

**UNITED NATIONS DEVELOPMENT
PROGRAMME (UNDP)
Pulchowk, Lalitpur, Nepal**

**Renovation of UN Main Building Roof
in UN House
Pulchowk, Lalitpur, Nepal**

Technical Specifications

SPECIFICATION OF MATERIALS AND WORKMANSHIP FOR CIVIL WORKS

1. The work shall be carried out according to the specifications whether specifically mentioned in it or not. No payment for any work in any form shall be made unless it is definitely stated as an item in the bill of quantities. Whenever the specifications are not given or appear, the relevant Indian Standard/ Nepal Standard and further amendments or decision of the Consultant shall be considered as final and binding.
2. The work shall be carried out simultaneously with the other services and in cooperation with the Contractors for the above services. The work shall be carried on till it is completed satisfactorily. The Contractor shall keep the other Contractors informed well in advance of the proposed program of the work so that the proposed work is not hindered. The Contractor shall further cooperate with other Contractors in respect of any facilities required by them e.g., making holes in shuttering for pipes, electric conduits, etc. however, nothing extra shall be admissible to him for such reasonable assistance and facilities afforded to other Contractors and the Contractor shall be deemed to have taken these factors into consideration while quoting his rates.
3. The work shall be related to the drawings, which the Contractor is presumed to have studied. Nothing extra will be paid for any item on its shape, location or other difficult circumstances, even if the schedule makes no distinction as long as the item is shown in the drawings.
4. The specified dimensions shall be those dimensions shown on the drawing. No dimensions shall be scaled from the drawing. If any discrepancies detected in the supplied or approved drawings, it should be timely brought to the notice of the Consultant who shall then rectify or change.
5. The Contractor shall assist the Consultant at any time when checking bench marks or other points established by the Contractor. Any control by the Consultant shall not relieve the Contractor of his responsibility for the accuracy of structures or parts of them regarding to their position or dimensions, elevations etc.
6. The sources of materials stated in the specifications are those from which materials are generally available. However, materials not conforming to specifications shall be rejected even if they come from the stated sources. The Contractor should satisfy himself that sufficient quantity of material of acceptable specification is available from the stated or other sources.
7. **The requirements of specifications under A: General and B: Materials shall be fulfilled by the Contactor without extra charge including transportation or any other taxes involved i.e. the item rates quoted in the bill of quantities are deemed to have taken these into account.**

A. GENERAL

1. BOARD

A board of size approximately 2.15m x 2.0m shall be made and put at an approved place of the site. This board shall be painted in approved colour with name of (1) The proposed construction and Employer (2) The Consultant (3) The Contractor. This shall be provided by the Contractor at his own expenses.

2. DRAWING, INSTRUCTIONS AND MEASUREMENT

All the Works shall be done according to the drawings and instructions of the Consultant and the Contractor shall arrange to test materials and/or soundness and sufficiency. If after any such test and in the opinion of the Consultant any work or portion of work is found to be defective or unsound the Contractor shall pull down and re-execute the same at his own cost.

Defective materials shall be removed from the site within 24 hours of the written instruction by the Consultant.

3. CLEARING THE SITE

The Site described and shown on the plans shall be cleared of all obstructions, loose stones and materials, rubbish of all kinds as well as brushwood. All holes or hollows whether originally existing or produced shall be well rammed and levelled off as directed. Also the Contractor shall dress the site prior to the construction works and landscape the premises after completion. No extra shall be paid for this unless specified otherwise.

4. MEASURING MATERIALS

Materials requiring measurement shall be measured separately in boxes of appropriate sizes or weighed as instructed by the Consultant before being mixed. They should be calibrated and marked with red if necessary in presence of the Consultant.

5. QUALITY OF WORK

Materials, tools and plants, and the workmanship shall be of the best of several kinds obtainable in the market and as approved by the Consultant.

6. LEAVE CLEAN

On completion, all works must be cleaned up, rubbish removed and the works and the site cleaned off surplus materials, debris and other accumulations and everything should be left in clean and orderly condition by the Contractor.

7. SAMPLES

Sample of materials required shall be submitted by the Contractor for the approval of the Consultant and after such approval these samples shall be deposited at a safe place instructed by the Consultant. The Contractor shall acquire the materials as per these approved samples.

8. WATER SUPPLY & POWER SUPPLY

The Contractor shall make his own arrangement for the supply of water, including portable water, for the purpose of the Contract. The quality of the water shall be to the approval of the Consultant and suitable for the purpose for which it is intended.

Waste water shall be disposed to the satisfaction of the Consultant so as to cause no damage or nuisance to the environment and the surrounding areas.

The Contractor shall make his own arrangements for the supply of electric power for the purposes of the Contract.

9. MEDICAL ARRANGEMENTS

The Contractor shall make arrangements for treatment on the site of casualties and sick persons in first-aid units or in such other wards as may be necessary in accordance with the appropriate regulations.

Notwithstanding the minimum requirements prescribed above, the Contractor shall be responsible for the adequacy of all the arrangements made as per the provisions of the Contract.

10. LATRINES

The Contractor shall provide, maintain and clean suitable and sufficient latrines throughout the period of construction of the works for the use by his employees. He shall ensure that his employees do not foul the site but make proper use of the latrines.

11. NOTICE OF OPERATIONS

The Contractor shall give full and complete written notice of all important operations including setting out to the Consultant sufficiently in advance to enable the Consultant to make such arrangements as the Consultant may consider necessary for inspection and for any other purpose. The Contractor shall not start any important operation without the written approval of the Consultant.

12. ASSISTANCE TO THE CONSULTANT

The Contractor shall supply such assistance and plant as may be required in performing operations in connection with the execution, examination, inspection and measurement of the works including the installation and surveying of bench marks and survey stations and marks wherever and whenever the Consultant shall deem necessary.

12.1 Meetings and Reports

Approved representative of the Contractor shall attend formal meetings at the office of the Consultant on site or in the Employer's office or in the Project Area, when called upon, for the purposes of Contract Administration.

The Contractor shall submit in duplicate to the Consultant each month a report in a manner approved by the Consultant on his progress in the performance of the Contract. Such reports shall include information regarding delivery, manufacture, and installation etc.

12.2 Photographs

The Contractor shall supply negative and uncounted positive prints of photographs, postcard size, of such proportions of the works, in progress and completed, as may be directed by the Consultant and specified herein. The photographs shall be of two categories:

- a) Progress photographs
- b) Record photographs

The photograph shall be indexed with date and short description of the object of the photograph. The photographs as ordered by the Consultant shall be supplied in one negative and two prints, having signatures of the Contractor and the Consultant or Consultant's Representative on the back of the photograph for the purpose of attestation.

12.3 Scaffolding, etc. for Inspection

The Contractor shall provide safe access when requested by means of scaffolding, slings, etc. for the Consultant to inspect at close quarters those portions of the works not safely accessible by other means.

12.4 Site Office, Stationary, Furniture, Equipment, etc.

The Contractor shall provide (construct or hire at the nearest area of the site) and maintain at its own cost site offices. The office shall be equipped with computer, printer, electricity, water, drinking water, latrines, electrical fans/heaters, etc. The office shall be at the core satisfaction of the Consultant. The Contractor shall depute an attendant.

Subject to the availability, a set of telephone together with line may be arranged by the Project at site, at its own cost and deliver to the Contractor for the use at site. The cost of operation, maintenance and services of the said telephone line shall be borne by the Contractor.

12.5 Survey Assistance and Equipment

The Contractor shall make available to the Consultant suitably educated and trained survey assistants and labourers when required.

The Contractor shall supply and maintain survey equipment as level, theodolite etc. whenever required by the Consultant for the sole purpose of the Contract.

12.6 Safety Equipment

The Contractor shall provide the Consultant with necessary safety equipment which shall be the property of the Contractor after completion of the Contract.

No separate payment will be made for any of the above listed items. All associated costs are deemed to be included in the unit rates of the bill of quantities.

B. MATERIALS

The materials supplied and used in the works shall comply with the requirements of these Specifications. They shall be new, except as may be provided elsewhere in the Contract or permitted by the Consultant in writing. The materials shall be manufactured, handled and used in a workmanlike manner to ensure completed work in accordance with the Contract. Where an Indian/ Nepal Standard are specified, the latest version of the standard quoted shall be considered to apply.

1. SOURCES

The materials shall be from an approved source in order to maintain quality, consistency and quantity required for the Project. Should a source be exhausted of the supply or deterioration in quality is observed, it shall be the responsibility of the Contractor to obtain the specified quality from another source. Any extra costs or claims incurred by the Contractor in this connection will not be considered.

When any proprietary or manufactured product, either new or used, is furnished by the Employer, the location at which such material will be delivered to the Contractor will be designated. In such cases, the Contractor shall haul the materials from the designated delivery point to the point of use, and compensation for such hauling shall be negotiated prior to compliance, and shall include the price for placing the materials in the finished work.

2. INSPECTION AND ACCEPTANCE OF MATERIALS

Final inspection and acceptance of materials will be made only at the site of work. The Consultant reserves the right to sample, inspect and test materials throughout the duration of the work, and to reject any materials which are found to be unsatisfactory at the time of use.

A preliminary inspection of materials may be made at the source for the convenience of the Contractor, but the presence of Consultant at the source shall not relieve the Contractor of the responsibility of furnishing materials which comply with these Specifications.

The Consultant shall have free access at all times to plants, quarries, and places of manufacture etc. for the materials required for the works.

3. PROCUREMENT PROGRAMME AND SAMPLES AND TESTS

The Contractor shall submit samples of all materials for the approval of the Consultant prior to commencement of work.

The Contractor shall give immediate notification of the placing of orders for shipment of materials to permit testing; he shall furnish without charge all samples required; and he shall afford such facilities as the Consultant requires for collecting and forwarding such samples.

The Contractor shall not make use of or incorporate into the work the materials represented by the samples until the tests have been made and the materials are found to comply with the requirements of the Specifications, except that any materials which have a satisfactory record of compliance with the Specifications may, at the discretion of the Consultant be used until the tests are completed. If the material fails the tests, no further use thereof shall be made until the Contractor has taken steps satisfactory to the Consultant to correct the deficiencies.

When required by the Consultant, preliminary samples of the character and quantity prescribed shall be submitted by the Contractor for examination and shall be tested. Samples approved shall not be construed as acceptance of materials. Acceptance or rejection shall be based on the results of the tests and inspections prescribed in these Specifications of the batches received at the site.

Within two weeks from the date of signing this Contract the Contractor shall also furnish a detailed "Procurement of Materials Programme" for the approval of the Consultant. This Procurement Programme above mentioned shall cover the programming of all sample collection, time for approvals by the Consultant, and time for procurement, order, transport and arrivals at the Project Site to be completed within the first six months of the Project as assessed from the date of signing this Contract for all building and finishing materials. Failure on the part of the Contractor to comply with this clause shall be treated as a breach of contract. Assessment of the Programme of work at the end of the said Project shall be evaluated by the Consultant, and should the Project not be completed in the specified time, in the light of the above, the Consultant's decision shall be final and binding on the Contractor.

All samples shall arrive in sufficient time for testing and approvals keeping in mind the time required for the final procurement and arrival of the approved materials at the Project Site and this time factor shall conform to the Programme of Works and Procurement of materials programme.

4. DEFECTIVE MATERIALS

All materials, which do not conform to the requirements of the Contract, will be rejected whether in place or not. They shall be removed immediately from the site unless otherwise permitted by the Consultant. No rejected material, the defects of which have been subsequently corrected, shall be used in the work unless approval in writing has been given by the Consultant. Upon failure of the Contractor to comply promptly with any instruction of the Consultant given under this Clause, the Consultant shall have authority to cause removal and replacement of the rejected materials and to deduct the cost thereof from any monies due to the Contractor.

5. TRADE NAMES AND ALTERNATIVES

For convenience in designation in the Contract, certain articles or materials to be incorporated in the work may be designated under a trade name or the name of a manufacturer and the catalogue information. The use of an alternative article or material, which is of equal quality and of the required characteristics for the purpose intended, will be permitted, subject to the following requirements:

- a) The burden of proof as to the quality and suitability of alternatives shall be upon the Contractor and he shall furnish all information necessary as required by the Consultant. The Consultant shall be the sole judge as to the quality and suitability of alternative articles or materials and his decision shall be final and binding.
- b) Whenever the Specifications permit the substitution of a similar or equivalent material or article, no tests or action relating to the approval of such substitute material will be made until the request for substitution is made in writing by the Contractor accompanied by complete data as to the equality of the material or article proposed. Such request shall be made in ample time to permit approval without delaying the work.

6. IMPORTED MATERIALS

Materials which are manufactured, produced or fabricated outside Nepal shall be delivered in time. The Contractor shall not be entitled to an extension of time for acts or events

occurring outside Nepal and it shall be the Contractor's responsibility to deliver materials obtained to the point of entry into Nepal to permit timely delivery to the job site. The Contractor shall supply the facilities and arrange for any testing required at his own cost. All testing by the Contractor shall be subject to witnessing by the Consultant.

The manufacturer, producer or fabricator of imported material shall furnish to the Consultant a "Certificate of Compliance" with the Specifications where required. In addition certified mill test reports, clearly identifiable to the lot of material delivered, shall be furnished where required by the Consultant. Where structural materials requiring mill test reports are obtained from foreign manufacturers, such materials shall be furnished only from those foreign manufacturers who have previously established, to the satisfaction of the Consultant, the sufficiency of their in-plant quality control, as deemed necessary by the Consultant, to give satisfactory assurance of their ability to furnish material uniformly and consistently in conformance with these specifications. At the option of the Consultant, such sufficiency shall be established whether by submission of detailed written proof thereof or through in-plant inspection by the Consultant.

C. CONTRACT DOCUMENTS

The Contractor is bound to execute and realize the Project works covered under these Contract Documents. These Contract Documents cover the said work along with that which is normally understood therein and shall comprise of:

- a) These Tender Documents with any addenda and in any combination whatsoever.
- b) All Tender and Working Drawings issued as prepared by the Consultant.
- c) All site instructions made in the site order book or log book issued by the Consultant or Consultant's Representative.
- d) All instructions given to the Contractor by the Consultant, amplifying sketches, directions along with requests for additional data, shop drawings, measurement details etc. from the Contractor.
- e) All shop drawings and samples approved by the Consultant.
- f) All manufacturers' specifications, data, brochures, information etc., approved by the Consultant.
- g) All aspects of work checked and approved by the Consultant either on, or off, the Project site.
- h) All samples and guidelines that the Consultant shall instruct the Contractor to follow.

1. WOODEN STRUCTURES

Providing and fixing wooden rafters, purlins and planks made of first class kiln seasoned and preservative treated sal wood, to shape and size as shown in the drawings.

1.1 TIMBER

a) Quality

Timber shall generally conform to IS. 287-1960. Timber to be used for the work shall be from the heart entirely removed. It shall be uniform in substance, straight in fibre, free from large, loose, dead or cluster knots, flaws, shakes, wasp, cup spring, twist, bends and defects of any kind. It should be free from spongy, brittle, flaky or brushy condition, sapwood and borer holes.

All timber shall be seasoned and be free from decay, harmful fungi and insect attacks and from any other damage of harmful nature which will affect the strength, durability, appearance or its usefulness for the purpose for which it is required.

b) Kind

The timber shall be of best quality timber as specified in the item. The samples of the approved timber to be used shall be deposited in the office of the Consultant for the purpose of comparison.

c) Colour

The colour shall be uniform as far as possible, the darkness of colour amongst colour species of timber being generally a sign of strength and durability.

d) Moisture content

The moisture content for timber shall not exceed 12 percent of dry weight of timber.

e) Sawing

All scantlings shall be swan in straight lines, planes and of uniform thickness with full measurement from end to end and shall be swan in the direction of the grain. They shall be sawn with such sufficient margin as to secure specified dimensions, lines and planes after being wrought and dressed .

1.2 CONSTRUCTION

The rafters purlins and planks should be prepared to the required size as per the drawings. The timber shall be properly plained wrought and dressed in a workmanlike manner. Joints shall be true to fit properly and as directed by the Consultant. Any defective timber member observed after installation shall be rejected. Sample of workmanship shall be submitted for approval.

These wooden members shall be properly fixed in perfect line and level, as per the drawings.

1.3 PAINTING

Two coats of bitumen emulsion paint shall be applied on the unexposed surfaces and two coats of enamel paint of the approved colour shall be applied over two coats of wood primer on the exposed surfaces.

1.4 MEASUREMENT

The measurement of the wood structure shall be taken in its net end section and worked out correct up to two of decimals in cubic metre. Total tolerance of 3 mm. is admissible in section of dressed timber. The rate shall include cost of application of two coats of bitumen emulsion/ enamel paint over two coats of wood primer.

2. ROOFING CLAY TILES

Providing and laying roofing clay tiles of approved make, size and colour, laid in perfect line and level on wooden battens.

2.1 CLAY TILES

Roofing tiles are to be clay tile from Harisiddhi Brick Factory or equivalent locally made tile. The clay tiles shall have a single lap inter-locking at head and side and with ridge tiles etc. to match. They are to be uniform in size, shape and colour and free from twist and other defects, in every respect equal to samples to be deposited with and approved by the Consultant.

These roofing tiles shall be laid in perfect line and level. The damaged tiles shall be replaced with new tiles.

2.2 MEASUREMENT

The measurement of works will be made in sq.m. of the plan area of works. The rate shall include the cost for all material, labour, and equipment to complete the works as specified

3. BRICKWORK

3.1 ONE OR MORE THAN ONE BRICK THICK (CHIMNEY MADE)

Providing and laying brick masonry work with first class chimney burnt bricks in superstructure in specified cement sand mortar including scaffolding wherever necessary.

3.1.1 Bricks

The bricks shall be chimney burnt hand cast bricks of first class quality. These shall be of quality approved by the Consultant, free from grit and other impurities such as lime, iron and other deleterious salts. These shall be well-burnt, sound, hard with sharp edges and shall emit ringing sound when struck with a mallet. These shall be of uniform size. The bricks shall conform to IS 3495 and be tested in accordance with IS 1077.

Sampling:

Brick samples shall be randomly selected for testing in quantities not less than 5 bricks per one thousand for each lot supplied for the construction works.

Acceptance Criteria:

1. **Compressive Strength:** The average compressive strength of the brick shall be minimum of 35 kg/sq.cm. The compressive strength of any individual brick shall not fall below the above mentioned minimum average compressive strength by more than 20%.
2. **Water absorption:** The average water absorption of the brick samples shall not be more than 15% over the dry weight after immersion in cold water for 24 hours.
3. **Efflorescence:** The rating of efflorescence shall not be more than "Slight".

3.1.2 Mortar

Cement mortar shall be mixed in proportion of materials as indicated. The ingredients shall be accurately measured by volume and shall be well and evenly mixed together in a mechanical pan mixer. Too much water shall not be used. River sand shall be used unless otherwise specified. If hand mixing is allowed, it shall be done in brick tanks. The gauged materials shall be put in the tank and mixed dry thoroughly. Water in required quantity will then be added and the whole mix will be mixed again until it is homogeneous and of uniform colour.

3.1.3 Soaking of Bricks

Bricks shall be soaked in water for a minimum period of one hour before use. Any dirt, sand and dust shall be removed from the surface of bricks. Bricks shall not be too wet at the time of use, as they are likely to slip in the mortar bed and there will be difficulty in ensuring verticality of the wall. When bricks are soaked they shall be removed from the tank sufficiently in advance so that at the time of laying they are skin dry. Such soaked bricks shall be stacked on a clean place where they are not again spoiled by dirt, earth etc.

3.1.4 Laying of Bricks

All brickwork shall be laid in English bond, even and true to line, plumb, level and all joints accurately kept. Whole bricks used on the face shall be selected ones of uniform size and true rectangular face.

Bricks shall be laid with frogs up, if any, on a full bed of mortar evenly applied on the wetted surface of the old brick work. If any dirt or earth is on the wall, they shall be cleaned by wire brush and washed down with water jet. When laying, bricks shall be slightly pressed so that the mortar can get into all the surface pores of bricks to ensure proper adhesion. All joints shall be properly flushed and packed with mortar so that no hollow spaces are left.

Before laying bricks in foundation, a layer of not less than 12 mm of mortar shall be spread to make the surface on which the brickwork will be laid even. Immediately thereafter, the first course of bricks shall be laid.

The brickwork shall be built in uniform layers. Corners and other advanced work shall be raked back. Brickwork shall be done true to plumb or in specified batter. No part of it, during construction, shall rise more than one meter above the general construction level, to avoid unequal settlement and improper jointing.

Holes of required size shall be left in the brick work during laying for fixing pipes, service lines etc. After they are fixed, the extra hollow left in the holes shall be filled with 1:3 cement sand mortar or 1:3:6 cement concrete and the face neatly made up with brick in cement mortar.

Toothing may be done where future extension is contemplated but shall be used as an alternative to raking back.

3.1.5 Thickness of Joints

The thickness of joints in brickwork shall not exceed 10 mm unless otherwise specified and shall be uniform throughout the work.

3.1.6 Raking Out Joints

Joints of brickwork shall be raked out to a depth of 6 mm at the time of laying to receive setting beds and / or for pointing work where required. The face of brickwork shall be kept clear of all mortar, on the same day the brickwork is done.

3.1.7 Curing and Protection

- a. The brickwork shall be kept wet for 7 days commencing from 24 hours after the course is laid.
- b. At the end of day's work the brickwork shall be protected from harmful effects of rain, sun and frost by suitable coverings such as tarpaulin or any other suitable coverings.
- c. Care shall be taken during construction that edges of RCC members are not damaged.

3.1.8 Measurement

The measurement of work shall be the product of the length, height and thickness. Deductions for doors, windows and other openings including lintels shall be made to arrive at the net quantity of work. Nothing shall be paid extra for forming such openings. However, no deductions shall be made for openings of areas less than 0.1 sq.m. overall and for bearing of lintels, beams, girders and hold fast blocks but nothing extra like formwork shall be paid for embedding these. Similarly no deductions shall be made for chimney flue left in the walls, but nothing extra shall be allowed for rendering for flue opening as specified. Brickwork as covering to RCC structures and in continuation of the main wall shall be measured in thickness of quarter brick unit. Unless otherwise specified nothing extra shall be admissible for cutting shape other than straight or any cutting necessary for shaping the walls to the structural design. Rate shall be inclusive of all necessary scaffolding, watering, cutting of bricks, curing, materials and labour.

3.2 EXPOSED BRICKWORK (MACHINE MADE)

Providing and laying brick masonry work with first class machine made bricks in specified mortar in superstructure in specified cement sand mortar including scaffolding wherever necessary.

3.2.1 Bricks

The bricks shall be machine made bricks of first class quality. These shall be of quality approved by the Consultant, free from grit and other impurities such as lime, iron and other deleterious salts. These shall be well-burnt, sound, hard with sharp edges and shall emit ringing sound when struck with a mallet. These shall be of uniform size. The bricks shall conform to IS 3495 and be tested in accordance with IS 1077.

Sampling:

Brick samples shall be randomly selected for testing in quantities not less than 5 bricks per one thousand for each lot supplied for the construction works.

Acceptance Criteria:

1. **Compressive Strength:** The average compressive strength of the brick shall be minimum of 35 kg/sq.cm. The compressive strength of any individual brick shall not fall below the above mentioned minimum average compressive strength by more than 20%.
2. **Water absorption:** The average water absorption of the brick samples shall not be more than 15% over the dry weight after immersion in cold water for 24 hours.
3. **Efflorescence:** The rating of efflorescence shall not be more than "Slight".

3.2.2 Mortar

Mortar shall be as mentioned in 3.1.2 above.

3.2.3 Workmanship

All the bricks shall be thoroughly soaked in water (preferably 12 hours) before use till the bubbles cease to come up. The bricks shall be laid in cement mortar bed in proper bond. When

bonding, the brickwork must be set back in every course. The vertical toothing shall not be accepted. The courses shall be truly horizontal and the work strictly in plumb. The mortar joints shall be broken vertically. All the joints shall be raked out to a depth of 6 mm to receive setting beds and / or for pointing work where required.

The walls are to be carried up in a uniform manner with level courses and perpend strictly kept, no one portion being built up more than 14 single courses per day. The top of the walls shall be well wetted before the work recommences.

This will be done as per specification of brickwork of item used for facing ensuring regular and clean faces. Brick, which are broken, chipped, wrinkled or having irregular edges or corners shall not be used. If instructed by the Consultant the exposed face of every brick shall be rubbed clear without extra charge. Wooden fillets 10 mm thick and 12 mm wide shall be used to clean any mortar, which comes on the surface of the bricks and will also be used to maintain a regular thickness of joints.

The surface shall be rubbed down with brushes or bricks if necessary and thoroughly washed. No mortar shall be allowed to stick to the exposed brick surface and shall be cleaned to Consultant's satisfaction with horizontal and vertical joints even and true to straight line.

A sample of workmanship shall be approved prior to the execution of the work and kept for future comparison.

3.2.4 Measurement

The measurement of this item shall be taken as per item 3.1.8.

4. GLAZED CERAMIC TILES ON WALLS

Providing and laying glazed ceramic tiles on wall / skirting of approved manufacturer and colour, size in 1:4 cement sand mortar as per drawings and instructions.

4.1 MATERIALS

Glazed ceramic tiles shall be of approved colour and make. These shall be of specified size approved by the Consultant.

4.2 GENERAL

Prior to installing any tile, the Contractor shall inspect surfaces and conditions in areas to receive tile work and shall notify the Consultant of any serious defects or conditions that will interfere with or prevent a satisfactory tile installation and shall co-ordinate with other trades of work.

4.3 INSTALLING THE TILE

The surface shall be brushed, cleaned and wetted. Tiles shall be soaked completely by immersing in clean water at least 30 minutes and drained. Individual tile that exhibits drying along the edge shall be re-soaked and drained. No free moisture shall be allowed to remain on the backs of the tiles at the time of setting. Tiles shall be installed by applying a skim coat of plastic mix of 1 : 4 (1 cement : 4 sand) cement mortar maximum 12 mm thick on wall by firmly pressing tile into the cement mortar applied on the wall so that the back of the tile is completely in touch with the mortar. Joints in the tile work shall be accurately aligned with horizontal joints level and vertical joints in plumb. Joints shall be maintained uniformly 1.5 mm wide or as directed by the Consultant. Tiles shall be laid out in such a way that no tile is less than half size course. Where tile must be cut at edges or penetrated the cut edges shall be carefully filed and neatly ground. Chipped, cracked or broken tiles shall not be used and all defective work shall be replaced and repaired to the satisfaction of the Consultant at the Contractor's expense. After tiles have been set firm and strings from set tiles removed tiles shall be dampened and joints grouted full with a plastic mix of white cement by trowel, brush or finger application. During grouting all excess grout shall be cleaned off the tile surface with damp cloth or sponge. All tile work finishing shall be adequately protected from damage during the progress of construction till completion and any damage shall be repaired to the satisfaction of the Consultant at the Contractor's expense. Upon completion prior to final inspection and acceptance, the Contractor shall clean all tile work. Acids or other agents liable to damage the work shall be avoided. If tile surface shows mass scratches, cracks or other imperfections, which cannot be removed by cleaning; the contractor shall remove the defective material and replace with new material at no additional expense.

4.4 MEASUREMENT

The measurement shall be done in square metre of the work done. Rate shall include for the cost of all material and labour.

5. POINTING WORKS

Ruled pointing on brick walls using cement mortar (1:2), all complete.

5.1 GENERAL

For pointing, the mortar of the required proportion as mentioned in the bill of quantities/drawing shall be filled and pressed into the raked out joints, before giving the required finish. The pointing shall then be finished to proper type given on the drawing. For ruled pointing after the mortar has been filled and pressed into the joints and finished off level with the edges of the bricks, it shall while still green be ruled along the centre with a half round tool of such width as may be specified by the Consultant. The superfluous mortar shall then be cut off from the edges of the lines and the surface of the masonry shall also be cleaned of all mortar.

The mortar shall be first dry mixed, by measuring with boxes to required proportion, and then water added slowly and gradually and mixed thoroughly for the uniform consistency.

The coat shall be finished by rubbing with a steel trowel and any depression shall be filled in and rubbed to shining surface.

Moist curing shall be accomplished by keeping the plaster uniformly damp by suitable means. Moist curing shall start during application and continue for not less than 7 days.

5.2 MEASUREMENT

The measurement shall be the net area in square metre, a product of length and breadth and the rate shall be for all the materials, labour and scaffolding.