilled for and fixed with, including nails at 15cm rows not exc. 1 metre apart or fixed according to maker's instruction. Hard board shall be not less than 3mm thick and fixed as above.
4. **Veneered Partex Board.** Veneered Partex board shall not be less than 12mm thick. The grains will be long way free knots and will be approved manufacture to protect it from damage etc.
5. **Cloth Surfaces.** The cloth shall be damped, stretched and nailed with 2.5cm end and side laps and fixed as specified in para 3 above.
6. **Treatment for Elimination of Termite From Wooden Panel False Ceiling Wooden Partition Cup Board Cabinet etc.**

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a. Wooden panels, false ceiling partition wall, cup board, cabinet similar other wooden and termite susceptible items will be treated with dursban 20 EC (chlorpyrifos diluted with water concentration 1.0% A.I) the diluted pesticide will be applied to the surfaces using brush on and/or injection methods. Depending on the surface concerned about 1 liter of diluted pesticide will be applied. The brush on application may have to be done in two or more and dry cycles.

b. Wooden panels, false ceiling partition wall, cup board, cabinet similar other wooden and termite susceptible items will be treated with Pesto-clea A & B of Baral Chemical Company Ltd. (BCCL & Conmix Ltd). diluted with water. The diluted pesticide will be applied to the surfaces using brush on and/or injection methods. Depending on the surface concerned. The brush on application may have to be done in two or more and dry cycles. Chemical will be mixed at the company instruction.

Method of Measurement

7. **Measurements.** All work shall be measured net as fixed with no allowances for cutting and waste, laps means turnings, etc.

Clarification of Rates

8. **The rates inter alia include particularly.**

- a. Fixing complete with screws as specified in any position.
- b. All cutting and waste

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- c. Cutting holes for pipes etc.

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SECTION-14

WHITE/ COLOUR WASHING AND DISTEMPERING

SPECIFICATIONS

General

1. **Distempers.** Distemper will be water bound (Liquid) obtained from any of the following manufacturers and approved by the GE/Engineer-In-Charge.
 - a. Berger Robbialac
 - b. Elite / Aqua
 - c. Imperial
 - d. Navana.
2. **Lime.** The lime for white/colour washing shall be ordinary fat lime of good quality.
3. **Whiting Paris.** Shall be of an approved quality.
4. **Cement Slurry.** Shall be of a creamy consistency.
5. **Preparatory Work.** For white washing colour washing, distempering etc. Shall consist of brushing with stiff broom to remove all loose scales and removing nails, screws plugs etc. as required and stopping holes n. exc. 25sq.cm.
6. **Whitening.** Give any number of coats required to produce a well-covered smooth bodied opaque surface.

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7. **White Washing.** The lime is to be slaked at site with an excess of water to the consistency of a cream and allowed to remain under water for 2 days. The mixture shall then be strained through coarse cloth and gum water (in the proportion of 100 grams gum to 16 liter of water) added as directed. The white wash shall be applied with proper fiber brushes.
8. **Colour Washing.** Shall be prepared as for white washing and the colour added after the white wash has been strained. The colouring matter is to be boiled in water and gum water added to it and then strained into the white wash.
9. **Distemper.** Shall be applied strictly in accordance with manufacture's instructions on the tins etc.
10. **Snowcem Wash.** Shall be of foreign made or equivalent and be applied strictly as per Maker's instruction.
11. **Cleaning.** Protect all surfaces liable to splashing and clean all splashes of neighbouring work and leave the whole of the premises clean.
12. **Use of Sealer for Distemper & Snowcem Wash.** The first coat of distemper and snowcem wash on new or old surface should be carried out according to the following procedure. The plastered surface shall be covered with Acrylic water base sealer made of reputed approved company and then distemper or snowcem shall be applied strictly accordance with manufacturers instruction on the container or approved by the Engineer-in-Charge.

Method of Measurements

13. **Measurement.** All surfaces measured flat (not girthed) whether plain or corrugated.
14. **No Addition.** Shall be made for attachments to surfaces as casings, pipes, timbers etc. which are distempered, or lime washed and no deduction shall be made for such attachments if not distempered or lime washed etc.

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15. **Opening.** No deduction or addition shall be made for opening n. exc. 0.35 Sq.m Opening shall not be deducted when the jambs are distempered or lime washed and no addition will be made for the jambs. No deduction shall be made for ends of joists, beams, timbers etc.

16. **Payment.** Where the record Measurement Book for white washing colour washing distempering etc. duly checked by MES authorities exist for old building, payment will be made on the quantities recorded therein.

17. **Sanction for Additional Coats.** Prior written approval of Engineer-in-Charge will be required for the following.

- a. More than one coat on old surfaces.
- b. 4th coat white or colour wash on new surfaces.
- c. 3rd coat distemper/plastic emulsion paint / weather coat on new surfaces.

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SECTION-15

GLAZING, PAINTING AND LETTERING

SPECIFICATIONS

General

1. **Glazing.**

a. Generally all glass to be the best of its respective kind, free from specks, bubbles and other defects.

b. Putty shall be made as follows. Take 1 kg finely powdered whiting 60 grams white lead (dry) 360 grams raw linseed oil, 30 grams litharge, mix well together and beat with a wooden mallet until thoroughly incorporated. if the putty becomes hard it can be restored by heating it and working it up while hot. For glazing in metal sashes, 5 percent red lead to be added.

2. **Sheet Glass.** Where not otherwise specified to be fixed in oil putty (red lead putty for steel sashes) well bedded and back puttied and glass well sprigged where necessary. All broken or damaged glass will be hacked out and replaced and the whole of the glazing left perfect on completion. Rebates, whether in new or old work to be painted one coat before glazing, or moistened with raw linseed oil if joinery is to be oiled. Each pane of glass to be in one whole piece, pieces of panes of glass will not be allowed.

3. **Painting Generally.** Paint, oil turpentine, driers, varnish, polish, etc., used by the contractor will be obtained from any of the following manufacturers and approved by GE/Engineer-in-charge:

a. Berger (Robbialac)

b. Elite / Aqua

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c Imperial

d. Navana

Painting as far as possible, to be carried out in dry weather.

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Paint to be applied with proper paint brushes of good quality, carefully maintained throughout the work so to be always pliable and free from the loose bristle and well worked over the surface. Where more than one coat is specified, each coat is to be of a different shade and to be passed by the Engineer-in-charge before the next coat is started. The faces of all new priming and under coat to be properly rubbed down with pumice stone or sandpaper and well dusted. If old paint is unsound it shall be entirely removed by burning off or using suitable paint remover. Burning off or stripping of paint will not be done unless specifically ordered in writing by the Engineer-in-charge

4. **Painting New Wood Surfaces or Old Surfaces from Where Paint has been Burnt or Removed.** Painting shall be done in the following order.

- a. **Knotting.** Knots and resinous portions shall be coated with two thin coats of "patent" knotting well brushed in.
- b. **Stopping up.** All crevices, crack or holes shall be thoroughly cleaned out and filled up with thick coat of white lead paint and or putty.
- c. **Touching up.** All the knots crevices, cracks and hole treated as above (not the whole surface to be painted) shall be touched up with an even coat of primer.
- d. **Priming Coat or Under Coat.** The entire surface will then be painted with pink primer manufactured by any of the manufacturer specified below for paints for first coat or pink obtained by a mixture of white and red lead paint.
- e. **First Coat.** Apply thick coat of paint of the required shades obtained from any of the following manufacturers as approved by Engineer in Charge.

- (1) Elite / Aqua
- (2) Berger (Robbialac)
- (3) Imperial
- (4) Navana

- f. **Second and Subsequent Coat.** Apply a thin coat of paint as specified for first coat.

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5. **Painting Old Wood Surfaces.** Painting on old surface shall be done in the following order:
 - a. **Washing Down.** Surfaces are to be well rubbed down with pumice or soapstone to remove all blisters, scales of old paint, etc. and greasy spots rubbed and removed with turpentine. The surface to be then well washed with soap and water.
 - b. **Filling Cracks.** All holes and cracks shall be filled up with putty to an even and smooth surface.
 - c. **Touching up in Patches.** All patches rendered naked by "Washing down" shall be touched up with primer to the tint of the required paint.
 - d. **First Coat.** Apply thick coat of paint obtained from any of the manufactures specified for new surface.
 - e. **Second and Subsequent Coats.** Apply a thin coat of paint obtained from any of the manufacturers specified for new surfaces.

6. **Painting New Surfaces or Old Surfaces from Where Paint has been Burnt or Removed (Steel And Iron).**
 - a. All mill scale, rust scale, etc, to be removed by means of heavy steel scrapers of steel wire brush and well dusted.

 - b. **Priming Coats.** To be oxide of iron paint or red lead or obtained from manufacturers specified for FIRST Coat of paint on new wood surface.

 - c. **Second and Subsequent Coats.** To be oxide of iron or lead base paint as ordered or paints obtained from manufacturers specified for FIRST Coat on new wood surface.

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7. **Painting on Old Surfaces (Steel And Iron).**

- a. If the existing paint is not ordered to be removed, remove all blisters, scales of old paint, rust, etc and dusts the surface.
- b. Surfaces, which become naked by the above process, will be treated with priming coat.
- c. When thoroughly dry, one or two coats shall be applied as ordered.

8. **Wood Preservative.** Shall be of approved manufacture, Creosote shall comply with BS No. 144.

9. **Tarring.** Tar shall be heated near boiling point and 1 kg of unslaked lime added to each 5 kg of tar. The mixture shall be thinned with 1 part of kerosene to 4 parts of tar by volume and applied hot.

10. **Crude Oil & Creosote.** These shall be applied as thickly as practicable in one coat so as to cover completely all surfaces to be treated. The materials shall be worked in with a brush.

11. **Oiling Wood Work shall be done as Follows.** A mixture of 450 grams beeswax, 0.12 litre of turpentine and 1.30 litre boiled linseed oil is to be used for oiling 75 metre. Super of work. The oil and wax are to be mixed by heating slowly till the wax has melted. The turpentine is to be then added boiled linseed oil not raw linseed oil, is to be used to facilitate drying.

12. **Painting on Plastered Surfaces & use of Sealer for Painting on Plastered Surfaces.**

- a. The first coat of Acrylic weather coat paint and plastic emulsion paint on new or old surface should be carried out according to the following procedure. The plastered surface shall be covered with a Acrylic water base sealer made of reputed approved company and a

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paste made of the under mentioned in gradients for 01 sq.m and shall be rubbed with sand paper after being dried. After rubbing Acrylic weather coat paint or plastic emulsion paint shall be applied with roller/ brush.

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Ingredients required for making paste for 1 square metre.

(i)	Chalk powder	0.49 kg
(ii)	Zinc oxide	0.20 kg
(iii)	Linseed oil	0.15 litre
(iv)	Thinner	0.25 litre
(v)	Synthetic enamel paint	0.20 litre

- b. The second and subsequent coat of plastic emulsion paint: shall be applied with the help of roller/brush after drying first coat.

13. **Weather Coat Painting on Plastered Surfaces.** The weather coat paint on new surface should be carried out according to the following procedure:

- a. The plastered surface should be prepared by sand paper and dust should be removed.

(1) First Coat : Apply water base acrylic sealer @ 0.08 litre per sq.m and after 24 hours, the first weather coat should be apply @ 0.08 litre per sq.m.

(2) Second and subsequent coat : 24 hours after the first coat, the second weather coat should be applied @ 0.06 litre per sq.m.

Note : When weather coat painting on old surface, the previous paintings, white/colour wash must be removed/cleaned, then surface to be considered as a new surface and the above procedure should be applied.

Method of Measurements (Glazing)

14. **Tolerance.**

- a. Take dimensions to nearest cm.
- b. Measure irregular panes as the smallest circumscribing rectangle.

Clarification of Rates

15. **The rates, inter alia, include particularly:**

- a. Glazing with sprigs and oil putty well bedded and back puttied or beads and screws as required in wood or metal sashes, skylights, etc.
- b. All cutting and waste.
- c. Fixing in any position.

Method of Measurements (Oiling, Painting etc)

16. **Generally.** Oiling will be paid per cubic metre as per quantity of timber measured.

17. **Attachments.** No extra shall be paid for oiling or painting attachments (block, wood handles, etc.) in a similar manner to the main work.

18. **Measurements.** Method, boarding with cover fillets, corrugated sheeting, etc, shall be measured net and flat (Not girthed). Boarding with faces and edges exposed shall be measured over the faces only.

19. **Doors, Windows.** shall be measured on both sides, portion of doors slashed or with panels left out shall not be measured separately from doors with panels, and no deductions shall be made for glass or panels left out.

20. **Trellis Work, Iron Guard Bars, Iron Bar Gates, Grating and Railing, etc.** Shall be measured on one side only but shall be coated on all exposed faces.

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- a. **Oiling or Tarring.** Second coat will only be paid if specially ordered by GE/Engineer-in-charge.

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Clarification of Rates

21. The rates, inter alia, include particularly:

- a. Cleaning and preparing all surfaces for the application of wood preservatives, tar, paint etc.
- b. Work on surfaces of any materials in any position.
- c. The rates apply to paint of any base and /or colour or tint.
- d. The use of cradles, etc, where required particularly for convenience of inspection, etc, by the GE/Engineer-in-charge.
- e. Rate for priming coat, which is for new work will include knotting, stopping and under coat on crevices, cracks or holes.
- f. Rates for washing down, which is for old work, will include rubbing, filling cracks with putty and under coat on naked patches.
- g. The rates in Iron and Steel work section (with the exception of sheets steel work, sheet iron pipes, reinforcement and galvanized work) include for painting with one coat of paint before fixing and one coat of paint after fixing.

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SECTION-16

SANITARY FITTINGS

SPECIFICATIONS

General

1. **Workmanship and Materials.** The materials shall be of the best description, and the workmanship and labour required in preparing and fitting shall be executed in neat and workmanlike manner.
2. **Hard Brass.** Hard brass shall be a composition of copper and zinc with or without lead of tin, not less than 62 percent by weight of the composition being copper and having tensile strength of not less than 2000 kg per Sq. Cm of sectional area.
3. **Gunmetal.** The gunmetal shall be an alloy containing not less than 88 percent by weight of copper and not less than 8 percent by weight of tin and the balance of 4 percent made up of zinc, lead or spelter as may be decided by the contractor and having a tensile strength of not less than 2100 kg per Sq. Cm of sectional area.
4. **Joints Generally.** These should be made with special care, particularly joints between different materials. No joint to be embedded in a wall if avoidable.
5. **Cement Caulked Joints.** The spigots to be packed and caulked with 12mm depth of tarred yam. Pipes to be truly fitted concentric to be solidly bedded, packed or caulked with wooden caulking tool shaped to fit the annular ring and jointed in cement mortar (1.1) and finished with a bold collar of cement mortar on the outside of each joint. The bore of the pipes to be carefully wiped clean as work proceeds.

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6. **Runlead Caulked Joints.** The spigots and sockets are to be cleaned, truly fitted and concentrically aligned. The joint to be packed and caulked for half the depth of the socket with picked gasket and then filled with molten lead caulked and trimmed.

7. **Lead Wool Caulked Joint.** To be as for run lead but using lead wool in lieu of molten lead.

8. **Redlead Caulked Joint.** The pipes to be clean, fitted, aligned, concentric and the joint packed and caulked with packed gasket intimately mixed with red lead putty. The joint to be neatly finished with a bold collar of similar materials.

9. **Rubber Cone Joint Cover.** Rubber cones to be 10 to 15 cm long with end diameters as required, edges beaded . Rubber to be 6mm thick. The cone to be bound on with copper wire.

10. **Ragjoint Cover.** To consist of clean linen 5cm wide, thickly coated with thick red paint and bandaged (six laps) round the joint. To be secured with copper wire and finished with 3 coats of red lead paint.

11. **Joints to Similar Materials**

- a. Lead to lead-wiped lead joint.
- b. Stoneware (or porcelain) to stoneware-caulked cement joint.
- c. Iron to iron.
 - (i) Run lead caulked joints.
 - (ii) Lead wool caulked joint.

12. **Joints To Dissimilar Materials.**

- a. Lead to stone ware, etc use a 15 cm long by 5 mm thick brass ferrule plain one end flanged the other. Plain end to be wiped to the lead and flanged end, caulked with stoneware, by any one of the following:

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- (1) Cement caulked into stoneware socket or
- (2) Red lead caulked into stoneware socket AND
- (3) finish (1) or (2) with rag cover.

b. **Stoneware To Lead.** Use a spigot and socket piece 15cm long of 5 mm brass.

- (1) Cement caulk the stoneware spigot into the brass socket OR (2) Red lead with stoneware spigot into brass socket AND (3) Cover (1) or (2) with a rag cover.

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The brass spigot to be wiped to the lead pipe.

c. **Lead to Iron.** Use a 5mm thick brass ferrule 15cm long with one flagged end. Wipe the plain end to the lead and (1) Run lead caulk the flanged end of the brass ferrule into the cast iron socket, OR (2) caulk with lead wool.

d. **Iron to Lead.** use a brass spigot and socket piece of 5mm brass 15cm long.

(1) Run lead caulk the iron spigot into the brass socket Or (2) lead wool caulk the iron spigot into the brass socket. The spigot end of the brass to be wiped to lead.

e. **STONEWARE ETCTO IRON:**

(1) Cement caulked the stoneware spigot into a special large socket of the iron pipe OR (2) All as (1) but red lead caulk AND (3) Use a rag cover where directed in addition.

f. **Iron to Stoneware.**

(1) Cement caulk the iron spigot into the stoneware socket OR (2) All as (1) but red lead caulk AND (3) cover with rag where directed.

13. **All Sanitary Fittings.** Unless specially ordered to the contrary will be supplied by the Contractor.

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14. **All Pipe and Fitting**. Joints will be tested under a water pressure head of 0.60m to 1.80m or by smoke as directed in the presence of the Engineer-in Charge. Defects will be notified immediately and pipes and fitting retested until passed by the Engineer-in-Charge.

15. **The Whole of the Work**. Is to be tested at the contractor's expense at such time and in such manner, as the Engineer-in charge shall direct, and to his satisfaction.

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Clarification of Rates

16. **The rates, inter alia, include particularly:**

a. **Fixing Only Rates.**

b. The rates of "fixing only" water closets and urinals complete include for pedestal pattern pan with combined basins "P" or "S" traps or Asiatic pattern with loose trap. and basin or stall urinals. the rates include for securing to floors wall in CM 1.3 and bedding traps of Asian W.C in cement concrete 1:2:4 also for securing seats, flushing systems and their brackets to walls, fixing and jointing ,flush pipes including joints to fittings fixing stoppers if anti-syphonge pipes are not required.

c. The rates of "fixing only" for Slipper Baths, etc. include placing the bath in position and securing to floor, if required, fixing overflow and waste grating and trap, stopper and chain.

d. The rates of "Fixing only" Sinks, ablution basin in ranges, etc. include for properly securing to brackets of bedding in cement to dwarf piers, and fixing waste or overflow gratings and trap, stopper and chain. These rates also include for "Fixing only" a porcelain stopper in lieu of a pillar cock. if only one pillar cock required and supplied.

2. The rates for "Add if fixed in Repairs" include carriage to MES store or for safe custody until required to reuse, and making good on completion.

3. All "fixing only" rates include all jointing and fixing material, i.e. lead, lead wool, red lead, cement mortar, screws, nails and other subsidiary articles required for the proper fixing of the

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fittings, but do not include for red joints to iron or soldered joint to lead service waste or overflow pipes, where required.

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SECTION-18

DRAINAGE AND SEPTIC TANKS

SPECIFICATIONS

General

1. **Cement Concrete Pipe (Cylindrical).** These shall be of an approved manufacturer. The unreinforced pipes are suitable for sub-soil drainage and the reinforced (non-pressure) pipes are suitable for drainage, sewers, irrigation and culverts. Pipes for sub-soil drainage shall be laid dry. The pipes shall not be more than 6 x lengths of pipes to the required gradient, fill in the groove at the end of each pipe with hemp soaked in molten bitumen shall be of size sufficient to fill the groove while pressed. These 6 x lengths of pipes should be pressed tight by means of jack and the loose collars. Slided over joints of two pipes and kept concentric by means of few wooden wedges. The cement mortar 1:1 shall then be pressed into the joints and the edges finished off a beveled joint. Laying and joining shall be carried out in sets of not more than 6 pipes each time.

2. **Cast Iron Soil Waste and Ventilating Pipes.**

a. Pipes to be as BS No.416 and to be of "Extra Heavy" grade for soil pipes "Heavy" grade for waste pipes less than 75 mm. dia and medium grade for ventilating and waste pipe 75 mm dia and over made of **MAANCO/ NISSAN/SNC SUPER/ NANAKHAI** or any other approved brands.

b. Pipes without ears shall be secured with holder bats let into equal and pinned and those with ears will be secured to wall with strong galvanized wrought iron pipe nail passing 75 mm tin to wall through distance pieces all as described below.

c. Pipes to be in 0.60,1.20 and 1.80 metre lengths socket jointed with or without ears for fixing as ordered and coated inside and outside with DR. ANGUS SMITHS composition before leaving the manufacturer's works.

d. Pipes to be blocked out from walls at least 25mm and securely fixed by means of short pieces of 19 mm G.I pipe and stout pipe nail or by standard pattern malleable cast iron Lewis ended holder bats let into walls. The two portions of the holder bats to be

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secured with and including gunmetal bolts and nuts. Pipe nails to be stout wrought iron and after allowing for thickness of distance pieces, to run not less than 75 mm in to the wall.

e. All pipes and connections to be jointed with molten lead well caulked. Joints in inverted and difficult positions, however, may be made with lead wool well caulked. Access doors to be jointed with oil dressed leather end and secured with gunmetal set screws.

3. **PVC Pipe.** PVC (non pressure type) down pipe to be connected in accordance with the latest engineering practice. Pipe will be **Lira / Aziz / Zakaria / Rina (BRB) /Adcon Polymer** or any other approved brands and to be connected by approved suitable consumables.

4. **U PVC Pipes.** U PVC pipe shall be product of any approved manufacturer and to be connected in accordance with the latest engineering practices

5. **Cast Iron Drains.** Drains passing under building and under roads railways etc. where damage from traffic is feared, are to be laid with cast-iron spigot and socket drain pipes in accordance with the lasted edition of BS No. 437 with bends junctions and other fittings in accordance with the latest edition of BS No. 78 all as described in water supply section. All cast iron pipes and fittings are to be coated outside and with DR. ANGUS SMITHS solution by dipping at the manufacturer's works. Pipes to be jointed with molten lead and picked gasket well caulked.

6. **Concrete for Cover Benching etc.** The concrete for benching and for pre-cast covers, to manholes etc, is to be composed of one part of cement to two parts of sand and four parts of 19 mm graded aggregate. The concrete in main and branch benching to be trowelled up to a smooth hard face with a steel trowel, additional cement being added as required, benching to be brought up to an average height of 25 mm above main, invert level, so as to ensure quick falls forwards the various channels.

7. **Drain Pipes Connections Accessories etc.** These are to be salt glazed ware, with plain spigot and socket joints, thoroughly burnt throughout the whole thickness of clean and even texture, free from air blows fire blister cracks and other imperfections and the surfaces, both external and internal to be smooth and perfectly glazed. All joints and connections are to be carefully made, the spigot are to be wound with one turn of 13 mm tarred yarn and accurately fitted to and concentric

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with the sockets and to be solidly bedded and jointed in cement mortar (1:1) and finished with a bold collar in cement mortar on the outside of each joint. Each joint to be carefully wiped clean inside as the works proceeds.

8. **Foundation Concretes.** Concrete in foundations under drains, manholes traps, gullies etc. to be either cement concrete (1:3:6) or (1:4:8) as may be ordered. The composition, mixing and laying of concrete to conform to the conditions laid down in " CONCRETE SECTION"

9. **Foundation Beds to Drains.** The concrete beds to be 100mm thick under collars of the pipes add 300 mm wider than the internal diameter of the pipes after the pipes are laid and tested they are to be hunched with similar concrete. The hunching to extended from the edge of the foundation concrete to at least half -way up the side of the pipes and include packing solid under the pipes.

10. **Gullies.** To be strong salt glazed ware, conforming to the specification laid down for salt glazed ware pipes connections etc. These are to be set truly level and jointed to drain pipes in cement mortar (1:1) Gullies to be encased in cement concrete (1:3:6). Cleaning eyes are to be provided to gullies when the distance between the gully and the manhole exceeds 6 metre.

11. **Galvanizing.** Galvanizing shall be a thorough even coat of zinc, free from stains, bare spots or defects.

12. **Inlet Ventilators.** let ventilators for drain ventilation shall be of inlet type of galvanized iron with mica valve to be fixed to vertical or horizontal pipes with run lead or lead wool joints.

13. **Intercepting Chambers.** To be as described for manholes but to include a salt-glazed intercepting trap of approved pattern with cleaning arm having an approved stopper fitted with a galvanized iron lever and chain complete. This trap to be carefully bedded in concrete on the discharge side of the manhole and set so as to ensure that the normal "drop" from inlet to outlet is preserved.

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14. **Laying Drains.** Every line of drain shall be accurately laid and be perfectly true to line and gradient from point to point. Every main drain shall be true from manhole to manhole and any change in direction shall take place inside the manhole by the use of curved main channels similar changes in internal diameter of drain shall be made in manholes by the use of tapers channels, straight or curved as necessary and not by the use of tapers or bend in the line of drain outside the manhole.

15. **Manholes.**

- a. Excavate in any soil, make good and dispose of surplus spoil.
- b. Foundations shall be 150 mm thick, projecting 150 mm beyond the outside of the walls and to be of C.C. 1:3:6.
- c. Bolsters around manhole covers shall be of 150 mm x 180 mm of C.C. 1:2:4.
- d. Benching shall be of cement concrete (1:3:6) with main and branch channels formed therein rising 45 degree from channel edges and all surfaces trowelled smooth.
- e. Cover slabs shall be of concrete bedded in cement mortar :
- f. 75 mm thick cement concrete 1:2:4 reinforced with 10 mm dia bars at 150 mm centers both ways and surfaces and edges finished fair.
- g. Cover and frame shall be supplied by the contractor will be bedded in mortar, bolstered round with 150 mm x 150 mm cement concrete 1:2:4 and to be paid under relevant item.
- h. Mortar shall be cement mortar 1:4.
- j. Walls shall be :
 - (1) Burnt brick works in CM, 250 mm thick.
 - (2) Approved rubble stone in CM, 300 mm thick.
 - (3) Solid concrete blocks 1:2:4 in CM, 200 mm thick.
 - (4) Poured concrete 1:3:6, 225 mm thick.

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(5) 150mm thick RCC 1:2:4 with 8 mm dia bar, at n.exc. 150 mm centers both ways.

k. Internal faces of wall shall be hacked for plaster key, cleaned, dubbed out with mortar and rendered not less than 12 mm thick with CM 1:4. If rock is encountered in Excavation of the manholes, prior orders of the Engineer in Charge shall be obtained before starting excavation. Extra payment for rock shall be made under Excavation Section and the cost of excavation shall be deducted at the av. rate of ordinary and hard soil rates.

16. **Testing.** All new drains, manholes, etc shall be tested before hunching with concrete or the trenches are filled in.

a. All drains are to be tested by filling with water having a head of, not less than 0.60 meter and not more than 1.80 metre above the top of the lowest pipe in the length to be tested.

b. Manholes and branch drains discharging into manholes shall be tested independently. All vent pipes and soil pipes shall be tested by a smoke test.

c. The contractor is to be responsible for any disturbance of the drains, etc, after have passed the test satisfactorily . After drains are laid, an interval of at least 48 hours must elapse before testing to allow sufficient time for the joints to set.

d. For smoke testing the smoke machine and necessary chemicals or smoke rockets to be provided by the contractor. The tests shall be carried out in such a manner as the Engineer –in- Charge shall direct to his satisfaction.

17. **Wire Guard.** To be of stout wire, galvanized after manufacture, dome or balloon pattern as ordered, to be fixed over outlets of down pipes of tops of ventilating pipes.

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Method of Measurements

18. **Pipe Work Generally shall be Measured.**

- a. Net overall length of pipes and fittings as fixed, except where otherwise indicated.
- b. Fittings shall be enumerated and described as extra over “ pipes and fittings” except where otherwise indicated.
- c. Fittings of unequal bores shall be classified according to the larger bore.

19. **Manholes.** Internal plan area x height (as defined below) :

- a. Uniform area on plan:

Height = From invert to top of manhole cover.

- b. With shaft of reduced area:

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- (1) Chamber height = From invert to junction of shaft with chamber.
Internal plan area of chamber.
- (2) Shaft height = From junction of shaft with chamber to top of
manhole cover. Internal plan area of shaft.

The internal area of circular manholes shall be the internal diameter squared. In calculating internal area of shaft, ignore any corbelling out.

Clarification of Rates

20. **The rates inter alia include particularly:**

- a. Fixing complete in long or short lengths, including running joints in the length.
- b. Fixing soil waste and ventilation pipes.

- (1) Distance pieces, supported or un-supported.
- (2) Making good surfaces disturbed.
- (3) Cutting holes in walls, and roofs and making good.

21. The contractor shall provide lead and gasket.

22. The manhole rates are ONLY applicable to manholes with a total depth of 1.80 metre from invert to top of manhole. Setting of manhole cover is not included. Manholes deeper than 1.80 metre shall be measure in details under relevant sections.

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23. For cast iron drainage pipe, use relevant items and rates from water supply section.

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SECTION - 19

SEWERAGE AND SEWAGE DISPOSAL

SPECIFICATION

General

1. **Drainage.** Pipe up to 225 mm dia and under for drainage work and are payable under section 18.
2. **Sewage Lines.** Pipe 300 mm dia and above, are covered under this section i.e. Sewage section.
3. **Pipes.** The pipes shall be reinforced cement concrete, obtained from approved manufacturers and shall conform to respective BS.
4. **Laying.** The pipes shall be laid according to the gradients required, in straight lines, manhole to manhole. The pipe shall rest on PCC 1:2:4 Saddles, pre cast/cast in situ at distances as directed. Any change in direction shall take place inside the manhole by the use of curved main half round channels, straight or curved as necessary, and NOT by the use of tapers or bend in the sewage line outside the manhole. Lay not more than 6 x lengths of pipes to the required gradient, fill in the groove at the end of each pipe with hemp soaked in molten bitumen. The hemp will be of a size sufficient to fill the groove while pressed. These 6 x lengths of pipes should be pressed tight by means of jack and the loose collars slide over the joints of two pipes and kept concentric by means of few wooden wedges. The cement mortar 1:1 is then pressed into the joints and the edges finished off with a bevelled joint. Laying and jointing shall be carried out in sets of not more than 6 pipes each time.
5. **Manholes.** The manholes shall be designed according to the depth and the No. of sewage lines meeting at that point.

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6. **Manholes Covers.** Only, cast iron heavy pattern manholes covers of approved manufactures shall be used.

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7. **Testing.** All new sewage lines, manholes, etc. shall be tested before heaunching with concrete or the trenches are filled. All sewage lines shall be tested by filling with water having a head of not less than 0.60 Metre and not more than 1.80 Metre above the top of the lowest pipe in the length to be tested, preference will however be given to a method of test specified by the manufactures.
8. **Damage, etc.** The Contractor shall be responsible for any disturbance of the sewage lines, etc, after they have passed the test satisfactorily.

Method of Measurements

9. **Sewage pipes shall be measured :**
- a. Net, between manholes, length of pipes excluding fittings, as fixed.
 - b. Fittings shall be enumerated and paid for extra as supplied and fixed.
 - c. Fittings of un-equal bore shall be classified according to the larger bore.

Clarification of Rates

10. **The rates, inter alia, include particularly :**

- a. Fixing complete in long or short lengths.

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- b. Making good, surfaces disturbed.
- c. Lowering of pipes with tackles or cranes etc.

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SECTION-20

DEMOLITION AND DISMANTLING

SPECIFICATIONS

General

1. When there are rates elsewhere in the schedule for "add if in repairs" the demolition or dismantling rates in this section will NOT be applicable either in addition to or in substitution of the "add if in repairs" items.

2. **Demolition.** Implies taking down or breaking up, removing as ordered and spreading and leveling as required and will normally be applied to:

- a. Matting, thatching, bamboo framing.
- b. Ordinary concrete cast in situ, reinforced concrete generally, brickwork etc.
- c. Asphalt work.

3. **Dismantling.** Implies carefully taking up or down without damage (either large or small quantities, in patches or for work in repairs or replacement of parts where not otherwise provided for in the schedule) and carting to store (if directed by Engineer in Charge) any useful materials, sorting, stacking, cleaning and the removals of normally be applied to all other classes of work.

4. **Damage to.** The contractor at his expense will make any part of the work, which is to be left intact, good.

5. **Cutting Opening Through Walls.**

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a. For doors, windows and other purposes not covered by (b) below includes forming reveals and rough face work, except provisions of arches, lintels and new finishing around opening which will be paid for separately under the relevant items.

b. For small holes for pipes, etc. where surface areas does not exceed 900 sq.cm includes all works including filling, finishing and making good.

6. **New Works in Making Good.** After dismantling, etc., shall be paid for under the respective items in the other sections of the schedule. No additional payment for connecting up to existing work etc., shall be made.

7. **Cutting Through.** Or excavating and grubbing up concrete, brick works, etc., in ground floors roads, paving and foundations shall be paid for under the items for "Excavation Section" as applicable.

8. **Method of Measurements**

a. **Measurements of all Works.** Shall be made before dismantling and as described for new works in respect of deductions for voids, openings, etc. and no allowance shall be made for any increase in bulk.

b. **Measurement for Brick Work.** Plastered one or both side are to exclusive of plaster thickness, but the rates for demolition include taking down the plaster.

c. **In Cutting for Openings.** Measurements shall be the net finished size of the new opening or enlarged portion of opening.

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- d. **No Additional Allowance.** Shall be made for cutting and pinning in bolts, holdfast, ends of steps, timbers, etc.

Clarification of Rates

9. **The rates, inter alia, include particularly:**

- a. Use and waste of all temporary strutting and shorting required, and clearing away after use, together with any scaffolding, tools, plants, watching, etc.
- b. Removal of all serviceable materials to store, or fresh site within the contract area if so required.
- c. Removal of all un-serviceable materials on MD premises within a distance of 4 Kilometer and spreading leveling, stacking, etc., as directed.
- d. As an alternative to (c) above, removal of all un-serviceable materials off MD premises, in which case the materials shall become the property of the contractor and no deduction shall be made for their value.

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SECTION – 26

SCOPE OF WORK

Expanded Soils Investigation Program

Soil Investigation

1. Investigation into the general geological character of the site.
2. To make exploratory bore holes for specific information regarding the character and thickness of individual soils.
3. To determine physical properties of the soil by laboratory tests.

Boring at Each Location

4. Collection of soil samples by 100 mm minimum inside diameter sand boring.
5. Number of boring (as per field requirement).
6. Depth of boring (as per requirement).
7. Location of borings: Boring to be located on transverse center line approximate 3 m from edge of building or specified by the Engineer-in-Charge.
8. The log of these borings are to be analyzed immediately to ascertain whether additional depth and number of borings are required to adequately describe the soil condition at the site.

Sampling

9. **Undisturbed Sample.**
 - a. Undisturbed samples shall be collected from cohesive soil layers at a maximum interval of 3m (or from each strata change if in less than 3m) upto the bottom of the bore hole.
 - b. After recovery, undisturbed samples shall be carefully sealed and marked for laboratory tests. Before sealing a small quantity of soil from the bottom part of the samples shall be put in a glass jar for identification purpose.

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10. **Disturbed Samples.** Disturbs soil samples shall be collected from every 1m interval irrespective of whether the soil is cohesive or cohesion less.
11. **Standard Penetration Test.** Blow count (N) per 0.3 m of penetration shall be recorded for every disturbed sampling interval. At a depth where on disturbed samples cannot be extracted because of the availability of only cohesion less soil layers, record of N-Blows may be considered sufficient for the determination of bearing capacity of soil.
12. Execution of Dynamic Cone (60⁰) Penetration tests or static cone penetration tested at four locations in each building, upto a depth required or upto refusal (N+of 50 counted as refusal).

Scope of Work

13. Scope of work is as under:
- a. Expanded Soils Investigation Programme
 - b. Soil Investigation
 - c. Laboratory Tests.
14. **Undisturbed soil samples:**
- a. Laboratory Test shall be conducted for the following:
 - (1) Unconfined compression test on all representative undisturbed cohesive soil samples.
 - (2) Consolidation test on representative undisturbed cohesive soil samples when stratum is considered substantially compressible by the Engineer (average one in four borings).
 - (3) Dry density and Natural Moisture Content test.
 - (4) Tri-axial compression test (consolidated untrained) on representative undisturbed soil samples from potential shear zones below the assumed elevation of base of footing (average of one in four borings).
15. **Disturbed Samples.**

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a. Laboratory test to be performed on representative disturbed samples.

- (1) Atterberg limit test.
- (3) Grain size analysis.
- (4) Visual identification of the soil.

16. **Other Laboratory Tests.** Tri-axial compression test shall be performed on selected samples of cohesion less soils encountered below the proposed footing (approximately one for every four borings).

Report

17. The report should contain standard charts, graphs, bore-logs etc. and to include allowable bearing capacity of the soil at different depths including F.S. and skin friction values at different level with F.S.

18. The recommendation on the sub-structure for the proposed structures should be clearly stated without any ambiguity.

19. The report should have the Notice Inviting Tender, any corrigendum & the schedule as its enclosure.

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SECTION – 28

FURNITURE & STORES

SPECIFICATION

General

1. **Wood Works.**

a. **Quality of timber.**

(1) Timber is to be well seasoned, free from sap, dry roots, bores, cracks or loose knots. All noticeable knots are to be tested for looseness by means of striking them with a small hammer.

On economical grounds, the following limits will be followed in accepting knots:

(a) Dead knots 12.5mm in diameter and under may be neglected provided they do not exceed two per 0.093sq.m of any of the surface and those upto 19 mm diameter provided they do not exceed one per 0.093sq.m

(b) Knots should not occur in clusters.

(2) Timber shall be straight in the grain, but for curved members the timber should be so selected that the grains conform to the shape of the member as far as possible.

(3) Moisture content of the timber should be 12% with tolerance of plus/minus 2%.

(4) Hard or soft wood will be used as specified on the drawing. Timber specified in the particular specification will supersede the one specified in the drawing.

b. **Classification of Timber.** The following are the classes of the common timber.

(1) Hard wood: Chittagong teak, Jessore teak, Chittagong Shilkorai and Shisham.

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(2) Soft wood: Chamble, Tit Chamble, Garjon, Khathal, Gamar and Jarul.

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- c. **Joints.** All joints are to fit fully and truly without wedging or fitting. Planks will be joined by secret screws as under:

- (1) Drive number of screws into the edge of one plank with the heads to project a little above the surface. Holes are bored at a distance of about 6mm in front of their actual final position in the plank to be jointed to take the heads of the screws. Narrow channel of about 6mm in length is to be cut in the second plank just wide enough to take the smooth shanks of the screws. After gluing this, plank are so placed that the screw heads enter the holds in the other piece and are then driven on from the end until it assumes its correct position. The heads of the screws tend to work upwards as they cut channels for themselves and thus tighten the joints.
- (2) All joints and grooves of panels will be glued with best glue. Application of dewless when specified is to be made from good quality bamboo. Screws used are to be of superior quality. Nails will not be used unless specified.

2. **Polishing/Painting/Finishing.**

- a. **Finish.** All wood works are to be well smoothed and finished with No. '0' sand paper. All sharp outer edges are to be very slightly rounded. After sand papering all wood works will be polished, varnished or painted as specified in the plank or in the particular specification.

b. **Polish.**

- (1) Primary coat of mixture of plaster of paris, water and adjusting colour to match wood will be applied on hard wood and then sand papered to remove the materials not absorbed in the grains of wood.
- (2) Primary coat of mixture of glue, water and burnt senna will be applied on soft wood and then sand papered to remove the excess materials.
- (3) After preparation of the surface as stated above repeated application with molmol cloth and cotton of polish of composition as under will be made on the outside (visible) surface of the wood and finished of glossy surface. Sand papering will be done by sand papers No. '0' after 1st application to make the surface even. Polish can thinned with the addition of sprit as necessary for final coat:

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a.	Methylated sprit	-	4.546 litre
	Shellac best quality	-	0.454 kg
	Sindur	-	.06 kg
	Rumi Mustaqi	-	.06 kg
	Loban	-	.03 kg

- c. **Varnishing.** After preparing the surface as explained above for polish two coats of good quality varnish will be applied.

- d. **Painting.**

(1) One primary and two subsequent coats will be applied before priming coat is applied, wood is to be thoroughly cleaned, sand papered, smoothed and dusted.

(2) Painting with proper paint brushes, which will carefully, be maintained throughout the work. It should be pliable and free from loose bristles when applied evenly over the surface.

(3) The surface of the priming and under coat paint is to be rubbed down with sand paper No. '0' before the application of the next coat. Great care is to be taken with the final coat to ensure that no brush marks are visible on the completion.

3. **Glazing.** All glazing work is to be of sheet glass of not less than 0.454 kg per 0.093sq.m, free from spots, rubbles or other defects and if not otherwise specified will be fixed nailing wooden fillets to the frame on the inner side of the glass sheet.

4. **Cane Work.**

a. Cane is to be of the best quality free from sap and discoloration and of uniform width (not less than 2.35 mm). The outside of the cane will be used only.

b. Cane work will be done of double horizontal and verticals and single diagonals. All are to be inter woven, horizontal and verticals will be 12.5mm center to center. Holes will be bored in frame accordingly.

c. Before caning all edges of seat frames etc. will be rounded and holes slightly countersunk to prevent under wear of the cane.

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5. **Iron Work.**

- a. All sheets are to conform to BS and to be as per specification in the plans or in particular specifications.
- b. Bolts and nuts are to be of standard quality both as regards threads and sizes.
- c. Rivets must fit fully and truly to the holes made for them. They must be tight and closely driven and all ragged edges removed after shaping coat iron to be uniform in thickness, clean, sound and free from air bubble or defects of any kind.
- d. Finish. All rust to be removed and sharp edges to be filed/smoothed. Then to be dusted and painted as specified. Painting to be done as already specified. In tarring the tar to be heated to near boiling, paint, thinned by the addition of one part of kerosene oil four parts of tar by volume and applied while still hot. 0.91 kg of unslaked lime to be mixed with 4.546 liter of tar when nearing boiling point too prevent running off.

6. **Powder Coating (Painting) of CR Steel Furniture.**

- a. **Standard of CR Steel Products.** CR steel products are the befitting the spirit of the age which are now using in the MES for manufacture & supply of certain steel furniture. CR (cold rolled pipe/Box type) produced with in a modern technology for which mother coils / sheets, that is nothing but the imported from abroad of different sizes and thickness.
- b. **Procedure.** Procedure of powder coating (Painting) of CR steel furniture are given as under :-
 - (i) **Pre-Treatment.** All surfaces of CR steel furniture / products are to be cleaned to be removed rust, sharp edges to be smoothened and then to be dusted.
 - (ii) Oil grease to be removed from surfaces by using Gardo clean 619 Sulphuric Acid / applying kemlix 1m 202 (which is a chemical acid chemicals 3 in 1) or similar chemicals.
 - (iii) All surfaces to be washed with clean water.
 - (iv) Then, all surfaces to be Zinc phosphating (a chemical solvent) and to be dried at best by Air.
- c. **Powder Spray.**

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- (i) All surfaces to be spray powder coated with best quality powder (Berger / powder from abroad).
- (ii) Spray powder to be produced with a spray gun or pistol compressed by air on the surface.

d. **Heat applications.**

- (i) All products / surfaces to be produced in a heat chamber applying consecutively up to 200^oc plus if necessary for 15-20 minutes.
- (ii) Then all products to be cool separately as an individual item.

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METRIC CONVERSION TABLES

Inches			Miles			Feet		
Milli Metres			Kilo Metres			Metres		
0.039	1	25.400	0.621	1	1.609	3.281	1	0.305
0.079	2	50.800	1.243	2	3.219	6.562	2	0.610
0.118	3	76.200	1.864	3	4.828	9.843	3	0.914
0.157	4	101.600	2.485	4	6.437	13.123	4	1.219
0.197	5	127.00	3.107	5	8.047	16.404	5	1.524
0.236	6	152.400	3.728	6	9.656	19.685	6	1.829
0.276	7	177.800	4.350	7	11.265	22.966	7	2.314
0.315	8	203.200	4.971	8	12.875	26.247	8	2.438
0.354	9	228.600	5.592	9	14.484	29.528	9	2.743

Square Feet		Square Metres		Square Yards		Square Metres	
				<i>Yards</i>			

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10.764	1	0.093	1.094	1	0.914	1.196	1	0.836
21.528	2	0.186	2.187	2	1.829	2.392	2	1.672
32.292	3	0.279	3.281	3	2.743	3.588	3	2.508
43.056	4	0.372	4.374	4	3.658	4.784	4	3.345
58.820	5	0.465	5.468	5	4.572	5.980	5	4.181
64.583	6	0.557	<div>The key figure printed in the centre column, can be read as either the metric or the British measure, Thus 1 meter =1.094 yard and 1 yard = 0.914 meter</div>					
75.347	7	0.650						
86.111	8	0.743						
96.875	9	0.836						

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Cubic Feet To Cubic Metre			Cubic Yards To Cubic Metre			
35.315	1	0.028	1.308	1	0.765	
70.629	2	0.057	2.616	2	1.529	
105.944	3	0.085	3.924	3	2.294	
141.259	4	0.113	5.232	4	3.058	
176.573	5	0.142	6.540	5	3.823	
211.888	6	0.170	7.848	6	4.587	
247.203	7	0.198	9.156	7	5.352	
282.517	8	0.227	10.464	8	6.116	
317.832	9	0.255	11.772	9	6.881	

Gallons To Litres			Ounces To Grams			Pounds To Kilo Grams		
0.220	1	4.546	0.035	1	28.350	2.205	1	0.454
0.440	2	9.092	0.071	2	56.699	4.409	2	0.907
0.660	3	13.638	0.106	3	85.049	6.614	3	1.361

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0.880	4	18.184	0.141	4	113.398	8.818	4	1.814
1.100	5	22.730	0.176	5	141.748	11.023	5	2.268
1.320	6	27.276	0.212	6	170.097	13.228	6	2.722
1.540	7	31.822	0.247	7	198.447	15.432	7	3.175
1.760	8	36.368	0.282	8	226.796	17.637	8	3.629
1.980	9	40.914	0.317	9	255.146	19.841	9	4.082

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CONVERSION FORMULA

To Convert	Multiply	To convert	Multiply by
Inches to cm	2.540	cu. cm to cu. inch	0.061
cm to inches	0.3937	cu. ft to cu m.	0.028
ft to metre	0.3048	cu. m to cu. ft	35.315
metre to feet	3.281	cu. m to cu. yards	0.7646
yards to metres	0.9144	cu. yards to cu. m	1.308
metres to yards	1.094	cu. inch to litre	0.01639
miles to K. metres	1.609	Litres to cu. inch.	61.03
K. metres to miles	0.6214	Gallons to litres	4.546
Sq. inch to Sq. cm	6.452	Litres to Gallons	0.22
Sq. cm to Sq. inch	0.1550	Grains to Grams	0.0648
Sq. m to Sq. ft	10.764	Grams to Grains	15.43
Sq. ft to Sq. m	0.093	Ounces to Grams	28.35
Sq. yard to Sq. m	0.8361	Grams to Ounces	0.03527
Sq. m to Sq. yards	1.196	Pound to grams	453.60
Sq. miles to Sq.	2.590	Grams to Pounds	0.002205
Sq. to Sq. Miles	0.3861	Pounds to Kilograms	0.44536
Acres to Hectares	0.405	Kilograms to Pounds	2.205

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Hectares to Acres	2.471	Tons to Kilograms	1000.00
Cu. inch to cu. cm	16.39	Kilograms to Ton	0.001

MPH 20 30 40 50 60 70 80 90 100													
PH 32 48 64 80 96 112 128 144 160													
0 _F		32	40	50	60	70	75	85	95	105	140	175	212
0 _C		0	5	10	15	20	25	30	35	40	60	80	100

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LINEAR MEASURES

FPS Unit	Metric Unit	Metric Unit	FPS Unit
1 Inch	2.54 cm	1 cm	0.3937 Inch
	or 25.4 mm		or 0.0328 Foot
1 Foot	30.48 cm	1 metre	3.281 Feet
	or 304.8 mm		or 39.37 Inch
1 Mile	1.609	1	0.6215 Mile
	or 1609 Metre		or 3281.54 Feet

SQUARE MEASURES

FPS Unit	Metric Unit	Metric Unit	FPS Unit
1 Sq. in	6.452 Sq. cm	1 Sq. Cm	0.155 Sq. in
1 Sq. ft	929.03 Sq. cm	1 Sq. m	10.764 Sq. ft
	or 0.093 Sq. m		
1 Sq. mile	2.590 Sq.	1 Sq.	0.3861 Sq. mile

CUBIC MEASURES

FPS Unit	Metric Unit	Metric Unit	FPS Unit
1 Cu. ft	0.028 Cu. m	1 Cu. m	35.315 Cu. ft

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	or	28316.85 Cu. cm		
1 Cu. inch		16.39 Cu. cm	1 Cu. cm	0.061 Cu. inch

WEIGHT MEASURES

FPS Unit	Metric Unit	Metric Unit	FPS Unit
1 Lbs	0.4536 Kg	1 Kg	2.205 Lb
	or 453.60 gram		
1 CWT	50 kg	1 Litre	0.22 Gallons
			or 1.761 Pint
1 Ton	1000.00 Kg	1 Gram	0.03527 OZ

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UNIT WEIGHT OF M.S. ANGLES

(a) EQUAL ANGLES

Size		Weight		Size		Weight	
inch	Mm	lb/ft	kg/m	inch	mm	lb/ft	kg/m
.75x.75x.125	19.05x19.05x3.17		0.87	2x2x.375	50.8x50.8x9.52		6.88
	20x20x3	0.60	0.90		50x50x10	4.63	7.10
.75x.75x.19	19.05x19.05x4.76		1.25	2.25x2.25x.25	57.15x57.15x6.35		5.38
	20x20x5	0.85	1.40		60x60x6	3.62	5.40
1x1x.125	25.4x25.4x3.17		1.19	2.25x2.25x.3125	57.15x57.15x7.93		6.62
	25x25x3	0.80	1.10		60x60x8	4.45	7.10
1x1x.19	25.4x25.4x4.76		1.72	2.25x2.25x.375	57.15x57.15x9.52		7.83
	25x25x5	1.17	1.80		60x60x10	5.26	8.70
1x1x.25	25.4x25.4x6.35		2.22	2.50x2.50x.25	63.5x63.5x6.35		6.01
	25x25x6	1.49	2.10		65x65x6	4.04	5.90
1.25x1.25x.19	31.75x31.75x4.76		2.21	2.50x2.50x.3125	63.5x63.5x7.93		7.41
	30x30x5	1.49	2.20		65x65x8	4.99	7.70
1.25x1.25x.25	31.75x31.75x6.35		2.85	2.50x2.50x.375	63.5x63.5x9.52		8.78
	30x30x6	1.91	2.60		65x65x10	5.90	9.40
1.50x1.50x.19	38.1x38.1x4.76		2.67	2.50x2.50x.50	63.5x63.5x12.7		11.40
	40x40x5	1.79	3.00		65x65x12	7.66	11.10
1.50x1.50x.25	38.1x38.1x6.35	2.34	3.48	3x3x.25	76.2x76.2x6.35	4.89	7.28

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	40x40x6		3.50		75x75x6		6.80
1.50x1.50x.375	38.1x38.1x9.52		4.98	3x3x.3125	76.2x76.2x7.93		9.00
	40x40x10	3.35	5.50		75x75x8	6.05	8.90
1.75x1.75x0.19	44.45x44.45x4.76		3.14	3x3x.375	76.2x76.2x9.52		10.68
	45x45x5	2.14	3.40		75x75x10	7.18	11.00
1.75x1.75x.25	44.45x44.45x6.35		4.12	3x3x.50	76.2x76.2x12.7		13.93
	45x45x6	2.77	4.00		75x75x12	9.36	13.00
1.75x1.75x.375	44.45x44.45x9.52		5.93	3x3x.375	88.9x88.9x9.52		12.58
	45x45x10	3.99	6.30		90x90x10	7.18	13.40
2x2x.19	50.8x50.8x4.76		3.62	3.50x3.50x.50	88.9x88.9x12.17		16.46
	50x50x5	2.46	3.80		90x90x12	11.06	15.80
2x2x.25	50.8x50.8x6.35		4.75				
	50x50x6	3.19	4.50				

(b) UNEQUAL ANGLES

Size		Weight		Size		Weight	
inch	Mm	lb/ft	kg/m	inch	mm	lb/ft	kg/m
2X1.50X.25	50.8X38.1X6.35		4.12	3x2.50x.25	76.2X63.5X6.35		6.65
	50X40X6	2.77	4.00		75X65X6	4.47	6.30
2.50X2X.25	63.5X50.8X6.35		5.38	3X2.50X.32	76.2X63.5X7.93		8.20
	65X50X6	3.62	5.15		75X65X8	5.64	8.30
2.50X2.25X31.25	63.5X57X15X7.93	4.72	7.02	3X2.50X.38	76.2X63.5X9.52	6.62	9.73

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	65X60X8		7.40		75X65X10		10.20
3X2X.25	76.2X50.8X6.35		6.01	3.50X2.50X.25	88.9X63.5X6.35		7.28
	75X50X6	4.04	5.60		90X65X6	4.89	7.00
3X2X.3125	76.2X50.8X7.93		7.41	3.50X2.50X.32	88.9X63.5X7.93		9.00
	75X50X8	4.99	7.40		90X65X8	6.19	9.25
3X2X.375	76.2X50.8X9.52		8.78	3.50X2.50X.38	88.9X63.5X9.52		10.68
	75X50X10	5.90	9.00		90X65X10	7.27	11.38

UNIT WEIGHT OF M.S. TEE

Size		Weight		Size		Weight	
inch	Mm	lb/f t	kg/ m	inch	mm	lb/ft	kg/m
1X1X.125	25.4X25.4X3.17		1.20	2.25X2.25X.25	57.15X57.15X6.35		5.41
	25X25X.3	0.81	1.12		60X60X6	3.64	5.40
1X1X.25	25.4X25.4X6.35		2.29	2.50X2.50X.25	63.5X63.5X6.35		6.05
	25X25X6	1.54	2.24		65X65X6	4.07	5.85
1.25X1.25X.19	31.75X31.75X4.76		2.23	2.50X2.50X.3125	63.5X63.5X7.93		7.44
	30X30X5	1.50	2.25		65X65X8	5.00	7.80
1.25X1.25X.25	31.75X31.75X6.35		2.80	2.50X2.50X.375	63.5X63.5X9.52		8.80
	30X30X6	1.88	2.70		65X65X10	5.92	9.75
1.50X1.50X.1875	38.1X38.1X4.76	1.81	2.70	3X3X.25	76.2X76.2X6.35	4.91	7.30

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	40X40X5		3.00		75X75X6		6.75
1.50X1.50X.25	38.1X38.1X6.35		3.50	3X3X12.50	76.2X76.2X9.52		10.7
	40X40X6		3.60		75X75X10		1
		2.35				7.20	11.2
							5
1.75X1.75X.25	44.45X44.45X6.35		4.15	3X3X.50	76.2X76.2X12.7		13.9
	45X45X6		4.05		75X75X12		5
		2.79				9.38	13.5
							0
1.75X1.75X.1875	44.45X44.45X4.76		3.14	3.50X3.50X.375	88.9X88.9X9.52		12.6
	45X45X5		3.37		90X90X10		3
		2.11				8.49	13.5
							0
2X2X.25	50.8X50.8X6.35		4.77	3.50X3.50X.50	88.9X88.9X12.7		16.4
	50X50X6		4.50		90X90X12		8
		3.21				11.0	16.2
						8	0
2X2X.375	50.8X50.8X9.52		6.90				
	50X50X10	4.64	7.50				

UNIT WEIGHT OF FLAT BARS

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Breadth		RESTRICTED Thickness									
inch	mm	³ / ₁₆ in	4.76 mm 5 mm	¹ / ₄ in	6.35 mm 6mm	⁵ / ₁₆ in	7.93 mm 8 mm	³ / ₈ in	9.52 in 10 mm	¹ / ₂ in	12.70 mm 12 mm
	mm (round)	lb/ft lb/ft (round)	kg/m k/m (round)	lb/ft lb/ft (round)	kg/m kg/m (round)	lb/ft lb/ft (round)	kg/m kg/m (round)	lb/ft lb/ft (round)	kg/m kg/m (round)	lb/ft lb/ft (round)	kg/m kg/m (round)
¹ / ₂	12.7 12	0.319	0.475 0.50	0.43	0.633 0.65	0.53	0.79 0.80	0.64	0.95 0.95	0.85	1.27 1.30
⁵ / ₈	15.875 16		0.59 0.60		0.791 0.80		0.99 1.00		1.19 1.20		1.58 1.60
³ / ₄	19.05 19		0.71 0.75		0.95 0.95		1.19 1.20		1.42 1.45		1.90 1.90
1	25.40 25		0.95 1.00		1.27 1.30		1.58 1.60		1.90 1.90		2.53 2.55
1 ¹ / ₄	31.75 32		1.19 1.30		1.58 1.60		1.98 2.00		2.37 2.40		3.17 3.20
1 ¹ / ₂	38.10 38		1.42 1.50		1.90 1.90		2.37 2.40		2.85 2.85		3.80 3.80
1 ³ / ₄	44.45 45		1.66 1.70		2.21 2.20		2.77 2.80		3.32 3.35		4.43 4.45
2	50.80 50		1.90 2.00		2.53 2.55		3.16 3.20		3.80 3.80		5.06 5.10
2 ¹ / ₄	57.15 57		2.14 2.20		2.85 2.85		3.56 3.60		4.27 4.30		5.70 5.70
2 ¹ / ₂	63.50 63		2.37 2.40		3.17 3.20		3.95 4.00		4.75 4.75		6.33 6.35
3	76.20 76		2.85 2.90	RESTRICTED			4.74 4.75		5.70 5.70		7.60 7.60

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FLAT IRON BARS

Size in inches	Size in mm	Area in sq. inch	Area in sq. cm	Weight in lbs per Rft	Weight in kg per metre
0.75x.125	19.05x3.17	0.094	0.603	0.319	0.470
0.75x.1875	19.05x4.76	0.140	0.906	0.476	0.71
1x.0625	25.4x1.59	0.063	0.404	0.210	0.317
1x.125	25.4x3.17	0.125	0.805	0.423	0.632
1x.1875	25.4x4.76	0.188	1.210	0.639	0.949
1x.25	25.4x6.35	0.250	1.610	0.850	1.264
1x.3125	25.4x7.937	0.313	2.01	1.065	1.580
1x.375	25.4x9.53	0.375	2.42	1.276	1.900
1x.4375	25.4x11.11	0.438	2.82	1.489	2.213
1x0.50	25.4x12.70	0.500	3.22	1.700	2.528
1.25x.0625	31.75x1.59	0.078	0.505	0.265	0.396
1.25x.125	31.75x3.17	0.156	1.006	0.530	0.785
1.25x.1875	31.75x4.76	0.234	1.511	0.796	1.186
1.25x0.25	31.75x6.35	0.313	2.016	1.065	1.582
1.25x.3125	31.75x7.94	0.390	2.52	1.327	1.978
1.25x.375	31.75x9.53	0.469	3.025	1.595	2.374
1.25x.4375	31.75x11.11	0.547	3.527	1.861	2.768
1.25x0.50	31.75x12.70	0.625	4.032	2.126	3.165
1.50x0.0625	38.10x1.59	0.094	0.625	0.319	0.474
1.50x0.125	38.10x3.17	0.188	1.207	0.639	0.947

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1.50x.1875	38.10x4.76	0.281	1.183	0.956	1.429
1.50x0.25	38.10x6.35	0.375	2.419	1.276	1.900
1.50x.3125	38.10x7.94	0.469	2.025	1.595	2.374
1.50x.375	38.10x9.53	0.563	3.63	1.915	2.849
1.50x.4375	38.10x11.11	0.656	4.232	2.232	3.322
1.50x0.50	38.10x12.70	0.750	4.838	2.552	3.800
1.75x.0625	44.45x1.59	0.109	0.706	0.370	0.550
1.75x.125	44.45x3.17	0.219	1.409	0.745	1.106
1.75x.1875	44.45x4.76	0.328	2.115	1.116	1.660
1.75x0.25	44.45x6.35	0.438	2.822	1.49	2.215
1.75x.3125	44.45x7.94	0.547	3.529	1.862	2.770
1.75x.375	44.45x9.53	0.656	4.236	2.232	3.325
1.75x.4375	44.45x11.1	0.766	4.938	2.606	3.876
1.75x0.50	44.45x12.70	0.875	5.645	2.977	4.431
2x0.0625	50.80x1.59	0.125	0.807	0.425	0.633

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Size in inches	Size in mm	Area in sq. inch	Area in sq. cm	Weight in lbs per Rft	Weight in kg per metre
2x.125	50.80x3.17	0.250	1.61	0.850	1.263
2x.1875	50.80x4.76	0.375	2.418	1.276	1.90
2x0.25	50.80x6.35	0.50	3.225	1.700	2.53
2x.3125	50.80x7.94	0.625	4.033	2.126	3.166
2x.375	50.80x9.53	0.750	4.841	2.552	3.800
2x.4375	50.80x11.17	0.875	5.674	2.977	4.454
2x0.50	50.80x12.70	1.00	6.451	3.400	5.064

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REQUIREMENT OF STORES FOR VARIOUS

ITEM OF WORKS

1. **Concrete.**

Per cum

Mix	Cement in Kg	Sand in Cum	Aggregate in Cum
1:1.5:3	388.47	0.412	0.825
1:2:4	302.70	0.425	0.850
1:3:6	197.76	0.420	0.840
1:4:8	148.32	0.420	0.840
1:6:12	100.65	0.427	0.885

2. **Lime concrete.**

Per cum

Mix	Lime unslaked in Kg	Surki in Cum	Brick aggregate in Cum
1:2.5:5	172.97	0.450	0.900

3. **Building block (1:3:6) & set in CM (1:6).**

Per cum

Type	Cement in Kg	Sand in Cum	Aggregate in Cum
Solid block	211.89	0.420	0.840
Hollow block	158.92	0.340	0.600

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(3-14 to 3-17)

4. Pudlo 5% in concrete.

Mix	Pudlo in Kg
1:2:4	15.01

(3-58)

1:1.5:3 19.42

(3-59)

5. PB-4 for 1.25 cm wide expn joint.

Per sqm.

Fire wood 9.04 kg,

PB-4 = 17.70 Kg

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6. **Road works.**

Per Sqm

Description	Bricks	Aggregate in Cum	Sand in Cum
Bottoming brick flat 7.50 cm thick	31 Nos	-	0.015
Bottoming brick on edge 12.50 cm thick	52 Nos	-	0.025
Bottoming brick on end 25cm thick	103 Nos	-	0.050
Bottoming boulders 10 cm thick	-	0.100	0.030
Bottoming boulders 15 cm thick	-	0.152	0.046
Water bound macadam carpet 7.50cm thick	38 Nos	0.012 Cum screeding	-
Water bound macadam carpet 10 cm thick	50 Nos	0.012 Cum screeding	-
Water bound macadam carpet 15 cm thick	73 Nos	0.012 Cum screeding	-
Water bound macadam carpet using stone aggregate 7.50 cm thick	-	0.094 Cum stone 50 mm graded screeding 0.012 Cum	-
Water bound macadam carpet using stone aggregate 10 cm thick	-	0.128 Cum stone 50 mm graded screeding 0.012 Cum	-
Water bound macadam carpet using stone aggregate 15 cm thick	-	0.192 Cum stone 50 mm graded screeding 0.012 Cum	-

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Per cum

Providing Compacted
aggregate & sand sub
base course

380 Nos

-

-

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Premix bituminous carpet road

Per sq.m

Description	Bitumen in Kg	Sand in Cum		Bricks in Nos.	Shingle/crushed stone in Cum	Fire wood in Kg
		Syl	Local			
Premix carpet 25 mm thick on bituminous surface	2.05+0.49=2.540	-	-	-	0.023	08
Premix carpet 38mm thick on bituminous surface	3.075+0.488=3.563	-	-	-	0.045	12
Premix carpet 50 mm thick on bituminous surface	4.10+0.488=4.588	-	-	-	0.061	16
Premix carpet 25 mm thick on non-bituminous surface	2.05+0.976=3.026	-	-	-	0.030	08
Premix carpet 38 mm thick on non-bituminous surface	3.075+0.976=4.051	-	-	-	0.045	12
Premix carpet 50mm thick on non-bituminous surface	4.10+0.976=5.076	-	-	-	0.061	16
Semi-grouting with brick aggregate 75 mm thick	4.20+1.00=5.200	-	-	39 Nos	-	08
Semi-grouting with stone aggregate—do—	4.20+1.00=5.200	-	-	-	0.096	08
Scal coat on freshly laid premix capreting using Sylhet and local sand	0.60	0.01	0.01	-	-	0.51
Premix bituminous seal	1.20	-	0.01	-	0.015	0.51

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coat without tack coat

Pot holes repair n. exc. 1.00 Sqm	3.026	-	-	-	0.030	0.08
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Tack coat for seal coat if laid on old bituminous surface (2-25)	0.488	-	-	-	-	-
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Tack coat for seal coat if laid on non-bituminous surface (2-26)	0.732	-	-	-	-	-
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Ser	Mix	Cement	Brick agg. in Cum	Crushed stone	Gravel in Cum	Local sand in Cum	Sylhet sand in Cum
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Concrete road landing ground etc.

2-30	1:3:6	29.66	-	0.126	-	0.032	0.032
	1:2:4	45.03	-	0.13	-	0.0324	0.0324
2-31	1:3:6	29.66	-	-	0.126	0.032	0.032
	1:2:4	45.03	-	-	0.13	0.0324	0.0324
2-32	1:3:6	29.66	0.126	-	-	0.032	0.032
	1:2:4	45.03	0.13	-	-	0.0324	0.0324
2-33	1:3:6	39.55	-	0.168	-	0.0420	0.0420
	1:2:4	60.04	-	0.170	-	0.043	0.043
2-34	1:3:6	39.55	-	-	0.168	0.0420	0.0420
	1:2:4	60.04	-	-	0.170	0.043	0.043
2-35	1:3:6	39.55	0.168	-	-	0.0420	0.0420
	1:2:4	60.04	0.170	-	-	0.043	0.043

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		Bitumen	Sa nd	fire wood
2-38	Expn joint	2.18 Kg	0.02 cum	09 kg
2-39	Bitumen painting on seal coat	0.70 Kg	0.012 cum	-

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Per Cubic metre

Description	Mix	Bricks in Nos	Cement in Kg	Sand in Cum
For brick works built straight or to curve with 6m radius & above	1:3	406	130.48	0.277
	1:4	406	97.11	0.275
	1:6	406	65.33	0.277
For brick works built with less than 6metre radius	1:3	406	146.55	0.311
	1:4	406	109.12	0.309
	1:6	406	72.92	0.309
Cut and rubbed bricks in arches etc.	1:3	406	130.48	0.277
	1:4	406	97.65	0.275
	1:4	320	35.32	0.09
Honey-comb brick work	1:6	320	26.49	0.093
Ceramic brick facing work: per square metre for 100 mm wide (Pavement)	1:4	46	9.85	0.014

Description	Mix	Bricks in Nos	Cement in Kg	Sand in Cum
	1:3	46	13.24	0.028
Ceramic brick facing work: per square metre for 50 mm wide	1:3	92	6.62	0.014
	1:4	92	4.90	0.013

8. Pointing to brick struck flush

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or recessed

Per sq.m	1:3	-	0.90	0.002
	1:4	-	0.70	0.002

9. Brick work with ceramic brick

Per	1:3	406	130.48	0.277
	1:4	406	97.11	0.275

10. DPC 1:3 19mm

thick	1:3	-	9.68	-
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11. **38 mm PCC with one coat bitumen on roof per SqM**

Ser	Mix	Cement in Kg	Bitumen in Kg	Sand in Cum	Brick aggregate Cum
4-47 to 4-50	1:1.5:3	14.80	0.24	0.02	0.03

12. **Floors & wall tiling**

Per Square metre

Description	Brick in Nos	Sand in CuM	Cement in Kg
Brick flat soling jointed with sand	31	0.015	-
-Ditto-laid & jointed in cm (1:4)	31	0.015	2.42
-Ditto-in (1:6)	31	0.015	2.15
Brick soling laid on edge and jointed with sand	52	0.021	-
-Ditto-laid & jointed in CM (1:4)	52	0.021	3.23
-Ditto-in (1:6)	52	0.021	2.96
Neat cement finishing in floors	-	-	2.69

Description	Bitumen in Kg	Sand in Cum	Shingle in Cum	Fire wood in Kg
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19mm thick bitumen premix carpet under floor	2.11+0.73=2.84	0.012	0.012	8.00
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Description	Mix	Cement in Kg	Bricks agg. in Cum	Sand in Cum
150 mm thick per Sqm	1:6:12	15.34	0.130	0.065
	1:4:8	22.60	0.128	0.064
	1:3:6	30.14	0.128	0.059
	1:2:4	45.75	0.129	0.060
100mm thick	1:6:12	10.22	0.087	0.043
	1:4:8	15.07	0.085	0.043
	1:3:6	20.07	0.085	0.043
	1:2:4	30.51	0.085	0.043
75mm thick	1:6:12	7.67	0.065	0.033
	1:4:8	11.30	0.064	0.032
	1:3:6	15.07	0.064	0.032
	1:2:4	22.87	0.065	0.032
50mm thick	1:2:4	15.83	0.022	0.044
38mm thick	1:3:6	7.53	0.032	0.016
	1:2:4	11.44	0.032	0.016
29 mm thick	1:3:6	5.65	0.024	0.012
	1:2:4	8.56	0.024	0.012
25mm thick	1:3:6	5.00	0.021	0.011
	1:2:4	7.62	0.021	0.011

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Stonolithic finish to floors

Description	Shingle/Gravels	Cement in Kg	Sand in Cum
Stonolithic layer 12 mm thick (1:1.5)	0.011	10.33	-
Stonolithic layer 12mm thick for stair rise & tread.	0.011	10.33	-
Stonolithic 12mm thick in dados skirting etc.(1:1.5)	0.011	10.33	0.0085
		+4.04	
		14.37	

Descript ion	Grey cement in Kg	White cement in Kg	Coloured black chips in Kg	White chips in Kg	Oxalic acid in Kg
Silver grey mosaic 6mm thick for (sch. item 11-15)	4.05	4.05	1.16	6.94	0.024
-do- in dados/skirting (sch. item 11- 15)	4.04	4.05	1.16	6.94	0.024
	4.05				
	8.09				
-do- but using grey cement only in floor (sch itme 11-16)	8.10	-	1.16	6.94	0.024
-do- for dados/skirting (sch item 11- 16)	8.10	-	1.16	6.94	0.024
	4.04				
	12.14				
-do-but using white cement in floor (Sch item 11-17)	-	8.10	1.16	6.94	0.024
-do-for dados/skirting (Sch item 11- 17)	4.04	8.10	1.16	6.94	0.024
Silver grey mosaic in floor (Sch item 11-18)	4.05	4.05	2.025	6.075	0.024

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-do-in dados.skirting (Sch item 11-18)	4.05	4.05	2.025	6.075	0.024
	4.04				
	8.09				
-do- but using grey cement only in floor (Sch item 11-19)	8.10	-	2.025	6.075	0.024
-do- in dados/skirting (Sch item 11-19)	8.10	-	2.025	6.075	0.024
	4.04				
	12.14				
Silver grey situ mosaic using white cement only in floor (Sch item 11-20)	-	8.10	2.205	6.075	0.024
-do- but in dados/skirting (Sch item 11-20)	4.04	8.10	2.025	6.075	0.024

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Description	Grey cement in Kg	White cement in Kg	Coloured black chips in Kg	White chips in Kg	Oxalic acid in Kg
Silver grey mosaic 9mm thick for (Sch item 11-21)	5.50	5.50	1.58	9.42	0.024
-do-in dados & skirting (Sch item 11-21)	4.04	5.50	1.58	9.42	0.024
	5.50				
	9.54				
-do-but using grey cement only in floor (Sch item 11-22)	11.00	-	1.58	9.42	0.024
-do-in dados/skirting (Sch item 11-22)	11.00	-	1.58	9.42	0.024
	4.04				
	15.04				
-do- but using white cement only in floor (Sch item 11-23)	-	11.00	1.58	9.42	0.024
-do-in dados/skirting (Sch item 11-23)	4.04	11.00	1.58	9.42	0.024
Silver gray mosaic 9mm thick for (Sch item 11-24)	5.50	5.50	2.75	8.25	0.024
-do- in dados & skirting (Sch item 11-24)	4.04	5.50	2.75	8.25	0.024
	5.50				
	9.54				
Silver grey situ mosaic using grey cement only in floor (Sch item 11-25)	11.00	-	2.75	8.25	0.024
-do-in dados/skirting (Sch item 11-25)	11.00	-	2.75	8.25	0.024
	4.04				
	15.04				

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-do-but using white cement only in floor (Sch item 11-26)	-	11.00	2.75	8.25	0.024
-do-in dados/skirting (Sch item 11-26)	4.04	11.00	2.75	8.25	0.024
Base of all kinds of 19mm thick mosaic tiles	9.23	-	-	-	-
Brick Bonded concrete floor (1:2:4) Sch Item 11-50	8.83	Bricks 21 Nos	Sand 0.012 Cum	Khoa 0.024 CUm	-

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Description	Grey cement in Kg	White cement in Kg	Sand Cum
Requirement of stores for Floor tiles/Sqm 19mm thick CM (1:4)	9.36	.022	.025
Requirement of stores for Wall tiles / Sqm 6 mm thick CM (1:2)	9.37	.022	.012

13. **Pointing flush to brick floors**

Per Sqm

Description	Mix	Cement in Kg	Sand in Cum
laid edge normal bricks	1:3	0.91	0.0019
Flat soling –do-	1:3	0.64	0.001

Pointing flush incl laying & jointing in CM

Description	Mix	Cement in Kg	Sand in Cum	Bricks
Ceramic solid brick laid flat	1:4	7.53	0.021	46 Nos
-do- but on edge	1:4	11.30	0.032	92 Nos

14. **Plastering**

Per SqM

Description	Mix	If with pudlo 2.5% (in Kg)	Cement in Kg	Sand in Cum
12mm thick	1:3	0.021	8.075	0.017
12mm thick	1:4	0.161	6.46	0.018
12mm thick	1:6	-	4.57	0.019
19mm thick	1:3	0.289	11.57	0.024
19mm thick	1:4	0.228	9.14	0.025
19mm thick	1:6	-	6.45	0.027

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Description	Mix	Cement incl slurry in Kg	Sand in Cum
6mm thick plaster on RCC faces	1:4	3.23+0.43=3.66	0.009
6mm thick plaster on top of wall	1:4	3.23	0.009
Neat cement finish to walls where applicable	-	1.35	

15. **Filleting**
Per Metre

Exc 3.75cm n.exc 7.50 cm	1:3	0.771	0.001
-do- but exc 7.50cm & n. exc 15cm	1:3	1.55	0.003

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COMPARISON OF CONDUCTOR SIZE OF DIFFERENT
SPECIFICATION

Imperial standard size B.S.S (Old)			Metric standard size		Symbol & Meaning
Construction (Inch)	Normal		B.S.S (New)	Symbo	Meaning
	Inch ²	mm ²	VDE mm ²	I	
1/.044	0.0015	0.97	1.0*	*	Single solid wire
3/.029	0.002	1.29	1.5*		
3/.036	0.003	1.94	1.5*		
7/.029	0.0045	2.90	2.5*		
7/.036	0.007	4.52	4+	+	Single solid wire or 7 wire.
7/.052	0.015	9.34	10+		round standard
7/.064	0.0225	14.42	16+		
19/.044	0.03	19.35	16x	x	7-wire or 19-wire round standard
19/.052	0.04	25.81	25x		
19/.064	0.06	38.71	35**	**	19-wire round of 20-wire sector shaped standard
19/.072	0.075	48.39	50**		
19/.083	0.1	64.52	70**		
37/.072	0.15	96.77	95**		37 wire round
37/.083	0.2	129.00	120		or
37/.093	0.25	161.30	150		39 wire sector
37/.103	0.3	193.50	185		Shaped standard
61/.093	0.4	258.10	240 0	0	61 wire round
61/.103	0.5	322.60	300 0	0	or 39 wire sector shaped standard
91/.093	0.6	387.10	400 0	00	91 wire round
91/.103	0.75	483.90	500		standard

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127/.103	1.0	654.20	630	127 wire round standard
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PLINTH AREA RATES OF BUILDING

EFFECTIVE FROM 1ST April 2016

General

1. On the publication of this New Schedule of Rates, effective from 1st April 2016 rough estimates for work, schemes, projects etc should from now onwards may be prepared on the basis of the following plinth area rates.

a. Normal building built in bricks with five storied foundation having brick flat soling, cement concrete (1:4:8) and brick work (1:4/1:6) including PCC and DPC in foundation and plinth, 250 mm thick brick work in superstructure, door and windows made of best local timber/steel with standard window grills, RCC works (1:2:4) in roof slab, beams, lintels, stair cases, minimum 12mm thick cement plaster (1:6) to both sides of superstructure walls, minimum 12mm thick cement plaster (1:4) in plinth steps and dado, 6mm thick cement plaster 1:4 to ceiling, beams etc. (if directed) white washing, colour washing and necessary earth work in foundation, earth and sand filling in plinth and other petty items as required.

b. Foundation Upto Plinth Level.

(1)	1(One) storied building	Tk. 6,615.00 per sq.m
(2)	2(Two) storied building	Tk. 7,140.00 per sq.m
(3)	3(Three) storied building	Tk. 7,802.00 per sq.m
(4)	4(Four) storied building	Tk. 8,500.00 per sq.m
(5)	5(Five) storied building	Tk. 9,400.00 per sq.m

c. Superstructure Only Without Foundation.

(1)	Ground floor	Tk. 11,650.00 per sq.m
(2)	First floor	Tk. 12,180.00 per sq.m
(3)	Second floor	Tk. 12,960.00 per sq.m
(4)	Third floor	Tk. 13,700.00 per sq.m
(5)	Fourth floor	Tk. 14,700.00 per sq.m

d. Roofing Compound and Parapet.

Water barrier coating on top of roof. Tk. 1,780.00 per sq.m

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For top floor

2. RCC (Framed structure) building built in RCC/ Bricks with six storied foundation having brick flat soling / PCC (1:4:8) and RCC (1:2:4) with brick work 1:4 / 1:6 including PCC and DPC in foundation and plinth, 250mm / 125mm thick brick work in superstructure, door and windows made of best local timber / steel with standard window grills. RCC works (1:2:4) in column, roof slab, beams. Lintels, stair case, 12 mm thick cement plaster (1:6) to both side of superstructure walls, 12mm thick cement plaster (1:4) in plinth, steps and dado, 6mm thick cement plaster (1:4) to ceiling beams etc. White washing, colour washing and necessary earth work in foundation, earth and sand filling in plinth and other petty items as required.

a. Foundation Upto Plinth Level.

(1)	1 (One) storied building	Tk. 7,980.00 per sq.m
(2)	2 (Two) storied building	Tk. 8,400.00 per sq.m
(3)	3 (Three) storied building	Tk. 8,925.00 per sq.m
(4)	4 (Four) storied building	Tk. 9,765.00 per sq.m
(5)	5 (Five) storied building	Tk. 10,580.00 per sq.m
(6)	6 (Six) storied building	Tk. 10,760.00 per sq.m

b. Superstructure Only Without Foundation.

(1)	Ground floor	Tk. 12,600.00 per sq.m
(2)	First floor	Tk. 12,700.00 per sq.m
(3)	Second floor	Tk. 13,000.00 per sq.m
(4)	Third floor	Tk. 13,230.00 per sq.m
(5)	Fourth floor	Tk. 13,540.00 per sq.m
(6)	Fifth floor	Tk. 14,900.00 per sq.m

3. Normal buildings built in bricks with general specifications as noted in item No. I together with special specification:

a. For mosaic/tiles work in all rooms Add @ Tk. 1880.00 (One thousand eight hundred eighty) only per square metre for each floor of item No. I(b).

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b. For mosaic/Tiles work in all rooms, door and windows made of Teak wood Chowkats, distemper, snowcem and plastic painting Add @ Tk. 4025.00 (Four thousand twenty five) only per sq.m for each floor of item No. 1 (b)

c. For mosaic/Tiles work in all rooms, aluminum door and windows, distemper, snowcem and plastic painting. Add @ Tk. 4095.00 (Four thousand ninety five) only per square metre for each floor of item No. 1(b)

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4. Semi-permanent building with CI sheet roofing on best local timber truss, brick flat soling, cement concrete (1:4:8) and brick works (1:4/1:6) (including 19 mm thick DPC) foundation and plinth 125 mm thick brick work in superstructure with 250 mm x 250 mm intermediate pillar at 2.4 m to 3 m C/C, doors and windows made of best local timber with standard window grills, RCC work (1:2:4) in lintels, patent stone flooring (1:2:4), minimum 12mm thick cement plaster (1:6) to both sides of superstructure walls and 12mm thick cement plaster (1:4) in plinth, steps and dado, white washing, colour washing and necessary earth work in foundation, earth and sand filling in plinth and other petty items as required:

@ Tk. 9,800.00 (Nine thousand eight hundred) only per sq.m.

5. For internal electric and water supply including sanitary fitting-fixtures, add 15% (fifteen) percent on the gross calculated amount of the normal building mentioned above.

6. Plinth area rate for Permanent R.C.C framed structure high rise building (15 storied) incl internal svcs .

a.	Residential Building (Rate per sq.m).	Rate
1.	Foundation up to plinth incl pile fdn.	Tk 40,800.00
2.	Ground floor (Open) incl floor.	Tk 21,850.00
3.	1 st floor	Tk 21,470.00
4.	2 nd floor	Tk 21,630.00
5.	3 rd floor	Tk 21,790.00
6.	4 th floor	Tk 21,950.00
7.	5 th floor	Tk 22,110.00
8.	6 th floor	Tk 22,330.00
9.	7 th floor	Tk 22,550.00
10.	8 th floor	Tk 22,755.00
11.	9 th floor	Tk 22,995.00
12.	10 th floor	Tk 22,275.00
13.	11 th floor	Tk 23,550.00

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14.	12 th floor	Tk	23,830.00
15.	13 th floor	Tk	24,105.00
16.	14 th floor (Top floor)	Tk	30,360.00

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Annex'A'

BDS EN• .197-1 : 2003 CEM-1

Brand of Cement :

Cemex Cement Bangladesh Ltd (Cemex brand), Confidence Cement Ltd (Lion brand), Seven Circle (Bangladesh) Ltd (Seven ring cement), MI Cement Factory Ltd (Crown cement), Royal Cement Ltd (Engineer brand), Unique Cement Industries Ltd (Fresh cement) Shah Cement Industries Ltd (Shah Cement).7 Mechanical, physical, chemical, durability requirements Mechanical requirements and Purbachal Steel Mills Ltd.

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Brand of Deformed bars :

BSRM, Basundhara steel mills, Rahim steel mills, Ratanpur Steel industries Ltd., Baizid steel mills industries Ltd., Kabir steel re-rolling mills Ltd., Abul Khair steel mills Ltd., Shafiul Alam steel mills Ltd. & GPH Ispat Ltd.